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Nicholas Tsounis
Aspasia Vlachvei *Editors*

Advances in Applied Economic Research

Proceedings of the 2016 International
Conference on Applied Economics (ICOAE)

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Preface

The International Conference on Applied Economics (ICOAE 2016) has been co-organised in 2016 by the Department of Finance and Economics of the University of Nicosia, Cyprus, and the Department of International Trade at Kastoria of the Western Macedonia University of Applied Sciences, Greece, after the kind invitation by the Head of the Department of Finance and Economics of the University of Nicosia Dr. Spyros Hadjidakis who is also a co-chair of the conference.

ICOAE is an annual conference started in 2008 with the aim to bring together economists from different fields of Applied Economic Research in order to share methods and ideas. Applied economics is the field of economics that combines economic theory with econometrics to analyse economic problems of the real world usually with economic policy interest. The topics covered by the articles presented at ICOAE 2016 include applied financial economics issues with wide geographical dispersion, applied microeconomics with a focus on specific economic sectors of various countries, applied macroeconomics with interesting policy conclusions for the specific countries used in the analysis, applied international economics with interesting conclusions about the effects of globalisation process and applied education and health economics with conclusions regarding welfare.

All papers presented in ICOAE 2016 and published in the conference proceedings were peer reviewed by anonymous referees. In total, 96 works were submitted from 32 countries while 64 papers were accepted for presentation and publication in the conference proceedings. **The acceptance rate for ICOAE 2016 was 67 %.**

ICOAE 2016 had the following keynote speakers who are scientists with a major contribution in their fields (in alphabetical order):

Prof. George Agiomirgianakis, Hellenic Open University, Greece.

Prof. Kostas Karantininis, University of Copenhagen, Denmark—Swedish University of Agricultural Sciences, Sweden.

Prof. Ian Steedman, Manchester Metropolitan University, Senior Research Fellow, William Temple Foundation, Honorary Research Fellow, University of Chester, United Kingdom.

Finally, the organisers of ICOAE 2016 would like to thank:

- The Scientific Committee of the conference for their help and their important support for carrying out the tremendous work load organising and synchronising the peer reviewing process of the submitted papers in a very specific short period of time.
- The anonymous reviewers for accepting to referee the conference papers and submit their reviews on time for the finalisation of the conference programme.
- Special thanks are also due, as I have already mentioned, to Dr. Spyros Hadjidakis, the Chair of the Department of Finance and Economics, for accepting to host the conference and provide the required resources for its successful organisation.
- The local organising committee and the volunteering students of the University of Nicosia for their help in the success of the conference.
- Last but not least, special thanks are due to
 - Prof. Rania Notta and Mr. Dimitrios Toullos.
 - Mr. Lazaros Markopoulos and Mr. Stelios Angelis for the administration of the conference web site and technical support.
 - Europa Voukelatou and Gerassimos Bertsatos for their services at the registration desk of the conference in Cyprus.

Kastoria, Greece

Nicholas Tsounis
Aspasia Vlachvei

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Chapter 1

A CGE Analysis of the Macroeconomic Effects of Carbon Dioxide Emission Reduction on the Algerian Economy

Touitou Mohammed

Abstract This study analyzes the macroeconomic effects of limiting carbon emissions using computable general equilibrium (CGE) model in the Algerian economy. Doing so, we developed an environmental computable general equilibrium model and investigate carbon tax policy responses in the economy applying exogenously different degrees of carbon tax into the model. Three simulations were carried out using an Algerian social accounting matrix. The carbon tax policy illustrates that a 1.52 % reduction of carbon emission reduces the nominal GDP by 1.26 % and exports by 3.04 %; a 2.67 % reduction of carbon emission reduces the nominal GDP by 1.92 % and exports by 4.86 %; and a 3.72 % reduction of carbon emission reduces the nominal GDP by 3.79 % and exports by 6.90 %. Imposition of successively higher carbon tax results in increased government revenue from the baseline by 23.68, 50.18, and 76.38 %, respectively. However, fixed capital investment increased in scenario 1a (first) by 0.23 % but decreased in scenarios 1b (second) and 1c (third) by 0.35 and 2.03 %, respectively, from the baseline. According to our findings, policy makers should consider initial (first) carbon tax policy. This policy results in achieving reasonably good environmental impacts without losing the investment, fixed capital investment, investment share of nominal GDP, and government revenue.

Keywords Air emission • Environmental general equilibrium • Algerian economy

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1.1 Introduction

The impact of economic development and trade liberalization policies on the environmental quality is becoming increasingly important concerns into main public policy agenda. This is especially important nowadays as the environmental consequences of human activities exceeded certain limits and degrading environmental quality worldwide. Higher awareness has led to greater scrutiny being placed on development policies in order to assess the long-term negative effects of further economic development on the environment and its sustainability (Levinson and Taylor 2004; Cole and Elliott 2003, 2005). In the last four decades, a number of environmental quantitative models are developed to capture the economic development and complex concept of economic sustainability. These models were analyzing systematically and quantitatively the evolution of the variables related to its three macro objectives (economic growth, equity, and environmental sustainability). In particular, since the late 1970s and especially in the 1980s, applications based on computable general equilibrium models (CGE) were developed. These multi-sectoral models solve the limitations of some previous quantitative models as evaluation instruments, representing in a more realistic way the economy of a country by incorporating market mechanisms in the assignment of resources.

Empirical studies for developed countries reveal that imposition of a carbon tax would decrease carbon emissions significantly and might not dramatically reduce economic growth. A good number of previous studies (i.e., Bullard and Herendeen 1975; Stephenson and Saha 1980; Strout 1985; Forsund and Strom 1988; Robinson 1990; Han and Lakshmanan 1994; Wier 1998; Antweiler et al. 2001; Munksgaard and Pedersen 2001; Beghin et al. 2005) have given a detailed evaluation of economic development and environment in the world perspective; however, little attention has been given to enquiring about these relationships in the newly industrializing countries of North Africa, in particular Algeria. Due to lack of efficiency of environmental policy options, Algeria failed to achieve the environmental goal. The existing Algerian environmental tax policies have lack of effectiveness, and the present level of pollution charge is very low as most of the cases is found insignificant. The main reason is that the environmental tax is not appropriate. Currently there is no carbon tax policy model in Algeria, and environmental monitoring system does not cover the whole economy. Therefore, the goal of this paper is to develop an environmental CGE model and show the potential of CGE modeling and economy-wide impacts of using CGE analysis as a tool for policy evaluation. Our model captures the changes in factors of production, industry output, consumer demand, trade, private consumption, public consumption, and other macroeconomic variables resulting from environmental policy changes. Specifically, several carbon tax policies are developed for Algeria to analyze the impacts of trade and economic development as well as to limit the further environmental degradations in the economy. The paper is organized as follows. In the next section, we review the environmental CGE literature. Section 1.3

presents underlying model, which is based on the extended environmental CGE techniques. Simulation results are presented in Sect. 1.4. Discussions on policy recommendations are given in Sect. 1.5.

1.2 Review of Literature on CGE Model and Environment

Studies on incorporating environmental components into a CGE framework emerged in the late 1980s. Forsund and Strom (1988), Jorgenson and Wilcoxon (1990), Robinson (1990), Blitzer et al. (1992), Lee and Roland-Holst (1993), Robinson et al. (1993), Bergman (1993), Beghin et al. (1994), Copeland and Taylor (1994), Beghin et al. (1997), Reinert and Roland-Holst (2001), Antweiler et al. (2001), Beghin et al. (2005) contributed to the development of environmental CGE models. These CGE models are distinct from each other in terms of the ways they integrate environmental components with economic activities in their CGE models.

There are several types of environmental CGE models according to the level of pollution-related activities integrated into them. The first type of models is not very different from a standard CGE model. These models are the extension of the standard CGE models. The extensions include either estimating pollution emissions using fixed pollution coefficients per unit of sectoral outputs or intermediate inputs or exogenously changing prices or taxes concerning environmental regulations without any changes in model structure. To extend the applications of a standard CGE model in such ways do not affect the behavioral specification of a standard CGE model and provide detailed description of production results from the environmental perspective. The models of Blitzer et al. (1992), Lee and Roland-Holst (1993), and Beghin et al. (1997, 2005) belong to this group. The second type of environmental CGE models, represented by Jorgenson and Wilcoxon's (1990) model, has pollution control costs specified in production functions. It extends the production specification and considers the effects of environmental quality on productivity. To represent the effects of pollution emission and abatement activities on consumption, a number of models have environmental effects incorporated in utility functions. Robinson (1990) and Bergman (1993) belong to this group.

Robinson (1990) develops a two-component general equilibrium framework to evaluate the efficiency of two policy instruments—pollution taxes and government pollution cleaning—in an economy where pollution is treated as a public good. The first component is a CGE model which incorporates pollution and pollution cleaning. Pollution is generated as fixed proportions by the product of certain production activities and enters the households' utility functions as a public good. Pollution cleaning is undertaken by the government and financed via Pigouvian taxes. For an exogenously determined pollution cleaning and specified tax rate, the solutions of the CGE model satisfy the market equilibrium conditions but are not welfare maximizing. This happens because the amount of the public good, pollution, and its price, the Pigouvian tax, are not optimally determined,

i.e., they do not maximize social welfare. Using an iterative nonlinear optimization procedure (the second component), Robinson maximizes the social welfare function corresponding to the economy simulated in the CGE model over the values of the policy instruments. Since his CGE model contains only one consumer, the social welfare function is equivalent to the representative consumer's utility function.

Beghin et al. (1997) developed a theoretical computable general equilibrium (CGE) model which underlies six-country case studies. The research describes the base model specification for a series of six-country case studies undertaken at the OECD Development Centre to analyze the links between growth and emissions and emissions and trade instruments. The CGE model of this research attempts to capture some of the key features relating to environmental emissions. These features include (a) linking emissions to the consumption of polluting inputs (as opposed to output); (b) including emissions generated by final demand consumption; (c) integrating substitutability between polluting and nonpolluting inputs (including capital and labor); (d) capturing important dynamic effects such as capital accumulation, population growth, productivity and technological improvements, and vintage capital (through a putty/semi-putty specification); and (e) the impact of emission taxes to limit the level of pollution.

Reinert and Roland-Holst (2001) studied NAFTA and industrial pollution. In this paper, the authors utilize a three-country, applied general equilibrium (AGE) model of the North American economy and data from the World Bank's Industrial Pollution Projection System (IPPS) to simulate the industrial pollution impacts of trade liberalization under NAFTA. According to their studies, they find that the most serious environmental consequences of NAFTA occur in the base metal sector. In terms of magnitude, the greatest impacts are in the United States and Canada rather than Mexico. However, the Mexican petroleum sector is also a significant source of industrial pollution, particularly in the case of air pollution. Beside petroleum sector the transportation equipment sector is also an important source of industrial pollution in Mexico. This is the case for both volatile organic compounds and toxins released into the air in Canada and the United States. Finally, the authors identified that the chemical sector is a significant source of industrial toxin pollution in the United States and Mexico, but not in Canada.

Recently Fisher-Vanden and Sue Wing (2008) employ a CGE simulation of the Chinese economy for climate policy analysis. The authors construct an analytical model to show that efficiency-improving and quality-enhancing R&D have opposing influences on energy and emission intensities, with the efficiency-improving R&D having an attenuating effect and quality-enhancing R&D having an amplifying effect. They find that the balance of these opposing forces depends on the elasticity of upstream output with respect to efficiency-improving R&D, the elasticity of downstream output with respect to upstream quality-enhancing R&D occurring upstream, and the relative shares of emission-intensive inputs in the costs of production of upstream versus downstream industries. They construct a theoretical model in which there are two industries, one upstream (U) and the other downstream (D), where the latter uses the output of the former as an input to production. The numerical economic simulations use the CGE model of China's economy which is calibrated based on econometric estimates of the sectoral impacts.

1.3 Methodology

A static environmental computable general equilibrium (CGE) model of the Algerian economy is constructed for this study.¹ The model consists of ten industries, one representative household, three factor production, and rest of the world. The CGE technique is an approach that models the complex interdependent relationships among decentralized actors or agents in an economy by considering the actual outcome to represent a “general equilibrium.” Briefly, the technique expresses that the “equilibrium” of an economy is reached when expenditures by consumers exactly exhaust their disposable income, the aggregate value of exports exactly equals import demand, and the cost of pollution is just equal at the marginal social value of damage that it causes. The benchmark model representing the baseline economy is constructed using a social accounting matrix (SAM).² A SAM is a snapshot of the economy, and it reflects the monetary flow arising from interactions among institutions in the Algerian economy.

The Algerian CGE model is comprised of a set of nonlinear simultaneous equations and follows closely the specifications in Dervis et al. (1982) and Robinson et al. (1999) with some modifications in terms of functional form in the production technology to allow for pollution emission estimation incorporating carbon emission block into the model, where the number of equations is equal to the number of endogenous variables. The equations are classified in four blocks, i.e., (1) the price block, (2) the production block, (3) the institution block, and (4) the system constraint block.

1.3.1 The Price Block

1.3.1.1 Domestic Price

Domestic goods price by sector, PD_i , is the carbon tax-induced goods price t_i^d times net price of domestic goods \widehat{PD}_i and can be expressed as follows:

$$PD_i = \widehat{PD}_i (1 + t_i^d) \quad (1.1)$$

¹Compared with other modeling techniques, such as the input–output approach or linear programming, the CGE approach has appealing features for modeling environmental policy analysis. This modeling approach can consider simultaneously environmental policy analysis and welfare effects of trade and trade policies. A prominent advantage of CGE models lies in the possibility of combining detailed and consistent real-world database (social accounting matrix) of trade and environment with a theoretically and empirically sound framework (Perroni and Wigle 1994).

²SAM is estimated by the authors using the Algerian 2009 input–output table and national accounts Algeria 2009.

1.3.1.2 Import and Export Price

Domestic price of imported goods, PM_i , is the tariff-induced market price times exchange rate (ER):

$$PM_i = pwm_i (1 + tm_i) \cdot EXR \quad (1.2)$$

where tm_i is import tariff and pwm_i is the world price of imported goods by sector.

Export price, PE_i , is the export tax-induced international market price times exchange rate and is expressed as

$$PE_i = pwe_i (1 + te_i) \cdot EXR \quad (1.3)$$

where te_i is the export tax by sector and pwe_i is the world price of export goods by sector.

1.3.1.3 Composite Price

The composite price, P_i , is the price paid by the domestic demanders. It is specified as

$$P_i = [PD_i D_i + PM_i M_i] / Q_i \quad (1.4)$$

where D_i and M_i are the quantity of domestic and imported goods, respectively, PD_i is the price of domestically produced goods sold in the domestic market, PM_i is the price of imported goods, and Q_i is the composite goods.

1.3.1.4 Activity Price

The sales or activity price PX_i is composed of domestic price of domestic sales and the domestic price of exports where

$$PX_i = [PD_i D_i + PE_i E_i] / X_i \quad (1.5)$$

where X_i stands for sectoral output.

1.3.1.5 Value-Added Price

Value-added price PV_i is defined as residual of gross revenue adjusted for taxes and intermediate input costs. That is,

$$PV_i = [PX_i X_i (1 - tx_i) - PK_i \cdot IN_i] / VA_i \quad (1.6)$$

where tx_i is the tax per activity, IN_i stands for total intermediate input, PK_i stands for composite intermediate input price, and VA_i stands for value added.

1.3.1.6 Composite Intermediate Input Price

Composite intermediate input price PK_i is defined as composite commodity price times input–output coefficients.

$$PK_i = \sum_j a_{ij}P_j \quad (1.7)$$

where a_{ij} is the input–output coefficient.

1.3.1.7 Numeraire Price Index

In CGE model, the system can only determine relative prices and solves for prices relative to a numeraire. In this model the numeraire is the gross domestic product price deflator (or gross national product can also be used). Producer price index and CPI are also commonly used as numeraire in applied CGE studies. In this model,

$$PP = GDPVA/RGDP \quad (1.8)$$

where PP is the GDP deflator, GDPVA is the GDP at value-added price, and RGDP is the real GDP.

1.3.2 Production Block

This block contains quantity equations that describe the supply side of the model. The fundamental form must satisfy certain restrictions of general equilibrium theory. This block defines production technology and demand for factors as well as CET (constant elasticity of transformation) functions combining exports and domestic sales, export supply functions and import demand, and CES (constant elasticity of substitution) aggregation functions. Sectoral output X_i is expressed as³

$$X_i = a_i^D \prod_f FDSC_{if}^{\alpha_{if}} \quad (1.9)$$

where $FDSC_{if}$ indicates sectoral capital stock and a_i^D represents the production function shift parameter by sector.

³The production function here is nested. At the top level, output is a fixed coefficient function of real-world value-added and intermediate inputs. Real value-added is a Cobb–Douglas function of capital and labor. Intermediate inputs are required according to fixed input–output coefficients, and each intermediate input is a CES aggregation of imported and domestic goods.

The first-order conditions for profit maximization are as follows:

$$WF_f wfdist_{if} = PV_i \cdot \alpha_{if} \frac{X_i}{FDSC_{if}} \quad (1.10)$$

where $wfdist_{if}$ represents sector-specific distortions in factor markets, WF_f indicates average rental or wage, and $\cdot \alpha_{if}$ indicates factor share parameter of production function.

Intermediate inputs IN_i are functions of domestic production and defined as follows:

$$IN_i = \sum_j a_{ij} \cdot X_j \quad (1.11)$$

On the other hand, the sectoral output is defined by CET function that combines exports and domestic sales. Sectoral output is defined as

$$X_i = a_i^T \left(\gamma_i E_i^{\rho_i^T} + (1 - \gamma_i) D_i^{\rho_i^T} \right)^{\frac{1}{\rho_i^T}} \quad (1.12)$$

where a_i^T is the CET function shift parameter by sector, γ_i holds the sectoral share parameter, E_i is the export demand by sector, and ρ_i^T is the production function of elasticity of substitution by sector.

The sectoral export supply function depends on relative price (P^e/P^d) as follows:

$$E_i = D_i \left(P_i^e (1 - \gamma_i) / P_i^d \cdot \gamma_i \right)^{\frac{1}{\rho_i^T}} \quad (1.13)$$

Similarly, the world export demand function for sectors in an economy, $econ_i$, is assumed to have some power and is expressed as follows:

$$E_i = econ_i (pwe_i / pwse_i)^{\eta_i} \quad (1.14)$$

where $pwse_i$ represents the sectoral world price of export substitutes and η_i is the CET function exponent by sector.

On the other hand, composite goods supply describes how imports and domestic product are demanded. It is defined as

$$Q_i = a_i^C \left(\delta_i M_i^{-\rho_i^C} + (1 - \delta_i) D_i^{\rho_i^C} \right)^{\frac{1}{\rho_i^C}} \quad (1.15)$$

where a_i^C indicates sectoral Armington function shift parameter and δ_i indicates the sectoral Armington function share parameter.

Lastly, the import demand function which depends on relative price (P^d/P^m) is as follows:

$$M_i = D_i \left(P_i^d \delta_i / P_i^m \cdot (1 - \delta_i) \right)^{\frac{1}{1+\rho_i^C}} \quad (1.16)$$

1.3.3 Domestic Institution Block

This block consists of equations that map the flow of income from value added to institutions and ultimately to households. These equations fill out the interinstitutional entries in the SAM.

First is the factor income equation Y_f^F defined as

$$Y_f^F = \sum_i \text{WF}_f \cdot \text{FDSC}_{if} \cdot \text{wfdist}_{if} \quad (1.17)$$

where FDSC_{if} is the sectoral capital stock, if wfdist represents sector-specific distortion in factor markets, and WF_f represents average rental or wage.

Factor income is in turn divided between capital and labor. The household factor income from capital can be defined as follows:

$$Y_{\text{cap}^H}^H = Y_1^F - \text{DEPREC} \quad (1.18)$$

where $Y_{\text{cap}^H}^H$ is the household income from capital, Y_1^F represents capital factor income, and DEPREC is the capital depreciations.

Similarly household labor income $Y_{\text{lab}^H}^H$ is defined as

$$Y_{\text{lab}^H}^H = \sum_{f \neq 1} Y_f^F \quad (1.19)$$

where Y_f^F is the factor incomes.

Tariff equation TARIFF is expressed as follows:

$$\text{TARIFF} = \sum_i \text{pwm}_i \cdot M_i \cdot \text{tm}_i \cdot \text{ER} \quad (1.20)$$

Similarly, the indirect tax INDTAX is defined as

$$\text{INDTAX} = \sum_i \text{PX}_i \cdot X_i \cdot \text{tx}_i \quad (1.21)$$

Likewise, household income tax is expressed as

$$\text{HHTAX} = \sum_h Y_h^H \cdot t_h^H \quad (h = \text{cap, lab}) \quad (1.22)$$

where Y_h^H is the household income and t_h^H represents household income tax rate.

Export subsidy EXPSUB (negative of export revenue) is

$$\text{EXPSUB} = \sum_i \text{pwe}_i \cdot E_i \cdot \text{te}_i \cdot \text{ER} \quad (1.23)$$

Total government revenue (GR) is obtained as the sum-up of the previous four equations. That is,

$$GR = \text{TARIFF} + \text{INDTAX} + \text{HHTAX} + \text{EXPSUB} \quad (1.24)$$

Depreciation (DEPREC) is a function of capital stock and is defined as

$$\text{DEPREC} = \sum_i \text{depr}_i \cdot \text{PK}_i \cdot \text{FDSC}_i \quad (1.25)$$

where depr_i represents the sectoral depreciation rates.

Household savings (HNSAV) is a function of marginal propensity to save (mps_h) and income. It is expressed as

$$\text{HNSAV} = \sum_h Y_h^H \cdot (1 - t_h^H) \cdot \text{mps}_h \quad (1.26)$$

Government savings (GOVSAV) is a function of GR and final demand for government consumptions (GD_i). That is,

$$\text{GOVSAV} = \text{GR} - \sum_i P_i \cdot \text{GD}_i \quad (1.27)$$

Lastly, the components of total savings include financial depreciation, household savings, government savings, and foreign savings in domestic currency ($\text{FSAV} \cdot \text{ER}$):

$$\text{SAVING} = \text{HNSAV} + \text{GOVSAV} + \text{DEPREP} + \text{FSAV} \cdot \text{ER} \quad (1.28)$$

The following section provides equations that complete the circular flow in the economy and determine the demand for goods by various actors. First, the private consumption (CD) is obtained by the following assignments:

$$\text{CD}_i = \sum_h [\beta_{ih}^H \cdot Y_h^H (1 - \text{mps}_h) (1 - t_h^H)] / P_i \quad (1.29)$$

where β_{ih}^H is the sectoral household consumption expenditure shares.

Likewise, the government demand for final goods (GD) is defined using fixed shares of aggregate real spending on goods and services (gdtot) as follows:

$$\text{GD}_i = \beta_i^G \cdot \text{gdtot} \quad (1.30)$$

where β_i^G is the sectoral government expenditures.

Inventory demand (DST) or change in stock is determined using the following equation:

$$DST_i = dstr_i \cdot X_i \quad (1.31)$$

where $dstr_i$ is the sectoral production shares.

Aggregate nominal fixed investment (FXDINV) is expressed as the difference between total investment (INVEST) and inventory accumulation. That is,

$$FXDINV = INVEST - \sum_i P_i \cdot DST_i \quad (1.32)$$

The sector of destination (DK) is calculated from aggregated fixed investment and fixed nominal shares ($kshr_i$) using the following function:

$$DK_i = kshr_i \cdot FXDINV / PK_i \quad (1.33)$$

The next equation translates investment by sector of destination into demand for capital goods by sector of origin (ID_i) using the capital composition matrix (b_{ij}) as follows:

$$ID_i = \sum_j b_{ij} \cdot DK_j \quad (1.34)$$

The last two equations of this section show the nominal and real GDP, which are used to calculate the GDP deflator used as numeraire in the price equations. Real GDP (RGDP) is defined from the expenditure side, and nominal GDP (GDPVA) is generated from value-added side as follows:

$$GDPVA = \sum_i PV_i \cdot X_i + IND TAX + TARIFF + EXPSUB \quad (1.35)$$

$$RGDP = \sum_i (CD_i + GD_i + ID_i + DST_i + E_i - pwm_i \cdot M_i \cdot ER) \quad (1.36)$$

1.3.4 System Constraint Block

This block defines the constraints that are must be satisfied by the economy as a whole. The model's micro constraints apply to individual factor and commodity markets. With few exceptions, in the labor, export, and import markets, it is assumed that flexible prices clear the markets for all commodities and factors. The macro constraints apply to the government, the saving–investment balance, and the rest of the world. For the government, savings clear the balance, whereas the investment value adjusts to changes in the value of total savings.

Product market equilibrium condition requires that total demand for composite goods (Q_i) is equal to its total supply as follows:

$$Q_i = IN_i + CD_i + GD_i + ID_i + DST_i \quad (1.37)$$

Market clearing requires that total factor demand equals total factor supply and the equilibrating variables are the average factor prices which were defined earlier, and this condition is expressed as follows:

$$\sum_i FDSC_{if} = fs_f \quad (1.38)$$

The following equation is the balance of payments that represents the simplest form: foreign savings (FSAV) is the difference between total imports and total exports. As foreign savings set exogenously, the equilibrating variable for this equation is the exchange rate. Equilibrium will be achieved through movements in ER that effect export–import price. This balancing equation is expressed as

$$pwm_i \cdot M_i = pwr_i \cdot E_i + FSAV \quad (1.39)$$

Lastly the macro-closure rule is given as

$$SAVING = INVEST \quad (1.40)$$

where total investment adjusts to equilibrate with total savings to bring the economy into the equilibrium.

1.3.5 Carbon Emission

The aggregate CO₂ emission is formulated as follows:

$$TQ_{CO_2} = \sum_i \varphi_i \cdot X_i \quad (1.41)$$

where TQ_{CO_2} is the total CO₂ emission and φ_i is the carbon intensity per output.

Total carbon tax revenue (T_{CO_2}) is given by the following equation:

$$T_{CO_2} = \sum_i t_i^d PD_i \cdot D_i + \sum_i t_i^m PM_i \cdot M_i + \quad (1.42)$$

where t_i^d is the carbon tax of domestic product by sector and t_i^m is the carbon tax of imported product by sector. These rates are in turn determined as follows:

$$t_i^d = P_{CO_2} \psi_i^d \omega_i^d \quad (1.43)$$

$$t_i^m = P_{CO_2} \psi_i^m \omega_i^m \quad (1.44)$$

where P_{CO_2} indicates price of carbon (i.e., the assumed social cost of carbon). ψ_i^d is the carbon emission coefficient per unit of (domestic) fuel use by sector i . ω_i^d is a fossil fuel coefficient per unit of domestic goods by sector i . ψ_i^m is the carbon emission coefficient per unit of (import) fuel use by sector i , and ω_i^m is a fossil fuel coefficient per unit of import goods by sector i .

1.3.6 Database: Social Accounting Matrix of Algeria

The model is based on a social accounting matrix (SAM) of information system that provides initial information on the structure and composition of production, the sectoral value added, and the distribution of value added among factors of production and households. The input–output (I–O) table (94×94) of the year 2009 provides the principal data for SAM and main data source for CGE calibrations. The adopted input–output table is a transaction table of intermediate inputs grouped by commodity at producer prices. The parameter values on the other are obtained in such a way that the model's solution for the base year is capable of the same reproducing the assembled equilibrium data in the SAM. By imposing this restriction, the parameter values have been determined from outside the SAM manner of the model's solution for the base year. Before doing so, the sectoral classification of the I–O table is redesigned for SAM 2009 to confirm the desired estimation and policy formulation. After some adjustments for balancing, the SAM are aggregated to 14×14 sectors, among which ten are production sectors. Table 1.1 presents the aggregated SAM of the Algerian economy.

1.4 Results and Discussion

Using the Algerian CGE model, several environmental policy alternatives are examined from the different policy simulations. This section presents the results obtained from different policy simulations carried out using CGE modeling designed in this study. The simulations carried out are based on SAM of the Algerian economy of the year 2009 and illustrate the realistic situation of the economy and tried to fit the model as closely as possible. The scenarios are listed in Table 1.2.

Scenario 1 represents the carbon tax policy impact scenario. This scenario is carried out in three versions where an exogenously determined carbon tax was imposed on domestic products. Implementation of this scenario would allow us to see the possible reduction in CO_2 emissions and its impact on various economic

Table 1.1 Sectoral aggregation of Algerian social accounting matrix (SAM) for the year 2009 (DZD thousand)

	A	C	L	C	H	E	G	S-I	Ytax	Tva	Tariff	ROW	Total
Activities		13,759,741											13,759,741
Commodities	4,403,061				3,922,963		1,862,704	4,545,845				3,427,170	18,161,745
Labor	8,273,639												8,273,640
Capital													
Household				5,286,439	7052	29,228	1,102,359					25,387	6,450,466
Enterprises				2,986,615		5277	542,227					14,000	3,548,120
Government	1,083,040				797,552		701,887		1,984,716	542,063	169,055	598,871	5,877,188
Saving- investment					1,514,413	1,601,408	1,430,023						4,545,845
Income tax					205,540	1,779,176							1,984,716
Sales tax													542,063
Tariff													169,055
ROW					2943	133,029	237,986						4,065,430
Total	13,759,741	18,161,745		8,273,640	6,450,466	3,548,120	5,877,188	4,545,845	1,984,716	542,063	169,055	4,065,430	

Source: Author

Table 1.2 Scenario codes and definition of the simulations

Scenario codes	Simulation specifications
Scenario 1	
Scenario 1a	Imposition of carbon tax of domestic product by sector
Scenario 1b	Two times increase in carbon tax of domestic product by sector
Scenario 1c	Three times increase in carbon tax of domestic product by sector

variables such as domestic production, exports, imports, private consumption, gross investment, government revenues, GDP, as well as other incomes, revenues, and savings variables.

1.4.1 Carbon Tax Policy Simulations

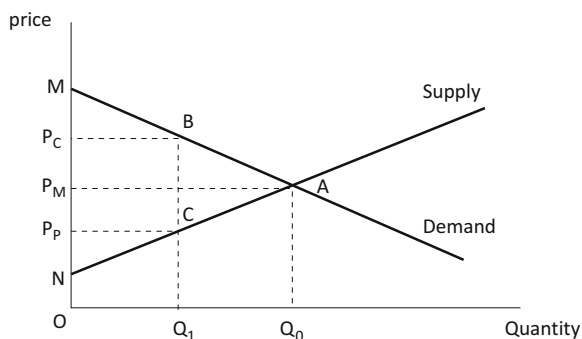
Uncertainties regarding the economic benefit of limiting carbon emissions breed hesitation. In particular, changes in economic activity due to carbon tax lead to significant changes in factor prices, factors of production, consumption pattern, terms of trade, and, consequently, consumer welfare and gross domestic product. It follows that policy makers would seek to determine how to minimize dampen to the economy while pursuing environmentally sound objectives. This section presents simulation results of imposing carbon tax into the model. The purpose of this exercise is to investigate the implications of carbon tax in the Algerian economy with respect to total domestic production, exports, value added, real and nominal GDP, investment, fixed capital investment, household consumptions, household savings, enterprise savings, and total and government revenue and savings.

1.4.1.1 Carbon Dioxide Emission Implications via Carbon Tax

Figure 1.1 illustrates the outcome of imposing a unit carbon tax. Consider the supply and demand of a good where equilibrium level prior to tax is point A. The quantity produced and consumed is Q_0 , and the relevant price is P_m . Total surplus is given by the area MNA. When a unit carbon tax is imposed, the new equilibrium will be B where only Q_1 units will be consumed at price P_c .⁴ Total surplus is reduced; the consumer surplus is now MBP_c and the producer surplus is now CP_pN ; and the government collects revenues represented by the area P_cP_pBC .

To capture the economy-wide effects of an artificial environmental tax policy, a unit carbon tax is imposed on the model where the unit of carbon tax is calculated by multiplying the exogenous carbon tax with the carbon content per unit domestic

⁴It is assumed that emission is a linear function of outputs throughout this paper.

Fig. 1.1 Effects of a carbon tax**Table 1.3** Impact of carbon tax imposition on the Algerian economy

Sectors	Percentage change from the baseline		
	Scen 1a	Scen 1b	Scen 1c
Carbon dioxide emission ^a	-1.521	-2.672	-3.715
Domestic production	-1.522	-2.673	-3.715
Exports	-3.038	-4.863	-6.901
Value added	-3.127	-4.470	-5.236
Household consumption	-2.393	-4.836	-5.477
Real GDP	-1.263	-1.921	-3.789
Nominal GDP (nGDP)	-1.264	-1.922	-3.790
Government revenue	23.675	50.178	76.381
Investment	0.355	0.078	-0.924
Fixed capital investment	0.230	-0.345	-2.027
Tariff	-1.275	-3.254	-4.892
Export tax	-3.623	-6.824	-7.976
Enterprise tax	-1.983	-2.689	-5.018
Household tax	-1.147	-2.413	-4.018
Enterprise savings	-1.983	-2.689	-5.018
Household savings	-1.146	-2.413	-4.019
HH consumption share of nGDP ^b	-0.245	-0.612	-0.810
Investment share of nGDP ^b	-1.471	-2.360	-2.865

Note: ^aMillion tons

^bPercent

production. Changes in CO₂ emission is given by the difference between the baseline value and the simulated value. Table 1.3 shows the impact of carbon tax on carbon emissions and effects on macroeconomic variables. It should be noted that the effects of the carbon tax presented are for the short run. Generally substitution will occur in the long run, thus resulting in changes in energy structure, and resources will shift from energy-intensive industries to less energy-intensive industries.

This study finds that the imposition of carbon tax on domestic production sectors reduces the carbon emissions (first row of Table 1.3). Simulations 1a, 1b, and 1c

indicate that imposition of carbon tax results in lower carbon emissions, domestic production, exports, value added, private consumption, real and nominal GDP, tariff revenue, export tax revenue, enterprise tax revenue, household tax revenue, enterprise savings, and private savings (Table 1.3). In contrast the government revenue is positive in all versions of scenario 1, and investment share of nominal GDP is positive (1.47 %) in version a of scenario 1 but negative in version b (2.36 %) and version c (2.87 %) from the base level. However, investment and fixed capital investment are higher than the baseline level at low level of carbon tax (scenarios 1a) but are lower than the baseline as the carbon tax becomes higher (scenario 1c).

More specifically, imposition of successively higher carbon tax results in 1.52, 2.67, and 3.72 % reduction in carbon emissions. However, these reductions are also accompanied by 1.26, 1.92, and 3.79 % decrease in nominal and real GDP. Exports decreased by 3.04, 4.86, and 6.90 %, while value added decreased by 3.13, 4.47, and 5.24 %, respectively. Enterprise savings is lower from the baseline by 1.65, 2.41, and 4.32 %, respectively. However, government revenue increased from the baseline by 23.68, 50.18, and 76.38 %, respectively. On the other hand, investment and fixed capital investment increased in scenario 1a by 0.36 % and 0.23 %, respectively, and fixed capital investment decreased in scenarios 1b and 1c by 0.35 and 2.03 %, respectively, from the baseline (Table 1.3).

Carbon tax lowers household consumption and savings. Specifically, the simulation results show that for each of the three successively larger carbon taxes, household consumptions decreased by 2.39, 4.84, and 5.48 % from the baseline, respectively. Household savings decreased by smaller percentages, i.e., 1.15, 2.41, and 4.02 %, respectively, as shown in Table 1.3, and the industrial sector has the highest increase from the baseline for scenarios 1a, 1b, and 1c. For the respective sub-scenarios, household consumption share of nominal GDP declined by 0.25, 0.61, and 0.81 %.

1.5 Conclusion and Policy Discussions

In general, as the environmental tax rate goes up, it results in quantitative decrease in production and a steady increase in the price index. Further, the decline in production further causes the investment rate to decrease and the level of pollution generation to decrease. The real gross domestic product (GDP) falls as well, following the decrease in the level of production. The trends observed from our simulations agree with the pollution taxation theory of environmental economics. The simulation finds that 1.52 % reductions of carbon emissions reduce the nominal GDP by 1.26 %, domestic production by 1.52 %, exports by 3.03 %, enterprise savings by 1.98 %, household consumptions by 2.39 %, household savings by 1.15 %, and household consumption share of nominal GDP by 0.25 %. Likewise, 2.67 % reductions of carbon emissions reduce the nominal GDP by 1.92 %, domestic production by 2.67 %, exports by 4.86 %, value added by 4.47 %, enterprise savings by 2.67 %, fixed capital investment by 0.35 %, household savings by 2.41 %, and

household consumption share of nominal GDP by 0.61. Finally, 3.72 % reductions of carbon emissions reduce the nominal GDP by 3.79 %, domestic production by 3.72 %, exports by 6.90 %, value added by 5.24 %, enterprise savings by 5.02 %, household consumptions by 5.48 %, and household savings by 4.02 %. However, the government revenue increases by 23.68 % in simulation 1a, 50.18 % in simulation 1b, and 76.38 % in simulation 1c from the base level.

1.5.1 Policy Recommendations

The model results illustrate that the investment losses in the economy tend to rise more sharply as the degree of emission reduction increases.⁵ Different degrees of carbon tax decrease the welfare in terms of losses of household consumption, household savings, enterprise consumption and enterprise savings, and eventually total economic savings (i.e., see Fig. 1). The aggregate production tends to decrease at a proportional rate as the carbon emission target becomes more stringent (drop by more than 3.72 %, in scenario 1c), and the decrease in gross production is quite significant. Considering higher carbon tax policy such as version b and c of scenario 1, the simulation illustrates that the macroeconomic impacts could be strongly negative. Higher reductions of pollution emission such as a 2.67 % of carbon emissions (scenario 1b) reduce the nominal GDP by 1.92 %, domestic production by 2.67 %, exports by 4.86 %, fixed capital investment by 0.35 %, household savings by 2.41 %, and enterprise savings by 2.69 %. And more reductions of pollution emission such as a 3.71 % reduction of carbon emissions (scenario 1c) reduce the nominal GDP by 3.79 %, domestic production by 3.72 %, exports by 6.90 %, household consumptions by 5.48 %, household savings by 4.02 %, and enterprise savings by 5.02 %.

While evaluating the simulation results from environmental policies, one should notice that the model only measures the economic gain or loss of an environmental policy. No nonmonetary environmental benefits from pollution reduction have been captured by the model. However, the simulation results from this model can be very useful to policy makers for evaluating the economic impacts and pollution reduction effects of a pollution control policy. According to our policy findings, policy makers could consider first carbon tax policy (scenario 1a). Initial carbon tax reforms (1 % CO₂ reduction) result in the decrease of real GDP by 1.26 %; however, it increases fixed capital investment by 0.23 %, investment share of nominal GDP by 1.47 %, and government revenue by 23.68 %. And revenues from the carbon tax can be used for the following purposes: (a) the revenue can be used to offset the negative effect on consumption welfare levels; (b) they can be financed to adoption of technological change in the long run. This policy results in achieving reasonably good environmental impacts without losing the investment, fixed capital investment, investment share of nominal GDP, and government revenue.

⁵The carbon tax also falls of domestic production, exports, value added, real GDP, tariff revenue, export tax revenue, enterprise tax, household tax, and enterprise savings.

This study suggests that an initial carbon tax can be applied for the central purpose of reducing the rate of growth of carbon emissions. Even in the absence of technological change on the Algerian economy, a carbon tax induces general equilibrium effects that offset the further negative effects on the economy. Our findings provide several suggestions and message to policy makers, who are considering carbon taxation policy together with economic development. This study serves as a guide to the selection of more feasible and appealing environmental policies, the responses of the Algerian economy to each policy change, and the relative merits of the range of policies that might be considered for reducing emissions. It may be useful to conclude this study by discussing briefly a variety of interesting future research area which is not analyzed in this study. This model did not consider other various pollutants (nitrogen dioxide, sulfur dioxide, methane, and other particulates) which are also related with environmental pollution. An extension of the model offered in this study is to include other pollutants associated with environmental concerns. On the other hand, because of the data limitations (capital composition matrix), this study did not consider the dynamic general equilibrium. The applied approach focuses on structural and causal mechanism at work due to a policy change, but cannot be used to make unconditional projections or forecasts. Dynamic general equilibrium model is incredibly important for forecasting purpose of environment, and it is very fruitful for future mitigation and adaptation policy. The dynamic modeling also focuses on the importance of indirect effects based on a large number of cause and effect circles. Further investigation of various capital composition matrices would provide better information to construct dynamic modeling about the economic consequences of environmental policies in the near future.

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Chapter 2

Impact of International Migration on Human Development: A South Asian Perspective

Sami Ullah

Abstract This study is going to empirically investigate the impact of international migration on human development in South Asian perspective because human development is the essential part for sustainable development by enhancing capabilities. For empirical investigation of the impact of international migration on human development in South Asian region, human development index of UNDP is taken as dependent variable and international remittances as independent variable and also used as proxy for international migration. To check robustness of the findings, different control variables are used for comprehensive model and policy recommendations. Control variables are selected on the basis of their theoretical justification and cover almost all sectors. Findings of this study guide us that if we want to use our remittances for the development and expansion of capabilities, then we should focus on political stability and institutional strength of this region. Empirics of this study are relevant for administrators, policy makers, social partners, media, and the researchers because they mainly focus on how best to address capability-based human development. At the end, policy makers should move away from a narrow perspective toward a wider perspective by understanding the valid reasons that can help in policy design that is supportive and effective for the well-being of the people of South Asia, which holds half of the world's poor.

Keywords Migration • Human development • South Asia

2.1 Introduction

The starting point of human development approach is based on Sen's expansion of capabilities, and the main focus of development is well-being of human life by expansion of choices that a person can be and do, such as awareness in terms of education, long and healthy life, and decent standard of living in the community. If these three basic requirements are not fulfilled, then they are unable to efficiently

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perform in social, economic, and political spheres of life. So, development is considered as removing the barriers on what any individual can perform in life, and empowered by these, and other, capabilities, individuals can achieve their desired state of being. Overall, HDI embodies Sen's capability approach in understanding human well-being, which focused on the importance of ends over means (Sen 1985).

The 2012 report of the UN System Task Team on the Post-2015 UN Development Agenda, with the theme "Realizing the Future We Want for All," which recognized migration as a key dimension of inclusive economic and social development of the globe, with special emphasis on capability-based human development. Currently, migration is increasingly coming into sharp focus on the global agenda and is also recognized as a powerful vehicle for boosting development in both countries of origin and destination.

As far as South Asia is concerned, which holds half of the world's poor, migration has been a critical indicator as a source of employment generation and livelihood for workers, and it also provides a stable flow of external finances to fill the budget and trade gap. Remittances have contributed in various natural and economic shocks and significantly contribute in GDP and economic stability of this region which further contribute in enhancing the indicators of human development.

According to IMF and World Bank recent data, US\$404 billion remittances of international migration were transferred to developing nations in 2013 and forecast its growth to an average of 8.4% annually in the next 3 years by enhancing the amount of remittances US\$516 billion to developing countries in 2016. The main focus of this study is to empirically investigate the impact of international migration on human development in South Asian perspective. South Asian countries are selected for this study because a massive number of migrants belong to this area. According to World Bank (2014) figures, India, Bangladesh, and Pakistan are in top 10 recipients of migrant remittance countries. India is the world's largest recipient of remittances followed by Pakistan, Bangladesh, and Sri Lanka, with strong growth of remittances as Pakistan with 16.6%, Nepal with 12.2%, and Sri Lanka with 12.1% in 2014. Overall international migrant remittance stance is favorable in South Asian region with accelerated growth and expansion in India, Pakistan, Nepal, Bangladesh, and Sri Lanka in 2015. Remittances in this region remain the largest source of external financial flows for the development of poor and marginalized part of the society.

In South Asian countries, where half of the world's poor are living, it become difficult for individuals to find opportunities within limited geographical arena. In this case, people have to move from one place to another which includes long and short distances. Currently, millions of people move geographically and socially to work across the globe and communicate without ever meeting in person. This mobility creates favorable environment for the people to develop and channelize their competencies and skills for the improvement of living standard and well-being in terms of educational attainment. Mobility of migrants is an important factor which enhances the education, healthcare services, knowledge, freedoms, and human development. It is also worthwhile to mention here that greater freedom obtained by migrants as a result of their mobility may either enhance the freedom of nonmigrants.

2.2 South Asian Perspective

According to World Bank (2014) statistics, remittances inflow toward developing countries has been estimated at US\$404 billion which is 3.5 % higher as compared to 2012. It is expected that flow of remittances toward developing countries will accelerate up to 8.4 % on average in the next 3 years and the number may touch to US\$516 billion in 2016. It is worthwhile to mention here that South Asia is the only region where many countries (India, Bangladesh, and Pakistan) are receiving remittances in top 10 country category, as shown in Fig. 2.1. This is also to share that remittance is one of the major contributors in overall financial inflows in South Asia.

In South Asian region, there is significant increase in remittances and migration since the 1970s by expansion of economic activities in the Middle East region, especially in construction and other developmental projects. During the time period of 2002–2008 with increase in oil prices, this increase further pushes growth and demand for labor in the Middle East. This increase in demand is one of the sources of international migration to provide employment opportunities in labor surplus region of South Asia.

Currently, official remittances are increased at 5.5 % and cross US\$117 billion in 2014 which is a slight increase as compared to 2013. All South Asian countries are considered as remittance countries, especially India, Pakistan, Sri Lanka, and Bangladesh. India is the world's largest recipient of remittances with US\$71 billion in 2014 which is 1.5 % higher as compared to 2013. There is also strong growth in remittances for Pakistan which is 16.6 % higher as compared to 2013. This growth is favorable for the economy of Pakistan to sustain its balance of payment and social sector development. Sri Lanka and Nepal both showed 12 % increase in receipt of

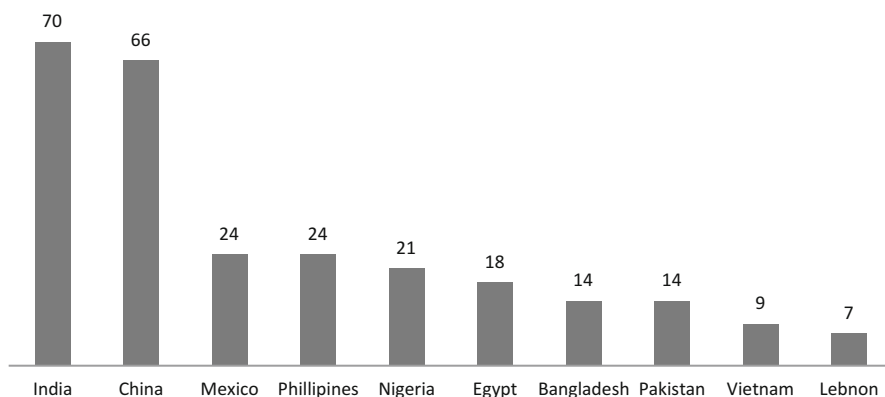


Fig. 2.1 Top 10 remittance recipients (US\$ billion) 2012. Source: World Development Indicators (2013)

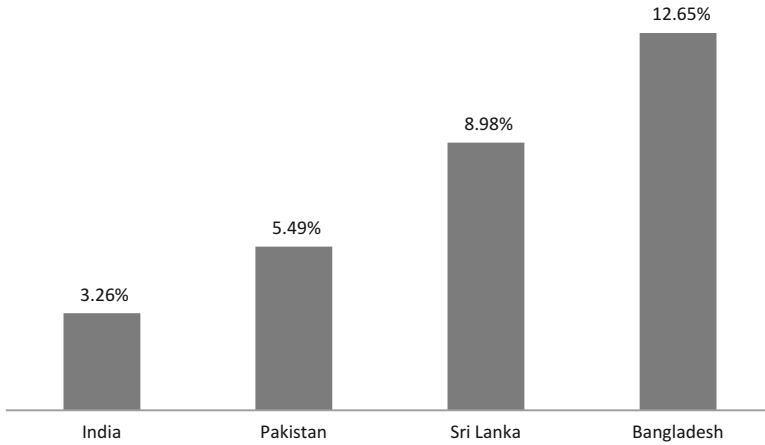


Fig. 2.2 Remittance as percent of GDP 2013 in South Asian countries. Source: World Development Indicators (2013)

remittances as compared to previous year. There is also significant contribution of remittances in GDP of almost all countries, as shown in Fig. 2.2.

In South Asian region, India is ranked as top recipient of remittance in 2014, and there is also significant growth from the last many decades, as in 1970 remittances were US\$80 million, in 1980 remittances increase to US\$2.78 billion, with rapid increase it reached to US\$52 billion in 2008, and currently the number crossed US\$70 billion.

In case of Sri Lanka, there is low-pace growth in international migration which was 1.6 % from 1980 to 2007. There is slight growth in the twenty-first century, and remittances increase from US\$111 million in 2000 to US\$3.09 billion in 2009. It is worthwhile to mention here that official figures of remittances grossly underestimate the real situation of remittance inflow because many informal channels are used for remitting money in South Asia, especially in Sri Lanka.

The outflow of migrants was stagnant during the 1980s in Bangladesh but slightly increased in the era of 1990s. In the 2000s, international migration declined because of the 9/11 event in the USA, but the migration rate increased by more than 60 % in 2007. In 2008, there were 6.26 million labor migrated under labor migration classification from Bangladesh. Currently, it is expected to rebound remittances from the GCC, and it is worthwhile to mention that average remittances to receiving households in Bangladesh are worth twice the income per capita and equivalent to almost 80 % of receiving household's income.

In Pakistan, there is rapid increase in inflow of remittances even in the years of financial crisis because this growth may be motivated on humanitarian basis from the earth quack 2005 to recent floods. This increase is being led by inflow from GCC countries where the number of skilled and semiskilled labor has increased and expansion of employment opportunities.

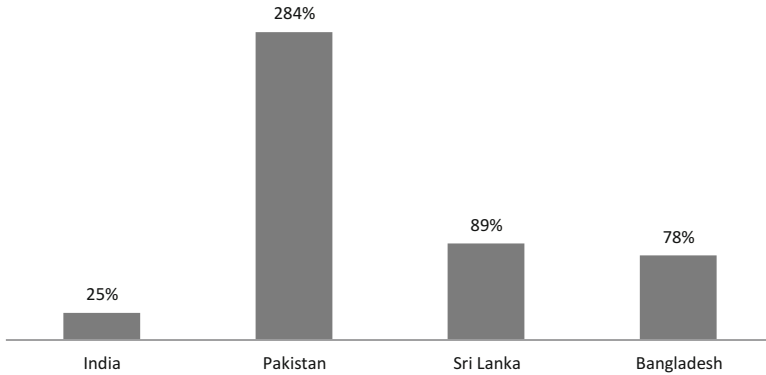


Fig. 2.3 Remittance as percent of total reserves 2013. Source: World Development Indicators (2013)

Overall the prospect of remittances for South Asian countries is favorable with rapid growth that is expected in the coming years for India, Bangladesh, Pakistan, and Nepal. Remittances still remain the largest source of financial inflows for this region by covering imports and contributing in foreign reserves, and detail is given in Fig. 2.3. So remittances are favorable for the economic growth and sustainable development of the masses. Figure 2.3 gives a new look for the importance of remittances for developing regions; especially Pakistan, Sri Lanka, and Bangladesh are among those countries where remittances are equal or much higher than foreign reserves.

Figure 2.4 gives statistics regarding growth in labor force from 2012 to 2020 and shows that South Asian countries will earn and grow at rapid rate because labor force is one of the important indicators of economic performance. In the globe, Pakistan has the potential of increase in labor force up to 22.90 % followed by Nepal, Bangladesh, and India from South Asian perspective. Many of the emerging and developed economies availed this sharp increase in their labor market, and if policy makers focused on this perspective, then it becomes one of the blessings or signs of sustainable development for this region.

2.3 Literature Review

The various indicators that can determine human development and literature suggested (Henderson and Clark 1990; Kim 1995; Becker et al. 1999; Chelliah and Shanmugam 2000; Hanson and Woodruff 2003; Córdova 2005; UNDP 2005; Lopez et al. 2007; Fayissa and Nsiah 2010; and Tripathi and Pandey 2012) that population dependency ratio, social infrastructure/communication, industrial revolution, and worker's remittances may determine level of human well-being at the country and

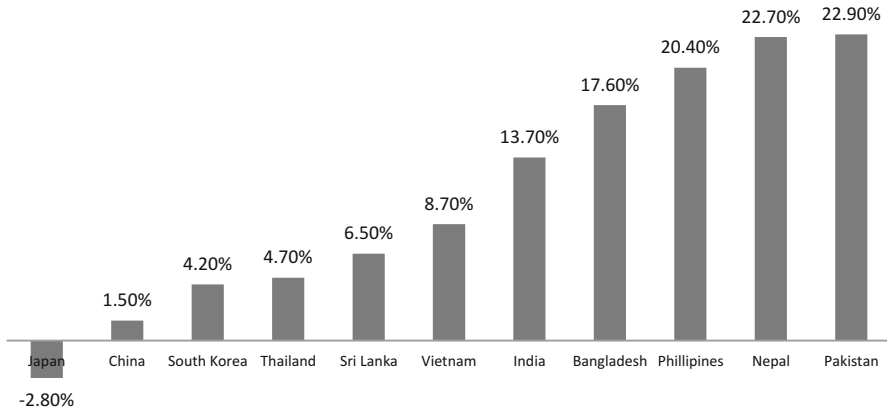


Fig. 2.4 Labor force growth 2012–2020. Source: International Labor Organization (ILO) (2013)

region level. This section will also shed light on different studies in the field of human development and important influential factors.

Iqbal and Sattar (2005) analyzed how workers' remittances are contributing in the development process of Pakistan by using time series data from 1972 to 2003. This study found that workers' remittances are positively and significantly impacting the economic development.

Adams (2006) empirically investigated that workers' remittances are favorable for poverty alleviation and income redistribution. Castaldo and Reilly (2007) highlighted expenditure pattern of household before and after the receipt of remittances in Albania on social development in health and education, as compared with other goods by the household. Overall, this study found that workers' remittances are positively impacting on human development.

Antman (2012) analyzed impact of parental migration decision on the educational attainment of their children. This study focused on one of the interesting aspects by focusing on the family to exploit variation in the ages of siblings at the time of migration. The findings are positive that international migration leads to increase in educational level of their children, but domestic migration does not play any role in determining the educational level of children. So, this study suggested that international migration can be seen as one of the potential pathways which raise educational outcome with special emphasis on girls' education.

Kibikyo and Omar (2012) checked impact of remittances on poverty and social development in Somalia by using 300 questionnaires from Mogadishu City. They surveyed remittance-recipient and non-recipient households by using qualitative and quantitative analysis. Empirical findings of this study indicate that remittances boosted income, health, and education but reduce poverty in the study area. It was observed that remittances are not contributing in employment generation and recommended to address employment policy related to workers' remittances.

Davis (2005) highlighted the growth of financial inflows and impact on social and economic sphere of households. This study indicates that remittances are playing significant role in economic performance/GDP through multiplier effect. Results of this study indicate that workers' remittances contribute in expansion of tourism industry along with other economic sectors. It also shows that remittances enhance purchasing power from home while living outside the destination followed by investment activities in home countries which further support developmental and philanthropic initiatives at home.

Ratha (2003) investigated the impact of remittances on incidence of poverty for 74 low- and middle-income countries. Findings of this study show that due to 10 % increase in the share of remittances, there will be 1.6 % decrease in incidence of poverty to those who are living less than US\$1 a day. This study also verifies that if there is 10 % increase in remittances, then there will be 2 % decrease in severity and depth of poverty. This study highlighted limitation that impact of remittances on poverty was underestimated because large unknown amount remitted through unofficial channels has been excluded from figures.

UNCTAD (2010) analyzed impact of remittances on poverty by using panel of 77 developing countries from 1980 to 2009. The findings of this study show that results are more worthwhile for countries where remittance inflow is more than 5 % of GDP. For this panel, there is 3.9 % decrease in incidence of poverty due to 10 % increase in workers' remittances. Remittances are also significantly contributing in poverty gap reduction. Empirical findings for Kerala (India) indicate that increase in remittances has put positive effect on per capita income and capital formation for sustainable development of developing countries.

Qasim and Amatul (ed) empirically investigated the impact socioeconomic determinants of human development index and non-income human development index for 35 districts of Punjab, Pakistan. Findings of this study showed that remittances, industrial revolution, social infrastructure, and population density are important determinants of human development. Out of these variables, population density is not significantly impacting non-income human development. This study also recommended that South and West Punjab districts require special policy incentive for the promotion of human development.

Kapur and McHale (2003) used microlevel analysis and found that remittances can settle down household budget that further push up expenditures on children's education, health, and activities of human capital. At macrolevel, Adams and Page (2005) found correlation that workers' remittances can alleviate poverty incidence in 71 developing countries. Empirics of this study indicated that if there is 10 % increase in remittances, then there will be 2 % decline in incidence of poverty to those who are living less than US\$1 a day.

2.4 Methodology, Variables, and Data

An overview of literature showed that numerous indicators are impacting human development among the countries and the regions. This study is going to empirically analyze different factors of human development with special emphasis on international migration in South Asian perspective. Generally, per capita income is used to measure well-being of the community, but it hides so many economic dimensions of society. Dasgupta and Weale (1992) highlighted that income per capita is not a sophisticated measure for human well-being of the society. For this purpose, HDI of UNDP is used as a proxy for human development in this study, and its main objective is to measure the progress level in any society in enlarging people's choices, capacities, and freedoms leading to enjoy a decent standard of living (UNDP 2005). This index is a weighted composite measure which comprises (1) life expectancy at birth for long and healthy life, (2) adult literacy, (3) gross enrollment ratio of awareness and knowledge, and (4) GDP per capita at PPP for standard of living. HDI is a well-known index, and having many merits, as, in contrast, certain indicators measuring human well-being and related concepts having focus on one side on either the end or the means, the HDI is specifically designed to include both in a comprehensive way (Booyesen 2002). Hagerty et al. (2001) made a detailed assessment and comparison of almost all quality of life indexes; after a detailed discussion on all indices, the HDI was evaluated as "satisfactory in having a clear public focus" and "excellent in the general level of aggregation in its purpose of providing an assessment of development in a broader view, education, health and standard of living."

Workers' remittances (REMT) are generally considered as current private transfers from workers, those are migrated residents in the host country for more than a year, while their immigration status is not considered, to recipients in their country of origin. Migrants' transfers are defined as the net worth of migrants who are expected to remain in the host country for more than 1 year that is transferred to another country at the time of migration. Compensation of employees is the income of migrants who have lived in the host country for less than a year. Workers' remittances are one of the major sources of foreign inflow in many developing countries and also put incentive to many developed economies, but still brain drain is a debatable topic. This variable indicates flow of labor from one nation to another and in the literature; it is measured with the help of workers' remittance inflow as a percent of GDP.

Workers' remittance may contribute to human development by affecting education and health outcomes (Kibikyo and Omar 2012; Hassan et al. 2013). The above discussion indicates that human development is the essential part for sustainable development by enhancing capabilities and South Asian region is the largest recipient of remittances. For empirical investigation of the impact of international migration on human development in South Asian region, human development index of UNDP is taken as dependent variable and international remittances as independent variable and also used as proxy for international migration. To check

robustness of the findings, different control variables are used for comprehensive model and policy recommendations. Control variables are selected on the basis of their theoretical justification and cover almost all sectors: social, economic, institutional, and political. Control variables for this study are foreign direct investment, supply of money, foreign aid, ICT, privatization, population growth, urbanization, law and order, investment profile, ethnotensions, and government stability.

The following model will be estimated for empirical investigation of objectives of the study:

$$\text{HDI}_{it} = \beta_0 + \beta_1 \text{REMT}_{it} + \beta_2 X_{it} + \varepsilon_{it}$$

where HDI is the human development index, REMT is the workers' remittances, X is the vector of control variables.

Data has been collected from World Development Indicators and International Country Risk Guide from 1990 to 2013 for four South Asian countries (India, Pakistan, Bangladesh, and Sri Lanka) selected on the basis of data availability. After collection of data on above-stated variables, descriptive statistics and characteristics of each variable have been discussed, and this is helpful in understanding empirical analysis of this study.

For empirical analysis of study objectives, panel data is used because of increase precision of regression estimates, study dynamics, and causal inference which is enhanced by temporal ordering, to model temporal effects along with control for variables that vary over time and allow for the possibilities of the isolating effects of unobserved differences between individuals.

"If individual effect μ_i (time-specific or cross-sectional effect) does not exist ($\mu_i = 0$), then ordinary least squares (OLS) give more consistent and efficient parameter estimates":

$$Y_{it} = \alpha + X_{it}\beta + \varepsilon_{it} \quad (\mu = 0)$$

After regression estimation, if individual effect μ_i is nonzero, then heterogeneity may influence assumptions. Specifically, if errors may not have the similar variant, but change across individuals, then there is another problem of heteroskedasticity, and if these errors are correlated with each other, then there is another problem of autocorrelation. If a violation of abovementioned assumptions exists, then estimator of the OLS is no longer the best linear unbiased estimator (BLUE).

If the individual (time or group) effect is not correlated with any regressors and heterogeneity is detected in the disturbance term, then the random effect model is the appropriate one. On the other hand, if heterogeneity is dealt with specifically intercept and the individual effect may possibly be correlated with any regressor, then the fixed effect model will be the best option. If each individual or group has its own initial capacity and shares the same disturbance variances with

other individuals, a fixed effect model is preferred. If each individual has its own disturbance, then the random effect will be better at figuring out heteroskedastic disturbances.

After these basic estimations, the next step is to check the time/individual group effect. If the null hypothesis of the LM test is not accepted, then panel effect/random effect model is more suitable than that of pooled OLS, and if the null hypothesis of F -test is not accepted, then fixed effect model is more appropriate than simply pooled OLS. At the end, if both hypotheses are accepted, then it is required to fit pooled OLS for efficient and consistent findings.

After estimation of fixed and random effect models, Hausman specification test will be applied to examine which effect is more dominating and significant in this specific case. The Hausman specification test will make a comparison of fixed effect and random effect models to the hypothesis that individual effects are uncorrelated with regressors in the model (Hausman 1978). Hausman specification test observes, if the findings of the random effect model are insignificantly different from that of the unbiased fixed effect estimate (Kennedy 2008).

2.5 Descriptive Analysis

This section consists of statistical description of all the variables used in this study. The focus of this section is on characteristics of individual variables in selected South Asian countries and will be discussed on the basis of their mean, median, maximum, and minimum value and their standard deviations. In the first step, we exclude all variables that have zero standard deviation at any level (overall, between, or within) and include only those variables having some deviation for empirical analysis of our study objectives. We use three different types of statistics, overall, between, and within, where “overall” statistics are ordinary statistics that are based on 96 observations. “Between” statistics are calculated on the basis of summary statistics of four selected South Asian countries, regardless of the time period, and “within” statistics by summary statistics of 24 time periods regardless of country.

Table 2.1 gives a comprehensive summary statistics of all variables used in this study. These findings are helpful for understanding empirics of the study and description of South Asian countries. Main focus of this study is on human development because HDI is at the worst stage and highest value is 0.661 in selected South Asian region with 0.513 as mean and 0.083 as standard deviation. So this study will highlight indicators that can enhance human development for the South Asian region because people are the real wealth of any nation.

Descriptive analysis of remittances indicates that there is significant share in GDP of all countries and its average is 4.97% of GDP. FDI is high in Asian countries but is limited in South Asian countries. ODA per capita shows significant contribution in this region, but alarming thing is high standard deviation which indicates that there is volatility in foreign aid which further disturbs developmental projects because of uncertainty.

Table 2.1 Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
HDI	overall	.512508	.0831119	.3415573	.661	N = 96
	between		.0789269	.4308843	.6163333	n = 4
	within		.0467582	.423181	.6467428	T = 24
REMT	overall	4.961969	2.764928	.7298474	12.65	N = 96
	between		2.164637	2.556967	7.097624	n = 4
	within		2.023264	.9949017	11.15966	T = 24
FDI	overall	1.055483	.7939668	.0044915	3.904417	N = 96
	between		.3591695	.5340815	1.328357	n = 4
	within		.7298033	-.0274893	3.631544	T = 24
M2	overall	42.91942	12.77409	22.16322	74.95	N = 96
	between		8.549067	34.37033	54.75043	n = 4
	within		10.38197	23.16612	68.6569	T = 24
ODA	overall	13.83261	12.48402	.6599054	59.11169	N = 96
	between		12.54965	1.786062	31.48486	n = 4
	within		6.04046	-3.904346	41.45944	T = 24
ICT	overall	6.22623	8.680172	.0513862	31.81	N = 96
	between		2.062865	4.009496	8.922593	n = 4
	within		8.492363	-2.519866	29.11364	T = 24
PSC	overall	28.81242	9.83215	8.8212	52.58	N = 96
	between		4.179473	24.93987	34.09969	n = 4
	within		9.134127	11.58422	51.2317	T = 24
POPU	overall	1.624023	.6166478	-1.609576	2.924228	N = 96
	between		.4808425	.9863987	2.154172	n = 4
	within		.4527935	-.9719511	2.411785	T = 24
URBAN	overall	25.55289	7.023535	13.02	38.85	N = 96
	between		7.68306	15.64265	33.97917	n = 4
	within		2.142887	20.89814	31.31215	T = 24
LO	overall	2.901286	.9754267	0	4	N = 96
	between		.7446589	2.164171	3.9375	n = 4
	within		.7288291	.1790636	4.179064	T = 24
IP	overall	6.541539	1.609569	2.416667	9.333333	N = 96
	between		.9576463	5.515503	7.551327	n = 4
	within		1.376828	2.99267	9.026036	T = 24
ET	overall	2.370083	1.313968	0	5	N = 96
	between		.8218325	1.246528	3.039931	n = 4
	within		1.102099	.3301528	4.447395	T = 24
GS	overall	7.689358	2.028774	1.833333	11.08333	N = 96
	between		.418269	7.075595	7.980937	n = 4
	within		1.995828	1.875088	10.79175	T = 24

Currently, we are living and growing in the era of technological advancement, but South Asian countries are still lagging in ICT access with average 6.23 % people having access to ICT, and maximum number is only 31.81 % for this region. ICT is one of the significant contributors in human development, and its expansion should be on top priority of the policy makers to break the vicious circle of backwardness.

As far as social sector is concerned, statistics are not encouraging. Population growth is very high, even average population growth is 1.6 % in four South Asian countries. Rural population is the major portion of this region without access to facilities, infrastructure, and societal development projects. Urbanization can positively contribute for the well-being of individuals, but in South Asian countries, there is average of 25.55 % urban population with maximum 38.85 % in the region.

At the end, this study introduced some control variables from political perspectives, and data indicates that IP and LO are above average in South Asian countries, but the major issue is ET which is one of the current problems for this region.

2.6 Empirical Analysis

This section covers empirical investigation of study objectives for South Asian perspective. Panel data for South Asian countries is used, and econometric technique of fixed and random effect model is used for empirical analysis. Detail of variables, models, and technique has already been discussed in previous sections (Table 2.2).

The first model indicates that international migration is positively and significantly contributing in human development of the South Asian region. Remittances are favorable for human development because empirics indicate that due to 1 % increase in workers' remittances, there will be 1.76 % increase in human development. These findings are in line with previous studies (Iqbal and Sattar 2005; Adams 2006; Antman 2012). As the previous section indicated, remittances can enhance income of the family which further enhances the educational and health outcomes of the recipient families.

By introducing some control variables, it has been empirically checked that migration is useful for enhancing human development in the presence of economic indicators but at very low pace. FDI and ODA both are contributing, but money supply shows very low contribution in South Asian perspective. In the presence of social indicators, migration has efficiently contributed in the development of livelihood of the masses and expansion of capabilities. If there is control on population growth, then it will put positive impact on human development in the presence of increase in remittance. ICT is another indicator of access to health and education, and sustainable development is not possible without expansion of ICT. South Asian countries are lagging behind in ICT services and will become one of the best contributors of well-being.

At the end, in the presence of political and institutional indicators, migration performed at the best in human development of this region which indicates that

Table 2.2 Empirical analysis of migration on human development in South Asian perspective

Variable	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9	Model10	Model11	Model12
REMT	1.76*	1.43*	0.74*	1.75*	1.07*	0.72*	1.36*	0.90*	1.69*	1.22*	1.85*	1.52*
FDI		2.26*										
M2			0.26*									
ODA				0.002								
ICT					0.28*							
PSC						0.31*						
POPU							-2.96*					
URBAN								1.11*				
LO									1.29*			
IP										1.55*		
ET											0.65*	
GS												0.65*
C	42.50	41.79	36.48	42.48	44.23	38.66	49.33	18.39	39.11	35.06	40.53	38.77
R2	0.58	0.69	0.72	0.58	0.74	0.75	0.63	0.70	0.62	0.74	0.60	0.65

Note: * indicates 5 percent level of significance.

migration becomes more development oriented if there are political stability and institutional quality. For this purpose, regional cooperative agencies should focus on the political stability for pro-poor growth in the vulnerable region of South Asia.

2.7 Conclusion

The main focus of this study was to empirically investigate the impact of international migration on human development in South Asian perspective. South Asia is the region where three countries are in top 10 remittance-recipient countries, and half of the world's poor are living in this region. It has also been discussed that human development is the essential part for sustainable development by enhancing capabilities. For empirical investigation of the impact of international migration on human development in South Asian region, human development index of UNDP is taken as dependent variable and international remittances as independent variable and also used as proxy for international migration. To check robustness of the findings, different control variables are used for comprehensive model and policy recommendations. Control variables are selected on the basis of their theoretical justification and cover almost all sectors: social, economic, institutional, and political. Control variables for this study are foreign direct investment, supply of money, foreign aid, ICT, privatization, population growth, urbanization, law and order, investment profile, ethnotensions, and government stability.

Findings of this study guide us that if we want to use our remittances for the development and expansion of capabilities, then we should focus on political stability and institutional strength of this region. Empirics of this study are relevant for administrators, policy makers, social partners, media, and the researchers because they mainly focus on how best to address capability-based human development. At the end, policy makers should move away from a narrow perspective toward a wider perspective by understanding the valid reasons that can help in policy design that is supportive and effective for the well-being of South Asia, which holds half of the world's poor.

At the end, it is suggested that South Asian countries should optimally utilize remittances by enhancing formal channels through reduction of transaction cost. Formal transfer of remittances is the sign of foreign exchange earnings and pushes up the poor and vulnerable to savings and investment in human capital.

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Chapter 3

Job Satisfaction Factors Among University Staff Officers in an Emerging Economy: The Case of Sri Lanka

Lakmini V. K. Jayatilake

Abstract Job satisfaction is an important attribute which organization desire of their employees. In higher education context, if nonacademic employees are not satisfied with their motivation factors, employee performance is very low, and inefficiency is increased. According to that, the purpose of this study was to identify factors that are most influencing on the job satisfaction of staff officers of state universities in Sri Lanka. This paper reviews the literature on single and multiple studies concerned about the job satisfaction and formulated the conceptual model. Mainly, researcher formulated the three dimensions as independent variables, namely, psychological factors, environmental factors, and work relationship, and work-life balance and job satisfaction have been taken as the dependent variables. The research method applied in this study is descriptive survey method. The researcher used questionnaire as the main instrument for this study. Multiple regression analysis method was used to measure the impact of identified job satisfiers on staff officers' job satisfaction. Results of his study indicate that there was positive relationship between satisfier factors and job satisfaction and there was an impact of identified job satisfiers on overall job satisfaction. Psychological factors have by far been the greatest influence on staff officers' job satisfaction. The correlation analysis revealed that there is a positive relationship between three main dimensions and job satisfaction. The study offers practical suggestions to the educational institutions and human resource managers on how to increase the job satisfaction and organization performance.

Keywords Job satisfaction • Staff officers • State universities • Psychological factors • Environmental factors • Work relationship • Work-life balance

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3.1 Introduction

To stay profitable in the highly challenging and competitive global market economy, all the factors of production—men, machines, and materials—should be wisely managed. Among the factors of production, the human resource constitutes the biggest challenge because unlike other inputs, employee management calls for skillful handling of thoughts, feelings, and emotions to secure highest productivity. Motivation is a complex psychological process that results from an interaction between the individual and his surrounding environment (Latham and Pinder 2005). A motivated employee is a valuable asset which delivers immense value to the organization in maintaining and strengthening its business and revenue growth.

Job satisfaction has attracted the attention of scholars for several decades. It has been researched more than any other variable in organizations (Abdulla et al. 2011) due to its impact on individuals and organizations. It is commonly defined as “a pleasurable or positive emotional state resulting from the appraisal of one’s job or job experiences” (Locke 1976). According to Morse (1997), “Satisfaction refers to the level of fulfillment of one’s needs, wants and desire. Satisfaction depends basically upon what an individual wants from the world, and what he gets.” Put simply it refers to the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs. If a person receives what he expects from the job, naturally the work he performs gives him pleasure and satisfaction. On the other hand, if a person is unable to fulfill his expectations from the job, dissatisfaction creeps in, and low job satisfaction is a sign of deterioration in the efficiency of work organization. Job satisfaction has been found to significantly impact job performance, absenteeism and turnover, employee relations (Serpello and Compell 1983), and employee health and well-being (Khaleque 1981). While dissatisfied employees are prone to excessive absenteeism and turnover (Koys 2001), satisfied ones are more likely to be effective in handling daily stress and less likely to be absent or withdrawn from their work (Zeffane et al. 2008). Employee satisfaction is a measure of how happy workers are with their job and working environment.

Although several authors have addressed the relationship between job satisfaction and job performance, the results indicate no agreement on the magnitude of the relationship or its direction. It is sure that there may be many factors affecting the organizational effectiveness, and one of them is the employee satisfaction. Effective organizations should have a culture that encourages employee satisfaction (Bhatti and Qureshi 2007). Early research denied the existence of clear relationship between satisfaction and performance (Brayfield and Crockett 1955). However, by far the strongest view and evidence on this front is that provided by Herzberg et al. (1957). They argue and repeatedly found that it is job satisfaction that leads to job performance, not the other way round. Each manager should have the responsibility to work with the staff to find out their individual needs and put them side by side to the organization needs. Job satisfaction has long been considered as the antecedent that should be addressed before the development of any motivation schemes within the organization. So, when human resource is satisfied in terms of their jobs,

productivity levels tend to go up. It is because Lease (1998) said that “Employee who have higher job satisfaction are usually less absent, less likely to leave, more productive, more likely to display organizational commitment and more likely to be satisfied with their lives.” If university employees are not satisfied with their motivation factors, employee performance is very low, and inefficiency is increased. Job dissatisfaction may also be a part of absenteeism and turnover, low employee health and well-being, grievances, low productivity, disciplinary problems, stress, and other human resource activity problems.

3.2 Research Problem

The Sri Lankan higher education sector has evolved and changed the second half of the last century heralding the start of perhaps the most turbulent and fast-changing period in its history. The university sector is playing the vital role in the process of economic development. Higher educational policies of government are implemented through the University Grants Commission (UGC) and universities. The government bears the large expenditure for university sector employees. If university sector employees are not satisfied with their motivation factors, employee performance is very low, and inefficiency is increased. It may also be a part of absenteeism and turnover, low employee health and well-being, low productivity, grievances, disciplinary problems, stress, and other human resource activity problems. It impacts the whole economic development and also wastes money and resources of government.

While job satisfaction and its relationship with individual and organizational or work-related demographics have been thoroughly addressed in Western literature, the same cannot be claimed in the case of Sri Lanka. Understanding the satisfaction of employees in emerging sectors is very important to academic and practitioners, given the assumption that employees in developing countries do not perceive their work as a source of satisfaction and experience several forms of deprivation and withdrawal behavior such as absenteeism and high turnover (Metle 1997). The main concern that drove this research was the fact that, even though there has been widespread interest in the concept of job satisfaction, very little attention has been focused on explaining job satisfaction among university staff officers.

The academic leaders in Sri Lanka’s university system can be grouped into two categories. The first consists of academic managers who are heads of various levels of the university hierarchy, i.e., vice-chancellor, director, rector, dean, and librarian. The second category consists of senior professors and professors who do not have administrative responsibilities. The staff officers in the university system comprise senior administrators in the University Grants Commission, the registrars, deputy registrars, bursars, and senior assistant accountants. The motivation for the study is further enhanced by the vital role played by universities within the economics of many countries and the role of staff officers within these organizations.

To contribute to this debate and the research, this study aimed to answer a fundamental question: which factors are the most influencing on the job satisfaction of staff officers of universities? The literature review provided support for further research into understanding which factors are most influencing on job satisfaction, and it also highlighted the fact that very little attention has been paid to understanding job satisfaction among university staff officers.

3.3 Research Questions

Research questions can be identified as the refining statements of specific component of the research problem. In other words research questions ask about the specific information that is required with respect to the problem components. These questions are guided by the research problem and the research objectives. According to the research problem, this research examines the following research questions.

1. What are the factors affecting the job satisfaction of staff officers at universities in Sri Lanka?
2. What is the satisfaction level with respect to each factor contributing to job satisfaction of staff officers at universities in Sri Lanka?
3. What is the relationship between job satisfiers and job satisfaction of staff officers at universities?

3.4 Research Objectives

Based on the study it has attempted to achieve two types of objectives. They are general objective and specific objective.

3.4.1 General Objective

The general objective of this study is to identify factors that most influence on job satisfaction at university sector staff officers.

3.4.2 Specific Objectives

Accordingly, the specific objectives of the study can be indicated as follows:

1. To identify the main dimensions of job satisfaction of university sector in Sri Lanka

2. To identify the satisfaction level of each factor of job satisfaction of staff officers of university sector in Sri Lanka
3. To identify the relationship between job satisfier factors and job satisfaction
4. To identify the impact of identified job satisfier factors on job satisfaction

3.5 Literature Survey

A large number of studies over the past several decades have argued that demographic factors including individual factors such as age, marital status, and education and organizational factors or work-related factors such as job level and years of experience impact job satisfaction (Abdulla et al. 2011; Davis 1992; Zeffane 1994).

Made famous by Herzberg's two-factor theory (Herzberg et al. 1957), the term intrinsic refers to content or motivators, including achievement, advancement, and responsibility. In contrast, extrinsic factors, also known as hygiene factors, refer to working conditions and rates of pay. However, it is worth remembering that in traditional socialist societies and owing to lack of desirable consumer products, wages were typically not a motivating factor in command economies. Evidence on the impact of financial benefits is inconclusive (Lehmann et al. 2005). Organizational and professional support, control over medical practice and working life, career opportunities, and professional development have proven to be even more important, at least in rich countries (Shields and Ward 2001; Lynn and Redman 2005). Lu et al. (2005) summarized the following factors that influence job satisfaction: physical working conditions, relationship with fellow workers and managers, pay, promotion, job security, responsibility, recognition from managers, and hours of work. The authors acknowledge that while determinants for job satisfaction might be similar across countries, sociocultural and labor market issues will influence priorities in these factors among service providers.

Instead, workers frequently identified job content, peer approval, and associated social standing as desirable job characteristics (Standing 1991); what is more, qualities associated with individual motivation such as achievement, personal responsibilities, ambition, and initiative were viewed with suspicion and contempt. Risk-taking by employees was suppressed, and individuals showing signs of excelling within a group were seen as destructive for group harmony (Longenecker and Popouski 1994).

Drukpa (2010) revealed that out of the seven aspects of job satisfaction, four aspects, like work, working condition, policy and management, and interpersonal relation, were at satisfied level, and the rest of the three aspects like income, self-esteem, and intrinsic rewards fall in a moderate level. Thereby, the findings of overall satisfaction were satisfied.

Govender's (2010) questionnaire assessed job satisfaction according to 3 main factors and 14 subscales (factors): nature of the job itself, physical work conditions, compensation and rewards, job security, leadership, career advancement opportunities, fringe benefits, relationship with co-workers, relationship with supervisor/boss,

work autonomy, work-life balance, organization culture, recognition, and a sense of purpose. Alavi and Askaripur (2003) used the questionnaire “job satisfaction” developed by Robbins (1998) which measures job satisfaction according to five aspects (factors): the kind of job, supervisor, co-workers, promotion, and salary and benefits. The questionnaire had 40 questions in total to evaluate the five aspects of job satisfaction (Robbins 1998).

The 17 factors used by Irene (2008) were to predict job satisfaction of the people working in the Ministry of Finance. They were opportunity to improve, occupational skills, social status of job, freedom to decide how to perform job, salary, opportunities or using skills and abilities, possibility of professional growth, likelihood of promotion, job security, participation in-service training, recognition of work on behalf of superior, recognition of work on behalf of colleagues, climate that prevails in the work environment, relationship with superior, existing appraisal system, meritocracy which is present in promotion, everyday working schedule, and duration of holidays.

The University Grants Commission (2014) reported that there are around 400 executive staff members, nearly 5610 teaching staff, and more than 10,957 nonteaching staff members in the all 15 state universities in Sri Lanka. Due to the rareness, members are considered important assets of the university system. They are responsible for general administration of universities. It is said that lack of opportunities for career development, discrimination in rewards and benefits, lower compensation, lack of flexibility and freedom, conflict between management and faculty members, lack of academic and research environment, limited job opportunities, etc. are the reasons for leaving the job.

Job satisfaction is an important attribute which organizations desire of their employees. Much of the research in this area has been based on the explicit assumption that job satisfaction is a potential determinant of absenteeism, turnover, in-role job performance, and extra-role behaviors and also that the primary antecedents of job attitudes are within management’s ability to influence (Oshagbemi 2003). The paper reported the results of an empirical study in which the impact of some personal variable on the level of overall job satisfaction of university teachers was investigated. The results of the robust regression analyses indicate that the rank of an academic staff and the length of service she/he has worked in higher education are significant predictors of the level of the individual’s overall job satisfaction. However, findings show that academic rank is positively and very strongly correlated with the overall job satisfaction (Oshagbemi 2003).

Among the demographic variable age, length of service in their university and length of service in higher education were significantly related to overall job satisfaction (Toker 2011). In age groups, 61 years and over have significantly related to overall job satisfaction. Marital status and gender were not significantly related to satisfaction. According to the study, he has found that the job satisfaction level of the academicians was moderately high. Social status was ranked as the highest, and compensation was ranked as the lowest of the examined items. The results of the study indicated that a professor reported a higher level of job satisfaction as compared to an instructor and research assistants (Fig. 3.1).

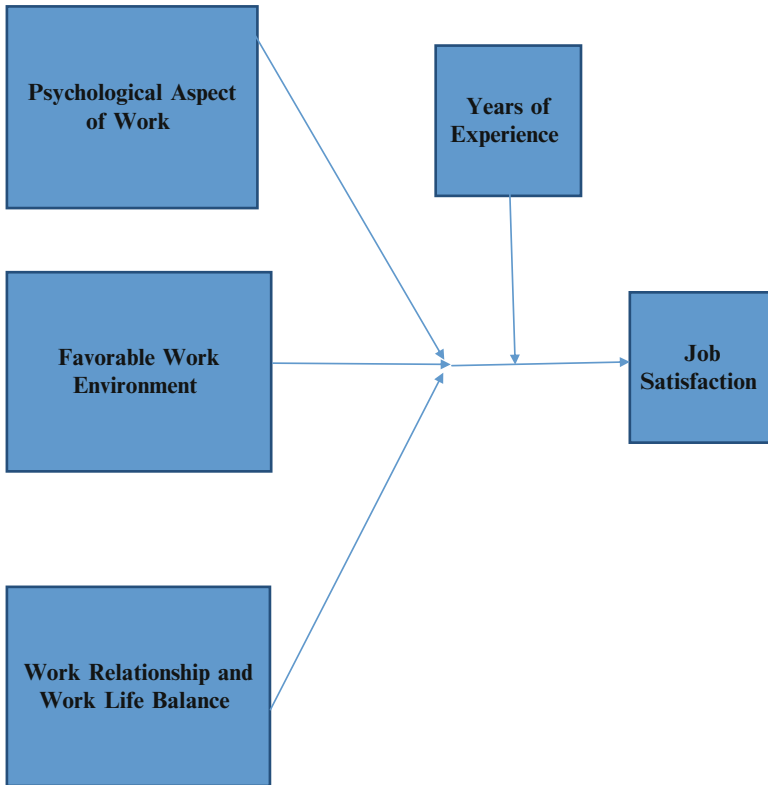


Fig. 3.1 Conceptual framework. Source: Proposed research model developed by the researcher

3.6 Research Hypotheses

Based on the literature review, the following hypotheses were formulated by the researcher to identify the relationship between identified job satisfiers and job satisfaction and impact of identified job satisfiers on overall job satisfaction.

Hypothesis 1 There is a positive relationship between psychological factors and job satisfaction of staff officers of universities in Sri Lanka.

Hypothesis 2 There is a positive relationship between work environment and job satisfaction of staff officers of universities.

Hypothesis 3 There is a positive relationship between work relationship and work-life balance and job satisfaction of staff officers of universities in Sri Lanka.

Hypothesis 4 There is an impact of identified job satisfier factors on overall job satisfaction.

3.7 Significance of the Study

The aim of this study is to contribute to the knowledge that factors most influence on job satisfaction at university staff officers. Moreover, more than 400 of the workforce population in the Sri Lankan university sector are staff officers (UGC 2016). It is very important to know the factors that impact the job satisfaction of the staff officers in the university services sector in order to improve the productivity of the employees and the profitability of this sector. It is a deliberate fact that in our country very few researchers are working in this area, so authors have chosen this area for research that would be helpful for further research and exploration of new ideas in this field.

Furthermore, findings of this study can aid human resource specialist in career counseling and designing management development programs catering to specific problems of staff officers. It will also provide an insight into the fact that how job satisfaction can be enhanced within the organizations.

Mainly the universities can take decisions on which element needs to be strengthened when it comes to the satisfiers and productivity improvement decisions. It will also provide insight into the fact that how job satisfaction can be enhanced within the organization. This will enable them to design initiatives and policies around, human resource activities, and resource allocation to ensure increased levels of job satisfaction and hence increased organizational effectiveness.

3.8 Research Methodology

The methodology section describes the research procedures. This includes the overall research design, the sampling process, the data collection methods, and the analysis process. This research examines the empirical evidence available on the selected industry with regard to identifying factors that most influence on job satisfaction at university staff officers.

3.8.1 Sources of Data and Data Collection

Primary data and the secondary data are both used in order to conduct the research. The primary data was collected by using a questionnaire. The secondary data was collected by referring existing records and data bases in UGC including policy manuals. Also books, journals, and international and national survey details were used as secondary data.

3.8.2 The Sampling Plan

In this study, population refers to the staff officers of five universities (University of Kelaniya, Wayamba, Ruhuna, Colombo, and Sri Jayewardenepura). For the sample, 100 employees were selected from the five universities. A non-probability sampling technique is used, in which units of the sample are selected on the basis of personal judgment or convenience. The measuring tools that are used in past studies are also used to develop the questionnaire for this study. Each statement was measured using a five-point Likert scale (Strongly Agree 5, Agree 4, Neutral 3, Disagree 2, and Strongly Disagree 1).

3.8.3 Data Analysis and Presentation Method

After selecting the sample and collecting the information through the questionnaires, the information should undergo through a proper analyzing procedure in order to convert the raw data into meaningful information. For the purpose of data analysis process, the study used correlation analysis technique for testing hypotheses and frequencies and percentages for data presentation. Once after analyzing data, graphs, charts, and tables were used to present the data, and in order to minimize the errors in analyzing data, SPSS software was used for the data analysis process.

3.9 Limitations of the Study

The limitations of the study are generally the characteristics of the design or methodology that set parameters on the application or the interpretation of the results of the study. In any kind of research, there will be limitations like money, human resource, time, and other geographical barriers.

The intent of the study is to interview 100 staff officers in five universities. Due to this small number of participants, there is a concern that the findings may not be comparable or generalizable to the population of all staff officers in universities. This study is focuses on nonacademics and findings are not generalizable to academics. The finding cannot be generalized for all executives from other sectors. Another delimitation is inherent in the geographic limitations of the study. The participants were drawn from four specific locations (Kurunegala, Colombo, Gampaha, and Matara), and finding should not be generalized to the entire country. The time frame for the project is limited to 2016, and therefore changes to survey results are anticipated as new-generation employees enter the job market and as older generations leave the job market.

3.10 Results and Conclusion

The applications of descriptive analysis (mean, median, mode, and standard deviation) more helped the researcher to recognize the job satisfaction factors which represent level of job satisfaction in universities in Sri Lanka.

The researcher used 13 factors under three main dimensions to measure the level of job satisfaction, namely, psychological factor, work environment, and work relationship and work-life balance. The psychological aspect of work was measured with five subdimensions including nature of job itself, compensation and rewards, work autonomy, recognition, and a sense of purpose. Work environment was measured with five subdimensions including career development, fringe benefits, job security, organization culture, and work condition, and finally work relationship and work-life balance were measured with three subdimensions including relationship with boss, relationship with co-workers, and work-life balance.

Descriptive data analysis revealed that out of the 13 factors 6 factors were at most satisfied like job security, nature of job itself, physical work conditions, relationship with co-workers, organization culture, and career advancement opportunities, and their mean value was around 4. It indicates that university sector employees are most satisfied with those factors. Then moderately satisfied factors were career advancement opportunities, work-life balance, work autonomy, and a sense of purpose, and their mean value was around 3. Finally, fringe benefits, recognition, and compensation and rewards were lowest satisfied factors, and their mean value was around 2. It indicates that most of the university sector employees are not satisfied with compensation and rewards, fringe benefits, and recognition. Further, current level of overall job satisfaction was close to agree level, and mean value is around 3.7 and mode is 4. It reveals that university sector staff officers are moderately satisfied.

The results indicated that between the psychological factors and job satisfaction of staff officers has a positive relationship with having correlation coefficient (r) of 0.570. It is significant at 0.000 ($p \geq 0.05$) level. Therefore, the first hypothesis formulated by the researcher was there is a positive relationship between psychological factors and job satisfaction of staff officers at universities.

The second hypothesis was there is a positive relationship between work environment factors and job satisfaction. The result of correlation analysis is consistent with the research hypothesis. Research findings support the second hypothesis (H2) formulated by the researcher.

The third hypothesis is that there is positive relationship between work relationship and work-life balance and job satisfaction of universities in Sri Lanka. The results of correlation analysis are consistent with research hypothesis. This study concludes that there is positive relationship between work relationship and work-life balance and job satisfaction.

Finally, researcher further analyzes the regression model to test the fourth hypothesis. There is an impact of identified job satisfiers on overall job satisfaction. The result of regression analysis consists with research hypothesis formulated by the

researcher. The final model has been given the predictor variables, psychological work environment, and work relationship and work-life balance. Psychological factors have by far the greatest influence on staff officers' job satisfaction with $\beta = 0.355$ (with t value of 4.124). Work relationship and work-life balance is next with $\beta = 0.325$ (t value = 3.977) and finally work environment with $\beta = 0.138$ (t value of 1.312). All predictor variables are significant at 0.05 levels. Employees' satisfaction explained by the final model is 43 % (adjusted r squared). It means identified job satisfiers accounted for 43 % of the staff officers' job satisfaction.

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Chapter 4

Blogs Usage in Purchasing Process

Martina Ferencová, Lukáš Kakalejčík, and Sebastian Kot

Abstract Blogs are considered as modern communication medium. They are currently used as a tool of communication content strategy and present their activities in the Internet environment. Blogs allow companies to reach the target audience by distribution of complex information. The aim of this paper was to determine the current status of using the blogs in the buying process in Slovakia and Poland. Results of the questionnaire survey confirmed that the terms of the frequency of visits of the blog between Slovak and Polish customers are not statistically significant. It was further confirmed that the Slovak and Polish customers use blogs by selected activities associated with the purchasing process as well. The last finding was that the frequency of visits of the blog and by whether the customer buys based on the blog, there is a statistically significant dependence.

Keywords Online marketing • Social media • Blog

4.1 Introduction

Due to the excessive amount of shopping alternatives and contradiction of information is buying process difficult and requires a lot of energy. Therefore, in general, it is clear that people do not search for information about the product before buying a lot of time. Research shows that low-income shoppers engaged in a search

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for information before purchasing less time than shoppers with higher incomes (Solomon et al. 2009). But the customers are looking for information already or, very often, it's on the Internet, through social media and social networking. Within these applications they share many types of content (video, music, photos, experience, experience, etc.) (Karlíček et al. 2013). It was the experience and the experiences associated with the product and purchasing process which could be shared through blogging.

Blogging as unconventional approach and two-way communication participated with the customer is now more than ever found in the marketing mix corporations (Pal and Kapur 2010). It is associated with the boom trend that is referred to as Web 2.0 (McCorkle et al. 2014); this term means a web address on the World Wide Web, which emphasizes user-generated content, usability, and interoperability (Governor 2009). Blogging as unconventional approach and two-way communication with the customer now more than ever finds its place in the marketing mix corporations (Pal and Kapur 2010). It is associated with the boom trend that is referred to as Web 2.0 (McCorkle et al. 2014); this term means a web address on the World Wide Web, which emphasizes user-generated content, usability, and interoperability (Governor 2009), and processing power and data storage have become virtually free, while networks and cloud-based solutions provide users with global access and wide-ranging services (Wielki 2015). Moreover, the amount of traffic on the Internet has been increasing because of network users, services, and communication devices (Nakata et al. 2015). A properly chosen blog content generated by enabling companies allows to reach opinion leadership in the sector of its competence and similar (predictably positive) reaction of customers in evaluating product (Bužeková 2007) and subsequent purchasing behavior.

4.2 Review of Literature

According to Sterne (2010) and Scott (2013), blog belongs to social media. Social media are online tools that allow users to create content and distribute it via the Internet (Sterne 2010). A blog is a personal journal in which posts are added in chronological order. This feature of blogs changed with the advent of social media arrival to the business itself. As blogs are usually available at no cost, there are suitable for small- and medium-sized enterprises that are most sensitive to market factors (Pietrasieński and Ślusarczyk 2015). The result is that many businesses today use blogs to distribute information relating to their activities (Handley 2014). Blog is a digital heartbeat of each brand (Young 2013) and an important tool for brands' marketing (Ryan and Jones 2012) that represents new opportunity of two-way communication with customers (Wuebben 2011). It offers the ability to consistently attract readers' attention with new contributions and a fresh batch of information (Cho 2012) and gives people a reason to return (Jefferson and Tanton 2013) by trying to meet their expectations (Griffin 2013). According to Handley and Chapman (2012), a blog is the first place that a potential customer visits. With so many easy software that is simple to use for the end user, it is not difficult to operate

a professional-looking blog that allows you to quickly create content in real time (Scott 2013) and whose management is much easier when compared to the website (Wright-Porto 2010). Furthermore, most of the software needed to blogging (such as WordPress) is available free of charge (Maya 2010).

The key factor that distinguishes successful and unsuccessful blogs is the quality of the content, since the content is important at every stage of the sales/purchasing process (Pulizzi 2013). Quality content is the only factor in the evaluation algorithm of search engines that does not change through time (Halligan and Shah 2014). Moreover, such content produces quantity of back links, thereby improving placement within the search results in search engines. In addition, regular updates (regular contributions) form another factor that speaks about website's quality (Enge et al. 2012). Blog thus works well at the stage of awareness, which is built automatically with an increase in the number of views and visits (Orzan et al. 2011). Ahuja and Medury (2010) argue that an active contribution to increasing the involvement of the corporate blog readers and commenting by readers of the blog is needed to deepen the relationship between the company and potential clients. Zarella (2013) claims that the blog helps to generate leads. By placing relevant features, the blog directs traffic to the desired webpage, while we can expect the higher result of engagement (compare Ahuja and Medury 2010) with higher conversion rates. In case of products with shorter sales cycles, a redirected visit can thus contribute to the actual purchase of the product. Chun Chien et al. (2013) argue that the blog is one of the important tools for companies selling services, allowing them to improve customer relationships, enhance public reputation, achieve self-fulfillment of these companies, build value emotions, and shape the various communities through process of socialization. The survey of Doyle et al. (2012) was conducted from autumn 2009 to winter 2010 on a sample of 436 students from a Canadian university. Testing by those hypotheses has been demonstrated that the skills and knowledge of blogger positively effect the confidence of readers. Trust is positively influenced by the effects of knowledge. In addition, the trust positively affects the quality of the information (which is also mentioned by Pulizzi 2013) and the uniqueness of readers' experience. This readership survey has also shown that if the blog owner wants to build a faithful readership, he/she must ensure that any contact with the reader would ensure knowledge acquisition. Pulizzi and Handley's (2013) survey was conducted during August 2012. The survey sample amounted to 1.416 respondents from North American companies. The results of this survey showed that 77% of respondents use blog content in their strategy. In addition, 59% of respondents consider the use of a blog effective. Forty-one percent of respondents consider the use of blogs less effective. Eccolo Media (2014) conducted a sample of 503 respondents, which consisted of managers, directors, vice presidents, executive directors (C-level executives), and other workers in small, medium, and large enterprises. The results of these surveys showed that 32% of workers responsible for decision-making are influenced by blog posts. In the sales process, blogs affect 38% of decision-makers in large enterprises, 34% for medium enterprises, and 20% for small businesses. Moreover, 38% of respondents identify blog posts

as an extremely influential. Thirty-two percent of respondents use blogs in the pre-purchase phase. Twenty-five percent of respondents use blogs when comparing sellers. Purchasing decisions implemented on the basis of blog posts were identified by 11 % of respondents.

4.3 Materials and Methods

The aim of this paper was to determine the current status of the using of blogs in the shopping process of users operating in a Slovak and Polish market. Besides, we were interested of the other activities during the shopping process, like those researching products, the decision to buy a product, discovering new products, review of election product, and answering questions in relation to the product. The subject of interest was the frequency of visits of blog by users as well. The subject of interest was the age category of 19–29 years. Because programs of study management prepare students for work in all sectors of the economy (including production, trade, and services), students of these programs were addressed. The selection of the sample was influenced by the fact that these students are not only real and potential customers who are actively using social media, search engines, price-comparison sites, and deal sites but also the real and potential employees, managers, and business owners or service providers, therefore people who could use the results of the survey in practice for more effective communication with the target audience.

Based on objective of survey, three working hypotheses were formulated:

H1 We assume that the frequency of the visits of the blog is not at Slovak and Polish users equally.

H2 We assume that the Slovak and Polish users do not use blogs during the purchasing process in the same way.

H3 We assume that there is a statistically significant dependence between the frequency of visits to a blog by users and purchases based on the blog.

4.3.1 Sample, Materials, and Methods

The sample consisted of 158 students of 1 faculty from Slovakia and 1 from Poland, selected by convenience sampling. The sample included only students of management—University of Prešov in Prešov (75) and Czestochowa University of Technology (83). Average age of participants was 22.80 years ($SD = 1.40$), with minimum 19 and maximum 26 years. Most of the sample were women (79.11 %), reflecting a higher proportion of women students in these faculties. At the bachelor level of study were studied 23.42 % of respondents; at the master level of study were studied 76.58 % of the respondents. Full-time or part-time job has 58.86 % of respondents.

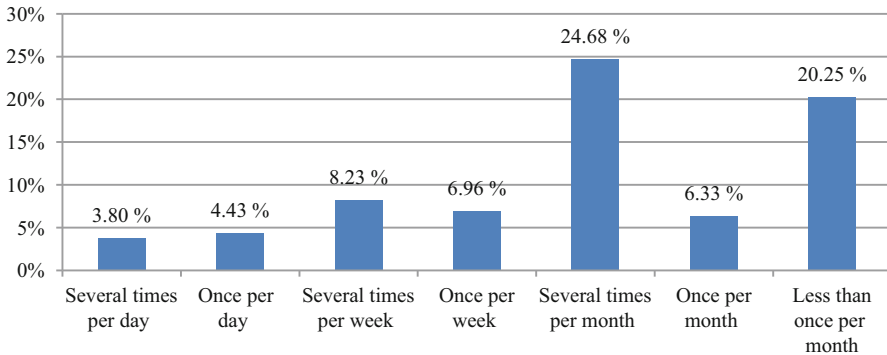


Fig. 4.1 Frequency of blog visits

The questionnaire of social media usage consists of 17 items. In this paper are presented the findings based on the answers of two of these items. Respondents answer each of these items using a five-point scale, from 1 = definitely yes to 5 = definitely not. The role of the respondents was to mark the option that best matches their beliefs about the use of the blog in various activities during the shopping process.

A paper version of the questionnaire was distributed in February 2015, and an online version of the questionnaire was distributed in March and April 2015. The data were analyzed using the software StatSoft Statistica. Because the data are not normally distributed, for the analysis of data were used nonparametric statistical methods. The Mann–Whitney test was used for the detection of differences. The Goodman–Kruskal gamma coefficient was used in order to determine dependencies. Data were analyzed using descriptive statistics, too (mode, mean, frequency tables, bar charts).

In accordance with the stated objective of our attention was primarily focused on the frequency of visiting the blogs. Complete results describe Fig. 4.1. On this basis, it is clear that a blog is visited several times daily by 3.80% and once per day by 4.43% of users. Taken together, however, blogs are read daily by less than 10% of users. The largest proportion of users read blogs several times a month (24.68%) and less than once per month (20.25%). Blogs do not attend 25.32% of users. We assume that this number can be as high as the significant value because of ignorance of the theory of marketing communication, which involves the inability of the respondent to define social media with which it comes into contact.

Within the issue of frequency of visits of the blog, we are also concerned about whether Slovak and Polish users visit blogs at the same frequency. These users we compared the testing by hypotheses H1, while the comparison was used Mann–Whitney test. U -value = 0.19 and $z = 3058.50$, with p -value equal to 0.85. Based on this result is rejected hypothesis H1; the difference found was large enough that appeared to be statistically significant. Thus, the null hypothesis could not be rejected.

Table 4.1 Blog helped me

Variable	Slovakia		Poland		<i>U</i>	<i>Z</i>
	M	SD	M	SD		
Make decision before product purchase	2.91	1.35	2.91	1.18	2823.00	1.01
Answer a question about a problem related to product	2.84	1.38	2.84	1.07	2401.00	2.48*
Discover new products	2.80	1.41	2.80	1.21	2317.00	2.77*
With assurance about product purchase	3.12	1.35	3.12	1.05	2902.00	0.73
Product purchase (I bought based on blog)	3.22	1.33	3.22	1.05	2934.50	0.62
Reevaluation of product choice	3.16	1.40	3.16	1.05	2998.00	0.40

* $p < 0.05$

The second part of our research was focused on finding blogging in selected activities of the purchasing process. 43.67% of users have decided to purchase a product based on a blog, 50% of users have corresponded on the basis of blogging question about problems related to the product, 50% of users through blogs appeared new products, 34.18% of the users were assured of buying the product by blog, 29.11% of users based on the blog and purchased, and 33.55% of users select the product evaluated based on the blog. Based on the fact that only 6.96% of respondents when questioned about the purchase based on the category labeled modal option “definitely yes,” we assume that users (a) cannot objectively assess the impact of blogs on their purchasing behavior and (b) have difficulty in defining blogs according to the theory of marketing communication.

Table 4.1 shows the results of testing the hypothesis H2. We tested whether the Slovak and Polish users use blogs differently in selected activities related to procurement processes. Since the differences were discovered only in answering questions about the problems associated with the product and with the discovery of new products based on category, hypothesis H2 was not confirmed. Comparing the means of modal responses shown in Table 4.1, we come to the same conclusion—Slovak and Polish users use blogs in selected activities in the buying process the same way.

Examining the frequency of visits and the using of blogs in selected activities of the purchasing process have been the object of our interest to establish whether there is a statistically significant relationship between the frequency of visits of a blog by users or purchases based on the blog. To conclude, we wanted to arrive at testing the hypothesis H3. By testing the significance level of $p < 0.05$, we reached the gamma coefficient of -0.49 . Thus the null hypothesis is rejected. On the frequency of visits of the blog and by whether respondents have purchased pursuant to the blog, there is a statistically significant dependence. The more users visit blogs more so on that basis and shopping.

4.3.2 Summary Results of the Survey

1. Users visit blogs often. There was no statistically significant difference to the frequency of visits to blogs by Polish and Slovak users.
2. Slovak and Polish users use blogs as well in selected activities related to the purchasing process.
3. The frequency of visits of blogs about whether users buy on the basis of the blog has a statistically significant dependence.

The results of this survey show that in the strategy of blog publishing, companies operating on the Polish–Slovak market need not apply the principle of territorial differentiation. But as a critic, it is the publishing quality of content that can ensure a regular readership, which ultimately impacts on increasing the number of purchases based on a blog. The companies are able to trace these data by application of association of their analytical content on the platform, while a visit to blog articles should figure in the control of the sales tunnel. As we worked with a purposefully selected group of respondents, the results of this survey cannot be generalized. They may serve as a guide for building a strategy for social media companies operating at the Slovak–Polish market.

4.4 Conclusion

Companies that were able to understand the information needs of their customers and included blogs into their marketing strategy can now provide comprehensive information aimed at acquiring customers at the stage of brand awareness phase and lead them to the phase of decision-making—while their product is one of the available options.

Blogs are among the social media that are directly owned by companies. Blog content is therefore a long-term asset company that directly fits into the marketing strategy undertaken using online media. The survey has been shown that despite the fact that the Slovak and Polish markets are not blogs frequently used extensively, their visit/monitor has an impact on selected activities within the purchasing process of online users. In addition, it was shown that increasing the frequency of visits of the company blog increases the likelihood that the user will make a purchase. It was found that the frequency and method of using of the blogs by Slovak and Polish users were not statistically different. It can be assumed that the meaning of the blog in the buying process varies depending on the company. Examining the differences in the use of blogs B2B versus B2C companies is an incentive for further exploration in this area.

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Chapter 5

Social and Community Services Government Expenditure and Nigeria's Economic Growth

Okezie A. Ihugba and Asoluka C. Njoku

Abstract Government expenditures are very crucial instruments for economic growth at the disposal of policy makers in developing countries like Nigeria. The study, “total government expenditure on social and community services and its effect on economic growth in Nigeria”, is an attempt at highlighting the quantity and quality of national commitment (through public expenditure) to education, health and the socially and economically disadvantaged using time series data from 1961 to 2013, obtained from the Central Bank of Nigeria Annual Report and Statement of Account. Using error correction model (ECM), the results indicate that total expenditure on social and community services is not statistically significant but has a positive relationship on economic growth in Nigeria in the long run, while in the short run, total expenditure on social and community services is highly and statistically significant and has a positive relationship on economic growth in Nigeria, and the speed of adjustment to equilibrium is 44 % within a year when the variables wander away from their equilibrium values. The result of Granger causality does validate the applicability of Wagner's law in Nigeria but doesn't support a unidirectional causality from public expenditure to growth and thereby not validating the applicability of Keynesian approach in the country. The result has an important implication in terms of policy and budget implementation in Nigerian. We conclude that economic growth has a positive relationship with total expenditure on social and community services and recommends that there is need to increase the allocation meant for the sectors and also ensure that the resources are properly managed and used.

Keywords Social expenditure • Economic growth • Nigeria

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5.1 Introduction

Government expenditure is one of the tools used by government to sustain and accelerate economic growth; it includes expenditure on programmes that try to alleviate the suffering of the less privileged. Economic growth refers to increase in a country's potential GDP which must be sustained for a developing economy to break the circle of poverty. The social and community services sector includes those services that non-payer cannot be excluded from (such as street lighting), services which benefit all of society rather than just the individual who uses the service (such as public education and health) and services that encourage equal opportunity and those services to people who are socially and economically disadvantaged or who have special needs for care and support. Community services, in this definition, comprise child care services, nursing homes, accommodation for older people, other residential care services and non-residential care services (such as information, referral and counselling), advocacy and representation and employment placement services for people experiencing disadvantage, delivered by not-for-profit, government and for-profit organisations.

According to Dickey and Fuller (1979), the mechanism in which government spending on public infrastructure is expected to affect the pace of economic growth depends largely upon the precise form and size of total public expenditure allocated to economic and social development projects in the economy. When public expenditure is incurred, by itself it may be directed to particular investments or may be able to bring about re-allocation of the investible resources in the private sector of the economy. Wagner (1890) introduced a model that public expenditures are endogenous to economic development, i.e. growth in the economy also causes public sector expenditures to expand. Keynes (1936) and his supporters, on the other hand, raise the thought that during recession times, the use of fiscal policies boosts economic activities, i.e. expansionary fiscal policies, expanding public expenditures and increase national output. Wagner's law and the Keynesian theory present two opposite perceptions in terms of the relationship between public expenditure and growth in national output. While according to Wagner's approach causality runs from growth in national output to public expenditure, the Keynesian approach assumes that causality runs from public expenditure to growth in national output in times of recessions. Endogenous growth theory gives governments a theoretical basis for actively fostering growth.

According to Okoro (2013), the relationship between government expenditure and economic growth has continued to generate a series of debate among scholars. Government performs two major functions – protection (and security) and provisions of certain public good (Al-Yousif 2000). Most studies argue that increase in government expenditure on socio-economic and physical infrastructures encourages economic growth. For example, government expenditure on health and education raises the productivity of labour and increases the growth of national output. Similarly, expenditure on infrastructure such as roads, communications, power, etc. reduces production costs and increases private sector investment and profitability

of firms, thus fostering economic growth. As observed by Al-Yousif (2000) and Cooray (2009), Abdullah (2000), Ranjan and Sharma (2008) and reported by Okoro (2013) that expansion of government expenditure contributes positively to economic growth. The study carried out by Landau (2003) on the relationship between public expenditure and social and economic infrastructure like education, health, transport, communication, water disposal, electricity, water and sanitation concluded that there was a positive relationship.

In Nigeria, rising government expenditure has not translated to meaningful growth and development, as the country ranks among the poorest countries in the world. In addition, many Nigerians have continued to wallow in abject poverty, while more than 50% live on less than US\$2 per day. Coupled with this is dilapidated infrastructure (especially roads and power supply) that has led to the collapse of many industries, including high level of unemployment (Nurudeen and Usman 2010). The present study aims to throw more light on this issue by examining empirically the relationship between total government expenditure on social and community services and Nigeria's economic growth for the period 1961–2013 in the short and long run. Two hypotheses are addressed as follows:

1. Total government expenditure on social and community services has no significant long- and short-run impact on Nigeria's economic growth.
2. Total government expenditure on social and community services does not Granger cause Nigeria's economic growth.

5.2 Trend and Growth Pattern of Government Spending on Social and Community Services

Government expenditure in the social and community services sector does not show marked improvement until lately. The total expenditure and growth of expenditure on social and community services in Nigeria are shown below:

Figure 5.1 shows that the highest allocation within the period of study was in 2013. Total expenditure on social and community services growth was highest in 1974 (384.9%), and at that same year, the GDP grew by 11%. The growth rate also shows that in every year the country had a change of government; there was always a high growth rate which falls the following year. In 1964 it was 20.6 and reduced to 11.0 in 1965, in 1980 it was 288.1 and reduced by -42.5 in 1981 and in 1985 it was 218.3 and reduced by -34.6 in 1986. In 1993 when Gen. Abacha took over government, it was 117.3 and reduced by -21.4% in 1996. In 1999, the growth rate was 198.6% and reduced by -45.8% in 2000; in 2003, it was 77.7% and reduced by -41.5% in 2004. In 2008, the late Yar'Adua increased the allocation by 98.8% and reduced it by -6.0% in 2009. President Jonathan increased it by 67.2% in 2010 and remained high (19.8%) in 2011 which was an election year and increased by 1.2% in 2012 when the government in power didn't need the votes of Nigerians (see Fig. 5.2).

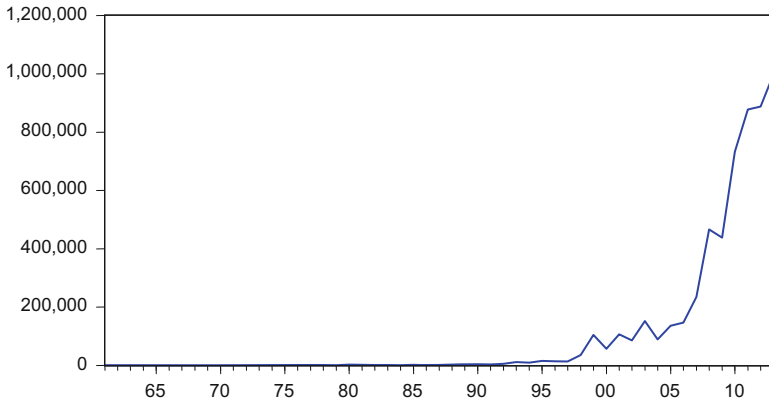


Fig. 5.1 Total government expenditure on social and community service 1961–2013. Source: CBN 2014

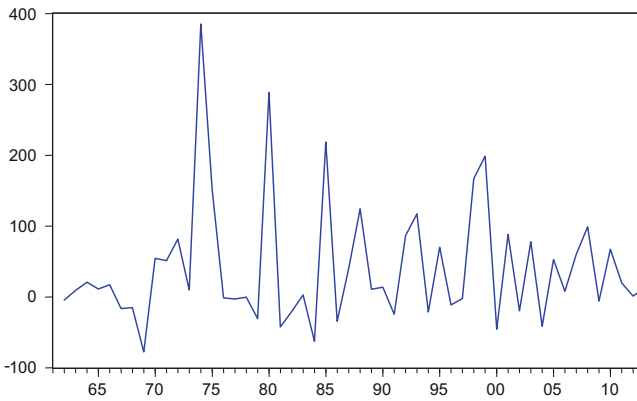


Fig. 5.2 Percent change in total government expenditure on social and community service 1961–2013. Source: Computed by the Authors 2015

5.3 Methodology of the Study

This paper uses the cointegration and error correction methods to analyse the relationship between total government expenditure on social and community services and Nigeria’s economic growth in the short- and long-run period. The framework for the study has its basis on the Keynesian and endogenous growth models. The data and their relationships are defined as follows:

1. Total government expenditure on social and community services: This is total government expenditure on education, health and other community and social services.

2. Political stability: This represents the dummy variable used to capture the investment climate in Nigeria. Years of military rule and civil unrest imply instability and are represented by (0), while years of civil rule that indicate stability are represented by (1).
3. Inflation: This is the percentage change in the general price level of goods and services.
4. Real gross domestic product: This measures economic growth; it is the monetary value of all the finished goods and services produced in Nigeria within 1 year. It includes all of private and public consumption, government outlays and investments and exports less imports.
5. Exchange rate: The price of Nigeria's currency in terms of another currency.
6. Population growth rate: It is the rate at which the number of Nigeria's population increases in a given time period as a fraction of the initial population. The relationship between economic growth and population growth in this study is assumed to be negative because of the unemployment problem. Average unemployment rate between 1961 and 2013 is 8.7 % while that of population growth rate is 2.4 % showing disparity in the purchasing power consumption ratio.
7. Money supply: A measure of money supply that includes cash and checking deposits (M1) as well as near money. "Near money" in M2 includes savings deposits, money market mutual funds and other time deposits, which are less liquid and not as suitable as exchange mediums but can be quickly converted into cash or checking deposits. It is expected that an increase in money supply will lead to increase in physical capital which will increase economic growth.

The study made use of annual time series data on a number of macroeconomic variables between 1961 and 2013 inclusive from both local and foreign sources. The data were obtained from various CBN statistical bulletin and World Bank Group–World Development Indicator (WDI) (Table 5.1).

Table 5.1 A priori signs of the variables

Explanatory variables	Abbreviations	Expected sign
Total government expenditure on social and community services	TGEXPSCS	Positive
Real gross domestic product	RGDP	Positive
Exchange rate	EXR	Negative
Inflation rate	INF	Negative
Political stability	PS	Positive
Money supply	M2	Positive
Population growth rate	PGR	Negative

Hypothesis 1 Based on the literature, we hypothesise that there is a significant relationship between economic growth, total government expenditure on social and community services, population growth rate, exchange rate, political stability, money supply and inflation rate.

5.4 Model Specification

We undertook the cointegration test to ascertain if there is a long-run equilibrium relationship between or among variables. If the variables are cointegrated, it means that the result will be used for meaningful analysis, leading to good decisions.

We specify the model based on the hypothesis as

$$RGDP = f(TGEXPSCS, INF, EXR, PS, M2, PGR) \quad (5.1)$$

where RGDP is the economic growth, TGEXPSCS is the total government expenditure on social and community services, PGR is the population growth rate, EXR is the exchange rate, PS is the political stability, MS is the money supply, INF is the inflation rate.

RGDP, TGEXPSCS and M2 are in logarithmic values; political stability is a dummy variable, while the others are rates. In log stochastic form, this can be rewritten as

$$\begin{aligned} LRGDP_t = c_0 + c_1 TGEXPSCS_t + c_2 LMS_t + c_3 EXR_t + c_4 PS_t + c_5 PGR_t \\ + c_6 INF_t + e_t \end{aligned} \quad (5.2)$$

where GDP is the economic growth at time t , TGEXPSCS is the total government expenditure on social and community services at time t , PGR is the population growth rate at time t , EXR is the exchange rate at time t , PS is the political stability at time t , MS is the money supply at time t , INF is the inflation rate at time t , c_0 is the intercept, c_1 – c_6 is the intercept, e is the error term.

5.5 Data Analysis Techniques

5.5.1 Unit Root Test

- In order to avoid estimating spurious regression, the stochastic properties of the series were tested. This we did by testing for unit root which involved testing the order of integration of the individual series under consideration. Several procedures for the test of order of integration have been developed in which the two most popular are the (ADF) augmented Dickey and Fuller (1981) and (PP)

Phillips and Perron (1998) which will be employed to perform the test. Table 5.2 reports the results of the ADF and PP unit root tests. The ADF and PP tests rely on rejecting a null hypothesis of unit root in favour of the alternative hypothesis of stationarity. The tests were conducted with or without a deterministic trend for each of the series in order to ascertain the level of their stationarity. The general form of the ADF is estimated by the following regression:

$$\Delta y_t = a_0 + a_1 y_{t-1} + \sum_{i=1}^n a_i \Delta y_{t-i} + e_t \quad (5.3)$$

$$\Delta y_t = a_0 + a_1 y_{t-1} + \sum_{i=1}^n a_i \Delta y_{t-i} + \vartheta_t + e_t \quad (5.4)$$

where y_t is the time series, it is a linear time trend, Δ is the first difference operator, a_0 is the constant, n is the optimum number of lags in dependent variable, e_t is the random error term.

The results of the stationarity (unit root) test in Table 5.3 indicate that total government expenditure on social and community services (LTGEXPSCS), economic growth (LGDP), population growth rate (PGR), inflation rate (INF), exchange rate (EXR) and money supply (LMS) in Nigeria are stationary at first difference (i.e. they are $I(1)$ processes) which sets the stage for cointegration test.

The residual of the long-run static regression in Fig. 5.3 indicates mean reversion, thereby pointing to the likelihood of cointegration. To confirm this view, a more formal test is conducted below.

The ADF test statistic (determined on constant, no trend basis) for the residual of the cointegrating equation is -3.702358 . Since the ADF test statistic of -3.702358 is less than the 10%, 5% and 1% levels of significance (-2.597285 , -2.918778 and -3.562669), we reject the null hypothesis of no cointegration and accept the alternative hypothesis that there is cointegration.

Table 5.4 shows the estimated result of the cointegrating Eq. (5.2).

5.6 Discussion

The results show an R -square of about 53.0%, indicating that about 53% change in dependent variable (DLGDP) is jointly explained by the explanatory variables total government expenditure on social and community services (LTGEXPSCS), population growth rate (PGR), inflation rate (INF), exchange rate (EXR), political stability (PS) and money supply (LMS). On the test of individual significance, only exchange rate (EXR), political stability (PS) and money supply (LMS) performed well, while total government expenditure on social and community services (LTGEXPSCS), population growth rate (PGR) and exchange rate (EXR) did not perform well.

Table 5.2 ADF and PP unit root test

Variable	ADF	ADF test			PP test				
		1%	5%	10%	1%	5%	10%		
LGDPCR	Level	0.31	-3.56	-2.92	-2.60	0.21	-3.56	-2.92	-2.60
	1st difference	-5.20*	-3.56	-2.92	-2.60	-5.20*	-3.56	-2.92	-2.60
LTGEXPSCS	Level	-0.02	-3.56	-2.92	-2.60	0.12	-3.56	-2.92	-2.60
	1st difference	-8.49*	-3.56	2.92	-2.60	-8.49*	-3.56	-2.92	-2.60
PGR	Level	-2.01	-3.56	2.92	-2.60	-2.16	-3.56	-2.92	-2.60
	1st difference	-4.27*	-3.56	-2.92	-2.60	-4.18*	-3.56	-2.92	-2.60
EXR	Level	0.10	-3.56	-2.92	-2.60	0.75	-3.56	-2.92	-2.60
	1st difference	-3.75*	-3.56	-2.92	-2.60	-3.58*	-3.56	-2.92	-2.60
LMS	Level	-0.38	-3.56	-2.92	-2.60	0.18	-3.56	-2.92	-2.60
	1st difference	-3.93*	-3.56	-2.92	-2.60	-3.83*	-3.56	-2.92	-2.60
INF	Level	-3.36	-3.56	-2.92	-2.60	-3.19	-3.56	-2.92	-2.60
	1st difference	-7.41*	-3.56	2.92	-2.60	-13.5*	-3.56	-2.92	-2.60

* signifies that the alternative hypothesis of no unit root is adopted.

Table 5.3 Cointegrating residual: *t*-statistic

Null hypothesis: ECM has a unit root		
Exogenous: constant		
Lag length: 0 (automatic—based on SIC, maxlag = 10)		
		<i>t</i> -Statistic
		Prob.*
Augmented Dickey–Fuller test statistic		-3.702358
Test critical values	1 % level	-3.562669
	5 % level	-2.918778
	10 % level	-2.597285

* one-sided *p*-values

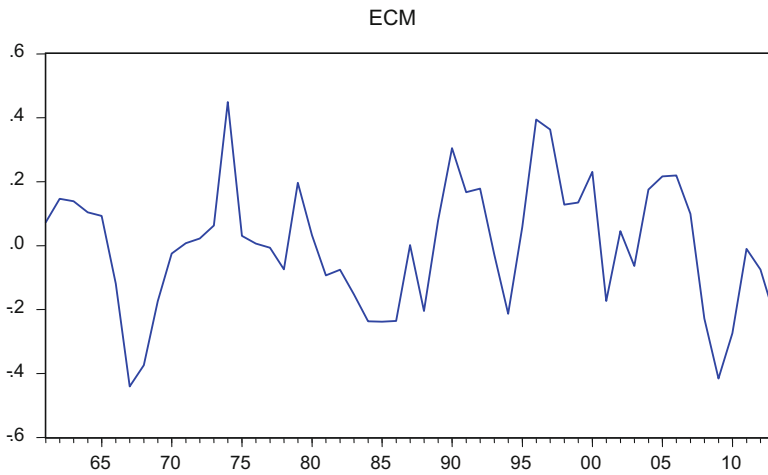


Fig. 5.3 Cointegration residual graph

Table 5.4 Total government expenditure on social and community services and Nigeria's economic growth 1961–2013 (ordinary least squares technique)

Dependent variable	Explanatory variables	Coefficients	Standard error	<i>t</i> -Statistic	(Prob.)
DLGDP	C	0.116977	0.051719	2.261764	0.0286
	DLTGEXPSCS	0.042573	0.043143	0.986790	0.3290
	DEXR	0.008842	0.003671	2.408597	0.0202
	DLMS	0.372304	0.183862	2.024904	0.0488
	DPGR	-0.093062	-0.356924	-0.260733	0.7955
	PS	-0.085126	0.048855	-1.742435	0.0883
	DINF	0.000547	0.001799	0.304090	0.7625

R-squared = 0.53, adjusted *R*-squared 0.44, DW = 2.12, *F* = 0.004255

It failed the *t*-test of significance at 1, 5 and 10 % levels of significance as reflected in Table 5.4 above. This reveals the presence of multicollinearity among the variables in the estimated model. A Durbin–Watson (DW) statistic of 2.12 which falls into the acceptable zone of 1.5 and 2.5 shows the absence of serial correlation.

Meanwhile, 1 % change in total government expenditure on social and community services (LTGEXPSCS) will bring about a positive change of 0.042573 economic growth (DGDP); this is not in line with bibliography that government investment through the injection of income resulting in greater spending in the general economy can lead to economic growth. A change in population growth rate (DPGR) will bring a negative change of -0.093062% in economic growth (DLGDP). Political stability has a negative relationship with economic growth (DLGDP): a percent increase in political stability will decrease economic growth (DLGDP) by 0.09 % which is not in line with our a priori expectation and also going by the nature of what good governance brings to an economy. The negative relationship may not be unconnected with mismanagement and diversion of public funds by government officials and political appointees. Money supply has a positive relationship with economic growth (DLGDP): a percent increase in political stability will increase economic growth (DLGDP) by 0.37 % which is in line with our a priori expectation. A change in inflation rate (INF) will bring a positive change of 0.000547 % in economic growth which is not in line with our a priori expectation. Exchange rate (EXR) has a positive relationship with economic growth (DLGDP); a percent increase in exchange rate will increase economic growth (DLGDP) by 0.008842.

5.7 The Short-Run Dynamics: Error Correction Model (ECM)

In the long run, economic growth can interact with only three variables to determine the long-term behaviour of real GDP. However, in the short run, total government expenditure on social and community services (LTGEXPSCS), exchange rate (EXR) and money supply turned out to be significant determinants of response variable. These variables are shown in the estimating equation in Table 5.5. The adjusted R -squared of 0.45 expresses the fact that the explanatory variables explain 45 % of the short-term variations in real GDP. The equilibrium error term is non-zero (highly statistically significant), which goes to show that the adjustment to short-run disequilibrium is not completed in 1 year but rather in about 2 years as only 44 % of the adjustments can take place in the first year.

5.7.1 Causality Test

In order to determine which variable in the model Granger cause each other, the Granger causality test advanced by Granger (1969) is used. The F -statistics is used to reject or accept the null hypothesis of no causation between the variables when F -statistics is greater than 2 and less than 2, respectively.

Table 5.5 Error correction model

Dependent variable	Explanatory variables	Coefficients	Standard error	t-Statistic	(Prob.)
DLGDP	C	0.035126	0.054226	0.647775	0.5205
	DLTGEXPSCS	0.080489	0.041367	1.945726	0.0581
	DINF	-0.000620	0.001690	-0.367157	0.7153
	DEXCR	0.005979	0.003487	1.714642	0.0934
	DLNMS	0.729387	0.203988	3.575641	0.0009
	DPGR	-0.225483	0.329729	-0.683842	0.4977
	PS	-0.055195	0.045780	-1.205656	0.2344
	ECML	-0.437824	0.141105	-3.102821	0.0033

R-squared = 0.45, adjusted R-squared 0.36, DW = 1.85, F = 0.000231

Table 5.6 Pairwise Granger causality test

Direction of causality	F-statistic	P-value	Decision	Lag length
DLGDP → DLTGEXPSCS	8.63	0.0007	Do not reject	2
DLTGEXPSCS → DLGDP	1.54	0.23	Reject	2
DLGDP → DLTGEXPSCS	7.83	0.0003	Do not reject	3
DLTGEXPSCS → DLGDP	1.89	0.14	Reject	3
DLGDP → DLTGEXPSCS	6.48	0.0004	Do not reject	4
DLTGEXPSCS → DLGDP	1.97	0.12	Reject	4

The arrow shows the direction of causality

The Granger causality test is estimated from the following equations:

$$\Delta DLGDP_t = \sum_{i=1}^n \alpha_i \Delta DLTGEXPSCS_{t-i} + \sum_{i=1}^n \beta_j \Delta DLGDP_{t-j} + u_{1t} \quad (5.5)$$

$$\Delta DLTGEXPSCS_t = \sum_{i=1}^n \lambda_i \Delta DLGDP_{t-i} + \sum_{i=1}^n \gamma_j \Delta DLTGEXPSCS_{t-j} + u_{2t} \quad (5.6)$$

where α, β, λ and γ are the respective coefficient of the variables, t represents time while i and j are their lags and u_{1t} and u_{2t} are uncorrelated white noise error term. The null hypothesis is $\alpha = 0$ for all i_s and $\gamma = 0$ for all j_s while the alternative hypothesis is given as $\alpha_i \neq 0$ and $\gamma_j \neq 0$.

Since causality test is affected by the number of lags included, we tested using 2, 3 and 4 lag lengths. The results in Table 5.6 show that at up to four lag lengths at 1% level of significance, DLGDP is found to Granger cause DLTGEXPSCS with no reverse causality from DLTGEXPSCS to DLGDP (no feedback). The hypothesis that the lag values of DLGDP to DLTGEXPSCS are statistically significantly different from zero is not rejected for the number of lags included as the p -values of the F -test indicate.

The finding validates the applicability of Wagner's law in Nigeria but does not support a unidirectional causality from public expenditure to growth and thereby doesn't validate the applicability of Keynesian approach in the country. Based on the result of Granger causality, we conclude that a unidirectional causality exists between the two variables used in this study.

5.8 Conclusion

This study further brings to the fore, the role of expenditure on education, health and other community and social services on economic growth. None of the variables was stationary at zero level. This means they all have unit roots. The six variables became stationary at first difference by ADF and PP application. The contribution to existing literature of this research is that it reveals that expenditure on education, health and other community and social services contributes positively in the short- and long-run period and the relationship is only significant in the short run. The effect of corruption by people entrusted to disburse and manage money meant for these very important sectors has tended to reduce its effectiveness. When money is appropriated for a project in the budget sometimes, it takes 3 years for the project to take off, and most times end up as abandoned projects. The positive multiplier effect of the pronouncement of the budget is normally high, e.g. if government announces that a school or hospital will be cited in an area, automatically the cost of land and building will increase immediately.

The study equally discovered that there is inverse relationship between population growth rate and economic growth in the long run which is line with our a priori expectation. This implies that demand is greater than supply and also unemployment is increasing more than that the growth of the economy. Exchange rate and money supply have a positive relationship with economic growth, and they are also statistically significant at 5%.

The paper recommends that government should increase the allocation meant the sectors and also ensure that the resources are properly managed and used. Government should increase its funding of antigraft or anticorruption agencies like the Economic and Financial Crime Commission (EFCC) and the Independent Corrupt Practices Commission (ICPC) in order to arrest and penalise those who divert and embezzle public funds.

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Chapter 6

The Relationship Between Government Expenditure on Health and GDP in Turkey

Nedim Dikmen

Abstract Today, rapid increases in government health expenditures constitute a serious problem for governments and households. While there is an extensive literature in this field in the OECD countries, the number of studies in the developing countries is quite inadequate. Although in Turkey there are some studies in this subject, theoretical and empirical studies are insufficient. There is a positive relationship between health expenditure and particularly GDP as one of the factors which have an influence on health expenditure increase. GDP is an important exogenous variable which affects health expenditure. In empirical studies on the relationship between GDP level and health expenditure, the existence of a generally unidirectional relationship from GDP to health expenditure has been determined. However in some studies, there are findings suggesting a relationship of causality between the two variables. It has been observed that in Turkey there have been a rapid increase in health expenditure in the recent years and that the share of government expenditure on health in total expenditure on health has increased substantially. In this study parametric Pearson test and nonparametric Spearman rank correlation test have been conducted in order to determine the relationship between government expenditure on health and GDP. Test results have been found to be statistically significant. The analysis has determined that there is a unidirectional, positive, and strong relationship between the two variables. The findings correspond to those in the literature, and there is a definite correlation between GDP and total government expenditure on health.

Keywords GDP • Social policy • Health expenditure • Human capital • Health level • Correlation test

JEL Classification C10, E21, H51

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6.1 Introduction

In the twenty-first century, the social functions of the state have expanded as a result of the popularization and development of the social welfare state approach. This has primarily led to a widening of the scope of social security and healthcare services. Right to health has been recognized, especially after the Second World War, as one of the universally important human rights. One of the most fundamental functions of social security services is to provide basic health financing and to protect individuals against health-related risks. Directing health expenditures with appropriate care in accordance with the principles of social state practices will help establish a healthy society and provide improved human capital sources. In our country, healthcare services are at the top of the list of prioritized issues. During the last decade in Turkey, there have been important developments in health management, healthcare services, health financing, and Social Security Institutions. Public and private investments in the healthcare field have increased. Therefore, the share of health expenditure in government expenditure has substantially risen.

6.2 Government Social Expenditure

Although being a social welfare state has implications in many fields, three of these receive the most attention. These are providing a certain minimum income and a standard of living for citizens, supporting individuals in their struggles against various social risks which they will encounter throughout their lives, and providing good conditions of living and environment by means of social services (Özdemir 2007). Policies aimed at realizing these goals are referred to as social policies. The spending made by the state while putting social policies into practice is defined as social expenditure. A big portion of social expenditure is made by the central state organization, and the remaining part is realized by local administrations and various other institutions operating on behalf of the state. Expenditure, which the state must realize by targeting social welfare both in order to decrease the negative effects of externalities and as a result of its responsibility as a social welfare state, is defined as social expenditure (Buğra and Keyder 2008).

Social expenditure positively contributes to economic development, decreasing poverty, and providing social peace. Moreover, social expenditure is an important variable which increases physical and human capital investments. This kind of expenditure decreases variations in income distribution and helps protect the social and cultural structure by eliminating regional, ethnic, and other various imbalances in the social structure which negatively affect capital accumulation. In the studies on this subject, the relationship between social expenditure and economic growth has been investigated in a limited manner. Barro (1991) has concluded that social transfers have a positive effect on growth but that this is not statistically significant. In a study on Malaysia, Crone (1993) has found out that a high level of social

expenditure (health, social security, and housing) had an effect on Malaysia's high growth rate. In the studies by Kelly (1997), it has been established that there is a linear and positive relationship at different significance levels between social security expenditure and economic growth. Bloom and Canning (2000) state that healthy individuals internalize knowledge more effectively and thereby perform more efficiently.

Welfare states either directly finance the healthcare system or act as financiers within the system by buying healthcare services from private sector firms. However, just as it is partially the case in our country, in many developed and developing countries, it can be observed that these two different approaches are implemented at the same time. There are three different healthcare systems with respect to financing of the provision of healthcare services. The first one is the "Bismarck model healthcare system" implemented in Germany. In this system, the costs are covered by the taxes deducted from payroll. The second type of system is the "National Health Service" (NHS) practiced in England. In this system, funds are provided by the general taxes. The healthcare services are totally nationalized and covers every individual in the country, and the citizen is provided healthcare services free of charge or at very low prices. The third system, as implemented in the USA, refers to that where healthcare services are provided by "insurance markets operating for commercial purposes." While in many countries a mixture of these three systems are in practice generally, one of these mentioned systems can become more dominant (Özdemir 2007).

State intervention in the name of providing higher life quality and establishing improved work conditions can be seen as a reflection of social democracy or welfare state politics. Generally, when viewed from the welfare state criteria, governments perceive health as a very fundamental and vital benefit for the individual and society. On the other hand, when the policies implemented for the solution of health problems are examined, important differences emerge among countries and geographical regions. For example, while in the Scandinavian countries there are better healthcare services as a result of higher welfare levels, in England and the USA, there is more liberal, and in Germany there is a more state-controlled market. As a result of these differences, variations in social expenditures emerge. According to the 2014 statistics, while the ratio of health expenditure to GNP was 16.4 % in the USA, this percentage was an average of 10 % for the Scandinavian countries, 11 % for Germany, and 8.5 % for England (OECD Health Statistics 2015).

6.3 Health Expenditure

In order for development and economic growth to be sustainable in a country, the existence of a healthy society among other factors of production is of vital importance. In the constitution of a healthy society, provision of healthcare services which will meet social needs emerges as a requirement. All the spending which will be made with this goal in mind confronts us as health expenditure. Not just

treatment expenditures but expenditures made for purposes of protection and precaution such as vaccination and fight against sexually transmitted diseases along with expenditures made for improvement purposes such as nutrition and health investments are also considered as “health expenditure.”

Health expenditure is a type of expenditure that directly affects human capital. For this reason, it is considered, along with education, among the primary compulsory expenditures. Health expenditure is not regular consumption spending but social investment expenditure. The negative outcomes which could emerge in the future as a result of insufficient health expenditure could lead to problems more difficult to compensate.

In order to compare health expenditures among countries globally recognized, standards have been defined. The most commonly used standards include data such as health expenditure/GNP ratio, health and drug expenditure per capita, and the share of drug expenditure in total expenditure on health. With the help of these ratios, variations and trends in expenditures for certain periods become comparable among countries. According to the World Health Organization (WHO), the share allocated to health expenditure in a country should be at least 5 % of annual GNP, and this ratio is established as a target which must definitely be reached by the developed or developing countries.

A large portion of health expenditure in Turkey is funded by the Social Security Institution, and another large portion is financed through the general budget by the Ministry of Health. However, even though the social security system is mostly based on premiums, an important part of the budget consists of treasury transfers. Therefore, the financing of the health system in Turkey is a mixed structure involving premium (health insurance) and non-premium (social aid) systems (Dilik 1991).

A look at Fig. 6.1 which presents the share of health expenditures in GDP in the OECD countries will show that the USA has the highest ratio with 16.4 %. West and North European countries have an average health expenditure ratio of 9–12 %. When it is considered that the OECD average is 8.9 %, Turkey ranks low among the OECD countries with a health expenditure ratio of 5.1 %. With respect to health expenditure, it can be seen that among the OECD countries, expenditures in developed countries like the USA, Holland, Switzerland, Sweden, and Germany are nearly two times more compared to developing countries. This is an indication that as the level of democracy and civilization of a country increases, the value of human beings also increase.

6.4 Factors Affecting Health Expenditure

Health expenditures have a global trend of rapid increase. After the Second World War, the increase in health expenditures in developed and developing countries has been more than the rise in growth rates. Within this scope, the factors which

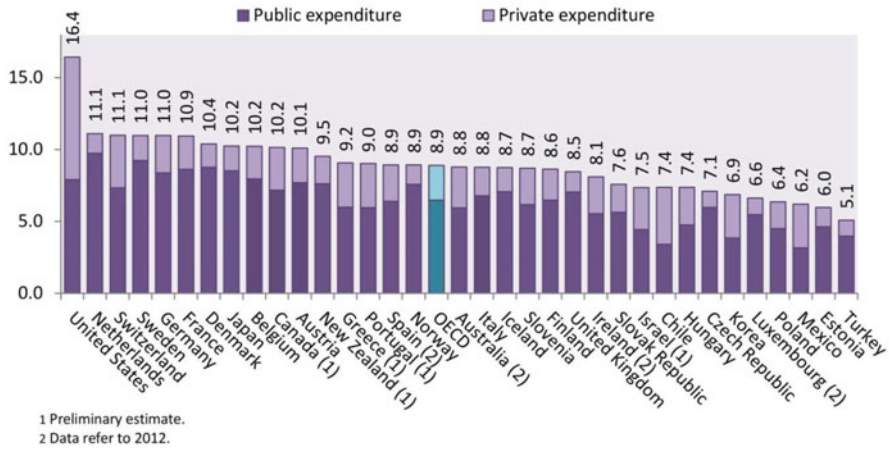


Fig. 6.1 Health spending (excluding investment) as a share of GDP. OECD countries, 2013. Source: OECD Health Statistics 2015

lead to the increase in health expenditures which constitute an important portion of government expenditure are of great importance for countries. Therefore, generally the factors which have an effect on the rise of health expenditure can be listed below.

Increasing Levels of Education and Development of Health Consciousness

Contemporary modern societies embrace a policy preference which prioritizes human health. For this reason, policies which aim at developing health consciousness and increasing levels of education have become widespread. According to the Universal Declaration of Human Rights adopted in 1948, right to education and health are two of the most fundamental human rights. Right to health is the right of all citizens in society to live in a physically and mentally healthy state. Everybody has the right to live healthy and benefit from healthcare services.

Increasing Levels of GDP and Per Capita Income GDP per capita is a measure of economic welfare, and it is calculated by dividing nominal GDP by country population. Capital accumulation and technological developments have very different roles in GDP increase and growth (Blanchard 2006). Increasing welfare due to the growth of national economy and increasing standards of living due to personal income lead to increased demand for health. There is a positive relationship between per capita national income and health expenditure.

Technological Developments As a result of increasing research and development activities in medicine and health-related fields, new discoveries have been made, and new technologies and methods have emerged in diagnosing and treating diseases. Particularly, the application of information technologies in the field of medicine is becoming more prevalent. The need for the use of computers and information technology increases as healthcare services become more complex every day. In the recent years, the rapid developments in computer and information technology have allowed new treatment methods and original implementations in the field of medicine.

Urbanization In the twenty-first century, natural population increase and acceleration of rural-to-urban migration cause speedy increases in the urban population. The increasing urban population brings along new health problems, and this leads to a rise in health expenditure. Rapid urbanization leads to serious environmental and health problems. While environmental pollution can be a cause for many diseases, it is at the same time one of the important factors enabling the spread of diseases.

Transformation of Social Standards of Judgment Through history, cultures and civilizations continue to change along with the human being and social and physical conditions which constitute them. Social standards of judgment also change at the stage of social transformation. This causes traditional perspectives on health expenditure to change in time, and previously unknown diagnosis and treatment methods emerge. This fact leads to an increase in health expenditure.

Extension of Average Life Expectancy According to the World Health Organization (WHO) statistics, average life expectancy around the world is rising; however the number of individuals who experience health problems is also increasing. New treatment methods and the increasing use of innovative drugs increase life expectancy at birth. Therefore, elderly population in total population also increases. The rising share of elderly population in total population is a major factor which increases health problems and health expenditure.

Social Changes Social change is differentiation which social relations, social institutions, and forms of social stratification, or briefly social structures, are experienced. Current cultural and social structure is experiencing a process of evolution. For example, there is a move away from large families to core families along with urbanization. Social changes are observed in all societies, and changes in one area have a knock-on effect on others. Today, citizen's perspective on how to demand their social rights from the state has been transformed as a result of the development of fundamental rights and freedom, education and freedom of thought, expansion of democratic rights, and rising volumes of information transfer as a result of the increasing means of communication. As a result of the increasing individual requests, rights, and demands, governments have provided constitutional guarantee for many rights including right to health. For this reason government expenditure on health has become compulsory expenditure.

6.5 The Relationship Between Health Expenditure and Level of National Income

Because health expenditure has the character of both current expenditure and investment expenditure within government expenditure, it is defined as current development expenditure. When the composition of health expenditure in Turkey is examined, it will be seen that government expenditure continuously increases (Fig. 6.2).

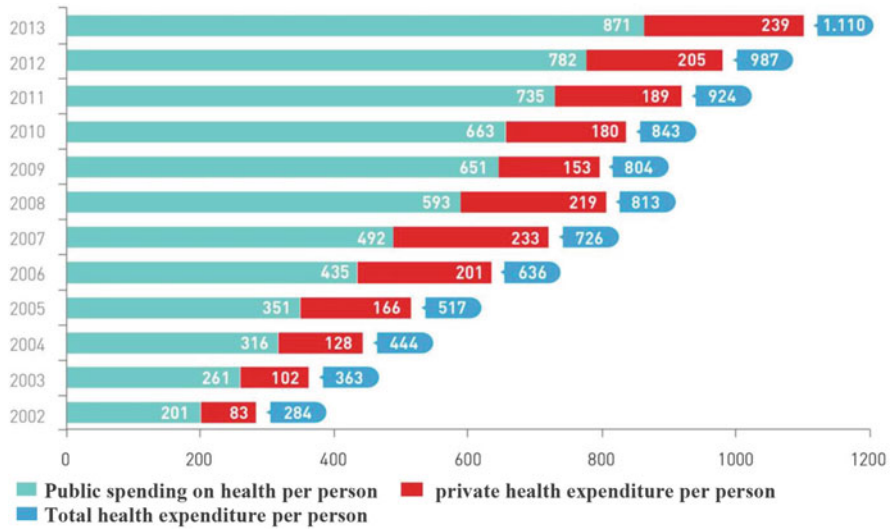


Fig. 6.2 Government and private expenditure on health per capita income according to years. Source: Turkish Statistical Institute, Ministry of Health 2015 Statistics Yearbook

Government expenditure is financed through Social Security Institution (premiums + state subsidies) and central budget funds. Government expenditure on health is considered as an allocation of funds from healthy to unhealthy in the case of premiums and in the case of treasury transfers as an allocation of income from the budget financed with taxes to those who need help. Education and health expenditures of social nature in government expenditure increase the income and welfare levels of mostly low-income social groups by relieving the burden on the family budgets of these groups. For this reason, the shares of Public Health and Welfare Ministry and Ministry of National Education in the state budget and GDP are important (Yüce 2002).

While the most important factor in increasing the human capital in a country is education, the level of social health confronts us as an effective and important factor in the development of human capital. It is generally recognized that there is a clear and mutual causality relationship between a country’s level of health and the level of economic development. As a result of economic development, transfer of funds to the field of health increases, and thus the increasing level of health accelerates economic development (Mazgit 2002).

The level of health expenditure is extremely important with regard to economic growth. The first effect of a good level of health on economic growth is allowing people to make use of human capital investments for longer periods of time by increasing the lifespan of individuals. Moreover, longer life expectancy, along with the returns which people will obtain from human capital investments throughout their lifetimes, will positively affect private saving decisions, and transforming the rising savings into investments will contribute positively to economic growth.

On the other hand, a higher level of health allows the quality of education as another factor of human capital to increase. Better-educated individuals mean more skilled, specialized, and qualified labor force and thus become a production-increasing factor. Improving the level of health allows allocating the funds which were previously being used to fight diseases to other fields. Moreover, as a result of the prevention of various diseases, thanks to precautionary health expenditure, funds which were supposed to be allocated to healthcare can be diverted to other fields producing goods and services. For all these reasons, health provides major contributions to countries' human capital accumulation and to economic growth as a result of this accumulation.

The effect of health expenditure investments on economic growth becomes clear in the long run. Within the scope of human capital approach, healthcare services have the character of health investment. Healthcare services are recognized as an investment which increases work productivity as they maintain and improve an individual's capability to work. Health expenditure allows a decreased future spending on health by maintaining the capacity to work and eliminating health problems. Health capital of a developing person constitutes an important part of human capital as well. Healthcare services and health investments, which will thereby increase health stock, assume important roles in country development by increasing human capital (Filiz 2010).

In a study conducted by using the data from 1994, the relationships between GDP per capita and health expenditure variables were investigated, and a direct and strong relationship, common across countries, between per capita income and health expenditure has been found. As a result of the analysis of this relationship, it has been determined that a 10-point increase in per capita GDP means an 11.3-point increase in health expenditure. Again in the same study, the income elasticity of government expenditure on health and private expenditure on health has been investigated, and these have been found to be 1.21 and 1.02, respectively. According to the research, the income elasticity of government expenditure on health is bigger than private expenditure on health. This shows that as countries' incomes increase, they allocate larger funds to (government and private) health expenditure than the increase in income, and thus as countries with rising incomes increase their health investments, they also allocate more funds to areas of rehabilitation which indicate more advanced levels of care (Schieber and Akiko 1999).

In another research which covers 75 countries, the causality relationship between income and health expenditure has been investigated, and it has been found that in 46 (approximately 61 %) of these countries, there is a two-way causality relationship both from income to health expenditure and from health expenditure to income. In the study, the countries in question were classified into low-, mid-, and high-income groups according to the World Bank criteria. In the studies conducted according to these three different groups, the ratio of two-way causality relationship was 68 % for low-income countries, 65 % for mid-income countries, and 50 % for high-income countries. In cases where there was not a two-way causality relationship, one-way relationship between income and health expenditure has been observed for most of the countries. The direction of this causality relationship was determined to be

either from income to health expenditure or from health expenditure to income. While with regard to mid- and low-income countries the causality relationship was either two-way or one-directional from income to health expenditure, with regard to high-income countries, there was a relationship from health expenditure to income (Erdil and Yetkiner 2004). Income (per capita GDP) has been identified as a very important factor for explaining differences across countries in the level and growth of total healthcare expenditures (Ke et al. 2011). According to a research conducted in 2002 on income elasticity, while the income elasticity of private expenditure on health was between 0.884 and 1.033 for government expenditure on health, this ratio was between 1.069 and 1.194 (Musgrove et al. 2002). In another research conducted in 2001 by using data on 44 African countries, income elasticity is shown to vary between 1.089 and 1.121 based upon the specific criteria used.

6.6 The Development of Health Expenditure in Turkey

According to a criterion generally recognized by the World Health Organization, the share allocated to health expenditure in a country should be at least 5 % of that country's national income or gross domestic product (Ünal 2013). It can be argued that in economically developed countries, the levels of health expenditure are higher compared to other countries. Nevertheless, developing countries also pay attention to health expenditure (Akar 2014).

Turkey's health expenditure/GDP ratio for the 2000–2014 period is shown in Fig. 6.3. When the ratios are examined, it can be seen that for the 2000–2014 period, the share of health expenditure in GDP has increased until 2009 and reached the highest level with a share of 6.1 %. However in 2011 and following years, this share has declined to a level of 5.4 %.

For the period between 2000 and 2013, total health expenditure in current prices in Turkey shows a trend of continuous increase. As it can be seen from Fig. 6.4, while the amount was 1.28 billion Turkish liras in 2000, it has increased to 111 billion Turkish liras in 2013. However the increase in question is nominal, and in order to make valid interpretations, a comparison should be made using real values.

In real terms the values obtained through the calculation of health expenditure based upon 2014 prices are presented in the figure below. As it can be seen from Fig. 6.5, in the period between 2000 and 2013, the health expenditure did not increase in real terms. The health expenditure which continuously increased in the period between 2001 and 2008 declined in 2009 and 2010 and restarted to rise in 2011. While in 2002 70.7 % of the total expenditure on health was financed by the public in 2013, this ratio increased to 78.5 %. In the 2002–2013 period, the health expenditure per capita increased 290 % nominally and 40 % in real terms.

When Fig. 6.5 is examined, it can be seen that the direction of real change in health expenditure is the same as the direction of the change in national income. The health expenditure changed less than the increase in national income for the 2002–2003 and 2009–2011 years.

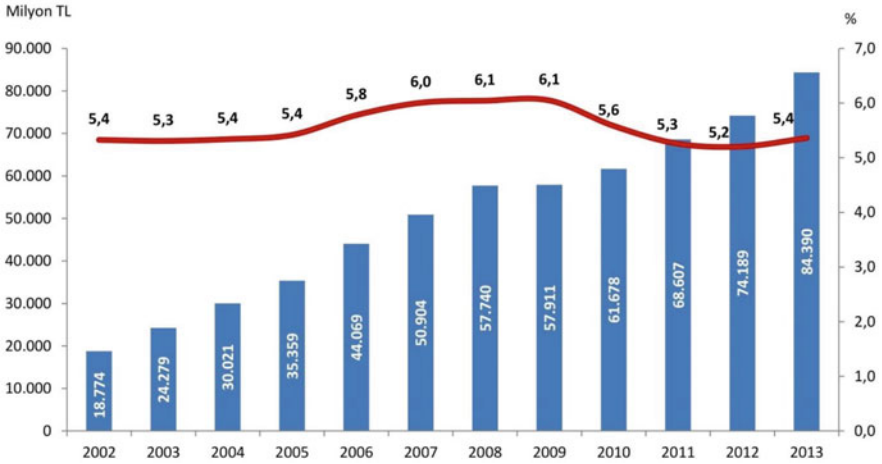


Fig. 6.3 Health expenditure as a share of GDP (%). Source: Turkish Statistical Institute, Health Expenditure Statistics

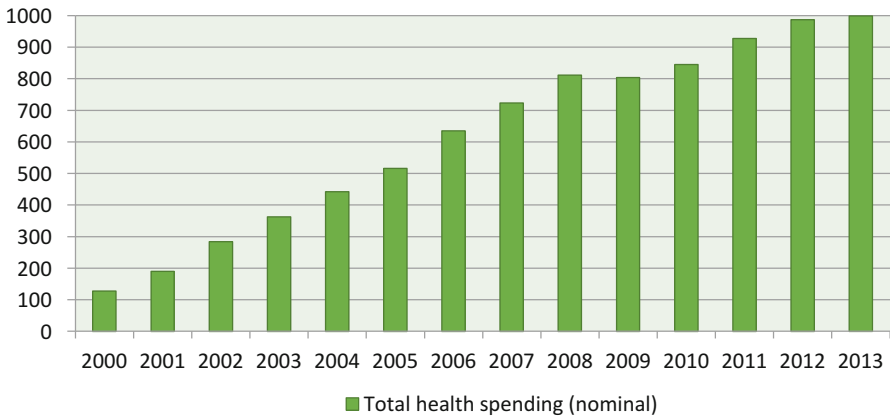


Fig. 6.4 Total expenditure on health, nominal prices, 2000–2013. Source: Turkish Statistical Institute, http://www.tuik.gov.tr/PreTablo.do?alt_id=1084

When we examine the health expenditure of the 1999–2012 period, it can be seen that the total expenditure on health increased 14 times in nominal terms and 73 % in real terms. For the same period, while the average nominal increase was 25 %, the average real increase was 4.5 %. The share of total expenditure in national income has increased from 4.8 in the period in question to a level of 6.1 in 2009; however it decreased to a level of 5.4 as of 2012.

While the share of total government expenditure on health in total expenditure on health was 59 % in 2012, it increased to 71 % in 2012. When we look at the change in health expenditure per capita, there is an increase from 699 Turkish liras in 1999

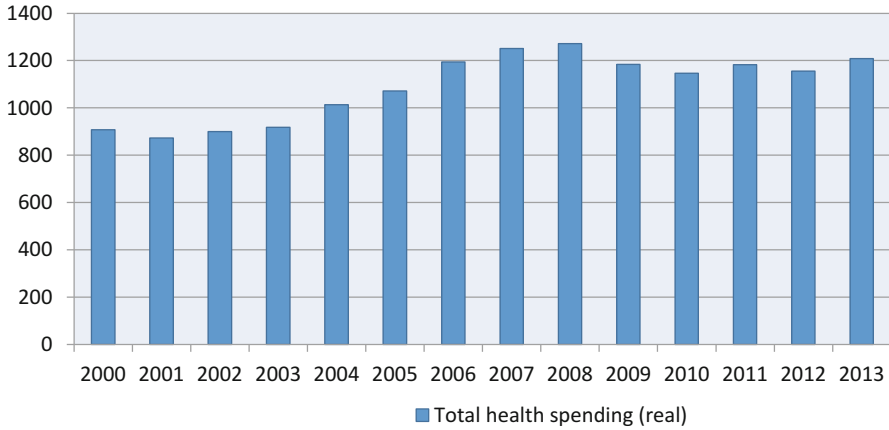


Fig. 6.5 Total expenditure on health, in real prices, 2000–2013. Source: Turkish Statistical Institute, http://www.tuik.gov.tr/PreTablo.do?alt_id=1084

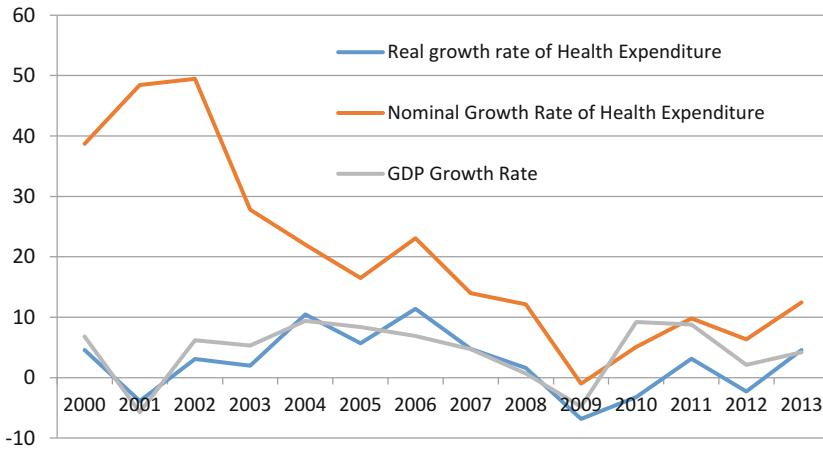


Fig. 6.6 Annual change in nominal and real growth rates of health expenditure and national income growth rate (compared to the previous year). Source: Turkish Statistical Institute and Ministry of Health, Health Statistics Yearbook 2014

to 1020 Turkish liras in 2012, based on 2012 prices. While health expenditure per capita nominally increased nearly 13 times, in real terms it only increased 1.5 times (Fig. 6.6).

With the Social Security reform which extended social security coverage to the whole society and targeted increased access to high-quality and effective healthcare services, there were substantial increases in the budget share that the government allocated to the health sector in the 2002–2008 period; however this increase started to recede as of 2008. While the overall government primary expenditures in Turkey was 91.9 billion Turkish liras in 2002, this amount increased at an average rate of 18.6 % annually throughout the 2002–2012 period reaching 503 billion Turkish liras

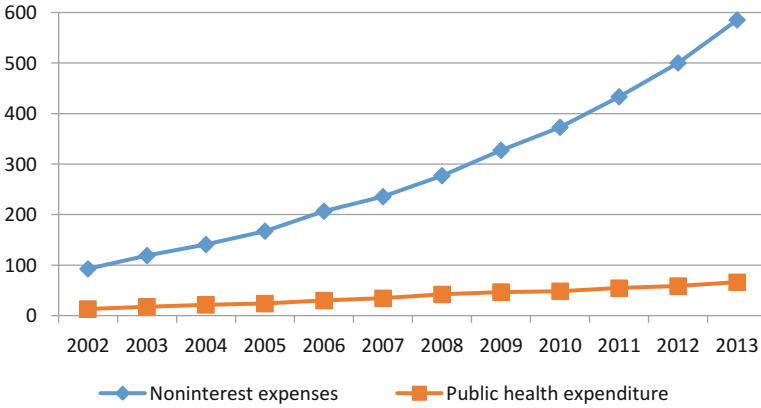


Fig. 6.7 Primary expenditure and government expenditure on health according to years (million liras) Source: Turkish Statistical Institute, Ministry of Health Statistics Yearbook 2014

in 2012. Parallel to this increase, while the total government expenditure on health was 13.3 billion Turkish liras in 2002, this amount increased at an average rate of 16.3 % annually throughout the 2002–2012 period reaching 58.8 billion Turkish liras in 2012.

The share to total government expenditure on health in the total government primary expenditure has increased from 14.4 % in 2002 to 15.2 % in 2008, and the share which started to recede in 2008 fell down to 11 % in 2013 (Fig. 6.7). This shows that government expenditure on health has increased less than total government expenditure during the period in question.

6.7 Statistical Analysis of Government Expenditure on Health in Turkey

The research subject is the analysis of the relationship between the change in total government expenditure on health between the years 2000 and 2013 and GDP. The relationship between total expenditure on health and GDP has been examined with the Pearson and Spearman rank correlation tests. As it is known, the correlation coefficient determines the relationship between variables; however it does not provide any insight on the degree of relationship. In such situations, rank correlation test is conducted in order to determine the level of relationship (Dikmen 2012).

The reason for selecting this model is the necessity of using the correlation test in order to test whether or not there is a positive or negative relationship between the two variables. The most popular correlation tests are the parametric Pearson and nonparametric Spearman rank correlation tests. While the low number of observations in the data set makes the assumption that the data is normally

distributed debatable, the parametric Pearson test and nonparametric Spearman rank correlation test have been used to determine the relationship between the two variables. The Spearman rank correlation is used to test the null hypothesis which states that there is no relationship between a pair of random variables (Newbold and Şenesen 2005). The distribution under this hypothesis is known, and the threshold values are located in the table of threshold values of Spearman rank correlation coefficient distribution. Just as Pearson's product-moment correlation coefficient, Spearman's ρ coefficient values vary between -1 and $+1$. Extreme values ($\rho = -1$ and $\rho = +1$ and approximate values) indicate that the relationship between the two variable rankings is very strong (if the rankings are placed on a scatter diagram as dots, they will all be on a single line).

The correlation coefficient indicating the relationship between two variables is calculated using the formula below:

$$\rho = 1 - \frac{6 \sum D^2}{n(n^2 - 1)}$$

Here, D is the difference between rank numbers and n the number of observations and ρ is the correlation coefficient. ρ values will be between $-1 \leq r_s \leq 1$. Whether the calculated correlation coefficient is significant or not is determined with a 0.01 or 0.05 margin of error. Test statistic is calculated using the formula below.

$$t = \frac{\rho \sqrt{n-2}}{\sqrt{1-\rho^2}}$$

Based on a specific significance level and degree of freedom, the calculated t statistic is compared with the $Z_{\alpha/2}$ value on the normal distribution table if $n \geq 30$; if $n < 30$ it is compared with the $t_{\alpha/2, n-2}$ value to be calculated according to the t distribution table with the $(n-2)$ degree of freedom (Dikmen 2012). If the calculated t -test statistic value is bigger than the table value, H_1 hypothesis will be accepted and H_0 hypothesis will be rejected. In this case, the relationship between the two variables will be recognized as statistically significant.

The analysis is based upon the data given in Table 6.1.

The main and alternative hypotheses established for the test are given below:

H_0 There is no relationship between the two variables.

H_1 There is a significant relationship between the two variables.

As a result of the analysis, there will be two results which are referred to as Spearman rank correlation coefficient and Rho (ρ) value. If ρ value is less than 0.05, H_0 hypothesis will be rejected; in other words a statistically significant relationship will be assumed between the two variables. As the calculated Rho (ρ) value, in other terms the correlation coefficient, approximates 1, the strength of the relationship between the two variables increases; as the correlation coefficient approximates 0, the strength of the relationship between the variables decreases. If ρ value is bigger than 0.05, H_1 hypothesis will be rejected; in other words it will be recognized that there is no statistically significant relationship between the two variables.

Table 6.1 GDP and total expenditure on health (2000–2013)

Years	GDP (current prices, thousand Turkish liras)	Government expenditure on health (central state +local state) (million Turkish liras)	SSI expenditure on health (million Turkish liras)	Total government expenditure on health
2000	1,666,580,215	2304	2886	5190
2001	2,402,240,831	3843	4595	8438
2002	3,504,760,895	5639	7631	13,270
2003	4,547,806,594	6800	10,662	17,462
2004	5,590,330,259	8159	13,231	21,389
2005	6,489,317,118	9987	14,000	23,987
2006	7,583,907,852	12,449	17,667	30,116
2007	8,431,784,214	14,833	19,697	34,530
2008	9,505,342,507	16,813	25,346	42,159
2009	9,525,585,788	18,613	28,277	46,890
2010	1,098,799,348	17,786	30,695	48,482
2011	1,297,713,210	19,643	34,937	54,580
2012	1,416,798,490	17,155	41,630	58,785
2013	1,567,289,238	19,235	46,993	66,228

Source: Turkish Statistical Institute, Ministry of Health Statistics Yearbook (2014)

For the statistical analyses which were conducted in the study, SPSS 20.0 Statistical Package Program has been used. As result of the findings obtained at the end of analysis, the examination of the relationship between the change in government expenditure on health and GDP using Spearman's rank difference correlation revealed values regarding the correlation coefficient, ρ value, and N (variable) indicators. In the Pearson and Spearman rank difference correlation test, analysis has been conducted based upon the GDP and total government expenditure on health time series data. The degree of the two-way relationship between the two variables has been tried to be determined. The results were evaluated with respect to the correlation coefficient and degree of significance.

The findings obtained according to the analysis are provided below:

Correlations		VAR00001	VAR00002
VAR00001	Pearson correlation	1	0.993**
	Sig. (2-tailed)		0.000
	N	14	14
VAR00002	Pearson correlation	0.993**	1
	Sig. (2-tailed)	0.000	
	N	14	14

**Correlation is significant at the 0.01 level (2-tailed)

Correlations				
		VAR00001		VAR00002
Spearman's rho	VAR00001	Correlation coefficient	1.000	1.000**
		Sig. (2-tailed)	.	.
		<i>N</i>	14	14
	VAR00002	Correlation coefficient	1.000**	1.000
		Sig. (2-tailed)	.	.
		<i>N</i>	14	14

**Correlation is significant at the 0.01 level (2-tailed).

According to the analysis results, the H_0 hypothesis is rejected, and H_1 hypothesis is accepted because the Pearson correlation coefficient between GDP and total government expenditure on health is $\rho=0.993$ and the degree of significance is bigger than 0.05. In other words there is a statistically significant relationship between the two variables. The fact that the correlation coefficient is 0.993 indicates a significant and strong relationship between the two variables.

According to the Spearman rank correlation test results, the H_0 hypothesis is rejected, and H_1 hypothesis is accepted because the correlation coefficient between GDP and total government expenditure on health is $\rho=1.000$ and the degree of significance is bigger than 0.05. In other words there is a statistically significant relationship between the two variables. The fact that the correlation coefficient is 1.000 indicates a significant and very strong relationship between the two variables.

The $t_{\alpha/2, n-2}$ value to be derived from the t distribution table at the $\alpha = 0.01$ significance level is $t_{0.005, 12} = 3.055$, and the calculated t -statistic value is 29.123. As the calculated t -test statistic value is bigger than the table value, H_1 hypothesis is accepted and H_0 hypothesis is rejected. Accordingly, the relationship between the GDP variable and total government expenditure on health is found to be statistically significant.

The analysis results are congruent with the literature, and the correlation between GDP and total government expenditure on health is clearly observed. However more data and regression models are needed regarding the direction and level of this relationship. However, when the previous studies are considered, it can be said that the relationship is not one-way and that there is a positive relationship from income to expenditure and from expenditure to income. Particularly the increasing government expenditure on health, the majority of which take the form of transfer expenditure, contributes positively to the development of GDP by, generally speaking, increasing the society's health level.

6.8 Conclusion

It can be seen that in the twenty-first century the traditional role of the state in realizing healthcare services has started to change. The public share in health expenditure is gradually increasing. Generally, there is a causality relationship

between health expenditure and GDP. While the direction of the relationship is from income to health expenditure, studies have revealed a relationship from expenditure to income. While the effect of health expenditure on economic growth is multidirectional in the long run, it has important effects with regard to economic growth and development. When generally considered as an investment in human capital, healthcare services will make, by eliminating potential diseases, important contributions to the creation of a healthier society, improving the capacity to work and thereby to economic growth and welfare increase.

The long life expectancy which will be brought about by the increasing health level, along with the expectation of returns people will obtain throughout their lives from human capital investments, will positively affect private saving decisions and will make important contributions to economic growth as increasing savings turn into investments. Another effect will be that as a result of the basic health financing obtained by government independently from premiums, individuals' out-of-pocket payments will decrease, and thus as the disposable incomes of society's middle and lower classes are positively affected, it will contribute to increasing the consumption expenditures. Moreover, the increasing national income and personal income levels also cause health expenditure to increase. The rising welfare caused by the growth of national economy and the rising standards of living caused by personal income lead to increased demand for health.

When we look at the health expenditure in Turkey, it can be seen that in the recent years, there have been considerable increases and that the share of government expenditure on health in total expenditure has increased. In this study the relationship between government expenditure on health and GDP has been analyzed. According to the Spearman rank difference correlation test results, there is a significant relationship between GDP and health expenditure. When this relationship is considered in accordance with the similar studies in the literature, it can be said that the increasing GDP positively affects health expenditure, and at the same time health expenditure positively affects GDP.

The fact that the share of the public in health expenditure has substantially increased in the recent years leads to the perception that health expenditure is an unnecessary burden. However, health expenditure which is current investment should not be considered merely as a burden on the national budget, and its effect on the level of health should be highlighted. By taking into consideration that if effectively and efficiently used, this expenditure will have positive contributions to economic growth and thus the level of national income, long-term policies should be formulated. Past research has shown that health investments make substantial contributions to increasing the level of human capital as much as education investments.

With regard to Turkey's economic growth and development targets, based upon the expectation that the rise in national income will continue, it is also perceived that the increase in health expenditure will also continue. The rise in the recent years of the share of government expenditure on health in total expenditure on health reveals that the increasing health expenditure will affect government funds the most. This situation confronts us as an important matter which the public decision-making bodies need to take into consideration when determining long-term policies.

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Chapter 7

Banking Efficiency and Financial Stability: Which Causes Which? A Panel Analysis

Nader Alber

Abstract This paper attempts to investigate the relationship between banking efficiency and financial stability using a sample of 12 MENA countries, over the period from 2005 to 2014. Using panel analysis according to fixed effect model, results indicate that hypotheses regarding the significance of this impact could be accepted. Also, robustness checks, using dynamic effect model, assure the significance of these effects.

Keywords Bank efficiency • Data envelopment analysis • Financial stability

7.1 Introduction

Efficiency is an aspect of firm performance that is measured with respect to an objective; it can be measured with respect to maximization of output, maximization of profits, or minimization of costs. Scale economies, scope economies, and X-efficiency are different aspects of performance. Scale and scope economies refer to selecting the appropriate outputs, while X-efficiency refers to selecting the appropriate inputs. Typically, scale economies refer to how the firm's scale of operations (its size) is related to cost. Scope economies refer to how the firm's choice of multiple product lines is related to cost (Mester 2003, p. 2).

Data envelopment analysis (DEA) is a mathematic technique developed in operations' research and management science, and over the last 40 years, the field of its usage has been extensively updated. DEA is a nonparametric linear programming technique that measures the relative efficiency of a group of decision-making units (DMUs) which receive multiple inputs to produce multiple outputs.

DEA, first proposed by Charnes et al. (1978) and applied by Sherman and Gold (1985), is based on earlier work initiated by Farrell (1957). DEA has become a popular technique in bank efficiency analysis since its first application by Berger and Humphrey (1997) provides an international survey of efficient frontier analysis

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of financial institution performance. Maletić et al. (2013, p. 845) address the basics of DEA methods: Charnes, Cooper, and Rhodes (CCR); Banker, Charns, and Cooper (BCC); and AP (Andersen and Petersen).

Regarding financial stability, many global, regional, and governmental bodies are established for its promotion. The Financial Stability Board (FSB) is established to address financial system susceptibilities and to drive the development and implementation of strong regulatory, supervisory, and other policies which enhance financial stability. Also, the Financial Stability Forum (FSF) has been set up by the G-7 in the wake of the Asian crisis in 1999, with an expanded membership (drawn mainly from the G-20).

In the USA, the legislation Restoring American Financial Stability Act of 2010 focuses on how to promote the financial stability. The UK Financial Services Authority (FSA) requires stricter capital rules than those proposed by the Basel Committee on Banking Supervision (BCBS). The European Central Bank (ECB) is in charge of monitoring and assessment of financial stability. Presently, the Committee of European Banking Supervisors (CEBS) provides regular bank sector analysis and performs assessments on banking risks, to be reported to the European Union political institutions.

Swamy (2011) analyzes the determinants of banking sector soundness, as measured by banking stability index (BSI) in the context of an emerging economy banking sector. This study considers the core set of soundness indicators for the construction of the index for the Indian financial system during the 1997–2009 period.

It's important to analyze the relationship between stability and market structure, within the structure-conduct-performance paradigm, the market structure that the firm stays will influence the conduct decision of the firm, and then influence the firm's performance.

In brief, this study tries to answer these two main questions:

- Does “banking efficiency” affect the “financial stability” as applied on Arabian banks?
- Does “financial stability” affect the “banking efficiency” as applied on Arabian banks?

The paper is arranged as follows: after this introduction, Sect. 7.2 reviews research literature that has concerned with “banking efficiency” and “financial stability”. Section 7.3 explains how to develop hypotheses and measure variables. Section 7.4 is for empirical work, presenting results, discussing how these results answer research questions with a robustness check. Section 7.5 summarizes the paper and provides remarks about conclusions.

7.2 Literature Review

This section tries to present some of previous work, which has been conducted in the fields of banking efficiency and financial stability.

Regarding “banking efficiency,” Athanassopoulos and Giokas (2000) examine 47 branches of the Commercial Bank of Greece and use the DEA results to implement the proposed changes in the bank performance measurement system.

Carvallo and Kasman (2005) investigate the cost-efficiency of a sample of 481 Latin American and Caribbean banks in 105 countries over the years from 1995 to 1999 using a stochastic frontier model (SFA). They use three inputs, loans, deposits, and other earning assets, and three prices of factors of production, the price of labor, the price of purchased funds, and the price of physical capital. Results indicate that on average, very small and very large banks are significantly more inefficient than large banks.

Efficiency of Canadian banks has been investigated by Avkiran (2006) and Wu et al. (2006). Avkiran (2006) applies DEA using a sample of 24 Canadian foreign bank subsidiaries in year 2000. The outputs include loans, securities, and noninterest income, while inputs include deposits, noninterest expenses, and equity multiplier. Wu et al. (2006) integrates the DEA and neural networks (NNs) to examine the relative branch efficiency of a big Canadian bank. The authors observe 142 banks in Canada and monitor the number of employees and costs for input indicators, while for output they monitor deposits, income, and bank loans.

Şakar (2006) in Turkey analyzes 11 banks and monitors input, branch numbers, employees per branch, assets, loans, and deposits, and outputs, ROA, ROE, interest income, and noninterest income (assets). Hassan and Sanchez (2007) examine banking performance using DEA. The authors estimate and compare the efficiency and productivity of seven Latin American countries (Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, and Venezuela) during the period from 1996 to 2003. The study finds that most of the sources of inefficiencies are regulatory rather than technical. This means that bank managers do not choose the correct (optimal) input and output mix, because they are not forced to do so by the environmental conditions (either government regulations or market conditions).

Moh'd Al-Jarrah (2007) uses DEA approach to investigate cost-efficiency levels of banks operating in Jordan, Egypt, Saudi Arabia, and Bahrain over 1992–2000. The estimated cost-efficiency is further decomposed into technical and allocative efficiency at both variable and constant return to scale. Later on, the technical efficiency is further decomposed into pure technical and scale efficiency. Results show that cost-efficiency scores range from 50 to 70% with some variations in scores depending on bank's size and geographical locations. Avkiran (2009) applied non-oriented network slacks-based measure in domestic commercial banks of United Arab Emirates (UAE), using non-oriented, non-radial SBM modeling.

Alber (2011) considers the effects of banking expansion on profit efficiency of the Saudi banks. This has been conducted using a sample of six commercial banks (out of 11) and covering the period from 1998 to 2007. Profit efficiency has been

measured using the ratio of actual profitability to the best one, which a similar bank can realize. Tests indicated that we could accept hypotheses regarding the effects of “availability of phone banking,” “number of ATMs,” and “number of branches” on profit efficiency of Saudi banks. Al-Farisi and Hendrawan (2012) examines the impact of capital structure on performance of conventional and Islamic banks, by using profit efficiency approach. They measure profit efficiency score for each bank in Indonesia during the period from 2002 to 2008 by using distribution-free approach (DFA). Results indicate that banks’ capital ratio has a negative effect on their profit efficiency.

Maletić et al. (2013) uses DEA technique in case of measuring operation efficiency of the banking sector in Serbia, which currently has 33 banks. Input and output indicators differ according to the used models A and B. According to model A, inputs include interest expenses and noninterest expenses, while outputs include interest income and net noninterest income. According to model B, inputs include deposits and employees, while outputs include loans and operating income.

Shafiee et al. (2013) evaluates the efficiency of an Iranian bank using dynamic SBM model in DEA during three consecutive terms considering net profit as a good link and loan losses as a bad link. Each branch in each term expends money on labor salaries and operating expense as inputs to produce loans as output. In each term some loans become nonperforming, because of borrowers unable to make full or even partial payment. Dynamic SBM efficiency is compared with its static efficiency to check the validity of described model. In addition, input-bad link excesses and output-good link shortfalls (slacks) are analyzed, and further suggestions to the management are provided.

Thayaparan and Pratheepan (2014) focus on total factor productivity growth and its decomposition of commercial banks in Sri Lanka, as applied on two state banks and four private banks over the period 2009–2012. By using DEA, total factor productivity and its components are measured in terms of efficiency change, technical efficiency change, pure efficiency change, and scale change. Interest income and loans are considered as outputs, and deposits, total assets, number of staff, and interest expenses are considered as inputs. Results indicate that all six banks operate averagely at 87.2 % of overall efficiency and that less performance is achieved due to the less progress in technical change than efficiency change. The overall results conclude that private banks are more efficient than state banks.

Alber (2015) aims at analyzing the effects of bank size, age, and ownership on efficiency of both Egyptian banks, as measured by data envelopment analysis (DEA) bank ownership according to CCR method. This has been conducted using Wilcoxon signed-rank test, as applied on a sample of ten banks during the period from 1984 to 2013. Results indicate that efficiency scores differ significantly, according to “size,” “age,” and “ownership” of the Egyptian banks, where small, old, and private banks seem to be more efficient than big, young, and public ones. Also, robustness check assures the “age” and “ownership” effects, using panel data analysis.

Regarding “banking stability,” Demirgüç-Kunt and Detragiache (2011) study the effect of compliance with the Basel core principles for effective banking supervision

on bank soundness. Using data for more than 3000 banks in 86 countries, the authors find that neither the overall index of compliance with the Basel core principles nor the individual components of the index are robustly associated with bank risk measured by Z-scores. This may cast doubt on the usefulness of the Basel core principles in ensuring bank soundness.

Dobravolskas and Seiranov (2011) investigate the reasons of financial instability, during the 2007–2008 crisis, and study the ways of rebuilding financial stability in the process of post-crisis regulatory reforms. Findings show that violation of stability is a result of deregulation processes in major financial markets since 1980s on the one hand and a result of inadequacy of national micro-prudential regulators on the other hand. The article studies how these targets are met in post-crisis regulatory reforms, in the USA, the European Union, and Lithuania.

De Nicolò et al. (2011) develop a dynamic model of a bank exposed to both credit and liquidity risk and analyze the impact of capital regulation, liquidity requirements, and taxation on banks' optimal policies and metrics of efficiency of intermediation and social value. The authors argue that the inverted U-shaped relationship between bank lending, bank efficiency, social value, and regulatory capital ratios indicates the existence of optimal levels of regulatory capital. Results indicate that mild capital requirements increase bank lending, bank efficiency, and social value relative to an unregulated bank. Also, findings show that liquidity requirements reduce bank lending, efficiency, and social value significantly.

Buston (2012) shows the net impact of two opposing effects of active risk management at banks on their stability. This has been applied on US BHCs using a sample of an unbalanced panel containing 7253 observations and 2276 banks, from 2005 to 2010. Empirical evidence supports the effects of active risk management at banks on their stability and shows that active risk management banks are less likely to fail during the crisis of 2007–2009.

Schaeck and Cihák (2013) assemble a panel dataset from Bankscope for European banks for the period 1995–2005. The sample covers Austria, Belgium, Denmark, France, Italy, Germany, Luxembourg, the Netherlands, Switzerland, and the UK and consists of 17,965 bank-year observations for 3325 banks. Results indicate that competition robustly improves stability via the efficiency channel.

Comparing with previous work, the current study tries to investigate the mutual effect of both financial stability and banking efficiency, while previous work tends to address them separately without this framework.

7.3 Measuring Variables and Developing Hypotheses

Banking efficiency is measured by DEA technique according to CCR approach, and financial stability is measured by Z-score that indicates the number of standard deviations that a bank's profit must fall to drive it into insolvency; where ROA is return on assets, E/A denotes the equity to asset ratio, and σ ROA is the standard deviation of return on assets. Table 7.1 illustrates this as follows.

Table 7.1 Measuring banking efficiency and financial stability

Variable	Calculation	Sign
Banking efficiency	Measured by DEA technique according to CCR approach	CCR
Financial stability	$= (ROA + E/A)/\sigma ROA$	Z

Table 7.2 Descriptive statistics of research variables

Variables	Minimum	Maximum	Mean	Std. deviation
CCR	0.7945	1.00	0.8983	0.0491
Z	2.6098	24.1539	11.9501	8.1842

Table 7.3 The effect of banking efficiency on financial stability

Model	α	β_1	F	R ²
Fixed effect	0.765 (0.008)	0.093 (0.010)	17.818	0.261 (0.0879)
Random effect	0.714 (0.019)	0.135 (0.018)	19.277	0.264 (0.0868)

Bold values indicate very high level of statistical significance

This paper aims at testing the following two hypotheses:

- There’s no significant effect of “banking efficiency” on “financial stability.”
- There’s no significant effect of “financial stability” on “banking efficiency.”

Regarding the first hypothesis, the null hypothesis H_0 states that $\beta_1 = 0$, while the alternative hypothesis H_1 states that $\beta_1 \neq 0$ where:

$$Z = \alpha + \beta_1 \text{ CCR} \tag{7.1}$$

Regarding the second hypothesis, the null hypothesis H_0 states that $\beta_2 = 0$, while the alternative hypothesis H_1 states that $\beta_2 \neq 0$ where:

$$\text{CCR} = \alpha + \beta_2 Z \tag{7.2}$$

7.4 Testing Hypotheses

Table 7.2 illustrates descriptive statistics of banking efficiency and financial stability using a sample of 12 MENA countries, over the period from the 2005 to 2014.

To investigate the effect of banking efficiency on financial stability, a panel data analysis has been conducted using each of fixed and random effect models and provides the following results (Table 7.3).

The above-shown table supports the significance of banking efficiency effect on financial stability with explanation power ranged from 26.1 % (using fixed effect model) to 26.4 % (using random effect model) at p -value of 1 %. Each of these two

Table 7.4 The effect of financial stability on banking efficiency

Model	α	B_2	F	R^2
Fixed effect	2.397 (0.008)	0.702 (0.019)	65.614	0.559 (0.1593)
Random effect	2.458 (0.019)	0.541 (0.023)	45.277	0.497 (0.1768)

Bold values indicate very high level of statistical significance

models could be considered as a robustness check for the other one. So, for the first hypothesis, the null hypothesis is rejected, and the alternative one could be accepted.

To investigate the effect of financial stability on banking efficiency, a panel data analysis has been conducted using each of fixed and random effect models and provides the following results (Table 7.4).

The above-shown table supports the significance of financial stability effect on banking efficiency with explanation power of 55.9 % (using fixed effect model) and of 49.7 % (using random effect model) at p -value of 1 %. Each of these two models could be considered as a robustness check for the other one. So, for the second hypothesis, the null hypothesis is rejected and the alternative one could be accepted.

7.5 Summary and Concluded Remarks

This paper attempts to investigate the relationship between banking efficiency and financial stability using a sample of 12 MENA countries, which include Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Palestine, Saudi Arabia, Syria, UAE, Oman, and Yemen, over the period from 2005 to 2014.

Using panel analysis according to fixed effect model, results indicate that hypotheses regarding the significance of this impact could be accepted.

Also, robustness checks, using dynamic effect model, assure the significance of these effects.

This means that banking efficiency and financial stability may affect each other, as applied on a sample of 12 MENA countries, over the period from the 2005 to 2014. More empirical work as applied on different countries and different periods is suggested.

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Chapter 8

Dynamic Modeling of Causal Relationship Between Energy Consumption, CO₂ Emissions, and Economic Growth in Italy

Pavlos Stamatiou and Nikolaos Dritsakis

Abstract The aim of this paper is to investigate the relationship between CO₂ emissions (carbon dioxide emissions), energy consumption, and economic growth in Italy, using annual data covering the period 1960–2011. The unit root tests results indicated that the variables are not stationary in levels but in their first differences. Subsequently, Johansen's cointegration test showed that there is a cointegrated vector between the examined variables. The vector error correction model (VECM) is used in order to find the causality relations among the variables. The empirical results of the study revealed that, in the short run, there is a unidirectional causality relation between economic growth and CO₂ emissions with direction from economic growth to CO₂ emissions, as well as a unidirectional causality relation running from economic growth to energy consumption. Moreover, the results showed that there is short-run bidirectional causality relation between energy consumption and CO₂ emissions.

Keywords Carbon emissions • Energy consumption • Growth • Italy

JEL Classification C32, Q43, Q53, Q56

8.1 Introduction

The rapid industrialization of most countries, the population growth, the increasing energy consumption, and the change of lifestyle over the last decades have increased the threat of global warming. Carbon dioxide emissions are considered as the main

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cause of the greenhouse effect. Since 1990, the link between CO₂ emissions and economic growth has been extensively studied. Many researchers have expressed their concerns about environmental degradation.

In the middle of the 1990s, the countries that had signed the agreement on climate changes realized that stricter rules were necessary in order to reduce CO₂ emissions. In 1997 the Kyoto protocol was adopted, which introduced legally binding objectives for emissions reduction in developed countries.

The second period of the Kyoto protocol began on January 1st 2013 and is ending in 2020. Thirty-eight countries participate including the European Union (EU) and the 28 member states. The second period is covered by the Doha (Qatar) amendment, where the participating countries are committed to reduce their emissions at a level that is at least 18 % lower than it was in 1990. In this period, the EU was committed to reduce CO₂ emissions at a level that is 20 % lower than 1990s levels.

The major weakness of the Kyoto protocol is that only developed countries are obligated to take action. Given that the United States has never signed it, Canada decided to withdraw before the end of the first commitment period, and Russia, Japan, and New Zealand do not participate in the second commitment period, the Kyoto protocol concerns only the 14 % of global emissions. However, more than 70 developed and developing countries have expressed nonbinding commitments for reducing or limiting their emissions.

At the Paris conference on December 12, 2015, representatives of 196 nations reached to a landmark agreement on climate change. The main elements of the new Paris agreement are:

- Long-term objective: governments agreed to keep the increase of global average temperature well under 2 °C compared to the preindustrial levels and to continue the efforts for restriction on 1.5 °C.
- Contributions: before the Paris conference, all countries had submitted comprehensive action plans as far as the reduction of their emissions.
- Ambition: governments agreed to notify every 5 years their contributions for the determination of more ambitious objectives.
- Transparency: in addition, governments agreed to report to each other and to the public their performance on the implementation of the objectives, ensuring in this way transparency and supervision.
- Solidarity: EU and other developed countries will continue providing funding on the developing countries in order to help them reduce their emissions and protect them against the effects of climate change.

The aim of this paper is to examine the long-run relationship between CO₂ emissions, energy consumption, and economic growth in Italy using annual data for the period 1960–2011, as well as the causal links between these variables.

The rest of paper is as follows: Sect. 8.2 presents the literature review. Section 8.3 describes data and methodology. Empirical results are discussed in Sect. 8.4. Concluding remarks are given in the final section.

8.2 Literature Review

In literature, there are three categories of studies on the relationship between CO₂ emissions and economic growth. The first category focuses on the relationship between environmental pollutants and economic growth and investigates the validity of the environmental Kuznets (1955) curve. The second category investigates the relationship between economic growth and energy consumption, and finally the third category examines the dynamic relationship between economic growth, energy consumption, and environmental pollutants.

The relationship between economic growth, energy consumption, and environmental pollutants has been the subject of intensive research over the last decades. However, the empirical results seem to depend on the period the study was conducted and on the stage of economic development of each country.

The environmental Kuznets curve assumes that the relationship between various indicators of environmental degradation and income per capita is an inverted U-shaped function of income per capita. According to this curve, the use of natural resources or the use of carbon dioxide increases when income per capita increases. In this context Grossman and Krueger (1991), Ang (2007), and Acaravci and Ozturk (2010) tried to examine the existence of Kuznets curve for different economies. Their results were contradictory and in many cases did not prove that the inverted U exists.

In the second category which examines the relationship between economic growth and energy consumption are included, among others, the studies of Kraft and Kraft (1978), Masih and Masih (1996), and Apergis and Payne (2009). All the above studies investigate the direction of causality among the considered variables.

Finally, the third category which is a combination of the two previous categories examines the dynamic relationship between economic growth, energy consumption, and environmental pollutants. Some recent studies on this category are Govindaraju and Tang (2013), Halkos and Tzeremes (2011), Akin (2014), Magazzino (2016), Dritsaki and Dritsaki (2014), and Ozturk and Uddin (2015). Their results show the existence of causal relationship between energy consumption and CO₂ emissions.

8.3 Data and Methodology

8.3.1 Data

In this study we use annual data of CO₂ emissions (CO₂) (metric tons per capita), energy consumption (EN) (kg of oil equivalent per capita), GDP per capita (GDP) (in constant 2005 US dollars), and trade openness (TRD) which is considered as a proxy of foreign trade of Italy. All data collected from World Development Indicators (WDI 2015) published by the World Bank.

8.3.2 Methodology

The relationship between CO₂ emissions, energy consumption, GDP per capita, trade openness, and the square of trade openness can be expressed as follows:

$$\text{CO}_{2t} = \alpha_0 + \beta_1 \text{EN}_t + \beta_2 \text{GDP}_t + \beta_3 \text{TRD}_t + \beta_4 \text{TRD}_t^2 + \varepsilon_t \quad (8.1)$$

where

CO_{2t} = per capita CO₂ emissions

EN_t = energy use per capita

GDP_t = per capita income

TRD_t = trade openness

TRD_t² = the square of TRD_t

ε_t = white noise

Implementing the logarithmic transformation and adding the trend variable, the above equation is expressed as follows:

$$L\text{CO}_{2t} = \alpha_0 + \alpha_1 t + \beta_1 L\text{EN}_t + \beta_2 L\text{GDP}_t + \beta_3 L\text{TRD}_t + \beta_4 L\text{TRD}_t^2 + \varepsilon_t \quad (8.2)$$

where

t is the trend variable.

L indicates that all the variables are expressed in natural logarithms.

The transformation of the data is made to reduce the potential problem of heteroscedasticity (see Gujarati 2004). According to equation (Eq. (8.2)), it is expected that the higher level of energy consumption will lead to greater economic activity having as a result higher CO₂ emissions. Therefore, we expect the β₁ coefficient to be positive. The literature on environmental quality and economic development focuses mainly on the analysis of the existence of the environmental Kuznets (1955) curve. Thus, the sign of β₂ coefficient can be either positive or negative. The expected sign of coefficient β₃ depends on the stage of economic development of each country. The sign will be positive in the case of the developing countries, as these countries have industries with high pollution level. On the other, the sign will be negative in the case of developed countries. These countries can reduce their pollution level by reducing their production and importing goods from other economies. Finally, the sign of the coefficient β₄ is expected to be negative due to trade openness which promotes technology transfer.

After determining the signs of the coefficients, the next step is to test if they are statistically significant. Many researches in their studies indicate an inability to support the environmental Kuznets curve. Moreover, several studies show that carbon dioxide emissions are positively related with trade openness and the square of trade openness, having as a result the multicollinearity problem in these variables (see studies of Galeotti et al. (2006) and Ozturk and Uddin (2015)). In this study, applying the collinearity test among the series of trade openness (LTRD) and the square of trade openness (LTRD²), we found that there is multicollinearity in the examined model.

Therefore, we remove these variables from the model (Eq. (8.2)). The following model arises:

$$LCO2_t = \alpha_0 + \alpha_1 t + \beta_1 LEN_t + \beta_2 LGDP_t + \varepsilon_t \quad (8.3)$$

So, we begin the estimation process from the model (Eq. (8.3)). The purpose of the paper is to examine the long-run relationship between CO₂ emissions, energy consumption, and economic growth in Italy. The methodological approach of the study includes the following steps:

- We check the stationarity properties of the series applying the augmented Dickey–Fuller (ADF) test (1979, 1981) as well as the Phillips–Perron (PP) test (1988).
- If all variables are integrated of order one, then Johansen’s (1995) cointegration test is the most appropriate to be used. In the case that the variables do not have the same integration order, Pesaran’s et al. (2001) cointegration test is the most appropriate.
- The third step is to check the causal relationship between the variables using the appropriate tests.

Figure 8.1 presents the progress of the three variables, per capita energy consumption, per capita CO₂ emissions, and GDP per capita for Italy during the years 1960–2011. The descriptive statistics of the variables are shown in Table 8.1.

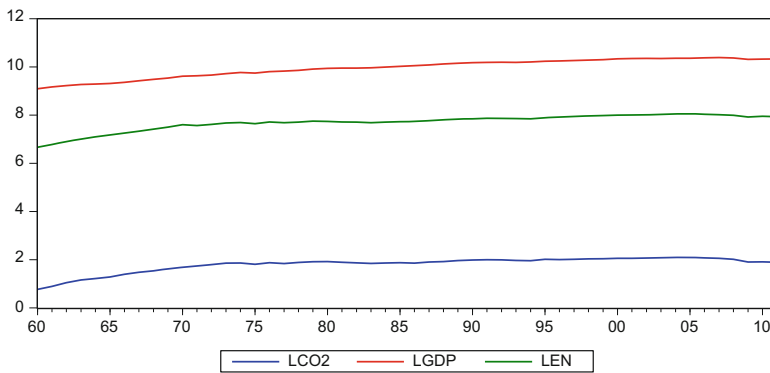


Fig. 8.1 Graphical representation of the data for Italy

Table 8.1 Descriptive statistics

	LCO2	LEN	LGDP
Mean	1.815848	9.960574	7.706844
Median	1.908116	10.04663	7.753269
Maximum	2.106143	10.39912	8.061392
Minimum	0.778611	9.106050	6.678091
Std. Dev.	0.315870	0.383520	0.334215
Skewness	-1.766146	-0.696584	-1.453633
Kurtosis	5.357717	2.274247	4.546222
Jarque-Bera	39.07783	5.346544	23.49316
Probability	0.000000	0.069026	0.000008
Sum	94.42410	517.9498	400.7559
Sum Sq. Dev.	5.088481	7.501466	5.696681
Observations	52	52	52

8.4 Empirical Results

8.4.1 Unit Roots Tests

Applying the unit root tests of ADF, by Dickey and Fuller (1979, 1981), and PP, by Phillips and Perron (1988), we present the results in Table 8.2.

The results of Table 8.2 showed that all variables are stationary in their first differences, namely, they are integrated of order one (i.e. $I(1)$). Therefore, we continue applying Johansen's cointegration approach in order to examine the long-run relationship among the variables.

8.4.2 Cointegration Test

Since Johansen's approach is sensitive to the lag length, before applying the cointegration test, we have to find the order of the VAR model. The optimal lag length is selected by the minimum value of the criteria AIC, SBC, and HQC. Table 8.3 presents the results of these criteria.

All the criteria indicate that the optimal lag length is equal to 1. Therefore, the order of the VAR model is equal to 1.

Johansen's cointegration test is based on the trace statistic and on the maximum eigenvalue statistic. The maximum number of cointegrating vectors is one less than the number of variables. For the trace test, the null hypothesis is that there are r cointegrating vectors against the alternative of more than r . The null hypothesis of maximum eigenvalue test remains the same as before; however, the alternative is that there are exactly $r + 1$ cointegrating vectors. The results of Johansen's cointegration test are presented in Table 8.4.

Table 8.2 Univariate unit root tests

Variable	ADF		PP	
	<i>C</i>	<i>C, T</i>	<i>C</i>	<i>C, T</i>
<i>LCO</i> ₂	2.115 (0)	−0.786 (0)	1.018 (5)	−0.876 (5)
<i>LEN</i>	3.724 (0)	−1.564 (0)	2.050 (5)	−1.256 (5)
<i>LGDP</i>	6.358 (0)	−0.564 (0)	4.167 (4)	−0.732 (4)
Δ <i>LCO</i> ₂	−3.712 (0)***	−3.871 (0)***	−3.525 (3)***	−3.693 (3)***
Δ <i>LEN</i>	−3.860 (0)***	−4.274 (0)***	−3.684 (3)***	−4.269 (4)***
Δ <i>LGDP</i>	−1.925 (2)**	−4.779 (0)***	−3.302 (3)***	−4.876 (4)***

*** and ** show significance at 1 and 5% levels, respectively, the numbers within parentheses followed by ADF statistics represent the lag length of the dependent variable used to obtain white noise residuals, the lag lengths for ADF equation were selected using Schwarz information criterion (SIC), Mackinnon (1996) critical value for rejection of hypothesis of unit root was applied, and the numbers within brackets followed by PP statistics represent the bandwidth selected based on Newey and West (1994) method using Bartlett kernel; *C* constant, *T* trend, Δ first differences

Table 8.3 Var lag order selection criteria (Max = 4)

Lag	Log <i>L</i>	LR	FPE	AIC	SBC	HQC
0	137.11	NA	7.51×10^{-7}	−5.5880	−5.4711	−5.543858
1	375.64	437.31 ^a	$5.3e \times 10^{-11a}$	−15.151 ^a	−14.684 ^a	−14.975 ^a
2	381.38	9.7996	6.08×10^{-11}	−15.015	−14.197	−14.706
3	391.02	15.272	5.99×10^{-11}	−15.042	−13.873	−14.600
4	396.77	8.3797	7.02×10^{-11}	−14.907	−13.386	−14.332

^aIndicates lag order selected by the criterion

Table 8.4 Johansen’s cointegration tests—VAR (1)

Cointegration rank tests	Hypothesis	Trace statistics	Critical values	<i>p</i> -values	Cointegrating equations
<i>Italy</i>					
λ trace tests					
0.489787	$H_0:r = 0, H_1:r > 0$	48.93913	29.79707	0.0001	1
0.221665	$H_0:r = 1, H_1:r > 1$	15.29282	15.49471	0.0536	0
0.053759	$H_0:r = 2, H_1:r > 2$	2.762920	3.841466	0.0965	0
λ max tests					
0.489787	$H_0:r = 0, H_1:r = 1$	33.64631	21.13162	0.0005	1
0.221665	$H_0:r = 1, H_1:r = 2$	12.52990	14.26460	0.0923	0
0.053759	$H_0:r = 2, H_1:r = 3$	2.762920	3.841466	0.0965	0

Trace and max-eigenvalue tests indicates 1 cointegrating equations at the 1 % level, MacKinnon et al. (1999) *p*-values

The results of Table 8.4 (trace test statistics and maximum eigenvalue statistics) support the presence of one cointegrating vector at 1% level of significance. We conclude that there is a strong evidence of cointegration among the examined variables. The cointegrating vector is shown below:

$$LCO2_t = 0.127LEN_t + 0.352LGDP_t \quad (8.4)$$

(0.188) (0.153) (standard error in parentheses)

8.4.3 Error Correction Model (ECM)

Since there exists a cointegrating vector (long-run relationship), a dynamic error correction model can be derived through a linear transformation. The dynamic ECM incorporates the short-run dynamic with the long-run equilibrium, from which we can examine the causal relationship between the variables.

The dynamic unrestricted error correction model is expressed as follows:

$$\begin{aligned} \Delta LCO2_t = & \alpha_{01} + \sum_{i=1}^p \alpha_{1i} \Delta LCO2_{t-i} + \sum_{i=1}^p \alpha_{2i} \Delta LEN_{t-i} + \sum_{i=1}^p \alpha_{3i} \Delta LGDP_{t-i} \\ & + \lambda_1 ECM_{t-1} + \varepsilon_t \end{aligned} \quad (8.5)$$

where ECM_{t-1} stands for the lagged error correction term from the long-run cointegration equation (Eq. (8.6)).

8.4.4 The VECM Granger Causality

After the long-run relationship, we continue applying the VECM in order to determine the direction of causality between the examined variables. The equations that are used to test Granger causality are the following:

$$\begin{bmatrix} \Delta LCO2_t \\ \Delta LEN_t \\ \Delta GDP_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} + \sum_{i=1}^p \begin{bmatrix} \beta_{11} \beta_{12} \beta_{13} \\ \beta_{21} \beta_{22} \beta_{23} \\ \beta_{31} \beta_{32} \beta_{33} \end{bmatrix} \begin{bmatrix} \Delta LCO2_{t-p} \\ \Delta LEN_{t-p} \\ \Delta LGDP_{t-p} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \end{bmatrix} ECM_{t-1} + \begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{bmatrix} \quad (8.6)$$

where i ($i = 1, \dots, p$) is the optimal lag length determined by the Schwarz information criterion (SIC); ECM_{t-1} is the lagged residual obtained from the long-run relationship presented in equation (Eq. (8.3)); λ_1 , λ_2 , and λ_3 are the adjustment coefficients; and u_{1t} , u_{2t} , and u_{3t} are the disturbance terms assumed to be uncorrelated with zero means $N(0, \sigma)$.

From the results of Table 8.5, we see that there is a short-run unidirectional causal relationship between economic growth and CO₂ emissions with direction from

Table 8.5 The ECM Granger causality analysis

Dependent variable	Short run (F -stat)			Long run (t -stat)
	ΔLCO_{2t}	ΔLEN_t	$\Delta LGDP_t$	ECM_{t-1}
ΔLCO_{2t}		0.423**	-0.836***	-0.709***
ΔLEN_t	0.644***		-1.212***	0.276
$\Delta LGDP_t$	0.045	0.008		0.015

*** and ** show significance at 1 and 5% levels, respectively, Δ first difference operator

economic growth to CO₂ emissions, as well as a unidirectional causal relationship running from economic growth to energy consumption. This means that a high level of economic growth leads Italy to a high level of energy consumption. Moreover, the results show that there is a bidirectional causality relation between energy consumption and CO₂ emissions.

In the long run, we see that the estimated coefficient of ECT in the equation of ΔLCO_2 is negative and statistically significant at 1 % level. This implies that there is convergence of dynamic equilibrium in the long run. The value of the estimated coefficient of the ECT shows the speed of adjustment (convergence).

The negative sign of the coefficient of ECT confirms the expected convergence of the process in the long run, of energy consumption and economic growth on carbon dioxide emissions.

8.5 Conclusion and Policy Implications

This study investigates the relationship among CO₂ emissions (carbon dioxide emissions), energy consumption, and economic growth in Italy, using Johansen's maximum likelihood procedure in a multivariate model over the period 1960–2011. Findings suggest that there is a strong evidence of cointegration among the examined variables, which indicates that there is a long-run equilibrium relationship.

The vector error correction model was used to capture the short-run and the long-run dynamic relationships. The obtained results revealed that in the short run there is a unidirectional causal relationship between economic growth and CO₂ emissions with direction from economic growth to CO₂ emissions, as well as a unidirectional causal relationship between economic growth and energy consumption with direction from economic growth to energy consumption. This means that in Italy the level of economic activity and energy consumption go together. In addition, the results showed that there is a bidirectional causality relation between energy consumption and CO₂ emissions. In the long run, we see that the estimated coefficient of ECT in the equation of ΔLCO_2 is negative and statistically significant at 1 % level implying that CO₂ emissions could play an important adjustment role in the long-run equilibrium.

This can be explained as follows. Although Italy is rich in carbon and endowed with renewable energy sources such as solar, wind, and bioenergy, it uses carbon heavily. Consequently, carbon has the highest emission rate of carbon dioxide compared with other sources.

Italy has to displace the energy use from carbon to alternative renewable energy sources even more rapidly. These measures will help Italy to maintain growth expectations, as well as to implement the EU's plan for climate change as agreed by the new Paris agreement.

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Chapter 9

Financial Literacy and Financial Behavior: An Evidence of Linkage in Albanian Context

Besa Shahini

Abstract This paper is an effort to undertake and analyze a survey of not only a detailed financial literacy but also to see a correlation between financial knowledge and the financial behavior among individuals (who represent households) considering socioeconomic factors. A quantitative approach was adopted for this study, utilizing questionnaire survey as the main research instrument, and factor analysis, analysis of variances, and correlative techniques are efficiently used. A positive significant correlation between financial literacy and financial behavior is expected. Moreover, less educated individuals and lower-income ones are expected to have lower financial literacy and lower behavior performance

Keywords Financial literacy • Financial behavior • Financial education

JEL Classification D14, G02, H3, I22

9.1 Introduction

Recently, all over the world, the developed and developing countries and economies have become increasingly concerned about the level of financial literacy of their citizens. This is due to some socioeconomic phenomenon such as shrinking public and private support systems, shifting demographic profiles including the aging of the population, and wide-ranging developments in the financial marketplace.

People are more and more challenged by the economic and financial developments and are conscious that there is a lack of financial literacy especially focused to the factors contributing to ill-informed financial decisions and that these decisions could, in turn, have tremendous negative spillovers (Gerardi et al. 2010). As a

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result, financial literacy is now globally acknowledged as an important element of economic and financial stability and development; this is reflected in the recent G20 endorsement of the OECD/INFE High-level Principles on National Strategies for Financial Education.

There has been a widespread transfer of risk from both governments and employers to individuals. This is why financial literacy is often considered and used interchangeably as financial education. There is a continuous increase of the number of financial decisions that individuals have to make due to rapid and serious changes in the market and the economy. For instance, longer life expectancy means individuals need to ensure that they accumulate savings to cover much longer periods of retirement. People also need to assume more responsibility for funding personal or family healthcare needs. Moreover, increasing education costs make it important for parents to plan and invest adequately for their children's education.

Competition and innovation in the market would be encouraged by financially literate consumers, who can make more informed decisions and demand higher quality services. They are also less likely to react to market conditions in unpredictable ways, less likely to make unfounded complaints, and more likely to take appropriate steps to manage the risks transferred to them. All of these factors will lead to a more efficient financial services sector and potentially less costly financial regulatory and supervisory requirements and above all less financial crisis all over the world. All these individual actions will affect the governmental behavior resulting in more helpful financial decisions on reducing government aid and more effective taxation policies.

Individuals with higher financial literacy are better able to manage their money, referring to their success in stock market, good performance in portfolio investment, and their choice of mutual funds with lower fees (Hastings and Tejada-Ashton 2008; Hilgert et al. 2003; Stango and Zinman 2009; Yoong 2011), opting for less costly mortgages and avoiding high interest payments and additional fees (Gerardi et al. 2010; Moore 2003). Lusardi and Mitchell (2011) conclude that those who have greater financial knowledge are more likely to accumulate higher amounts of wealth as well. These results have convinced policy makers all over the world that increased efforts in advancing financial education will increase household saving and participation in financial market, improve well-being, and reduce poverty. Increasing financial literacy and capability promotes better financial decision-making, thus enabling better planning and management of life events such as education, health, real estate, and retirement plans.

Considering the view in a macroeconomic perspective, we can say that individual financial behavior (focusing on savings and investment) benefits the entire nation. Individual financial behavior has a positive impact on the economy as a whole because funds financed for financial assets are then channeled through financial intermediaries to fund investments by business. As a result, investments of the business will ultimately benefit the nation through higher productivity and economic growth. Furthermore, savings and investments can also hedge countries against economic downturns and financial crisis as well. Thus, financially literate individuals

can make effective use of financial products and services and will not get cheated by salespeople selling financial products not suited for them. Financial literacy aids in improving the quality of financial services and contributes to economic growth and development of a country.

Through this paper an attempt has been made to know whether financial literacy affects the awareness and financial behavior (focused on savings and investments) of individuals in Albanian context.

9.2 Literature Review

Financial literacy is described as the understanding and knowledge of basic financial concepts and the ability to use them to plan and manage their financial decisions (Hogarth 2002). In the literature financial literacy was defined as “the ability to make informed judgments and to take effective decisions regarding the use and management of money,” while Roy Morgan Research (2003) defined the terms as “being knowledgeable and assured in the areas of saving and spending.”

The most used explicit definitions found for the concept of financial literacy include: “ability to read, analyze, manage and communicate about the personal financial conditions that affect material well-being” (Chen and Volpe 1998; Vitt et al. 2000; Cude et al. 2006; Huston 2010); “ability to manage the situation of cash and payments, knowledge about opening a saving account and obtaining a credit, basic understanding of health and life insurance, ability to compare offers and plan for future financial needs” (Emmons 2005); “basic knowledge necessary for people to survive in the modern society” (Kim et al. 2001); “capability to understand key financial concepts necessary to function in the normal American society” (Bowen 2002); “ability to make informed judgments and effectively take decisions concerning money” (ANZ 2005); “measure of the degree to which a person understands key financial concepts and has the necessary ability and confidence to manage own finances through short term decisions and long term planning, taking into consideration the economic events and changing conditions” (Remund 2010); and “ability to use knowledge and manage financial resources for a good financial well-being throughout the whole life” (Jump Start Coalition for Personal Financial Literacy 2009, cited by Huston 2010).

Going through all these definitions, we can see that the concept of financial literacy comprises several aspects: financial knowledge (ANZ 2005; Hung et al. 2009; Huston 2010; Remund 2010; OECD 2015), ability to communicate about different financial concepts (Remund 2010), ability to use different financial concepts and instruments (Hung et al. 2009; Huston 2010; Remund 2010), people’s confidence in financial operations performed (Huston 2010; Remund 2010), financial operations experience (Orton 2007; OECD 2015), ability to take adequate financial decisions (Remund 2010; OECD 2015), and attitude toward the use of financial instruments (Orton 2007).

Also, there are cases where the terms financial literacy, knowledge, and education may be used interchangeably (Huston 2010). The definition used by Remund (2010) match the ideas of being financially literate of this research. Both definitions include not only understanding financial concepts but utilizing that knowledge to make sound financial decisions.

Various types of surveys have been conducted to measure the degree and spread of financial literacy. People with a low level of education, females, African-Americans, and Hispanics, demonstrate low levels of financial literacy, which subsequently affect financial decision-making (Lusardi and Mitchell (2007)). Due to lack of knowledge in basic financial concepts, these groups of respondents fail to plan properly for the retirement period, have less participation in the stock market, and have poor borrowing behavior (Lusardi and Mitchell 2007).

A popular survey on financial literacy is the Jump Start Coalition in the USA, which measures individual personal capability among the high school students.

In the UK, a study conducted on financial literacy for Nat West Group Charitable Trust focused on people renting government-owned houses, young generation, single parents, and students. Questions of the survey asked about money management, saving and buying attitudes, and their confidence in facing with money issues. Brown and Graf (2013) conducted a survey to find whether households in Switzerland are equipped with the necessary financial knowledge to make well-informed investment and borrowing decisions. They found that household finance in Switzerland is characterized by an increased individual responsibility for retirement planning, increased exposure of retail investors to complex assets, exposure of mortgage borrowers to interest rate and house price risk, as well as rising levels of consumer debt.

Chen and Volpe (1998) examined financial literacy among more than 900 students in 14 American universities. By linking the scores to individuals' socio-economic and demographic attributes, results showed that young females with non-business majors and little work experience have very low degrees of financial literacy. Similar to confidence, a person's perceived financial literacy may affect their financial behaviors (Allgood and Walstad 2013). A study by Allgood and Walstad (2013) shows how perceived and actual financial literacy affects various credit card behaviors at different ages. In general, results showed that both perceived and actual financial literacy were related to positive credit card behaviors. Another study finds that women have lower financial literacy scores and are less likely to make household decisions compared to men (Fonseca et al. 2009). Lusardi and Mitchell (2007) find that in adults 55 and older, financial literacy is a significant related to retirement planning. Bernheim and Garrett (2003) estimate how workplace financial education affects people's saving rates.

In 2008, OECD created the International Network on Financial Education, INFE, as an organization which would help the coordination among countries to measure and develop the financial education through countries. It already established a OECD/INFE toolkit for measuring financial literacy and financial inclusion, welcomed by G20 leaders in September 2013. The toolkit was piloted in 2010 during the first OECD international financial literacy and financial inclusion

measurement exercise. Between 2011 and 2014, it was used in over 30 additional countries. Each of the questions has been chosen to provide valuable information about a specific aspect of financial literacy or financial inclusion. The responses to various core questions can also be combined to produce financial literacy scores and a financial inclusion score using the methodology devised by the OECD/INFE. In this respect, an initiative has been undertaken to promote financial literacy in Albania (Ceca et al. 2011). This paper is an effort to undertake and analyze a survey of not only a detailed financial literacy but also to see a correlation between financial knowledge and the financial behavior among individuals (who represent households) considering socioeconomic factors.

9.3 Methodology

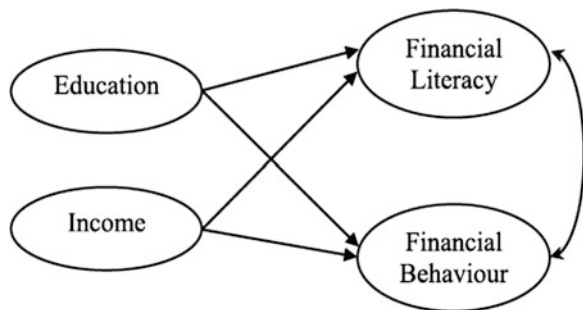
This study is conducted with the premise that financial behavior is associated with financial literacy and both financial behavior and financial literacy are influenced by individual’s education and income levels. Figure 9.1 diagrammatically explains these relationships.

Hilgert et al. (2003) noted that there is a significant correlation between financial literacy and behavior whereby those who are more financially literate are more likely to engage in recommended financial practices such as paying bills on time and having an emergency fund. They maintain that the direction of the causality between financial literacy and financial behavior is unclear because causality may be reversed in the sense that people may gain financial knowledge as they save and accumulate wealth. Hence, the following hypothesis is developed:

H_1 There is a significant correlation between financial literacy and financial behavior.

The current study therefore hypothesized that individuals who are more educated are more exposed to personal finance matters and are more resourceful. We all expect that more educated people exhibit better financial behavior and financial

Fig. 9.1 Theoretical framework. Source: Hilgert et al. 2003



literacy. So the second premise of the study holds that individuals with higher economic income may exhibit higher financial literacy and better financial behaviors. Thus, the following hypotheses are constructed:

H₂ Education has a statistically significant impact on financial literacy and financial behavior.

H₃ Income has a statistically significant impact on financial literacy and financial behavior.

The study is carried out through a survey and a research questionnaire is specifically developed as the main instrument for this study. The questionnaire was made up of the 40 core questions and elicits data on respondents' financial literacy, financial behaviors, and demographics. Financial literacy items test respondents' knowledge on various financial matters including investments, credit card usage, interest rates, insurance, and personal taxation. Financial behaviors items measure respondents' decisions and behaviors related to their personal finance matters such as savings, financial products, payments and other expenditures, loan repayments, and budgeting.

The survey targeted households, and it covered 500 individuals, aged 18 and over, distributed to five main cities of Albania: Tirana, Elbasan, Durrës (center of Albania), Vlorë (South), and Shkodër (North) whose allocation was proportional to the number of residents in the respective districts. All those salaried individuals of these cities (urban area) whether in government or nongovernment job and those who fall under income tax bracket were considered as the population for this study. Primary data from the respondents was collected by using a non-disguised structured questionnaire. The questionnaire was prepared with utmost care incorporating all necessary information by using close-ended questions, attitudinal rating questions, as well as knowledge testing questions. Multistage sampling has been adopted for collection of the data. A random sample has been applied. From each city, the required number of salaried individuals was selected based on purposive sampling by using some criteria like place of work, occupational status, and the attitude of the respondents to cooperate for the study, so as to get the representative sample of the population. Six hundred questionnaires were distributed, out of which 550 questionnaires were received back from the respondents. After analyzing the questionnaires, few questionnaires were found incomplete, and finally a total of 500 questionnaires were used for the purpose of this study.

In order to measure the level of financial literacy of the respondents, a mixture of OECD approach and Zauwiyah et al. (2013) has been used in this study. This kind of mixture approach is considered as more comprehensive, attempting to measure the level of financial literacy.

Socio-demographic data is gathered through multiple choice questions of the questionnaire. The answer is a categorical data, for gender, age, marital status, education level, occupation, and monthly income. The respondents had to put him/her in one of the category (group) of the respective closed question.

Financial literacy gauges respondents' knowledge on various personal finance matters. There were 18 questions on this chapter, and the respondents were required to indicate whether the statement given was correct (coded as 1) or incorrect (coded as 0). Respondents were also given an "uncertain" choice in order to avoid respondents from guessing the answers (this was considered as a missing value). In order to determine respondents' financial literacy, their correct responses were added to become a total score. The higher the total score indicates a higher literacy level. Responses therefore range between 0, where all responses are incorrect, to 18, where all responses are correct.

Financial behaviors were tested through ten statements introduced to the respondents. The statements were focused on good spending and saving habits such as monthly savings, maintaining emergency funds, and monitoring financial situation. Financial behavior was measured on 5-point Likert scale. Respondents were required to state the level of their agreement with each statement, ranging from "1," strongly disagree, to "5," strongly agree, and thus their maximum possible score is 5 each. SPSS 21.0 is used for analyzing the data and testing the hypothesis, and a correlation analysis and analysis of variance techniques are used to test the hypothesis and to provide descriptive statistics.

9.4 Data and Results

Referring to the *descriptive results* of the data of questionnaire, we can see that within 500 respondents, 57.4% are males, and 28.9% are within 40–49 years old. The majority of the respondents have, as the highest diploma, the high school diploma (51.7%), followed by a bachelor's degree (23.3%). Respondents are from various occupational backgrounds, ranging from self-employed (31.7%), professionals (30.8%), and non-self-employed (22.6%) to nonexecutives (17.1%). A majority of the respondents are from the lower-income bracket, i.e., below 200€ (45.2%). The demographic and employment distribution of respondents is presented in Table 9.1.

The response per statement, by which *financial literacy* is evaluated, is shown in Table 9.2. Statement 1, i.e., the need for financial knowledge, has the majority of the respondents who responded correctly (82.1%). Respondents also seemed to be well versed on matters related to loans (statements 5 and 17), whereby more than 70% of them responded to this statement correctly. On the other hand, a majority of respondents (42.7%) could not provide correct responses to statements related to investments (statement 7).

Respondents tend to respond as "uncertain" on most of the statements. The most uncertain response is received for statement 13, which tests respondents' knowledge on compound interests.

Statements relating to investments also received higher "uncertain" responses, including those relating to government bonds (statement 8, 41.8%), risks of investments (statement 8, 39.1%), inflation and cost of living (statement 11,

Table 9.1 Demographics results

	Demographic items	Percentage
Gender	Male	57.4
	Female	42.6
Age	18–29	12.15
	30–39	22.2
	40–49	28.9
	50–60	14.3
	Above 60 years old	22.1
Marital status	Single	21.2
	Married or co-lived	67.3
	Divorced/separated/widower	11.5
Education level	High school or lower	51.7
	Bachelor's degree	23.3
	Master's degree	16.8
	Postgraduate	8.2
Occupation	Self-employed	31.7
	Nonexecutive	17.1
	Executive	5.2
	Professional	30.8
	Others	15.2
Monthly income	Equal or less than 200€	45.2
	201–500€	32.3
	501–1000€	16.3
	Equal or above than 1000€	6.2

Source: Author's calculations

36.1 %), investment plan (statement 7, 36.1 %), and investment practice (statement 4, 29.1 %). This indicates the lack of respondents' knowledge on investments.

As it is previously mentioned, the *financial behavior* is summarized in Table 9.3. Ten items were constructed to test respondents. The evaluation of this kind of behavior is done through ten statements, to which the respondents should choose to strongly agree (5), agree (4), indifferent (3), disagree (2), or strongly disagree (1). The goal is to test the behavior on spending and saving habits such as monthly savings, maintaining emergency funds, and monitoring financial situation.

Table 9.3 presents the mean and standard deviation related to respondents' financial behaviors per item. Factor analysis is used to construct the validity of the tested items. The principal component analysis method was employed and Varimax rotation was applied. The factor analysis for these ten items resulted in one factor only (Kaiser–Meyer–Olkin measure of sampling adequacy was considered acceptable at 0.911). Cronbach's alpha for all items is 0.876, which is considered good. In every item the respondents agree with an average above 3, which means that the behavior is above indifferent, but still less than 4. Respondents rather agree that they are cautious with their spending (mean = 4.12), they always review the spending (mean = 3.62), and they always review their financial position (mean = 3.60).

Table 9.2 Financial literacy

No.	Statements	% of correct answers	% of incorrect answers	% of uncertain
1	Knowledge in personal finance helps you to avoid being conned in an investment scam	82.1	12.5	5.4
2	You are spending more, if the amount charged to your credit card is more than your salary	45.6	33.2	21.2
3	Value-added tax is payable by each individual and is deducted from his/her monthly salary	56.2	16.4	27.4
4	The main purpose of buying insurance policy is for personal protection against losses due to natural disasters such as earthquake	48.4	22.5	29.1
5	If you are the guarantor for your friend's loan, you will be responsible to repay the loan in the event your friend defaulted	79.3	12.4	8.3
6	Car insurance premium is fixed based on the type and age of the vehicle	69.8	11.3	17.9
7	A mutual fund investor has the right to advise the investment manager on the type of shares to be invested	21.2	42.7	36.1
8	Investment in the Albanian government treasury bonds is more risky than investment in the share market	44.8	13.4	41.8
9	Tax has to do with fiscal policy	68.9	11.7	19.4
10	A real estate property is more liquid than a current bank deposit	58.2	18.1	23.7
11	High inflation means that the cost of living is in a high-speed increase	46.8	17.1	36.1
12	Car insurance premium is determined based on the age of the car owner	58.2	23.5	18.3
13	With an investment of 1000€ at interest rate of 4 % per annum, compounded monthly, the total investment will be 1040€ within a year	48.2	8.4	43.4
14	"Besa" Foundation is a private company that provides borrower's credit background information	58.6	11.3	30.1

(continued)

Table 9.2 (continued)

No.	Statements	% of correct answers	% of incorrect answers	% of uncertain
15	It is more appropriate for a pensioner that receives fixed monthly pension to invest in high-risk investment that provides high return	41.3	19.6	39.1
16	Long-term investment refers to investment period of 2–5 years	45.9	22.1	32
17	As a guarantor for a friend's loan, you are entitled to receive part of the loan	76.8	7.2	16
18	Credit cards can be used to obtain cash loan or advance	69.2	11.9	18.9

Source: Author's calculations

Table 9.3 Financial behavior

Items	Mean	Standard deviation
1. I have monthly financial planning and observed it strictly	3.32	1.07
2. I always review my spending	3.62	1.03
3. I record every expense	3.15	1.12
4. I know the value my entire assets	3.07	1.14
5. I save every month	1.8	1.23
6. I always review my financial position	3.60	1.11
7. Investment is a very important matter to me	3.01	1.21
8. I am very cautious with my spending	4.12	1.05
9. I have savings that can be used in case of emergency	3.23	1.14
10. I am prepared to face any financial problem	1.96	1.91

Source: Author's calculations

However, they quite disagree that they save every month (mean = 1.8) and that they are prepared to face any financial problems (mean = 1.96). Perhaps the current uncertain economic condition creates a feeling of uncertainty among the general public. Respondents are also least likely to consider investments as an important matter to them (mean = 3.01) and to know the value of their assets (mean = 3.07).

Three *hypotheses* were developed for the purpose of this study, in accordance with the theoretical framework.

The hypotheses test the relationship between financial literacy and financial behavior and the impact of education and income levels on both financial literacy and financial behavior.

H_1 There is a significant correlation between financial literacy and financial behavior.

The interrelationship between financial literacy and financial behavior is evaluated through a Pearson correlation analysis (Table 9.4). A positive, significant

Table 9.4 Correlation analysis

		Financial literacy
Financial behavior	Pearson correlation	0.395*
	Sig. (2-tailed)	0.042
	Kendall's tau-b	0.302*
	Sig. (2-tailed)	0.048

Source: Author's calculations

*Correlation is significant at 0.05 level, 2-tailed

Table 9.5 Analysis of variance: education's effect on financial literacy and behavior

		Mean	F-value	Significance
Financial literacy	High school or lower	7.1	61.126	0.000*
	Bachelor's degree	9.3		
	Master's degree	11.8.		
	Postgraduate	12.5		
Financial behavior	High school or lower	3.1	22.673	0.000*
	Bachelor's degree	3.36		
	Master's degree	3.52		
	Postgraduate	3.81		

Source: Author's calculations

*Statistically significant at 0.05 level, 2-tailed

correlation is found between these variables ($r = 0.395$, significant at 0.05 level). Similar result is obtained from the nonparametric test of Kendall's tau-b. Hence, the above hypothesis is accepted. What we can conclude in this case is that in Albanian contexts, the financial literacy has a positive impact on financial behavior and the higher the level of financial literacy, the higher performance of financial behavior it provides.

H_2 Education has a statistically significant impact on financial literacy and financial behavior.

Table 9.5 summarizes the results from the analysis of variance performed in order to test hypothesis number 2. Respondents from different education backgrounds responded differently on both variables. Those who obtained a master's degree and a postgraduate degree seem to have higher levels of financial literacy compared to those with high school diploma and bachelor one. On average, master's and postgraduate degree holders achieved more than 12 correct responses out of 18. Those with high school diploma or lower only managed to obtain about seven correct responses and those with bachelor's degree ten correct responses. In terms of financial behavior, those with lower education exhibit less favorable financial behaviors. The influence of education levels on financial literacy and financial behavior are statistically significant.

H_3 Income level has a statistically significant impact on financial literacy and financial behavior.

Table 9.6 Analysis of variance: income level's effect on financial literacy and behavior

		Mean	F-value	Significance
Financial literacy	Equal or less than 200€	6.98	75.436	0.000*
	201–500€	10.02		
	501–1000€	13.12		
	Equal or above than 1000€	12.89		
Financial behavior	Equal or less than 200€	3.13	21.749	0.000*
	201 –500€	3.62		
	501–1000€	3.73		
	Equal or above than 1000€	3.92		

Source: Author's calculations

*Statistically significant at 0.05 level, 2-tailed

The analysis of variance techniques is used to test if monthly income level is a significant factor impacting the financial behavior and literacy as well. Table 9.6 summarizes the results. Significant differences were detected in responses among respondents from different income levels. Respondents with higher incomes were found to have higher financial literacy levels compared to those in the lower-income basket (equal or less than 200€). This group only obtained about seven correct responses out of 18. The middle income earners (200–500€) were found to have moderate financial knowledge (about ten correct responses). There is pretty much the same result for the income level of the last two groups with around 13 correct answers (501–1000€ and above 1000€). Low-income earners also seemed to indicate lower good financial practices compared to the other groups (mean = 3.13). This result further supports the notion that financial literacy is enhanced as individuals have resources to manage. Those who are low-income earners may not have the opportunity to consider investment choices. These results suggest that any personal finance program should focus on those from the lower education and lower-income backgrounds, maybe emphasizing the awareness toward financial management as well as equipping participants with financial knowledge necessary for wealth accumulation.

9.5 Conclusions

In this paper we use survey data covering a representative sample of 500 individuals to document the level of financial literacy and financial behavior among Albanians and to examine how financial literacy is related to individual financial behavior and to see how two main components such as education and the income level affect financial behavior and literacy.

Referring to the assessment of financial literacy, there were considered 18 statements, where the percentage of correct, incorrect, and uncertain attitude for each one is calculated. Considering the equal importance of each statement, the

average percentage of correct attitude is 59.2 %, incorrect attitude is 17.2 %, and uncertain attitude is 23.6 %.

Referring to the chapter of financial behavior, there we asked a set of multiple choice of ten questions (1 = strongly disagree to 5 = strongly agree), and the mean of the results' mean is equal to 3.08, which seems to be a little bit higher than neutral attitude (which is 3).

In this respect, there is positive correlation between financial literacy and behavior (Pearson correlation 0.395 and Kendall's one 0.305), and it is not a high one, but statistically significant.

The results of this paper show that there is a positive effect of education and income level of individuals to financial behavior. The study has also shown that monetary concepts as simple as compound interest are alien to this group of respondents. In this perspective, it is recommended that focus should be given to the lower-income earners and the less educated citizens.

One of the ways to impart financial knowledge is via financial education. It is believed that financial education may prove to be beneficial in improving financial literacy. Sometimes people fail to make correct decisions because they have not received a sound personal finance education. Those who are low-income earners may not have the opportunity to consider investment choices.

These results suggest that any personal finance program should focus on those from the lower education and lower-income backgrounds. Perhaps, these programs could also emphasize on creating the awareness toward financial management as well as equipping participants with financial knowledge necessary for wealth accumulation that cater specifically to their background.

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Chapter 10

Financial Leverage Hits Corporate Performance

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Abstract The study has been conducted to explore the relationship between financial leverage and financial performance. The study also involves macroeconomic perspective by involving few macro variables like interest rate. It has been conducted on the nonfinancial sector of Pakistan including all nonfinancial companies listed at Karachi Stock Exchange (KSE) as a sample. The study has been conducted over a period of 7 years, 2005 through 2011. Regression analysis has been performed in order to analyze the data. The results of the study exhibit that financial leverage, measured by debt to equity ratio, has significant impact on financial performance variables, measured by return on assets (ROA) and return on capital (ROC), whereas on the other two variables, return on equity (ROE) and earnings per share (EPS), its effect is insignificant. On the other hand, two variables, namely, gross domestic product and interest rate, were used as indicators of overall economy, and their impact was also studied on financial performance. The results show that their effect on financial performance is insignificant. Combining all the results together, it can be concluded that financial performance is majorly determined by firm's choice of financial leverage and not by the overall health of the economy specifically in context of nonfinancial firms in Pakistan. Managers in the search for improved performance apply firm-specific strategies, which they believe will provide their firms with the competitive advantage in the marketplace.

Keywords Capital structure • Financial performance • Asset and capital

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10.1 Introduction

Capital structure is the decision which deals with slicing the total pie of capital into pieces. In the context of corporate finance, it falls under the category of financing decisions. Since the choice affects the value of the firm, it is a worth studying topic. Capital means the money raised by the company which is further invested in asset capital—normally in the form of physical capital. Structure means decision of dividing the capital into parts normally debt and equity. Although both debt and equity can further be subcategorized like short term and long term and ultimate and hybrid, we restrict our study only to the broader categories as debt and equity. Remember, debt includes all types of debt, and equity includes both types, common and preferred. Another choice to be made is whether to use book values or market values. Here again we contend with book values which means amounts reflected in balance sheet.

Whether or not firm's choice of capital structure affects value of firm is a question which has long been studied by the academicians. Studies have shown mixed results, some indicating it does whereas others posing it does not. Therefore, a firm's particular approach has to go with the suitable mix of debt and equity to finance the firm's assets. The utilization of every source of financing illustrates diverse and conflicting outcome on the firm performance. Aforementioned insights have been provided by capital structure theory that has essential value in the domain of corporate finance.

Most significant exploration has been conducted by Modigliani and Miller proposing that the value of a firm is not influenced by the way it structures its capital. However, Robichek and Myers (1966) observe that cost of financial distress is sustained in case of bankruptcy, although it increases financial risk. Bankruptcy costs (the operation expenses of bankruptcy or reformation) tend to demoralize borrowing, even though contemporary research by Warner (1977) inquires whether these costs are controllable or not (Myers 1977).

Moreover, Baskin's (1987) work on growth strategies and capital structure provides valuable insights. The linkage between the two follows that growth strategy must be accurately realized; therefore it will generate stability, protection, and effectiveness for the benefits of capital structure and financial performance.

Previous researches provide a significant form of experimental orientation for the topic. Including are Burgman (1996) and Chen et al. (1997) which posit that multinational corporations have a propensity to take minimum debt in their capital structure as compared to the domestic firms (Singh and Nejadmalayeri 2004). Moreover, Baker and Wurgler (2002) recommended an innovative assumption: the "market timing assumption of capital structure." It states that firms time their equity issues when the stock price is supposed to exist overestimated and repurchase own shares while they are underestimated. Therefore, instability in stock prices has an effect on firm's capital structure. It was also concluded that leverage changes are associated to their market timing. Hence, capital structure of a firm is partly the reflection of past changes to equity market (Cheng 2012).

Albeit a large body of literature related to capital structure and firm performance is available especially in the context of developed economies, the studies covering developing countries like Pakistan are rare. This could be due to several reasons including asymmetric information, imperfect markets, and dearth of data availability. Just like Eldomiaty (2007) notes that in the case of such countries, market imperfections may halt the research in the area. This makes the topic worth studying in the context of a developing country, Pakistan.

The study observes the relationship between capital structure and firm financial performance. To pursue the objective, nonfinancial companies listed at Karachi Stock Exchange, Pakistan, have been selected. Data has been gathered over a 2005–2011 period from the Statistics Department State Bank of Pakistan. These companies constitute an essential sector of the country's financial system with a strong industrial base which is consequently important for the development of a country. The sector includes diversified companies.

10.2 Review of Literature

The significance of capital structure in terms of its impact on financial performance and value of a firm has been set up by previous studies. An analysis of the literature yields mixed results (Mohamad and Abdullah 2012).

The seminar study of Modigliani and Miller (1958) introduced an assumption of perfect capital markets which states that in the absence of transaction costs and taxes, financial markets are perfect. The study further follows that if debt is bound to bring tax benefits, all the capital should be raised through debt. Since it is based upon an assumption, the reality may differ in real-world settings; therefore hundred percent debt financing may not be a possible option.

Furthermore, Modigliani and Miller argued that if earning power of company's assets and capital investments, along with several other assumptions to be satisfied, is held constant, the combined market values of debt and equity of a company are independent of the choice of capital structure specifically known as "capital structure irrelevance" (Muritala 2012). The work, thus, is considered to be pioneer in the theory of capital structure upon which following studies were laid down (Ahmad et al. 2012). Modigliani and Miller (1958) illustrated that their model is not successful anymore if taxes were given consideration in a sense that tax subsidies tend schedule interest payments. This will ultimately case firm value to decline (Uremadu and Efobi 2012).

Studies attempting to investigate the relationship between capital structure and firm performance have shown mixed findings. For instance, Wipperfurth (1966) explored the relationship between capital structure and firm performance over several industries. The study took debt to equity ratio as measure of capital structure, whereas earnings to market value of common stock were selected as an indicator of firm performance. By assuming that shareholder equity can only increase by the way of external financing, the study concluded a positive relationship between

capital structure and firm performance (Soumadi and Hayajneh 2012). However, later on it was found that capital structure influences negatively on profitability of a firm. Moreover, Lev (1974) argued that firms with high leverage have a tendency to exhibit more inconsistency of their accumulation income than less levered firms comparatively. Also a marginal increase in the leverage increases the financial riskiness of the firm.

Similarly, Jensen and Meckling (1976) examined that the preference for capital structure can have an impact on firm's costs. The argument says that high utilization of debt resources can decrease firm's costs during the risk of bankruptcy, which causes losses to managers' own salaries, and standing while leading to persistent difficulty to produce cash flow to compensate routine costs (Manawaduge et al. 2011). On the other hand, Ross (1977) analyzed that a firm with a better ability to predict the issuance of additional debt may have significant implications for debt servicing. Accordingly, a high level of debt will be related to the high level of performance for a firm (Warokka et al. 2011). In addition, Barnea et al. (1980) recommended firms can manage financial distress by the way of efficient debt management because there is a trade-off between growth opportunities and debt maturity (Al Taleb and Al Shubiri 2011).

However, according to Myers and Majluf (1984), firms with high earnings during inception stage have a tendency to achieve low debt profile due to the fact that when firms are more profitable their first choice is to retain earnings if any additional financing is required. Since external financing does not have an explicit cost, it tends to maximize the wealth of shareholders. When retained earnings are insufficient, the firms' first choice is new equity instead of debt. The study also argued that shareholders commonly gather inside information, via managers, which results in low prices of new equity that can further have devastating effects specially in case of new issuance. In this situation, firms will be forced to avoid issuing new equity; rather, the first choice they opt for has to be retained earnings followed by debt financing with issuance of new equity as a final alternative (Uremadu and Efobi 2012). Following up, Krasker (1986) also articulated similar results (Shah and Hijazi 2004).

Linking to the cash flows, Stulz (1990) proposes that when investors cannot forecast the pattern of firm's cash flows, they will go for debt investment rather than equity. The study also debated that to increase debt but to lower its cost, free cash flows should be maintained by the firm (Shah and Khan 2007). However, according to Harris and Raviv (1991), higher financial leverage positively affects firm's value (Siddiqui and Shoab 2011). Furthermore, McConnell and Servaes (1995) also offered supplementary proof to what extent the growth rate of the firm could influence the relationship between capital structure and firm performance. Accordingly, firms with high growth rate may have negative relationship between financial leverage and firm performance, whereas vice versa is true for low growth firms.

As a principle, however, Brigham and Gapenski (1996) narrate that an optimal capital structure is able to survive in firms where there is tax shield, whereas managers should be able to identify their optimal capital structure and always strive

to achieve that. At that level, cost of capital of the firms is minimized, whereas firm value is maximized (Chinaemerem et al. 2012). On the other hand, Majumdar and Chhibber (1999) stated that debt to equity ratio (capital structure) is inversely related to financial performance of firm.

Another study by Cho (1998) initiated the nonlinear association among decision-making ownership, capital structure, and firm performance. The studies contain valuable insights about financial markets, insider information, and investor returns in this context. At small ownership concentration, firms normally go for external equity financing that may lead to value depletion of the company. However, for firms having more concentrated ownership, internal financing is normally preferred that results in value maximization. It logically follows that in case of tighter controls, more ownership concentration, improved firm performance, and value enhancement are bound to happen (Ruan et al. 2011).

Later on, Gleason and Mathur (2000) investigated the relationship between cultures, capital structure, and performance of the firm via a study conducted over 14 European nations. They illustrated that capital structure fluctuates depending upon the cultural settings. Moreover, capital structure may also influence firm's performance. Further research on the relationship between capital structure and a company's reaction to short-term financial distress states that firms with high debt ratio also have more potential to make better resource allocation that can help them manage the financial distress in advance (San and Heng 2011). Similarly, Dessi and Robertson (2003) also explored the idea and concluded that low growth on firms' effort to depend on the debt to cater the projected growth prospects will enhance the firm performance consequently (Soumadi and Hayajneh 2012).

At country level, Booth et al. (2001) proposed that debt proportions are more prevalent in developing countries. Albeit it is true, debt proportion is growing countries and appears to involve same variable as discussed by aforementioned studies. However, there are logical variations within the means of the proportions and are affected by country issues like GDP growth rates, inflation rates, and movements in financial markets (Owolabi and Inyang 2012). In firm's ownership context, Bunkanwanicha et al. (2008) studied the relationship between debt, decision-making activities, and firm performance in Thai and Indonesian markets. The results drew attention toward the significance of the country-specific institutional settings in managerial ownership (Ruan et al. 2011).

In firm performance context, Abor (2005) examined capital structure determined by short-term debt, long-term debt, and total debt. The study posed that capital structure is, statistically, negatively related to firm performance. The conclusion submits that in firms relying on debt particularly, tax protections will not be that effective; instead they will lead to increase in debt level. This may ultimately result in bankruptcy risks and depletion of returns (Soumadi and Hayajneh 2012).

Finally, most of the aforementioned studies have shown a substantive correlation between financial leverage and profitability (firm performance). More importantly, time of the association is considerably and certainly related to the performance of a firm. However, by making adjustments to the level of debt, the value of firm can be increased, in fact maximized (Benish and Akhter 2012).

There are two objectives of this study: one is to examine the influence of capital structure on the firm's financial performance. Second one is to propose making a relationship between the firm's performances by level of geared companies and establish whether an optimal capital structure exists.

10.3 Research Methodology and Empirical Results

10.3.1 *Sample and Sources of Data*

Our sample covers 399 nonfinancial companies operating in Pakistan over the 2005–2011 period. Data on firm performance come from various editions of the publication balance sheet analysis issued by the State Bank of Pakistan which contains annual information on the main balance sheet entries and revenues and expense for all firms operating in Pakistan. Macroeconomic variable data come from the Federal Statistical Bureau of Pakistan.

Literature uses a number of different measures of firm performance. In our analysis we employ four indicators of firm performance: return on equity (ROE), return on assets (ROA), return on capital (ROC), and earnings per share (EPS) as (e.g., Majumdar and Chhibber 1999; Abor 2005; Ebaïd 2009) we calculate return on equity as net income divided by the shareholders equity, return on asset calculated as net income divided by the total assets, return on equity calculated as net income divided by total capital, and earnings per share calculated as net income divided by the average outstanding shares. We include independent variables' growth rate (sales), growth rate (assets), debt to equity ratio, asset turnover, gross domestic product, and interest rate. Growth in sale (G1) is calculated as the % Δ in sales, growth in assets (G2) calculated as % Δ in assets, debt to equity ratio calculated as total debt divided by total equity, asset turnover ratio measured as total revenue divided by the average assets, while GDP and interest rate are given rates. We included interest rate in our analysis as firms borrowing decision are highly dependent on the interest rate. Many times, firms could not raise funds through borrowing just because of high interest rates.

Growth in the sales shows firms have good demand in the market; to respond to that demand, firms need to produce more over time. This growth pushes firms to grow their assets to satisfy demand. So growth in sales leads to growth in assets. To increase assets, firms need funds that could be managed through equity or debt. Cost of capital matters a lot for financing decision and choices. This is the reason why we included interest rate in our analysis.

10.3.2 Model Specification

The relationship between “dependent” and “independent” variables was analyzed by using the “linear regression analysis” in this study as follows:

$$Y = \alpha + \beta X + \epsilon$$

where “Y” is the dependent variable, “ α ” is constant, “ β ” is the coefficient of the explanatory variables, “X” is the explanatory variable, and “ ϵ ” is the error term.

$$ROE = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon \quad (10.1)$$

$$ROA = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon \quad (10.2)$$

$$ROC = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon \quad (10.3)$$

$$EPS = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon \quad (10.4)$$

where GR_1 is the growth in sale, GR_2 is the growth in assets, D/E is the debt to equity ratio, Turn is the asset turnover ratio, GDP is the gross domestic product, IR is the interest rate.

10.4 Empirical Results and Discussion

10.4.1 Descriptive Statistics

The table below shows the expressive facts of all the reliant and autonomous variables utilized as a part of this study.

Table 10.1 shows descriptive statistics of dependent and independent variables used in the study. Descriptive statistics show mean, median, minimum, maximum, standard deviation, and skewness. First, the mean (standard deviation) of ROE, ROA, ROC, and EPS are 24.56 (21.65), 9.45 (7.90), 18.46 (17.12), and 7.51 (10.08), respectively. The mean debt to equity ratio is 1.70 which indicates Pakistani firms heavily dependent upon debt.

The Pearson correlation was used to measure the degree of the linear association between independent and dependent variables. It was used to find how closely related variables are with each other in this research. This relationship is assumed to be linear, and the correlation is a measure of how closely collected data points are about a correlation line. Correlation ranges from -1 to $+1$. The correlation between the variables is reported in the table below.

Table 10.1 Descriptive statistics

	Mean	SD	Skewness	Minimum	Maximum
Return on equity	24.5964	21.65103	0.494	-34.12	82.24
Return on assets	9.4579	7.90793	0.285	-11.20	28.16
Return on capital	18.4631	17.12391	0.818	-18.77	67.79
Earnings per share	7.5164	10.08949	2.081	-6.80	54.09
Growth rate sales	0.1294	0.15062	-0.069	-0.33	0.52
Growth rate assets	0.1635	0.15432	1.222	-0.07	0.78
Debt to equity ratio	1.7051	0.82741	0.892	0.27	5.07
Asset turnover	1.1285	0.72810	1.198	0.18	3.47
Gross domestic product	4.1300	1.66684	-0.038	1.21	6.81
Interest rate	11.9821	2.05063	0.290	9.08	15.61

10.4.2 Correlation Analysis

In Table 10.2, the correlation matrix for the variables is reported in order to examine the correlation between the explanatory variables. The result shows that ROE and IR are negatively correlated at -0.257 , while ROE as a dependent variable has a positive relationship with all other explanatory variables. The correlation of ROA of all nonfinancial sectors with independent variables D/E and IR is negatively correlated at -0.177 and -0.298 , respectively; ROA with all other independent variables has a positive correlation. ROC of selected nonfinancial sector is positively correlated with explanatory variables, other than D/E and IR; these both independent variables have negative relationship with ROC at points -0.017 and -0.268 . On the other hand, the Pearson correlation of EPS with independent variable IR is negatively correlated at point -0.144 , while EPS is positively correlated with all other independent variables.

The variance-covariance among variables is excessively high for ROE and ROC which is on the higher side (96.30%). This demonstrates that both these variables speak to the same investment marvel.

10.4.3 Regression Results and Discussion

This approach involves the estimation of a static regression analysis which captures any possible relationship between all dependent and independent variables. The regression coefficients show the measure of progress in the quality of ward variable for a unit change in autonomous variable (Table 10.3).

Looking at the debt to equity ratio, we find that coefficient is negative but statistically insignificant, showing that leverage has negative effect on the performance. The insignificance of leverage and ROE could be explained by Coricelli et al.'s (2012) study that finds positive relationship between leverage and growth (performance) exists to a certain point and beyond that threshold negative relationship

Table 10.2 Correlation matrix

	ROE	ROA	ROC	EPS	GR ₁	GR ₂	D/E	TURN	GDP	IR
ROE	Pearson correlation Sig. (2-tailed)	1								
ROA	0.937*	Pearson correlation Sig. (2-tailed)	1							
ROC	0.000	0.963*	Pearson correlation Sig. (2-tailed)	1						
EPS	0.000	0.000	0.802*	Pearson correlation Sig. (2-tailed)	1					
G R ₁	0.000	0.000	0.000	0.135	Pearson correlation Sig. (2-tailed)	1				
GR ₂	0.071	0.217	0.155	0.103	0.432*	Pearson correlation Sig. (2-tailed)	1			
D/E	0.054	0.024	0.090	0.003	0.000	0.000	Pearson correlation Sig. (2-tailed)	1		
TURN	0.038	-0.177	-0.017	0.005	0.149	-0.019	0.840	Pearson correlation Sig. (2-tailed)	1	
GDP	0.691	0.061	0.855	0.954	0.117	0.840	0.137	0.150	Pearson correlation Sig. (2-tailed)	1
IR	0.718*	0.657*	0.797*	0.643*	0.129	-0.025	0.137	0.065	0.499	Pearson correlation Sig. (2-tailed)
	0.000	0.000	0.000	0.000	0.176	0.791	0.150	0.237	0.499	0.000
	0.240**	0.297*	0.239**	0.077	-0.020	-0.033	-0.113	0.045	-0.120	-0.687*
	0.011	0.001	0.011	0.419	0.832	0.731	0.237	0.208	0.000	0.000
	-0.257*	-0.298*	-0.268*	-0.114	0.226**	0.137	0.045	0.208	0.000	0.000
	0.006	0.001	0.004	0.232	0.017	0.151	0.641	0.208	0.000	0.000

*Correlation is significant at the 0.01 level (2-tailed)

**Correlation is significant at the 0.05 level (2-tailed)

Table 10.3 Model 1: $ROE = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon$

	Unstandardized coefficients		Standardized coefficients		Sig.
	B	SE	Beta	t	
(Constant)	8.690	15.566		0.558	0.578
Growth rate sales	4.181	10.428	0.029	0.401	0.689
Growth rate assets	29.281	9.615	0.209	3.045	0.003
Debt to equity ratio	-1.063	1.657	-0.041	-0.641	0.523
Asset turnover	20.881	1.881	0.702	11.098	0.000
Gross domestic product	1.380	1.128	0.106	1.223	0.224
Interest rate	-1.408	0.944	-0.133	-1.492	0.139

a. Dependent variable: return on equity

[$R = 0.778^a$; $R^2 = 0.605$; adjusted $R^2 = 0.583$; standard error of the estimate = 13.98265; $F = 26.856$; ANOVA's test Sig. = 0.000^a]

Table 10.4 Model 2: $ROA = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon$

	Unstandardized coefficients		Standardized coefficients		Sig.
	B	SE	Beta	t	
(Constant)	7.444	5.574		1.335	0.185
Growth rate sales	-0.278	3.734	-0.005	-0.075	0.941
Growth rate assets	12.924	3.443	0.252	3.754	0.000
Debt to equity ratio	-2.315	0.593	-0.242	-3.903	0.000
Asset turnover	7.289	0.674	0.671	10.819	0.000
Gross domestic product	0.624	0.404	0.132	1.546	0.125
Interest rate	-0.577	0.338	-0.150	-1.708	0.091

b. Dependent variable: return on assets

[$R = 0.788^a$; $R^2 = 0.621$; adjusted $R^2 = 0.599$; standard error of the estimate = 5.00698; $F = 28.647$; ANOVA's test Sig. = 0.000^a]

exists. Pakistani firms might just cross positive relationship point and do not reach at that threshold point where they have significant negative relationship.

Note first that growth in assets and asset turnover is significantly better than alpha 0.01. The significant positive coefficient on growth rate assets and asset turnover suggests that both variables increase the return on equity. Interestingly, negative coefficient on debt to equity ratio shows that high leverage lowers the firm's performance. Finally, negative coefficient on interest rate implies that higher interest rate decreases the return on equity (Table 10.4).

The above table shows the result of Model 2, the relationship between dependent variable (ROA) and independent variables (GR1, GR2, D/E, TURN, GDP, and IR). The overall model is significant at alpha 1 % with the explanatory power of 62.1 %.

In Table 10.5, the results show that coefficient on debt to equity ratio is negative and statistically significant (p -value < 0.01), suggesting that leverage has a negative

Table 10.5 Model 3: $ROC = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon$

	Unstandardized coefficients		Standardized coefficients		Sig.
	B	SE	Beta	t	
(Constant)	6.544	10.288		0.636	0.526
Growth rate sales	-0.945	6.892	-0.008	-0.137	0.891
Growth rate assets	22.606	6.355	0.204	3.557	0.001
Debt to equity ratio	-2.175	1.095	-0.105	-1.987	0.050
Asset turnover	18.717	1.243	0.796	15.052	0.000
Gross domestic product	0.952	0.746	0.093	1.277	0.204
Interest rate	-1.085	0.624	-0.130	-1.739	0.085

c. Dependent variable: return on capital

[$R = 0.851^a$; $R^2 = 0.724$; adjusted $R^2 = 0.709$; standard error of the estimate = 9.24157; $F = 46.016$; ANOVA's test Sig. = 0.000^a]

relationship on performance. Compared with the findings of the insignificant relationship between leverage and ROA reported by Connelly et al. (2012), we find that the leverage has negative relationship on ROA which is similar to the findings of Singla and George (2013). This finding is also consistent with the view that low level of leverage is associated with high level of the quality of the firm, which is, for example, manifested by the high level of profitability (see e.g., Park et al. 2013).

The results from the regression (10.3) indicate a significant negative relationship between return on capital and debt to equity ratio. The significant negative regression coefficient implies that an increase in debt to equity ratio position is associated with a decrease in the profitability (return on capital), thus higher debt to equity and lower the return on capital. This is true that firms do like to take more debt; meanwhile higher cost resulted in lower return on capital. Secondly, growth rate in assets has a significant positive association with the return on capital that is very obvious; wherever the firms increase the assets, it will enhance firms' ability to produce more that ultimately leads to higher profitability. The table also shows the positive but insignificant relationship with the asset turnover.

The adjusted r -squared value (0.709) shows that overall explanation power of the model is reasonable, and p -value significant even at alpha 1 % shows that overall model is highly significant (Table 10.6).

The table shows the relationship between leverage and earnings per share is a negative relationship, while it is positive with the growth in assets. This positive relationship gives us a meaningful inference, that is, mostly companies in Pakistan are managing their capital expenditures through debt. Although there is negative relationship with the performance that could be justified, assets are not utilized at their full capacity. It is very obvious that when companies went for expansion, they are supposed to do significant capital expenditures, and due to those huge investments, their performance in the following few years remains low, but in the long term it is very fruitful. Overall the model produced very satisfactory results as p -value of the overall model is significant even at alpha 1 %, and the model has respectable explaining power of 51.4 %.

Table 10.6 Model 4: $EPS = \alpha + \beta_1 (GR_1) + \beta_2 (GR_2) + \beta_3 (D/E) + \beta_4 (TURN) + \beta_5 (GDP) + \beta_6 (IR) + \epsilon$

	Unstandardized coefficients		Standardized coefficients		Sig.
	B	SE	Beta	t	
(Constant)	0.692	8.054		0.086	0.932
Growth rate sales	-2.721	5.396	-0.041	-0.504	0.615
Growth rate assets	20.966	4.975	0.321	4.214	0.000
Debt to equity ratio	-0.866	0.857	-0.071	-1.010	0.315
Asset turnover	9.122	0.974	0.658	9.370	0.000
Gross domestic product	-0.106	0.584	-0.018	-0.182	0.856
Interest rate	-0.386	0.488	-0.079	-0.791	0.431
d. Dependent variable: earning per share					

[$R = 0.717^a$; $R^2 = 0.514$; adjusted $R^2 = 0.486$; standard error of the estimate = 7.23530; $F = 18.475$; ANOVA's test Sig. = 0.000^a]

10.5 Results Discussion and Conclusion

Managers in the search for improved performance apply firm-specific strategies, which they believe will provide their firms with the competitive advantage in the marketplace. Mixture of debt and equity ratio in the firm's capital structure is one such firm-specific strategy used by the managers. This strategy and its effect on firm performance have been widely examined. Largely missing from this body of research is any research dealing with the influence of leverage on firm performance for Pakistani firms. This issue is addressed in this article.

Using different econometric tools, the results in this article provide conclusion that financial leverage has substantial effect on the firm's performance especially when return on assets (ROA) and return on capital (ROC) are used as an indicator of firm performance. Finally, it is shown that financial leverage influences the performance.

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Chapter 11

Comparison of Innovation Performance Within Visegrad Countries

Tatiana Corejova and Mario Al Kassiri

Abstract The proposed paper deals with the innovation, innovation activities, and innovation performance in Visegrad countries (e.g., Czech Republic, Poland, Hungary, and Slovak Republic). Three of these countries are classified as the high-income countries and one as the upper middle-income country. The analysis is based on the global innovation index (GII) of both the input and output side indexes by the OECD and EUROSTAT data. The changes of indexes by the Visegrad countries are identified as well as the trends. The contribution discusses differences or distances between the indexes and their stability. The comparison of global innovation index in Visegrad countries shows the opportunities for better understanding of the innovation activity conditions as well as the performances in the innovation in the country. Two of Visegrad countries are ranked better by innovation output (IO) indexes and two by innovation input (II) indexes. All these countries are weak in market sophistication. It is the opportunity for non-technological innovation processes. This is also the challenge of optimizing the institutional systems and processes. In the context of innovation, the key challenge is developing skills for innovation in education and training systems and connected with the changes and expenditures on education and training. The aim is to connect the equipment of more people with the skills related to innovation and creativity in all its forms. All countries have to increase the outputs based on the knowledge, innovation, and creativity.

Keywords Innovation index • Identification the gap in innovation index
• Visegrad countries

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11.1 Introduction

The changes of environment in terms of technology, policy, market conditions, etc. evoke and make new requirements on the economy of each country, on the inputs of production, and on the outputs for the market. They determine the combination as well as the importance of input production factors and require smart and balanced use of inputs and the newest information, knowledge, or permanent innovation of products, services, processes, etc. The changes of the combination of input production factors are characterized by their new proportion.

The growths of economy and the performance of production systems are based on the ability to innovate, to absorb the knowledge, and to use the innovation. The transfers of knowledge and technologies together with innovation are the terms that are presented in many strategic documents and presentations. They are perceived differently, but their content is explicitly or implicitly bound to the inputs and outputs of economic growth and employment.

The emphasis on knowledge, innovations, and enhancement of human capital is crucial for recovering the economic performance. Another important strategic field in Europe is to increase investment and employment which requires the completion of domestic market and improvement of business environment mainly through decreasing bureaucracy, improvement of infrastructure, and liberalization of services. The priorities in this context are clear: education, employment, science and research, as well as business and market environment. Healthy business environment which motivates people to carry business is one of the conditions in ensuring long-term competitiveness in the selected country. The business environment, business support, and the creation of suitable investment climate must enable an effective competition for businesses, which is the base engine of economy of each country.

In the proposed contribution, the indexes of competitiveness are compared between countries known as V4 or Visegrad countries. This configuration contains four countries: the Czech Republic, Hungary, Poland, and the Slovak Republic. They are located in Central Europe, and they entered the EU in 2004. In the years 1990–2004, they were included together between transitive economies. The economies of these countries are closely mutual related. Also the societal and cultural environment has a lot of similar marks.

11.2 Theoretical Background

The founder of innovation theory Schumpeter (1934) considered the innovation only the first entry of new product, raw materials, technological process, etc. on the market. It means the first materialization of idea and entry on the market. Many authors focused on innovation, and innovation management developed the original Schumpeter's theory, and nowadays their works are primarily focused on the successful innovation management in enterprises. For example, Baumol and

Blinder (1988) consider oligopolies as economic structures that support innovation. These large enterprises compete with each other through price differentiation and so stimulate creation of innovation and economic growth. The innovation activity is essential in order for the enterprises to survive.

According to Cooper and Edgett (2009), innovation includes the use of knowledge that generates new ideas, which brings benefit. Freeman and Soete (2005) said that innovation includes activities related with technology, design, production, management, and commerce aimed on the introduction of new or improved product on the market or the first commercial use of a new or improved process or equipment. Rothwell and Gardiner Classified the radical innovation (the commercialization of fundamentally new technology) and incremental innovation that means using less significant changes in technological know-how.

Porter said that enterprises achieve competitive advantages by innovation act and considered innovation in its widest sense, including both new technologies and new ways of realization of the things. Brandon and Lu (2008) regard innovative enterprise as one that considers and acts differently than others. It is not only about good ideas; it is a combination of good ideas, motivated employees, and intuitive understanding of customers' needs and requirements.

So, the term "innovation" has many definitions—according to survey there are around 200 of them. Their common features are application of new ideas (38%), changes or improvements of products or processes (28%), or invention (9%). According to most contemporary authors, innovation is the key term for the entrepreneur or manager.

Current understanding of innovation emphasizes connection to organization's way of life, thinking and behavior of people, and impact of dependence on major elements of system environment of organization that produces the innovation and provides it to market.

Green Paper on Innovation issued by the European Commission in 2004 defines innovation as synonym for a successful production, assimilation, and use of novelty in economic and social sphere. Innovations offer new solutions of problems and so make it possible to meet the needs of individuals and society (Rostášová et al. 2010).

11.3 Data and Methodology

In comparison of individual countries from the point of view of their living standard, economic development or growth several indexes connected to GDP and innovation index are used. Global innovation index expresses average value between the innovation inputs and outputs. The proportion between index of innovation inputs and outputs expresses the effectiveness. GII is evaluated by OECD within 141 countries in the world. The individual data related to the competitiveness and innovation in V4 countries are based on the OECD statistics.

Innovation input subindex includes five areas and each of them has three subareas. There are evaluated preconditions for innovation activities in economy of the country, e.g.:

- Institutions
- Human capital and research
- Infrastructure
- Market sophistication
- Business sophistication

Innovation output subindex includes two categories of output with three subareas:

- Knowledge and technology
- Creative outputs

Innovation subindex reflects the areas influencing and enabling innovation and competitiveness of national economy. Both sides, input and output, represent 81 individual indicators.

11.4 Comparison of Global Innovation Index for V4 Countries

Initial data for comparison of values of indicators and their development in V4 countries are shown in Tables 11.1 and 11.2. V4 countries represent 64.3 million EÚ inhabitants. The value of GDP per capita in USD ranks third of V4 countries to the high-income countries (CZ, SVK, PL) and one to upper middle-income countries (H). The top five economies by global innovation index include Switzerland, the United Kingdom, Sweden, the Netherlands, and the United States. V4 countries rank among the third up to the fifth of the ten countries.

Table 11.1 Main indicators for Visegrad countries in 2012–2015 (OECD 2012, 2013, 2014, 2015)

Country	Indicators	2012	2013	2014	2015
Czech Republic (CR)	Population (mil.)	10.5	11.0	10.5	10.7
	GDP per capita (USD)	25,933.8	27,164.8	27,200.1	28,086.5
Hungary (H)	Population (mil.)	10.0	10.4	9.9	9.9
	GDP per capita (USD)	19,647.1	19,754.0	20,065.1	20,817.4
Poland (PL)	Population (mil.)	38.1	39.7	38.5	38.2
	GDP per capita (USD)	20,136.9	20,976.1	21,214.3	22,201.1
Slovak Republic (SR)	Population (mil.)	5.4	5.6	5.4	5.5
	GDP per capita (USD)	23,384.1	24,283.6	24,605.3	25,524.7

Table 11.2 Innovation indexes and subindexes (score 0–100 or value) for Visegrad countries in 2012–2015 (OECD 2012, 2013, 2014, 2015)

Country	Index	2012	Rank	2013	Rank	2014	Rank	2015	Rank	
Czech Republic	GII, global innovation index	49.7	27	48.4	28	50.2	26	51.3	24	
	IO, innovation output subindex	46.1	23	43.3	26	46.8	17	48.5	17	
	II, innovation input subindex	53.3	31	53.4	27	53.6	27	54.2	27	
	Innovation efficiency ratio	0.9	22	0.8	53	0.9	18	0.9	11	
	Institutions	68.2	44	76.1	31	76.2	31	76.4	32	
	Human capital and research	49.1	31	45.7	30	45.7	29	45.8	29	
	Infrastructure	52.0	24	49.0	24	50.8	25	51	30	
	Market sophistication	44.2	48	48.9	53	49.1	62	52.4	45	
	Business sophistication	53.0	22	47.5	20	46.2	20	45.3	28	
	Knowledge and technology outputs	48.4	20	38.3	25	46.4	15	46.7	15	
	Creative outputs	43.9	26	48.2	25	47.3	18	50.2	21	
	Hungary	GII, global innovation index	46.5	31	46.9	31	44.6	35	43	35
		IO, innovation output subindex	41.9	29	45.4	23	42.2	29	37.7	37
		II, innovation input subindex	51.2	37	48.5	36	47.0	41	48.2	42
		Innovation efficiency ratio	0.8	41	0.9	23	0.9	15	0.8	35
Institutions		72.3	32	73.5	38	72.3	40	73.4	40	
Human capital and research		46.0	38	40.2	37	37.9	42	37.7	43	
Infrastructure		48.5	28	44.1	30	45.6	36	47.2	43	
Market sophistication		42.2	56	43.3	87	42.1	115	46	77	
Business sophistication		46.9	38	41.3	36	37.2	45	36.8	57	
Knowledge and technology outputs	46.8	21	44.9	13	41.9	24	34.7	40		
Creative outputs	37.0	43	45.8	37	42.5	35	40.7	36		

(continued)

Table 11.2 (continued)

Country	Index	2012	Rank	2013	Rank	2014	Rank	2015	Rank	
Poland	GII, global innovation index	40.4	44	40.1	49	40.6	45	40.2	46	
	IO, innovation output subindex	33.6	52	32.4	64	34.0	48	31.9	56	
	II, innovation input subindex	47.1	41	47.8	39	47.3	40	48.4	39	
	Innovation efficiency ratio	0.7	80	0.7	110	0.7	76	0.7	93	
	Institutions	68.1	45	74.4	35	74.7	35	75.3	34	
	Human capital and research	40.5	53	37.6	45	37.9	43	37.2	45	
	Infrastructure	39.7	48	38.0	47	41.9	49	45.5	47	
	Market sophistication	44.8	44	50.5	46	48.2	70	49	60	
	Business sophistication	42.3	52	38.6	40	33.7	64	35.2	66	
	Knowledge and technology outputs	32.9	51	29.0	55	31.2	53	28.3	56	
	Creative outputs	34.3	60	35.9	78	36.7	51	35.4	53	
	Slovak Republic	GII, global innovation index	41.4	40	42.2	36	41.9	37	43	36
		IO, innovation output subindex	35.4	43	36.2	45	37.0	38	37.1	38
		II, innovation input subindex	47.3	40	48.3	37	46.7	43	48.9	37
		Innovation efficiency ratio	0.7	65	0.7	84	0.8	45	0.8	48
Institutions		69.8	38	77.4	27	74.5	36	75.1	36	
Human capital and research		42.6	46	39.5	41	32.9	55	33.2	53	
Infrastructure		46.3	33	42.2	38	43.5	45	49.3	37	
Market sophistication		38.1	71	49.1	52	48.6	67	50.4	53	
Business sophistication		39.7	63	33.4	59	34.2	61	36.7	58	
Knowledge and technology outputs		36.5	39	33.3	42	34.7	41	33.7	41	
Creative outputs	34.4	57	39.1	61	39.4	42	40.4	40		

The Czech Republic is ranked on 24th position in 2015 and went up two positions from the 26th position in 2014, and in the last two years, it moved from the 28th to the 24th position. It indicates the changes in innovation activities in economy.

The strength of the country of 10.7 million inhabitants lies in the solid performance in six of seven areas excluding one area—market sophistication. However, the improvement of the market sophistication during the last year is significant (62nd place in 2014 and 45th place in 2015). The innovation efficiency ratio ranks Czech Republic on the 11th position among all countries, and innovation output as subindex was ranked to the 17th position. The knowledge and technology outputs as well as the creative goods and services played a major role in achieving its 17th place by the innovation output subindex. The strong position is a result of high-tech exports, that is, less reexports and creative goods export (4th).

From the point of view of innovation input subindex, the Czech Republic achieves a leading position on ISO 14001 environmental certificates. A very strong position is occupied by ecological sustainability, environmental performance, political stability, and the level of trade and competition.

The weak point of the country is market sophistication (only 45th in 2015, 62nd in 2014, 48th position in 2012), mainly in investment (118th), ease of protecting investors (75th), and market capitalization in percentage GDP (74th) (Fig. 11.1).

Hungary is ranked 35th in 2015 similar in 2014 and went down four positions from 31st in 2012 and 2013. Its major weaknesses are in market sophistication (77th), credit (73rd), and investment (132nd). These indices are related also with the

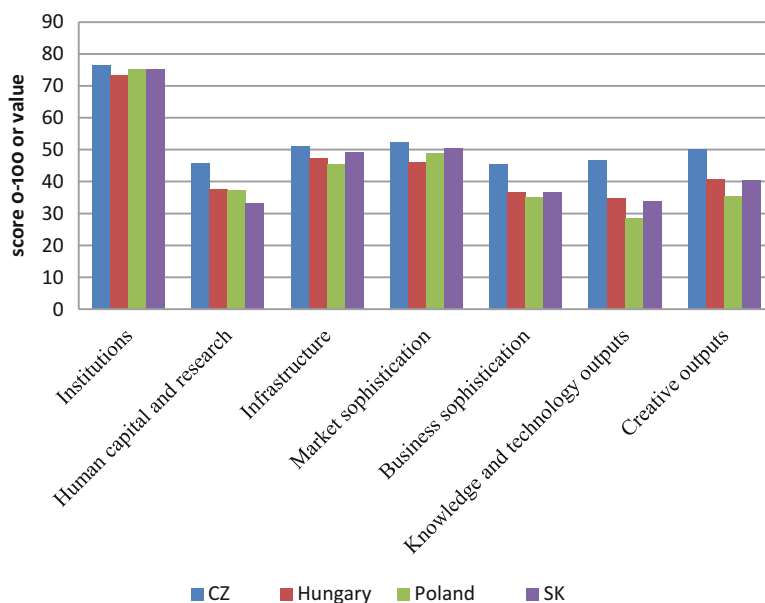


Fig. 11.1 Input and output innovation subindexes in the Visegrad countries in 2015

business sophistication, mainly with FDI net inflow as percentage of GDP (132nd), gross capital formation (103rd) in infrastructure area, and business sophistication related to the knowledge workers (60th) as well as innovation linkages (83rd) or state of cluster development (88th) or joint venture strategic alliance deals (69th). On the other hand, knowledge and technology outputs represent the good performances in knowledge impact (24th), high and medium high-tech manufactures (8th), and high-tech exports less reexports (8th). Other areas of concern are the tertiary education sub-pillar (63rd) with the graduates in science and engineering (67th).

Poland is ranked 46th (down one place from 2014) with the weaker performance in innovation outputs (56th) as in innovation inputs (39th). The business sophistication (66th) and market sophistication are the weakest areas of innovation index with the poor performance in investment (84th) as well as the microfinance gross loan in %GDP (67th). Its less good showing in the output subindex is the result of worsening position in intangible assets (108th) with poor performance in ICTs and business model creation (95th), knowledge impact (81st) with the new businesses (86th), and knowledge diffusion (89th) with the FDI net outflows in %GDP (119th).

The Slovak Republic is ranked 36th in 2015 similar in 2013. The subindex "human capital and research" is classified only on 53rd place because the expenditures on education as the percentage of GDP are on 85th rank (84th in 2014) among 141 OECD countries evaluated. Also the business sophistication area is influenced by the weak innovation linkages (69th) including the university/industry research collaboration (81st), state of cluster development (66th), royalty and license fee payments (92nd), or communication, computer, and information services import (105th). On the output side of innovation index, it is possible to see the impacts of the insufficient innovation and knowledge processes in the ranks of domestic resident patent application (59th), knowledge diffusion (69th), and FDI net outflows as %GDP (51st) in intangible assets (81st) and in printing and publishing manufactures (87th). The strengths of the Slovak Republic related to the innovation and knowledge are political stability (13th), ecological sustainability (10th), ISO 14001 certificates (7th), high-tech imports less reimports (14th), knowledge impact (19th) including high and medium high-tech manufactures in % (4th), and creative goods and services (17th) including creative goods export as % total trade (2nd).

The main problems in relation with the global innovation index and its areas of all V4 countries are connected with the market sophistication area in three countries, e.g., Hungary, Poland, and the Slovak Republic, and also with the business sophistication area. The values of the innovation indexes and subindexes in the V4 countries are determined by the gaps in the innovation and knowledge processes (creation, education, skills, diffusion, etc.).

The relations between the area of human resources and research represented by the following input indicator expenditures on education and research and development including the university ranking of top three and the area of knowledge creation represented by citation documents h-index are represented by Figs. 11.2 and 11.3.

The potential of the Slovak Republic to increase the GII level lies in supporting the linkages between education and research, research and innovation, and

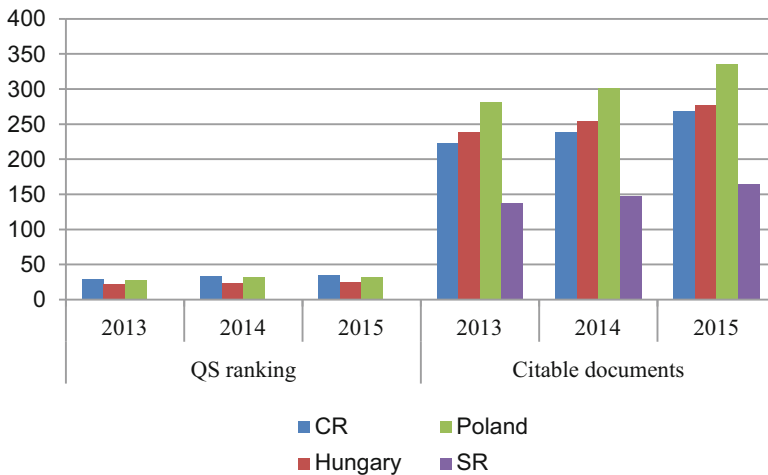


Fig. 11.2 QS university rankings (average score of top three) and citable documents h-index in Visegrad countries

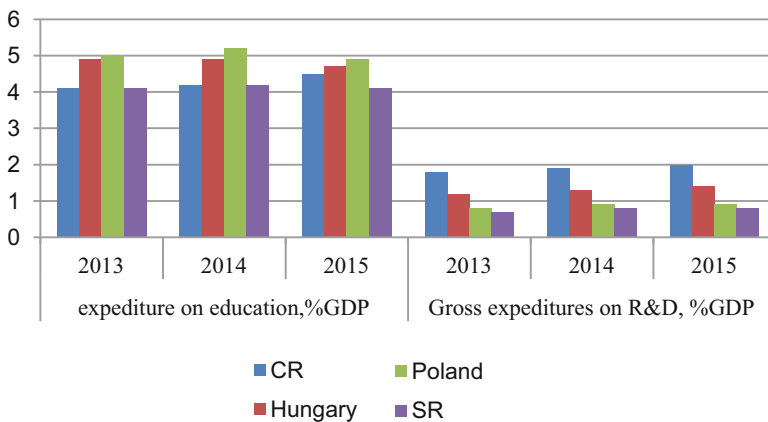


Fig. 11.3 Expenditure on education and R&D as a %GDP in Visegrad countries

education and innovation, e.g., to fulfill the concept of knowledge triangle. The level of citable documents as well as the domestic patent applications reflects the level of expenditures on research and development. In terms of university performance (citable documents and patent applications), the highest level among the V4 countries is achieved by Poland. The lowest level in expenditures on education as well as on research and development is achieved by Slovak Republic, and these levels influence the knowledge outputs represented by patent and citable documents (Table 11.3).

The knowledge is more and more important for competitiveness and performance of economy, industries, and business subjects of advanced countries. Certainly, the

Table 11.3 Selected indicators related to knowledge triangle relations in Visegrad countries in 2015 (OECD 2012, 2013, 2014, 2015)

Indicator	CR	Hungary	Poland	Slovakia
<i>Inputs</i>				
Expenditures on education (%GDP)	4.5	4.7	4.9	4.1
Graduates in science and engineering (%)	21.6	16.8	16.8	20.6
Gross expenditures on R&D (%GDP)	2.0	1.4	0.9	0.8
Knowledge-intensive employment (%)	37.8	35.6	35.9	31.8
University/industry research collaboration	50.0	54.6	41.7	39.3
State of cluster development	51.0	41.5	41.4	46.7
Royalty and license fee payments (% total trade)	0.6	1.1	1.1	0.2
<i>Outputs</i>				
Domestic resident patent app./bn PPP\$ GDP	3.2	2.7	4.7	1.3
Citable documents h-index	268	277	336	165
Royalty and license fee receipts	0.2	1.0	0.1	0.0

knowledge can be the source of economic growth that leads to a new view on the role of information, technologies, and education in increasing of economic performance. The traditional production function was focused on work and capital; the knowledge and technologies had only intermediary effect on production itself.

The analysis of global innovation index including subindexes and individual indicators has to provide better understanding of the innovation processes, the relations between the knowledge inputs and outputs as well as measures of innovation. The innovation policies can be defined on identification of targets or best practices in innovation processes. On the basis of analysis of Visegrad countries' global innovation index, it is possible to show the importance of non-technological innovation processes. All four countries are weak in market sophistication. This is also the challenge of optimizing the institutional systems and processes. The key challenge is developing skills for innovation in education and training systems. The target is connected with the equipment of more people with the skills related to innovation and creativity in all its forms. The levels of GDP per capita in PPP\$ and global innovation index score indicate that the Czech Republic ranks among the innovation leaders, Hungary and the Slovak Republic are on the way from achievers to leaders and Poland too, but Poland ranks among inefficient innovators. The Czech Republic, Hungary, and the Slovak Republic rank among efficient innovators.

From the comparison and analyses, the certain implication result for the V4 countries in relation to intellectual property and its creation and protection is an important production factor of the future. According to supported directions and focus on research (e.g., smart specialization), the outputs aimed to relevant industries influence the choice of form of transfer of knowledge, knowledge absorption, and university-industry research and development collaboration.

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Chapter 12

Dimensions of Market Liquidity: The Case of the Polish Stock Market

Joanna Olbrys and Michal Mursztyn

Abstract Liquidity in a financial market is not a one-dimensional variable but it includes several dimensions. The main aim of this paper is an empirical analysis of market liquidity dimensions on the Warsaw Stock Exchange (WSE). We investigate market depth and market tightness for the 53 WSE-listed companies divided into three size groups. The high-frequency data covers the period from January 3, 2005 to June 30, 2015. The additional goal is robustness analysis of the results obtained with respect to the whole sample period and three adjacent subsamples of equal size: the pre-crisis, crisis, and post-crisis periods. The order ratio (OR) is employed as a proxy of market depth, while market tightness is approximated using the relative spread (RS). In line with the expectations, the empirical results indicate that the OR values rather do not depend on firm size, while the RS estimates are slightly higher for small companies. Moreover, the results turn out to be robust to the choice of the sample. Furthermore, an initial research concerning interaction between liquidity dimensions on the WSE is provided by analyzing the degree of correlation between market depth and market tightness. In general, the correlation results are consistent with the literature. The majority of correlation coefficients between daily estimates of the order ratio and the relative spread indicators are not significantly different from zero.

Keywords Dimensions of market liquidity • Market depth • Market tightness • Trade classification algorithms

12.1 Introduction

Liquidity indicates the speed and ease at which one can trade, but it is not directly observable (Huberman and Halka, 2001, p. 161). Liquidity, by its very nature, is difficult to define and even more difficult to estimate (Lesmond, 2005). Usually, simple definitions are not able to capture the phenomenon “liquidity,” because

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liquidity is not a one-dimensional variable but includes several dimensions (von Wyss, 2004). Kyle (1985, p. 1316) pointed out that market liquidity “is a slippery and elusive concept, in part because it encompasses a number of transactional properties of markets.” He distinguished the following three dimensions of market liquidity: (1) depth—the size of an order flow innovation required to change prices a given amount; (2) tightness—the cost of turning around a position over a short period of time; (3) resiliency—the speed with which prices recover from a random, uninformative shock. von Wyss (2004, p. 5) emphasized the following four aspects: (1) trading time—the ability to execute a transaction immediately at the prevailing price; (2) depth—the ability to buy or to sell a certain amount of an asset without influence on the quoted price; (3) tightness—the ability to buy and to sell an asset at about the same price at the same time; (4) resiliency—the ability to buy or to sell a certain amount of an asset with little influence on the quoted price.

There is a growing body of empirical literature concerning direct measurement of liquidity, but relatively little empirical research has been conducted directly on the liquidity dimensions of equity markets in the world. Market depth has been investigated more extensively than other dimensions of liquidity, e.g., Ahn et al. (2001), Chordia et al. (2000a,b, 2005), Engle and Lange (1997, 2001), Huberman and Halka (2001), Lee et al. (1993), Lin et al. (2012), Rinaldo (2001), Wong and Fung (2002), von Wyss (2004). Moreover, there has been quite extensive research on the bid/ask spread, which may be treated as a measure of market tightness, e.g., Acker et al. (2002), Chordia et al. (2000a,b, 2001, 2005), Huberman and Halka (2001), Korajczyk and Sadka (2008), Lesmond (2005), Levin and Wright (1999), Peterson and Sirri (2003), Piwowar and Wei (2003), Rinaldo (2001), von Wyss (2004). Undoubtedly, the least empirical investigation has been conducted on the stock market resiliency, as this dimension of liquidity is especially difficult to estimate, e.g., Dong et al. (2007), Hmaied et al. (2006), Lo and Hall (2015), Rinaldo (2001). Since resiliency is a measure of price elasticity, it is difficult to define a straightforward indicator to gauge it (Rinaldo, 2001, p. 311). Moreover, as Engle and Lange (1997) perceived, this measure obviously requires some estimate of the equity equilibrium price.

The main goal of this paper is an empirical analysis of market liquidity dimensions on the Warsaw Stock Exchange (WSE). Fifty-three WSE-listed companies divided into three size groups are investigated. The proxies of market depth and market tightness are calculated. The order ratio is employed as a proxy of market depth, while market tightness is approximated using the relative spread. Generally speaking, the empirical findings confirm that a high order ratio indicates low market depth and low stock liquidity. Conversely, a small order ratio denotes high market depth and high stock liquidity. By analogy, a wide relative spread means high market tightness and low stock liquidity. Conversely, a narrow relative spread expresses low market tightness and high stock liquidity.

Moreover, the paper provides a robustness analysis of the obtained results with respect to the whole sample January 2005 to June 2015 and three adjacent subsamples of equal size: the pre-crisis, crisis, and post-crisis periods. The Global Financial Crisis (GFC) on the WSE was formally set based on the papers (Olbrys

and Majewska, 2014, 2015), in which the Pagan and Sossounov (2003) method for statistical identification of market states was employed. We can assert that the obtained results turn out to be robust to the choice of the sample for all groups.

Furthermore, an initial research concerning interaction between liquidity dimensions on the WSE is provided by analyzing the degree of correlation between the order ratio and the relative spread. The majority of correlation coefficients are not significantly different from zero and these results are rather in accord with the literature.

To the best of the authors' knowledge, the empirical results regarding dimensions of market liquidity on the WSE are novel and have not been presented in the literature thus far.

The remainder of the study is organized as follows. Section 12.2 specifies a methodological background concerning dimensions of market liquidity. In Sect. 12.3, we briefly describe trade classification algorithms. Section 12.4 presents and discusses the empirical results on the WSE. The last section encompasses the conducted research with a brief summary.

Nomenclature

WSE	The Warsaw Stock Exchange
GFC	The 2007–2009 Global Financial Crisis
LR	The Lee and Ready (1991) trade classification algorithm
OR	The order ratio
RS	The relative spread

12.2 Dimensions of Market Liquidity

According to the literature, the majority of researchers follow Kyle (1985) and they distinguish between three dimensions of market liquidity: depth, tightness, and resiliency. Wong and Fung (2002) pointed out that another commonly used concept is immediacy, but it incorporates elements of all three dimensions, and therefore it could be not considered as a separate dimension. Bernstein (1987, p. 55) mentioned the following three dimensions: depth, breadth, and resiliency. He stressed that these three attributes are generally accepted as the basic requirements for good markets. Harris (2003, p. 75) emphasized that when people think about liquidity, they may think about trading quickly, about trading large size, or about trading at low cost. However, people rarely distinguish among these dimensions when discussing liquidity. In this paper, we approximate and explore depth and tightness as market liquidity dimensions on the Polish stock market.

12.2.1 *Measuring of Market Depth*

Each security has its own liquidity, which may vary over time. Some quantities are related to liquidity, and one of them is market depth. The value of depth could be approximated by various methods. The related literature proposes the following proxies of market depth:

- Depth as the number of units offered at the ask price plus the number of units bid at the bid price, e.g., Ahn et al. (2001), Huberman and Halka (2001), Lee et al. (1993), Rinaldo (2001), von Wyss (2004), Wong and Fung (2002).
- Dollar depth, i.e., depth measures in currency terms, e.g., Huberman and Halka (2001), von Wyss (2004), Wong and Fung (2002).
- An average depth of the bid and the ask depth, e.g., Chordia et al. (2000b), Chordia et al. (2001), von Wyss (2004).
- An average dollar depth calculated in currency terms, e.g., Chordia et al. (2001), von Wyss (2004).
- An enhanced modified depth measure for the limit order book Lin et al. (2012).
- Various versions of the order ratio as a proxy of realized market depth, e.g., Engle and Lange (1997), Engle and Lange (2001), Lee et al. (1993), Rinaldo (2001), von Wyss (2004).

In this paper, we employ the order ratio (OR) as a refined measure of market depth, e.g., Rinaldo (2001). It compares depth measured as market order imbalance to cumulated daily trading volume:

$$\text{OR} = \frac{|\sum_{i=1}^m \text{VBuy}_i - \sum_{j=1}^k \text{VSell}_j|}{\sum_{n=1}^N V_n}, \quad (12.1)$$

where the sums $\sum_{i=1}^m \text{VBuy}_i$, $\sum_{j=1}^k \text{VSell}_j$, $\sum_{n=1}^N V_n$ denote daily cumulated trading volume related to transactions classified as buyer- or seller-initiated trades, and daily cumulated trading volume for all transactions, respectively. The OR indicator (1) captures imbalance in the market since it rises as the difference in the numerator becomes large. A high order ratio denotes low market depth and low liquidity. Conversely, a small order ratio denotes high market depth and high liquidity. The daily order ratio is equal to zero when daily cumulated trading volumes related to transactions classified as buyer- and seller-initiated trades are equal. Furthermore, the daily order ratio is set down as equal to zero in two cases: (1) when all transactions within a day are unclassified, or (2) when total daily trading volume is equal to zero.

12.2.2 *Measuring of Market Tightness*

The related literature indicates that various versions of the bid/ask spread are proper measures for tightness because they approximate the cost of immediate execution of a trade. In this paper, we employ the relative spread (RS) as a measure of market tightness, e.g., von Wyss (2004). This measure is sometimes referred to as inside bid/ask spread, e.g., Acker et al. (2002), Levin and Wright (1999). Considering that the bid and ask prices are not public information on the WSE, the best bid price is approximated by the highest price at time t , while the best ask price is approximated by the lowest price at time t . Then the relative spread RS is given by Eq. (12.2):

$$RS_t = \frac{2(P_t^H - P_t^L)}{P_t^H + P_t^L}, \quad (12.2)$$

where P_t^H, P_t^L are the highest and lowest prices at time t , respectively (Olbrys and Mursztyn, 2015, p. 43).

The relative spread is the measure most extensively used, as it is quite easy to estimate and it makes tightness of different stocks comparable to each other. Another advantage is that it may be calculated even if no trade takes place. A wide relative spread denotes high market tightness and low liquidity. Conversely, a narrow relative spread denotes low market tightness and high liquidity. The relative spread is equal to zero when a transaction is unclassified based on the LR trade classification algorithm.

12.3 Trade Classification Algorithms

To measure dimensions of liquidity on the order-driven market it is helpful to recognize the side initiating the transaction and to distinguish between the so-called buyer- and seller-initiated trades. The classification indicates which of the two participants in the trade, the buyer or the seller, is more eager to trade. The WSE is classified as an order-driven market with an electronic order book, but the information of the best bid and ask price is not publicly available, e.g., Nowak (2014), Olbrys and Mursztyn (2015). In fact, even the non-proprietary financial databases that provide information on trades and quotes do not identify the trade direction. As a consequence, the researchers rely on indirect trade classification rules to infer trade sides. There are some trade classification procedures described in the literature, but the Lee and Ready (1991) algorithm (LR) remains the most frequently used, e.g., Ahn et al. (2001), Asquith et al. (2010), Chakrabarty et al. (2007, 2012), Chan and Fong (2000), Chordia et al. (2000a, 2002, 2005), Dong et al. (2007), Ellis et al. (2000), Finucane (2000), Korajczyk and Sadka (2008), Lee and Radhakrishna (2000), Lu and Wei (2009), Odders-White (2000), Olbrys

and Mursztyn (2015), Peterson and Sirri (2003), Piwowar and Wei (2003), Theissen (2001).

In this paper, the LR method is employed because Olbrys and Mursztyn (2015) indicated that the LR algorithm performs well on the WSE, and the empirical results turn out to be robust to the choice of the sample and rather do not depend on firm size.

12.4 Data Description and Empirical Results on the Warsaw Stock Exchange

In this research, we used a database containing high-frequency data “rounded to the nearest second” for the WSE-listed stock, in the period from January 2, 2005 to June 30, 2015. When forming the database, we included only those securities which existed on the WSE for the whole sample period since December 31, 2004, and were not suspended. All companies entered into the database (147) were sorted according to their market capitalization at the end of each year. Next, the stocks were divided into three size groups based on the breakpoints for the bottom 30 % (small companies), middle 40 % (medium companies), and top 30 % (big companies) (Fama and French, 1993). The companies that remained in the same group during the period investigated were selected. Finally, the 53 WSE companies were entered into separate, representative groups, specifically: 8 firms into the SMALL group, 18 firms into the MEDIUM group, and 27 firms into the BIG group (Nowak and Olbrys, 2015).

We investigated dimensions of market liquidity on the WSE over the whole sample and three adjacent subsamples of equal size (436 trading days): (1) the pre-crisis period September 6, 2005 to May 31, 2007, (2) the crisis period June 1, 2007 to February 27, 2009, and (3) the post-crisis period March 2, 2009 to November 19, 2010 (Olbrys and Mursztyn, 2015). As mentioned in Introduction, the GFC on the WSE was formally set based on the papers (Olbrys and Majewska, 2014, 2015), in which the Pagan and Sossounov (2003) method for statistical identification of market states was employed.

12.4.1 Empirical Results of Market Depth on the WSE

As the data set does not identify a trade direction on the WSE, firstly the trade classification LR algorithm was employed to infer trade sides. Next, the OR indicator (1) was utilized to measure daily market depth for each stock.

In the first step, we calculated daily cumulated trading volume related to transactions classified as buyer- and seller-initiated trades, as well as daily cumulated trading volume for all transactions (also those unclassified), for each WSE-listed

company entering the size group (i.e., BIG, MEDIUM, or SMALL, respectively). In the second step, an average daily market depth was approximated. The empirical results are presented in Table 12.1.

Table 12.1 The average daily market depth (OR)

	B	P_1	P_2	P_3	P_4	M	P_1	P_2	P_3	P_4	S	P_1	P_2	P_3	P_4
1	BHW	0.38	0.47	0.47	0.49	ALM	0.43	0.39	0.47	0.37	APL	0.29	0.31	0.32	0.30
2	BPH	0.40	0.33	0.41	0.40	AMC	0.37	0.37	0.40	0.27	BDL	0.29	0.26	0.25	0.30
3	BNP	0.31	0.27	0.38	0.16	ATG	0.44	0.43	0.47	0.50	EFK	0.42	0.36	0.42	0.48
4	BOS	0.34	0.31	0.28	0.35	ATM	0.44	0.45	0.43	0.42	ENP	0.38	0.30	0.32	0.37
5	BDX	0.43	0.53	0.47	0.45	CNG	0.44	0.37	0.50	0.47	KMP	0.33	0.33	0.34	0.36
6	BZW	0.31	0.32	0.25	0.26	COL	0.37	0.47	0.40	0.25	MZA	0.36	0.33	0.39	0.33
7	DBC	0.44	0.41	0.49	0.41	IND	0.44	0.45	0.46	0.46	PLA	0.36	0.32	0.32	0.35
8	ECH	0.45	0.48	0.40	0.43	IPL	0.45	0.38	0.42	0.42	SME	0.42	0.38	0.39	0.43
9	GTN	0.27	0.26	0.29	0.25	LTX	0.34	0.28	0.28	0.33	Mean	0.36	0.32	0.34	0.37
10	GTC	0.30	0.33	0.25	0.26	MCI	0.25	0.24	0.25	0.17					
11	ING	0.48	0.58	0.53	0.43	MNI	0.34	0.27	0.28	0.41					
12	KTY	0.46	0.44	0.51	0.49	PEK	0.43	0.41	0.46	0.48					
13	KGH	0.17	0.17	0.19	0.19	PUE	0.41	0.42	0.39	0.43					
14	LPP	0.46	0.53	0.49	0.52	SKA	0.44	0.44	0.43	0.46					
15	MBK	0.29	0.40	0.28	0.24	STF	0.41	0.28	0.39	0.42					
16	MIL	0.35	0.38	0.39	0.30	STX	0.30	0.24	0.18	0.28					
17	MOL	0.47	0.44	0.49	0.50	TIM	0.43	0.38	0.46	0.48					
18	NET	0.36	0.29	0.42	0.39	VST	0.36	0.48	0.50	0.23					
19	OPL	0.21	0.20	0.20	0.22	Mean	0.39	0.38	0.40	0.38					
20	ORB	0.50	0.45	0.49	0.51										
21	PEO	0.21	0.24	0.21	0.21										
22	PKN	0.19	0.19	0.19	0.20										
23	PKO	0.20	0.23	0.21	0.20										
24	STP	0.45	0.43	0.47	0.46										
25	SNS	0.32	0.41	0.38	0.34										
26	TVN	0.27	0.28	0.25	0.26										
27	ZWC	0.39	0.41	0.42	0.43										
	Mean	0.35	0.36	0.36	0.35										

The table is based on: (1) the whole sample period P_1 (3.01.2005 to 30.06.2015); (2) the pre-crisis period P_2 (6.09.2005 to 31.05.2007); (3) the crisis period P_3 (1.06.2007 to 27.02.2009); (4) the post-crisis period P_4 (2.03.2009 to 19.11.2010). Ticker symbols are in alphabetical order according to the company's full name

B BIG, *M* MEDIUM, *S* SMALL

Several results in Table 12.1 are worth special notice. The value of the OR indicator varies between 0.16 and 0.58, and it rather does not depend on a firm size. Moreover, in line with expectations, we observe the lower values of the OR (i.e., the higher market depth) for the most liquid big companies with the largest market

capitalization (namely KGH, OPL, PEO, PKN, PKO), regardless of the subsample choice. Otherwise, the results reveal that the largest values of the OR indicator (i.e., not less than 0.45) occur for several companies from all size groups. Such big values of the OR inform about low market depth and low liquidity. Furthermore, the results turn out to be robust to the choice of the period. To sum up, it is worthwhile to note that using the order ratio disentangles the effect of firm size from the market depth measure and therefore the results for different stocks are comparable to each other.

12.4.2 Empirical Results of Market Tightness on the WSE

The RS indicator (2) was utilized to measure the market tightness for each stock. In the first step, we estimated the relative spread related to each transaction (at time t). In the second step, daily market tightness was calculated as an average of relative spreads for all transactions within a day. The daily relative spread was set down as equal to zero when daily trading volume was equal to zero. To avoid numerical problems, the daily data were rescaled by multiplying by 10^2 . In the third step, an average daily market tightness was approximated in all periods investigated, for each WSE-listed company entering the size group (i.e., BIG, MEDIUM, or SMALL, respectively). The empirical results are presented in Table 12.2.

The results in Table 12.2 are in line with the expectations and they are worth a comment. The RS estimates are especially low for the most liquid big companies with the largest market capitalization (namely KGH, OPL, PEO, PKN, PKO). This evidence confirms low market tightness and high stock liquidity in these cases. Conversely, the RS proxies are slightly higher for small companies and this evidence denotes high market tightness and low stock liquidity. Moreover, the findings turn out to be robust to the choice of the sample for all groups. Specifically, we do not observe that the RS estimates are quantitatively different in the crisis period (P_3) compared to the other periods.

12.4.3 Correlation Analysis Between Market Depth and Market Tightness on the WSE

The results presented in Tables 12.1 and 12.2 reveal that, generally, low order ratios (OR) are accompanied by narrow relative spreads (RS). Otherwise, high order ratios are accompanied by wide relative spreads. This evidence is consistent with overall relations between these two measures. Table 12.3 briefly summarizes basic relationships between market liquidity dimensions and market liquidity.

In order to carry out an initial assessment of interaction between market depth and market tightness on the WSE, correlation coefficients between daily measures

Table 12.2 The average daily market tightness (RS)

	B	P ₁	P ₂	P ₃	P ₄	M	P ₁	P ₂	P ₃	P ₄	S	P ₁	P ₂	P ₃	P ₄
1	BHW	0.02	0.02	0.03	0.02	ALM	0.08	0.09	0.08	0.08	APL	0.10	0.10	0.10	0.11
2	BPH	0.05	0.01	0.04	0.05	AMC	0.05	0.05	0.07	0.05	BDL	0.07	0.09	0.08	0.05
3	BNP	0.11	0.14	0.14	0.07	ATG	0.09	0.10	0.10	0.06	EFK	0.14	0.12	0.11	0.10
4	BOS	0.07	0.09	0.10	0.10	ATM	0.06	0.07	0.08	0.05	ENP	0.11	0.11	0.15	0.11
5	BDX	0.03	0.05	0.04	0.03	CNG	0.06	0.05	0.06	0.05	KMP	0.12	0.15	0.11	0.11
6	BZW	0.02	0.01	0.02	0.02	COL	0.06	0.09	0.08	0.04	MZA	0.11	0.13	0.15	0.10
7	DBC	0.05	0.04	0.05	0.06	IND	0.06	0.008	0.06	0.07	PLA	0.11	0.12	0.11	0.11
8	ECH	0.04	0.04	0.04	0.05	IPL	0.06	0.06	0.09	0.07	SME	0.13	0.16	0.10	0.18
9	GTN	0.02	0.02	0.02	0.02	LTX	0.06	0.006	0.05	0.07	Mean	0.11	0.12	0.12	0.11
10	GTC	0.02	0.02	0.02	0.02	MCI	0.04	0.05	0.05	0.04					
11	ING	0.03	0.03	0.04	0.03	MNI	0.07	0.04	0.06	0.05					
12	KTY	0.04	0.02	0.05	0.04	PEK	0.08	0.07	0.06	0.11					
13	KGH	0.01	0.01	0.01	0.01	PUE	0.10	0.09	0.12	0.11					
14	LPP	0.04	0.05	0.05	0.04	SKA	0.05	0.07	0.05	0.04					
15	MBK	0.02	0.02	0.02	0.02	STF	0.07	0.04	0.08	0.06					

(continued)

Table 12.2 (continued)

	B	P_1	P_2	P_3	P_4	M	P_1	P_2	P_3	P_4	S	P_1	P_2	P_3	P_4
16	MIL	0.02	0.02	0.03	0.02	STX	0.04	0.04	0.04	0.02					
17	MOL	0.04	0.02	0.05	0.04	TIM	0.08	0.06	0.08	0.09					
18	NET	0.02	0.01	0.03	0.02	VST	0.05	0.05	0.06	0.04					
19	OPL	0.01	0.005	0.009	0.01	Mean	0.06	0.06	0.07	0.06					
20	ORB	0.05	0.02	0.04	0.07										
21	PEO	0.009	0.008	0.01	0.01										
22	PKN	0.008	0.006	0.01	0.01										
23	PKO	0.007	0.006	0.01	0.01										
24	STP	0.07	0.06	0.07	0.05										
25	SNS	0.02	0.04	0.02	0.02										
26	TVN	0.02	0.01	0.02	0.02										
27	ZWC	0.07	0.08	0.12	0.07										
	Mean	0.03	0.03	0.04	0.03										

See Table 12.1 for explanation

Table 12.3 Overall relations between market depth, market tightness, and liquidity

Indicator	Market liquidity dimension	Market liquidity
<i>Order ratio (OR)</i>		
High order ratio	Low market depth	Low liquidity
Low order ratio	High market depth	High liquidity
<i>Relative spread (RS)</i>		
Wide relative spread	High market tightness	Low liquidity
Narrow relative spread	Low market tightness	High liquidity

of these liquidity dimensions for each stock were calculated. Table 12.4 presents empirical results concerning the correlation analysis.

The results reported in Table 12.4 are rather consistent with the literature. The majority of correlation coefficients between daily values of the OR and RS indicators are not significantly different from zero. Only in the case of the small companies we observe especially high and statistically significant correlations in the whole sample period (P_1). This evidence is a consequence of extraordinarily many zeros appearing simultaneously both in the OR and RS daily time series of those firms. This phenomenon is mainly connected with a non-trading problem on the WSE (Nowak and Olbrys, 2015). Non-trading is understood as a lack of transactions over a particular period when the WSE is open for trading, and it leads to zero daily volume (and zero value of the OR and RS indicators as a consequence). Another explanation of this phenomenon would be the rather large quantity of unclassified trades recognized in the case of small firms, which also leads to zero value of the OR and RS indicators.

To sum up the correlation analysis, Table 12.5 directly reports correlations averaged over the size groups.

12.5 Conclusions

The purpose of this paper was an empirical analysis of market liquidity dimensions on the WSE. We investigated market depth and market tightness using the high-frequency data for the 53 WSE-listed companies divided into three size groups. Moreover, a robustness analysis of the obtained results with respect to the whole sample January 2005 to June 2015 and three adjacent subsamples of equal size: the pre-crisis, crisis, and post-crisis periods, was provided. The order ratio (OR) was employed as a proxy of market depth, while market tightness was approximated using the relative spread (RS). Our findings have been in accord with the existing literature. The obtained results indicated that the lower values of the OR (i.e., the higher market depth) and the lower estimates of the RS (i.e., the lower market tightness) have been observed for the most liquid big companies with the largest

Table 12.4 Correlation coefficients between market depth (OR) and market tightness (RS)

B	P_1	P_2	P_3	P_4	M	P_1	P_2	P_3	P_4	S	P_1	P_2	P_3	P_4
BHW	-0.02	-0.04	-0.03	-0.05	ALM	-0.02	0.03	0.03	-0.07	APL	0.27	0.07	-0.02	0.04
BPH	-0.10	0.01	-0.02	-0.02	AMC	-0.05	-0.08	-0.01	-0.15	BDL	0.11	0.41	-0.04	-0.01
BNP	-0.03	-0.12	0.05	-0.06	ATG	-0.03	-0.02	-0.03	-0.02	EFK	0.08	0.05	0.04	0.15
BOS	-0.01	0.09	-0.07	-0.04	ATM	-0.01	-0.09	-0.01	0.06	ENP	0.06	-0.05	0.08	-0.03
BDX	-0.04	-0.04	0.05	-0.03	CNG	0.02	-0.05	-0.03	-0.06	KMP	0.11	-0.01	-0.07	0.01
BZW	-0.04	-0.03	0.03	0.02	COL	-0.02	-0.10	-0.01	-0.08	MZA	0.10	0.10	0.04	0.09
DBC	-0.01	-0.06	0.09	-0.10	IND	0.09	0.04	0.06	0.01	PLA	0.11	0.39	0.08	-0.09
ECH	0.003	0.06	-0.07	0.02	IPL	-0.01	-0.03	-0.04	0.11	SME	0.05	0.03	0.07	0.15
GTN	-0.07	-0.07	0.01	-0.07	LTX	0.01	0.01	0.02	0.00					
GTC	-0.03	-0.01	-0.11	-0.05	MCI	0.00	-0.01	0.11	-0.14					
ING	-0.03	0.02	-0.07	-0.01	MNI	0.06	-0.05	-0.03	-0.07					
KTY	0.00	0.05	-0.04	-0.03	PEK	0.02	0.10	-0.04	-0.03					
KGH	0.02	-0.07	-0.05	0.08	PUE	0.01	-0.02	0.06	-0.05					
LPP	0.07	0.06	-0.02	0.06	SKA	-0.01	-0.05	0.08	-0.03					
MBK	-0.10	-0.08	0.00	-0.12	STF	0.08	0.10	-0.02	0.03					

MIL	0.00	-0.01	0.01	-0.14	STX	-0.04	0.04	0.02	-0.04
MOL	0.08	0.12	0.10	0.07	TIM	0.00	-0.02	0.02	-0.03
NET	0.01	-0.06	-0.01	-0.14	VST	0.00	-0.01	-0.06	-0.01
OPL	-0.11	0.08	0.00	0.00					
ORB	0.01	0.01	-0.06	-0.06					
PEO	-0.02	-0.06	-0.02	-0.03					
PKN	-0.09	-0.08	-0.09	-0.03					
PKO	-0.02	0.00	-0.03	0.07					
STP	-0.01	-0.05	-0.07	0.05					
SNS	-0.01	0.00	-0.04	0.00					
TVN	-0.04	0.08	-0.06	0.00					
ZWC	0.11	0.11	0.01	0.12					

See Table 12.1 for explanation
 The correlation critical value is equal to 0.038 (the whole sample period P_1 ; 2626 daily observations) or 0.094 (the pre-, post-, and crisis periods P_2, P_3, P_4 ; 436 daily observations), at the 5% significance level. The significant coefficients marked in bold

Table 12.5 Correlations between daily order ratio (OR) and daily relative spread (RS) for stocks, averaged over the size group

Period	BIG	MEDIUM	SMALL
Whole sample (P_1)	-0.018	0.005	0.111
	[-0.017]	[-0.003]	[0.105]
Pre-crisis period (P_2)	-0.004	-0.012	0.125
	[-0.009]	[-0.019]	[0.062]
Crisis period (P_3)	-0.019	0.005	0.023
	[-0.024]	[-0.007]	[0.040]
Post-crisis period (P_4)	-0.019	-0.030	0.039
	[-0.025]	[-0.031]	[0.022]

See Table 12.1 for explanation. Median values for each group are given in brackets

market capitalization. Moreover, the results turned out to be robust to the choice of the sample.

In general, low order ratios (OR) were accompanied by narrow relative spreads (RS). Otherwise, high order ratios were accompanied by wide relative spreads. It is important to note that, from an investor's point of view, these findings were in accordance with the investor's intuition. Therefore, an initial research of interaction between liquidity dimensions on the WSE was performed by analyzing the degree of correlation between the market depth and market tightness.

Given the importance of the topic, one of the possible directions for further research would be a deeper analysis of the relation between market depth and market tightness on the WSE, following for example the methodology proposed by Lee et al. (1993), Rinaldo (2001), or Lesmond (2005). Moreover, the evidence is that the order ratio and the relative spread could be utilized as liquidity/illiquidity measures in further broader investigation concerning commonality in liquidity on the WSE, e.g., Chordia et al. (2000a), Huberman and Halka (2001), Korajczyk and Sadka (2008).

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Chapter 13

Formal Identification of Crises on the Euro Area Stock Markets, 2004–2015

Elzbieta Majewska and Joanna Olbrys

Abstract In this paper, crisis periods on the 19 euro area stock markets are formally detected and explored. A statistical method of dividing market states into bullish and bearish markets based on monthly logarithmic returns of major stock market indexes is employed. The sample period begins on January 2004, ends on December 2015, and includes the 2007–2009 Global Financial Crisis (GFC) and the subsequent euro area crises. Moreover, correctness of formal identification of down market periods is discussed utilizing two methods for verifying the bear market conditions. The empirical results indicate February 2009 as the end of the GFC for almost all countries investigated, except for Slovenia, Lithuania, Malta, Estonia, and Latvia, for which March 2009 is obtained as the end of the GFC. Furthermore, the findings concerning the European crises during the period beginning from late 2009 are in accord with the existing literature.

Keywords Eurozone • Crisis Periods • Market States

13.1 Introduction

The number of the eurozone countries has risen from eleven in 1999 to nineteen in 2015. The year 2009 was the tenth anniversary of the introduction of the euro. The 2007–2009 Global Financial Crisis (GFC) affected the European markets in general, but the euro area, along with most of the world, emerged from recession in 2009. However, the eurozone has suffered from the subsequent financial crises since late 2009.

The main goal of this paper is to formally detect and investigate crises on the 19 euro area stock markets. A direct identification of crisis periods is carried

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out by applying the Pagan and Sossounov (2003) statistical procedure of dividing market states into bullish and bearish markets, based on monthly logarithmic returns of major stock market indexes. We analyze 19 eurozone equity markets and, for comparison, the US stock market. The sample period begins on January 2004, ends on December 2015, and includes the 2007–2009 Global Financial Crisis and the subsequent euro area crises. Furthermore, a correctness analysis of formal identification of down market periods is provided using two methods for verifying the bear market conditions (Fabozzi and Francis, 1977). It is instructive to formally identify crises, as it enables us to provide sensitivity analyses of various relationships among international stock markets utilizing econometric and statistical tools, with respect to the pre-, post-, and crisis periods. In particular, the context of stock market integration and globalization is especially important for further research.

The remainder of this study is organized as follows. Section 13.2 presents a literature review concerning crisis periods in the eurozone stock markets. Section 13.3 specifies the methodological background of the statistical method of direct identification of down market periods. Section 13.4 presents data description and empirical results on the indexes in the euro area stock markets. Section 13.5 recalls the main findings and presents the conclusions.

Nomenclature

EU	European Union
EC	European Commission
EMU	European Economic and Monetary Union
ECB	European Central Bank
EFSF	European Financial Stability Facility
EFSM	European Financial Stabilization Mechanism
ESM	European Stability Mechanism
GFC	the 2007–2009 Global Financial Crisis
IMF	International Monetary Fund

13.2 Crisis Periods in the Euro Area: A Brief Literature Review

There is a growing body of literature concerning the causes and consequences of financial crises in the world. As the aim of this paper is a direct statistical identification of crisis periods in the euro area equity markets, we focus our analysis of the previous literature on the studies related mostly to the European economies.

13.2.1 The 2007–2009 Global Financial Crisis on the European Stock Markets

According to the literature, e.g., Brunnermeier (2009), Claessens et al. (2010) among others, the GFC timeline, from the US perspective, was marked by the following events: (1) the increase in subprime delinquency rates in the spring of 2007, (2) the ensuing liquidity crunch in late 2007, (3) the liquidation of Bear Stearns in March 2008, and (4) the failure of Lehman Brothers in September 2008.

It is pertinent to note that there is no unanimity in determining the phases of the GFC among researchers. For example, Pisani-Ferry and Sapir (2010) proposed two phases of crisis in the EU. They advocated that the first phase started in August 2007 with a general liquidity strain. The second phase started in September 2008 with the bankruptcy of Lehman Brothers. Similarly, Mishkin (2011) divided the financial crisis into two distinct phases: the first from August 2007 to August 2008, called the US subprime mortgage crisis, and the second, which started in mid-September 2008, known as the GFC. Bartram and Bodnar (2009) presented a detailed investigation of the GFC and provided a timeline of events and policy actions for the crisis in equity markets. They advocated September 15, 2008 to October 27, 2008 as the common crisis period in the world. In Calomiris et al. (2012) the global crisis period was defined as the period between August 2007 and December 2008. Chudik and Fratzscher (2011) established January 1, 2005 to August 6, 2007 as the pre-crisis period, and August 7, 2007 to end July, 2009 as a common crisis period for both advanced and emerging economies in the world. Olbrys and Majewska (2014a) formally identified the GFC periods on the major Central and Eastern European (CEE) emerging stock markets, including some of the EMU members (i.e., Slovenia, Slovakia, Lithuania, Estonia, and Latvia). They perceived October 2007 to February 2009 as the common crisis period for the US and the CEE equity markets, except for Slovakia. Moreover, in the paper (Olbrys and Majewska, 2014b) the authors detected the GFC periods on the largest European stock markets and they received October 2007 to February 2009 as the common period for the New York and London equity markets. The results indicated that the GFC period for the Frankfurt stock exchange lasted from December 2007 to February 2009, while in the case of the Paris equity market it lasted from May 2007 to February 2009. However, the results confirmed February 2009 as the end of down markets in all countries investigated.

13.2.2 The Euro Area Crises

In light of the recently growing literature on the euro area topic, it is worth stressing that researchers are rather unanimous in observing crisis periods in the eurozone. Essentially, they describe the same events connected with the European crises during the period beginning from late 2009. It is evident that the major event occurred in October 2009, when a newly elected Greek government stunned the EMU markets

with news that the fiscal deficit for 2009 would likely turn out to be more than twice the outgoing government's projection of 6% of GDP (Gibson et al., 2014a). The Papandreou government announced that public finance data had misreported deficit and debt. The European sovereign debt crisis became evident in 2010, starting with the reporting by the European Commission on January 8th that evidence had been found of severe irregularities in the Greek Excessive Deficit Procedure notifications (Mink and de Haan, 2013). Gibson et al. (2014b) and Provopoulos (2014) stressed that a sovereign-debt crisis in Greece spilled over to that country's banking system and created twin crises. In other euro area countries, including Ireland, Spain, and Cyprus, the crises originated in the banking systems and spilled over to the sovereign debt. Moro (2014) emphasized that the European Great Crisis began with Greece, but suddenly it spread over some other countries of the eurozone like Portugal, Ireland, Italy, and Spain (sometimes referred to as the PIIGS countries). As a consequence, Europe since 2010 has faced a severe economic and financial crisis. Katsimi and Moutos (2010) pointed out that the Greek crisis has been in fact mainly a government-induced crisis, but the contagion from this crisis has spread across Europe.

Merler and Pisani-Ferry (2012) investigated the so-called "sudden stops" in the euro area. The authors indicated that five countries (i.e. Greece, Portugal, Ireland, Spain and Italy) experienced significant private capital inflows from 2002 to 2007–2009, followed by unambiguous and massive outflows. They showed that these eurozone "sudden stops" episodes were clustered in three periods: (1) the GFC period; (2) the period following the agreement of the first Greek programme in spring 2010, and (3) the summer of 2011. Likewise, Ardagna and Caselli (2014) stressed that the euro area crisis started in Greece and it engulfed various countries. Therefore, the authors focused their research on the political and economic aspects of two Greek bailout agreements: first in May 2010, and second in July 2011. Mink and de Haan (2013) examined contagion effects during the European crisis and they analyzed the impact of the news about the first Greek bailout on bank stock prices in 2010 using data for 48 European banks. The authors found that these news led to abnormal returns, even for banks without any exposure to Greece or other highly indebted euro countries. Constâncio (2014) pointed out that there are various narratives and interpretations about the way the crisis had unfolded in the euro area. Like some other researchers, he focused on five countries (i.e. Greece, Portugal, Ireland, Spain, and Italy), which were substantially affected by the European crisis. The author discussed a deep rationale for Banking Union in the euro area, and he concluded that the Banking Union is a central pillar of the strategy to make the EMU more effective and robust.

The researchers are rather unanimous that the ongoing European crisis is often described as a sovereign debt crisis, but it is actually a sequence of interactions between sovereign problems and banking problems. Among others, Shambaugh (2012) indicated that the euro area has faced three interlocking crises recently. The crises have been interlinked in several ways. Firstly, there has been a banking crisis, i.e., banks have been undercapitalized and have faced liquidity problems.

Secondly, there has been a sovereign debt crisis, i.e., a number of countries have faced rising bond yields and challenges funding themselves. Thirdly, there has been a macroeconomic crisis, i.e., economic growth has been slow in the eurozone overall and unequally distributed across countries. Similarly, Lane (2012) stressed that the sovereign debt crisis has been deeply intertwined with the banking crisis and macroeconomic imbalances in the euro area. However, Taylor (2012) indicated that, historically, global imbalances are not as important as a factor in financial crises as is often perceived. He advocated that the credit boom explanation stands out as the most plausible predictor of financial crises since the late nineteenth century.

Bordo and James (2014) analyzed the eurozone financial crisis in the context of previous international financial crises. Among other conclusions, they pointed out that the later Cyprus crisis and its resolution exposed new dimensions to the clashes over the European debt and bank crises. The authors indicated that the discussion of a levy on bank deposits, and whether small customers should be exempted, puts a class conflict at the center stage. Zenios (2013) stressed that the Cyprus crisis, which started in 2011, is one of the most complex in the euro area, although in absolute terms it is a rather minor crisis. The author summarized the situation in Cyprus and he indicated following three aspects of the ongoing crisis: (1) debt of non-financial corporations and households is a drag on growth and it is significantly higher than in other eurozone countries; (2) government debt is a drag on growth and it is higher than in Ireland, similar to Spain, but not as high as in Greece; (3) banking sector problems are similar to those in Ireland and they dominate the government debt problems (Zenios, 2013, p. 29).

It is pertinent to note that five euro area countries (i.e., Spain, Ireland, Portugal, Greece, and Cyprus), which have been especially afflicted by the consequences of the current European crises, have received financial support from the international institutions (i.e., the EC, ECB, EFSF, EFSM, ESM, IMF). These countries have benefited from the economic adjustments programmes. The European Financial Stabilization Mechanism (EFSM) and the European Financial Stability Facility (EFSF) were parts of a wider safety net. The EFSM was activated for providing financial assistance to Ireland and Portugal. The EFSF was created as a temporary crisis resolution mechanism by the euro area Member States in June 2010. It has provided financial assistance to Ireland, Portugal, and Greece. In July 2013, the EFSM and EFSF were replaced by the European Stability Mechanism (ESM) which is now the sole and permanent mechanism for responding to new requests for financial assistance by the euro area Member States. However, De Grauwe (2012) analyzed the implications of the EMU fragility for the governance of the eurozone and he concluded that the ESM does not sufficiently recognize this fragility. Moreover, some of the features of the new financial assistance are likely to increase this fragility.

Table 13.1 summarizes information concerning the European economic adjustment programmes (the relevant stock markets in order of decreasing value of market capitalization at the end of 2014; see Table 13.2 for details). At the time of this writing (April 2016), Greece and Cyprus still remain in the official bailout programmes.

Table 13.1 The economic adjustment programmes

Country	Programme
Spain	(1) 07.2012–01.2014
Ireland	(1) 12.2010–12.2013
Portugal	(1) 06.2011–06.2014
Greece	(1) 05.2010–06.2013
	(2) 03.2012–06.2015
	(3) 08.2015–08.2018
Cyprus	(1) 05.2013–03.2016

Source: <http://ec.europa.eu>

There is widespread consent that a successful European Great Crisis resolution will need to include at least the following four components: (1) a fiscal union; (2) a banking union; (3) an overhaul of EU/eurozone institutions that would enable fiscal and banking unions to be sustainable, and (4) short-term arrangements that chart a path towards the completion of the previous three points (Moro, 2014). O'Rourke and Taylor (2013) pointed out that the institutional architecture of the eurozone needs to be deepened if a recurrence of the ongoing crisis is to be avoided, and a banking union seems essential. Lane (2012) emphasized that the most benign perspective on the European crisis is that it provides an opportunity to implement reforms that are necessary for a stable monetary union.

Eichengreen (2010) provided deep analysis about whether the euro and the EMU will survive, and how to avert a breakup of the euro area. In 2010, he concluded that “it is unlikely that one or more members of the euro area will leave in the next 10 years and that total disintegration of the euro area is more unlikely still” (Eichengreen, 2010, pp. 11–12). Nevertheless, at the time of this writing the eurozone situation is quite different and considerably more complicated.

13.3 Statistical Procedure for a Formal Identification of Down Markets

A direct, formal identification of crisis periods is possible based on statistical procedures for dividing market states into up and down markets, e.g., Lee et al. (2011), Lunde and Timmermann (2000). Pagan and Sossounov (2003) developed an algorithm that seems to be successful in locating bull and bear market periods in time. We employ a three-stage procedure of dividing market states into up and down markets Olbrys and Majewska (2014a,b, 2015a) and our methodology builds on Pagan and Sossounov (2003). In the first step, we conduct a preliminary identification of turning points, i.e., peaks and troughs, based on the conditions (13.1)–(13.2), respectively:

$$\ln P_{t-8}, \dots, \ln P_{t-1} < \ln P_t > \ln P_{t+1}, \dots, \ln P_{t+8} \quad (13.1)$$

Table 13.2 Summarized statistics for the monthly logarithmic returns for stock market indexes used in the study

Country	Eurozone member since	Index	Market Cap. EUR billion Dec 2014	Mean	Standard deviation	Skewness	Excess kurtosis	Doornik-Hansen test
United States	–	S&P 500	15,992.01	0.004	0.041	−1.000 [0.000]	2.848 [0.000]	20.163 [0.000]
France	1999	CAC 40	1723.78	0.002	0.048	−0.632 [0.002]	0.507 [0.216]	9.768 [0.008]
Germany	1999	DAX	1436.77	0.007	0.053	−0.895 [0.000]	2.398 [0.000]	17.405 [0.000]
Spain	1999	IBEX 35	820.54	0.001	0.056	−0.466 [0.024]	1.109 [0.007]	8.194 [0.017]
Netherlands	1999	AEX	650.02	0.002	0.053	−1.286 [0.000]	3.491 [0.000]	28.877 [0.000]
Italy	1999	FTSE MIB	446.64	−0.002	0.059	−0.406 [0.049]	0.759 [0.065]	5.628 [0.060]
Belgium	1999	BEL 20	312.81	0.003	0.049	−1.587 [0.000]	4.763 [0.000]	43.659 [0.000]
Finland	1999	OMXH	168.00	0.002	0.057	−0.562 [0.007]	1.481 [0.000]	11.067 [0.004]
Ireland	1999	ISEQ	118.56	0.002	0.059	−1.034 [0.000]	2.642 [0.000]	20.260 [0.000]
Austria	1999	ATX	79.99	0.002	0.068	−1.389 [0.000]	4.431 [0.000]	31.231 [0.000]
Luxembourg	1999	LuxX	52.20	0.002	0.060	−1.830 [0.000]	6.856 [0.000]	49.477 [0.000]
Portugal	1999	PSI 20	47.74	−0.002	0.056	−0.867 [0.000]	1.791 [0.000]	15.367 [0.000]
Greece	2001	ATHEX	45.58	−0.009	0.092	−0.617 [0.003]	0.931 [0.024]	8.751 [0.013]
Slovenia	2007	SBITOP	6.21	−0.001	0.057	−0.384 [0.062]	1.481 [0.000]	12.057 [0.002]
Slovakia	2009	SAX	4.44	0.004	0.054	0.752 [0.000]	6.318 [0.000]	76.796 [0.000]
Lithuania	2015	OMXV	3.38	0.007	0.075	−0.496 [0.016]	7.257 [0.000]	112.369 [0.000]
Cyprus	2008	CSE - GENERAL	3.33	−0.021	0.132	−0.314 [0.127]	1.487 [0.000]	12.681 [0.002]
Malta	2008	MSE	3.01	0.005	0.043	0.431 [0.036]	0.361 [0.378]	4.543 [0.103]
Estonia	2011	OMXT	1.88	0.007	0.078	−0.012 [0.955]	6.647 [0.000]	113.54 [0.000]
Latvia	2014	OMXR	1.27	0.005	0.064	−0.320 [0.119]	4.070 [0.000]	55.070 [0.000]

Source: National stock exchange websites and the authors' calculation

Notes: The table is based on all sample observations during the period January 2004 to December 2015. The test statistic for skewness and excess kurtosis is the conventional t -statistic. The Doornik-Hansen test (2008) has a χ^2 distribution if the null hypothesis of normality is true. Numbers in brackets are p -values

$$\ln P_{t-8}, \dots, \ln P_{t-1} > \ln P_t < \ln P_{t+1}, \dots, \ln P_{t+8} \quad (13.2)$$

where P_t represents the market index of month t , and from successive peaks/troughs we choose the highest/deepest one, respectively. Pagan and Sossounov (2003) stressed that in the business cycle literature an algorithm for describing turning points in time series was developed by Bry and Boschan (1971), but they modified this algorithm by taking the 8 months window (instead of six) in marking the initial location of turning points. In the second step, we rule out the phases (peak-trough or trough-peak) that last for less than 4 months, and cycles (peak-trough-peak or trough-peak-trough) that last for less than 16 months. Pagan and Sossounov (2003) pointed out that in business cycle dating the minimal cycle length is 15 months, hence 16 months were chosen to create a symmetric window of eight periods. Moreover, they advocated 4 months as the minimal length of a phase. In the last step we calculate the amplitudes A for each phase (amplitude is the difference in the natural logs of the index value in subsequent turning points). During the bull/bear market period there must be a large enough (of at least 20%) rise/fall in the index value. This means that the amplitude of a given phase must fulfill the condition $A \geq 0.18$ or $A \leq -0.22$ for the bull or bear market period, respectively (Olbrys and Majewska, 2015a, pp. 552–553).

13.4 Data Description and Empirical Results on the US and Euro Area Stock Markets

The data consists of monthly logarithmic returns of the 19 euro area major stock market indexes and the New York market index—S&P500. There are 144 monthly observations for each series for the period beginning January 2004 and ending December 2015. The period contains all data necessary to employ the procedure described in Sect. 13.3.

13.4.1 Preliminary Statistics

Table 13.2 includes basic information about the eurozone members. Moreover, it reports summarized statistics for monthly logarithmic returns for the S&P500 and 19 major indexes of the euro area stock markets (in order of decreasing value of market capitalization at the end of 2014), as well as statistics testing for normality.

Several results in Table 13.2 are worth special notice. The sample means are not statistically different from zero. The measure for skewness shows that the return series are skewed, except for the SBITOP (Slovenia), CSE GENERAL (Cyprus), OMXT (Estonia), and OMXR (Latvia) series. The measure for excess kurtosis shows that almost all series are highly leptokurtic with respect to the normal

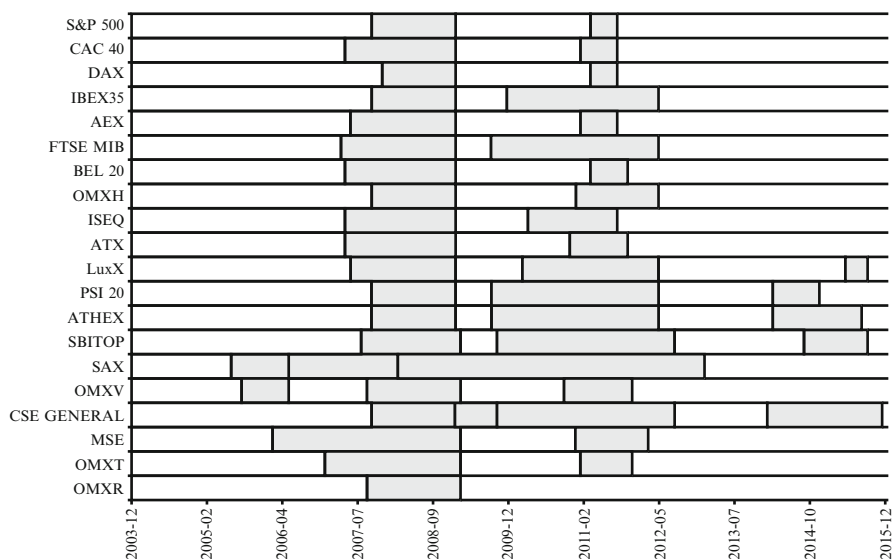


Fig. 13.1 Overall information about the US and euro area down market periods obtained from the procedure of dividing market states, in the whole sample period January 2004 to December 2015 (the stock market indexes in order analogous to that in Table 13.2)

distribution, except for the CAC 40 (France), FTSE MIB (Italy), and MSE (Malta) series. The Doornik and Hansen (2008) test rejects normality for almost all return series at the 5% level of significance, except for the FTSE MIB (Italy) and MSE (Malta) series.

13.4.2 Formal Identification of Crisis Periods on the Euro Area Stock Markets

As was asserted in Sect. 13.3, we employ the three-stage procedure of dividing market states into bullish and bearish markets to identify crisis periods. Figure 13.1 presents the down market periods for the S&P500 and 19 indexes on the eurozone stock markets, obtained from the procedure. The empirical results are generated in the whole sample period from January 2004 to December 2015.

13.4.3 Correctness Analysis

This subsection briefly discusses the correctness of formal identification of down market periods. Two methods for verifying the bear market conditions were

employed, both proposed by Fabozzi and Francis (1977): (1) the substantial moves procedure, and (2) the up and down market procedure.

The first procedure partitioned the sample into three subsets: (1) months when the market moved up substantially, (2) months when the market moved down substantially, and (3) months when the market moved neither up nor down substantially. Substantial moves were arbitrarily defined as months when the absolute value of market return was larger than half of one standard deviation of the market returns measured over the total sampled period (Fabozzi and Francis, 1977, pp. 1094–1095). Therefore, using the first procedure we tested whether during the down market months the absolute value of expected market return was larger than half of one standard deviation of the stock market returns measured over the total sampled period, for all markets investigated. According to the second procedure, we explored whether the expected index returns were negative during the crisis periods for all stock markets investigated. Table 13.3 reports detailed information about the US and euro area down market periods presented in Fig. 13.1. Moreover, it contains the empirical results of checking the bear market conditions for all periods.

To sum up, the results reported in Table 13.3 revealed that all determined periods were placed into the down category based on the second procedure for checking the bear market conditions (the answer “Yes” in the last column). Besides, the first procedure confirmed the GFC periods in all cases, also for the US stock market (the fourth column of Table 13.3). The empirical results indicated February 2009 as the end of the GFC for almost all countries investigated, except for Slovenia, Lithuania, Malta, Estonia, and Latvia, for which March 2009 was obtained as the end of the GFC. Moreover, Slovakia was the exception for which quite different crisis periods were specified. Otherwise, the results concerning the euro area crises are much more diverse. We obtained 22 down market periods in the eurozone during the period beginning from late 2009, but only 8 of them have been confirmed based on the substantial moves procedure. Nevertheless, our empirical results of a formal detection of down market periods on the euro area stock markets are rather consistent with the existing literature.

13.5 Conclusion

The purpose of this paper was a formal identification of crises on the nineteen eurozone stock markets and, for comparison, on the US market, during the period 2004–2015. The Pagan and Sossounov (2003) methodology of dividing market states into up and down markets was employed, as it seems to be useful in locating bear market periods in time, e.g., Olbrys and Majewska (2014a,b, 2015a). The empirical results confirmed February 2009 as the end of the GFC for almost all countries investigated, except for Slovenia, Lithuania, Malta, Estonia, and Latvia, for which March 2009 was obtained as the end of the GFC. Furthermore, the findings concerning the European crises during the period beginning from late 2009 are in accord with the existing literature.

Table 13.3 Detailed information about the US and euro area down market periods

Country	Index	Down market period	Absolute value of expected index return larger than half of one standard deviation of the index returns	Negative expected index return
United States	S&P 500	(1) 10.2007– 02.2009	Yes	Yes
		(2) 04.2011–09.2011	Yes	Yes
France	CAC 40	(1) 05.2007– 02.2009	Yes	Yes
		(2) 02.2011–09.2011	Yes	Yes
Germany	DAX	(1) 12.2007– 02.2009	Yes	Yes
		(2) 04.2011–09.2011	Yes	Yes
Spain	IBEX 35	(1) 10.2007– 02.2009	Yes	Yes
		(2) 12.2009–05.2012	No	Yes
The Netherlands	AEX	(1) 06.2007– 02.2009	Yes	Yes
		(2) 02.2011–09.2011	Yes	Yes
Italy	FTSE MIB	(1) 04.2007– 02.2009	Yes	Yes
		(2) 09.2009–05.2012	No	Yes
Belgium	BEL 20	(1) 05.2007– 02.2009	Yes	Yes
		(2) 04.2011–11.2011	Yes	Yes
Finland	OMXH	(1) 10.2007– 02.2009	Yes	Yes
		(2) 01.2011–05.2012	No	Yes
Ireland	ISEQ	(1) 05.2007– 02.2009	Yes	Yes
		(2) 04.2010–09.2011	No	Yes
Austria	ATX	(1) 05.2007– 02.2009	Yes	Yes
		(2) 12.2010–11.2011	No	Yes
Luxembourg	LuxX	(1) 06.2007– 02.2009	Yes	Yes
		(2) 03.2010–05.2012	No	Yes
		(3) 05.2015–09.2015	Yes	Yes
Portugal	PSI 20	(1) 10.2007– 02.2009	Yes	Yes
		(2) 09.2009–05.2012	No	Yes
		(3) 03.2014–12.2014	Yes	Yes
Greece	ATHEX	(1) 10.2007– 02.2009	Yes	Yes
		(2) 10.2009–05.2012	Yes	Yes
		(3) 03.2014–08.2015	No	Yes
Slovenia	SBITOP	(1) 08.2007– 03.2009	Yes	Yes
		(2) 10.2009–08.2012	No	Yes
		(3) 09.2014–09.2015	No	Yes
Slovakia	SAX	(1) 07.2005–06.2006	No	Yes
		(2) 03.2008–02.2013	No	Yes
Lithuania	OMXV	(1) 09.2005–06.2006	No	Yes
		(2) 09.2007– 03.2009	Yes	Yes
		(3) 11.2010–12.2011	No	Yes

(continued)

Table 13.3 (continued)

Country	Index	Down market period	Absolute value of expected index return larger than half of one standard deviation of the index returns	Negative expected index return
Cyprus	CSE GENERAL	(1) 10.2007– 02.2009	Yes	Yes
		(2) 10.2009–08.2012	Yes	Yes
		(3) 02.2014–12.2015	No	Yes
Malta	MSE	(1) 03.2006– 03.2009	Yes	Yes
		(2) 01.2011–03.2012	No	Yes
Estonia	OMXT	(1) 01.2007– 03.2009	Yes	Yes
		(2) 02.2011–12.2011	No	Yes
Latvia	OMXR	(1) 09.2007– 03.2009	Yes	Yes

Source: Authors' calculation

Notes: See Table 13.2 and Fig. 13.1 for explanation. The end of the GFC is marked in bold. The same conclusion (the answer "Yes") from both procedures for checking the bear market conditions is marked in bold

The precise identification of crises allows to provide a sensitivity analysis of various relationships and linkages among international equity markets using econometric and statistical tools with respect to different periods, especially in the context of stock market integration and globalization. Nowadays, there is a growing body of empirical literature concerning integration effects on the EMU stock markets, e.g., Büttner and Hayo (2011), Hardouvelis et al. (2006), and the references therein. Therefore, an important problem is verifying to what extent the results obtained during research depend on the choice of the period investigated, especially taking the pre-, post-, and crisis periods into consideration, e.g., Olbrys and Majewska (2015b). Moreover, the precise detection of crises is certainly important in practice, as researchers found that profits to investment strategies depend critically on the state of the market. Unfortunately, due to the global nature of crisis causes and consequences in the eurozone, diversification usually provides little help to investors, as markets simultaneously drop.

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Chapter 14

Economics and Marketing of E-Commerce at 0 km and Further on the Path Towards S-Commerce

Angela Besana and Annamaria Esposito

Abstract E-commerce gives evidence of the contemporary economics of attention, when consumers virtually reveal their preferences everywhere and for everything. Social media, above all, amplify attention, opportunities, markets, shopping, rankings and, as a consequence, economic growth. Web domains and social media enable consumers' experiences from information flows to persuasion and from shopping to international trade (Nadeem et al., *Int J Inform Manage* 35(4):432–442, 2015; Verhoef et al., *J Retail* 91(2):174–181, 2015; Xu et al., *J Mark* 78(4):97–112, 2014). Boundaries of economies are vanishing thanks to this e-market for everything and everyone.

E-commerce evolves into social commerce (s-commerce), when relationships grow together with transactions and economic performances. Who, what and where of e-commerce get into global and challenging features of s-commerce.

Marketing, and especially social media marketing, therefore, has a crucial new role and enhances 'interactive online world' in which 'participants with different interests, resources and power cocreate value' (Kornum and Mühlbacher, *J Bus Res* 66(9):1460–1464, 2013). Nowadays, consumers are spending more time than ever using social media, and organisations are striving to use social media to reach, engage, catch and hold the millions of consumers who use it daily (Parsons, *Allied academies international conference: proceedings of the academy of marketing studies*, 16(2):11–15, 2011).

After analysing the new marketing scenario and pointing out social media marketing strategies, this paper investigates EU27 for e-commerce performances, exports, imports, trade balance and gross domestic product (GDP) growth as concerns the latest 2010–2015 European Statistics. Thanks to cluster analysis, separating groups will emerge with different growth according to e-commerce performances.

Keywords Marketing • e-commerce • s-commerce • EU27 • Economics

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14.1 From E-Commerce to Social Commerce: Economic Implications

E-commerce does not only increase product availability on the Internet, but it also allows the perfect match between customers' needs and businesses in times of personalisation and attention to tastes. In order to gain the competitive advantage, firms must create values for their customers. This means an informative web domain, where marketing begins and evolves in order to stimulate a never-ending demand (Brodie et al. 2011; Anderson 2009; Corbitt et al. 2003).

Nevertheless, web domains are only a step of this dedication to personalisation and to attention. Social media amplify opportunities, and the perfect match between supply and demand is now aggregating potentials of web domains with potentials of Facebook, Twitter, Instagram, etc. Every page, link and e-photo does not allow to touch goods, but imagination is expanding when the consumer can see wide ranges of products he can compare, he can access rankings and he can discuss with the producer and the whole supply chain (Rigby 2011). Various digitisations take place and information is unlimited. Price competition can be high, and high-price strategy can be difficult (Lewicki 2016), unless the producer adopts the marketing echo of personalisation, which includes the propensity for fulfilment of every customer's need. Customers can be outdoors at 0 km or at further distance. The web environment supplies multiple platforms and media in order to build relations.

As a matter of fact, the global scale is facilitating relations. Information and promotion stream thanks to multiple channels. Customers are immediately reached with persuasive messages and multiple display formats. The customer's experience is not only a commercial transaction but also a relationship. Multichannel consumers experience what is more than a sale (Nadeem et al. 2015; Verhoef et al. 2015; Xu et al. 2014; Zhang et al. 2010; Neslin and Shakar 2009). The opportunity to build an e-community around the consumer is immediately caught: the co-producer, the creative craftsmanship, the shopping advisor, the financial intermediary, the e-banker, the blogger and any other stakeholders in a virtual network that is ready to grasp attention and match with customers' needs. Transaction costs can grow, as it is not excluded that some intermediaries charge fees in order to ensure safe payments, signal brands, good qualities, clubs and memberships. Anyway, it is not only e-commerce but also s-commerce (social commerce) where every business, retailer and actor is implementing a wide range of strategies in order to engage consumers (Buratti et al. 2016; Ceruti et al. 2015; Huang and Benyoucef 2013; Zhou et al. 2013; Liang and Turban 2011).

If attention is a scarce resource, effective advertising must stimulate attention. Attention, sense and sensibility of customers have to be impacted by advertising and any offline and online marketing. A little research has been deserved to these intangible features of demand, above all, assuming attention as a given. The high competition in e-markets has emphasised the importance of attention and engaging social media for at least one decade. The rising cost of this resource is stimulating managers to think about how to catch and exploit it (Teixeira 2014).

To sum up, there are multiple who, what, where and when. When is always, as e-commerce and s-commerce can happen at every hour. Where is not only the website of the shop and transaction. For example, Facebook becomes a platform where to join on suggestions, ranking and prosuming. Facebook can also be an e-commerce opportunity, and main websites have to consider where most of the customers are, either at the main websites or at Facebook? If what concerns goods and services of the main market and aftermarket, who refers to the buyer and the seller. Nevertheless, they are not the exclusive players. Sometimes at relevant fees, financial intermediaries offer payment details and tracking, insurance (for everything, from safe delivery and payment to transport), support for coupons, reimbursements and repayments. Bloggers and other fashion leaders support the main choice and ancillary choices (for accessories and aftermarkets). Craftsmanship and creative industries multiply and personalise their range of products. Nobody is first in the performance of the role. They all converge on the transaction and on the perfect match of attention, tastes and sensibility, always, everywhere, with anybody who is trustworthy, and for everything.

This paper is an analysis of e-commerce evolution in EU27, and, thanks to Eurostat data, a cluster analysis of EU countries in order to separate significant clusters of economies whose GDP (gross domestic product) growth can be granted by e-commerce. The evidence will be given thanks to the analysis of international trade, too.

The next paragraph will focus on marketing of e- and s-commerce. The third paragraph will refer to cluster analysis of EU27 countries, in order to separate which country is growing thanks to e-commerce at much more impact and higher percentages than which one is profiting by e-commerce at lesser percentages and with a negative trade balance.

14.2 Marketing of E- and S-Commerce: A New Scenario

Marketing scenario has changed considerably over the last decade. Technology, the Internet and the Web 2.0 have really reshaped the way consumers and organisations interact and communicate. Digital communication raises new opportunities and challenges both for organisations and consumers (Parsons 2011, Kornum and Mühlbacher 2013; Stelzner 2015).

On the one hand, thanks to social media and social networks, consumers have access to large amount of information about organisations, brands and products. On the other hand, companies strive to manage marketing communications via social media to create customer and brand value. Social media, as Internet-based application Web 2.0, allows the creation and exchange of user-generated content (Kaplan and Haenlein 2010) that is leading a transformation in the management of relationships with customers (Moretti and Tuan 2014; Kietzmann et al. 2011).

Companies, in order to grasp the attention of consumers and boost online B2C sales, are investing in social media marketing. Social media marketing strategies are

designed to offer customer new experiences and to enhance customer participation and engagement (Brodie et al. 2011; Huang and Benyoucef 2013; Ceruti et al. 2015).

Social media marketing strategies allow companies to *hear* and *talk with* prospects and customers and to develop and deepen the relationship between companies and customers.

Marketers are aware that social media marketing can bring companies near customers and, doing so, generate knowledge that helps to increase revenues, decrease costs and improve efficiency. Consequently, companies can achieve a greater economic value (Michaelidou et al. 2011; Huang and Benyoucef 2013).

As can be understood, social media marketing implies a new way to manage the relationships with customers, and, according to Moretti and Tuan (2014), it can be considered as an evolution of relationship marketing concept and practice (Vivek et al. 2012). In s-commerce, customers have to be engaged more and more via social and interactive ways in order to build consumers' trust that is a crucial factor in the success of s-commerce companies. Trust leads to relationship commitment that is really important in the social media environment, where normally online communities generate conversations and relationships, which are no longer under company control (Mangold and Faulds 2009; Moon and Park 2014). In addition, these conversations and interactions between customers, sellers and other stakeholders can affect company marketing decisions (Pastore 2009; Sashi 2012), making customers to become co-producers and co-creators of the value of the firm and finally prosumers.

To successfully exploit the potential of social media, companies need to facilitate collaborative experiences and dialogue to become part of the conversation and design experiences that deliver tangible value in return for customers' time, attention, endorsement and data (Baird and Parasnis 2011). Furthermore, they need to integrate the experience with other customer-facing initiatives.

Social media marketing managers have to strengthen social commerce campaigns with time-sensitive offers or discounts that motivate customers to act (Nadeem 2012) and incentives for people to share content with friends to capitalise on the viral benefits a community platform offers.

According to 2015 Social Media Marketing Industry Report, social media marketing is still growing, and most part of marketers are using social media marketing in their business, integrating social media and traditional marketing activities.

Marketers are aware that social media marketing strategies are generating benefits, even if only a few are able to measure the return on investment (ROI) for social media activities. The top benefits of social media marketing are increasing exposure and increasing traffic, develop loyal fans and gain marketplace and customers insight. The goal of improving sales is less immediate and usually is directly related to the development of long-lasting relationships that lead to sales. Nevertheless, according to 2015 aforementioned report, more than half of marketers who have been using social media for at least 2 years report that it helped them to improve sales and to decrease marketing costs.

Regarding social media platforms, Facebook and Twitter are the top choices. But as marketers gain experience, their marketing efforts seem to expand across all major social platforms such as LinkedIn, Google+, YouTube, Pinterest and Instagram.

Generally speaking, social media platforms are useful to facilitate prospect and customer transition from the social platform to the company website and vice versa, and they participate in all stages before and after product or service purchase.

Concluding, in the above depicted scenario, marketers have great opportunities to boost online business integrating social networks and e-commerce platforms.

On the one hand, social media marketing conveys also promotional messages, transforming social media to effective and powerful advertising channels, being able to engage, motivate and convince users to seek and share information about company products or services, including those relating to their online purchases.

On the other hand, social media marketing is able to solve one of the most important problems which are connected to e-commerce research phase, when user tends to get lost and get bored and often does not finalise the purchase. E-commerce must be an environment, where everything the user needs can be found easily.

Social media could be the solution transforming e-commerce in *social commerce*. Prospect and customers can use the social media platforms on which they spend most of the time to go through all the steps before and after the purchase without ever getting out of there.

Considering the two most important platforms and a B2B approach, it could be useful to consider how companies can take advantage from them to implement s-commerce.

Facebook might not be the best platform to improve sales, but it could be considered the best platform for increasing awareness of corporate brand identity. The most interesting feature of Facebook is the targeting capability. In fact, the platform collects many personal details, posted by users onto the platform, useful to target prospect.

Furthermore, it is a tool to keep people engaged between purchases. Recently, Facebook has been provided with a *buy button* in order to make it easy to transact directly within the social media experience.

In fact, unlike the traditional button, generally used to carry traffic from social media to company website, companies can sponsor a post with a picture of a product and offer the user concerned the opportunity to make the purchase without leaving Facebook, guaranteeing respect for privacy and security of credit card data or against the current used for the payment. Facebook requires no commission on the transition, but only the cost of the ad, which is the same as any other sponsored post.

This function is very useful, because the possibility of profiling the target audience through Facebook ads is very high and allows companies to advertise the right product to the right audience.

The same happened as regards Twitter that allows companies to build relationships with influencers and to communicate with customers. The buy button, in this case, brings the user to the seller e-commerce site.

In 2014, Twitter has signed an agreement with the e-dealer Amazon USA and UK. The new feature lets Twitter users add items to their Amazon carts by including a hashtag within a tweet. After the user connects their Twitter account to Amazon, they can extend their Amazon shopping experience by tweeting a reply to Amazon product links they see on Twitter including the hashtag #AmazonCart—or #AmazonBasket in the UK—to add the product to their shopping basket.

The feature not only extends the retail reach of Amazon beyond its own website, reducing purchase friction, but co-opts Twitter users into product marketing activity, since they are publishing tweets indicating which items they are buying from Amazon.

Pinterest is the most suitable social network to e-commerce, thanks to its nature which is distinctly visual. Users can look at product photos, inquire about more details through the description and, by clicking on the image, reach the seller e-commerce site to complete the purchase.

Instagram too is a social network devoted to the visual, but the use is more oriented to photo sharing and less to direct sale of a product.

Nevertheless, in 2014, IKEA Russia created the first example of a website built specifically for Instagram, a real interactive catalogue with product images, prices and descriptions. Produce a catalogue, promote a product, launch a contest and make visual marketing, all can be useful for building integrated marketing and communication strategies and bringing potential customers to the company e-commerce site.

As above depicted, the relationship between social media and e-commerce is close and full of interesting and engaging ideas, opportunities and promising future scenarios.

14.3 Economics of EU27 E-Commerce, Exports and Growth

EU economy is still far from a comprehensive recovery for all member countries. Nevertheless, the Community Survey on ICT usage and e-commerce in enterprises have been continually confirming the growth of EU28 e-commerce since 2002. In 2014, 40 % of enterprises in EU28 purchased electronically and 19 % of them made electronic sales. The percentage of turnover on e-sales grew from 14 % (2013) to 17 % in 2014. This was particularly true for big firms, whose 24 % of total turnover was made by e-sales. For small firms, this percentage was 6 % of turnover. In 2014, 37 % of Irish firms was realised thanks to e-sales. For Greek firms, this percentage was 1 %. Only 8 % of enterprises made e-sales to other EU countries. Outside the EU, Norway profited by the highest percentage 29 % of enterprises making e-sales out of Europe (Eurostat 2016).

E-commerce profits by flows of people, goods and services. E-commerce reveals itself in exports and imports, too. E-commerce, when it gives birth to flows of different kinds, can impact growth.

For example, tourism can impact e-commerce, trade and growth at several levels: it increases employment opportunities, personal incomes, taxes, investments and trade balance. Economies of scale and scope can flourish in destinations next to exports after holidays, when tourists recall experiences at home and e-buy, in order to import goods they tasted during holidays (Pinna 2011; Gil-Alana and Fischer 2010; Dwyer and Forsyth 2009; Lee and Chang 2008; Weng and Wang 2004; Balaguer and Cantavella-Jorda 2002).

This is particularly true if it is considered that the economic impact of globalisation on the EU is particularly felt through trade in goods and services, as well as through financial flows and movements of persons. Service industries are increasing, especially household expenditure for culture and tourism. International tourist arrivals grew from 25 million in 1950 to 278 million in 1980, 528 million in 1995 and 1087 million in 2013. Europe led the growth in absolute terms, welcoming 29 million more international tourists in 2013 and raising the total to 563 million. In 2013, EU tourism growth was 5 %, double the average for the period 2005–2012 (2.5 % per year). EU tourism is constantly growing, and main challenges remain such as security, safety, economic competitiveness, technology and innovation. In 2015, Europe is the world's number one tourist destination with 588 million international arrivals and more than 50 % of the market share of worldwide tourism.

Tourism and non-resident expenditures can be antecedents to trade and e-commerce, because experiences generate propensities for tangibles and intangibles after having been abroad. The greatest share of EU exports is 'food and drink', which is often imported after tourism experiences in a creative economy, where tourists appreciate culture, design and, above all, gastronomy of cultural destinations (Richards 2014). The greatest share of import is still 'energy' as a primary and expensive goods (Eurostat 2016).

The empirical investigation refers to EU27 for available data from 2010 to 2015 for e-commerce, international trade and GDP.

First of all, we investigated the Eurostat Database for time series from 2010 to 2015. The most comprehensive database for our aim was Eurostat EU27. Apart for Croatia, we found data for percentages of individuals having ordered/bought goods or services for private use via internet and/or networks other than internet, percentages of enterprises purchasing via internet and/or networks other than internet and percentages of enterprises receiving orders via the same media. These data were considered as evidence of dimensions of e-commerce in Europe for individuals and enterprises. If it is considered that orders can be commissioned outside of Europe, the variable of e-orders is an estimate of magnitude for extra-Europe e-commerce, too. Then, we considered export and import unit value indexes (2010 = 100) and trade balance in millions of euros in order to gain if e-commerce increased together with trade transactions that can be processed via internet in and out of Europe. The last investigated data was real GDP growth rate (volume).

Cluster analysis in time series was chosen in order to rank and classify significant groups of countries with average performances (cluster means).

Cluster analysis is often applied in biology and other natural sciences in order to disaggregate populations (species) into significant groups (subspecies), according

Table 14.1 E-commerce in EU27 (cluster means)

Clusters	2010 % e-buying individuals	2011 % e-buying individuals	2012 % e-buying individuals	2013 % e-buying individuals	2014 % e-buying individuals	2015 % e-buying individuals
Cluster 1	19.5	22.5	26	27.5	29.5	32.25
Cluster 2	41.27	44.9	47.09	50.54	53.36	53.81
Cluster 3	12.66	14.41	16.66	18.75	22.66	25.33
Clusters	2010 % e-buying enterprises	2011 % e-buying enterprises	2012 % e-buying enterprises	2013 % e-buying enterprises	2014 % e-buying enterprises	2015 % e-buying enterprises
Cluster 1	24.5	26.5	24	26.5	25.25	26.75
Cluster 2	51.63	49.27	47	49.9	51.81	51.72
Cluster 3	21.08	19.66	17.83	20	23.91	24.66
Clusters	2010 % enterprises receiving e-orders	2011 % enterprises receiving e-orders	2012 % enterprises receiving e-orders	2013 % enterprises receiving e-orders	2014 % enterprises receiving e-orders	2015 % enterprises receiving e-orders
Cluster 1	11.5	15	15	16.5	16.25	17.5
Cluster 2	22	22.72	22.45	22.63	23	23.63
Cluster 3	10.5	10.75	10.66	11.83	12.41	13.33

to specific features or selected variables. In microeconomics and industrial organisations, cluster analysis is very useful in order to classify industries, districts, networks, strategic groups and any other aggregate that reveal significant and differentiated patterns.

Having clustered above-mentioned ratios with JUMP statistical software, we obtained three clusters, whose performances are presented in Tables 14.1, 14.2, and 14.3.

Table 14.1 shows e-commerce performances. Table 14.2 concerns exports, imports and trade balance. Table 14.3 gives evidence of the real GDP growth, which is positive for EU27 and three clusters apart in 2012. The composition of clusters is listed in the note at the bottom of tables. Cluster 1 is a micro-cluster. Cluster 2 includes high-speed growing 11 countries. Cluster 3 refers to 12 countries, and it includes Mediterranean Greece, Spain, France and Italy.

E-commerce percentages increased for all EU27 countries. When e-commerce performances increase with higher percentages in Clusters 1 and 2 than Cluster 3, exports and imports increase with higher percentages than in Cluster 3. Trade balance is positive, and GDP growth is bigger in Cluster 1 and 2 than in Cluster3, whose trade balance is always negative, and import means are always more than export ones, apart in 2015 when they are the same, +7 %.

The most crowded cluster is 3, with 12 countries. E-buying individuals are fewer than in other clusters, though they increased from 12.66 to 25.33 %. The same is for e-buying enterprises and enterprises receiving e-orders. Exports and imports unit value indexes, they both decreased. With a negative trade balance, real GDP grew less than in other clusters.

Table 14.2 Export, import unit value indexes and trade balance (millions of euro) in EU27 (cluster means)

Clusters	2010 Export unit value index	2011 % Export unit value index	2012 % Export unit value index	2013 % Export unit value index	2014 % Export unit value index	2015 % Export unit value index
Cluster 1	100	107.15	106	105.57	103.52	105.3
Cluster 2	100	106.11	109.38	108.57	107.91	109.49
Cluster 3	100	108.19	111.58	110.26	108.92	107.36
Clusters	2010 % Import unit value index	2011 % Import unit value index	2012 % Import unit value index	2013 % Import unit value index	2014 % Import unit value index	2015 % Import unit value index
Cluster 1	100	106.52	109.8	107.27	104.12	102.82
Cluster 2	100	108.35	113.04	111.60	110.85	111.01
Cluster 3	100	109.93	114.83	113.00	110.97	107.20
Clusters	2010 Trade balance	2011 Trade balance	2012 Trade balance	2013 Trade balance	2014 Trade balance	2015 Trade balance
Cluster 1	857.75	1275.75	1826.75	1797	1569.75	1572.75
Cluster 2	12445.54	12863.63	11758	20987.45	18170.27	21899.54
Cluster 3	-19841.33	-20371.58	-14426.16	-9408.41	-9169.41	-7165.41

Table 14.3 Real GDP growth rate (cluster means)

Clusters	2010 Real GDP growth rate	2011 Real GDP growth rate	2012 Real GDP growth rate	2013 Real GDP growth rate	2014 Real GDP growth rate	2015 Real GDP growth rate
Cluster 1	+2.62	+1.77	-0.02	+1.57	+3.22	+3.92
Cluster 2	+2.78	+2.33	-0.16	+0.7	+1.94	+2.70
Cluster 3	+0.4	+1.55	-0.29	+0.10	+1.37	+1.98

Source: Elaboration with JUMP statistics software

Note: Cluster 1 includes Hungary, Malta, Slovenia and Slovakia. Cluster 2 includes Belgium, Czech Republic, Denmark, Germany, Ireland, Luxembourg, the Netherlands, Austria, Finland, Sweden and the United Kingdom. Cluster 3 includes Bulgaria, Estonia, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Poland, Portugal and Romania

With 11 countries, the Cluster 2 shows better performances for all variables than Cluster 3. E-buying individuals and enterprises grew to more than 50% in 2015. This cluster shows the highest percentage of enterprises receiving e-orders of the whole sample. With successful e-commerce, export and import unit value indexes grew more than in other clusters, and though imports grew more than export unit value indexes, trade balance topped to more than 21 billion euro in 2015. Real GDP grew apart in 2012 as for all countries of the sample.

With only four countries, Cluster 1 grew less than Cluster 2 and more than Cluster 3 for e-commerce performances. With export unit value indexes always more than import unit value indexes, trade balance was positive, and real GDP showed the highest percentages of the whole sample.

This analysis confirms that with e-commerce growth, exports are stimulated as well as imports (with offline and online transactions). With a positive trade balance and increasing e-transactions, GDP, as a consequence, grows. This is true for Clusters 1 and 2. For Cluster 3, with inferior e-commerce growth percentages, while imports increase more than exports, trade balance is negative and GDP does not grow as in Clusters 1 and 2.

14.4 Conclusion

For clusters of different size and membership, real EU27 GDP grows when e-commerce grows with a positive trade balance. This is true for most of EU countries, 15 economies of Clusters 1 and 2. For Cluster 3, with inferior and anyway positive e-commerce growth percentages, but a negative trade balance, GDP does not grow as in Clusters 1 and 2.

Economic growth is positively influenced by commerce, and e-commerce stimulates growth. E-commerce can remain national. Otherwise, e-commerce can internationally boost exports and imports, and when exports increase more than imports, a positive trade balance further fosters growth.

The economic growth is only one side of e-commerce. The social growth is improved by e-people, who engage with multiple relations, economic and social roles. Marketing can really make the difference in involving social media users in a new challenging and involving purchase experience. In fact, s-commerce as evolution of e-commerce allows customers to experiment purchase with greater interactivity and participation thanks to social media and community.

The objective of this new way of selling and buying is not only to change the way to buy one to one, between sellers and buyers, but also to allow a real social and sociable purchase. S-commerce brings together members of a community and facilitates communication between members giving them the possibility to talk about purchases and products, but also to make proposals on what products to sell. Through this specific exchange of information between supply and demand, the classic paradigm, according to which must be companies to offer customers their own products, is reversed. A new era, rich of potentialities, is beginning.

For available data, the research focused on the latest data of EU27 till 2015. Nevertheless, no data is available for public administrations and nonprofits as e-commerce players. The comprehensive growth may be affected by these innovative and social players, whose marketing and fundraising can be e-marketing and e-fundraising, too. The next research will try to include these economic and social actors.

E- and s-commerce can maximise growth potentials of Europe in recovery from the latest real and financial crisis. Growing capitals are physical and virtual, for sure. They are economic and social, too. Now, they are only to be positively injected, nurtured and continually stimulated. E- and s-commerce can help the economic and social growth.

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Chapter 15

Using Demographic Variables to Determine Target Segments in Binary Logit Models

Tsend-Ayush Ganbaatar

Abstract The paper aims to figure out possible ways to determine appropriate target segments for competitive yogurt brands in USA after identifying market segments based on demographic variables. We have chosen five yogurt brands to conduct the analysis and the dataset of demographics and consumers purchase is provided by IRI. According to the findings, the household income, size, and household head age are the most influential demographic variables and have enough potential to predict customer choices. There can be particular and distinctive target segments for the competitive brands in terms of the significant demographic variables out of the all possible market segments. More specifically, it is effective to employ Logit models to predict consumer purchase choices and it is easy to determine appropriate target segments for each brand based on the predictions. Interestingly, the target segments for each brand are distinctive and there can be three niche markets readily available for new entries.

Keywords Demographic variables • Target segments • Binary logit models

15.1 Introduction

In market segmentation, the problems of investigating the possible bases of segmentation, identifying segments of households in a population, and determining appropriate target segments all have occupied the attention of marketing researchers over the last three decades (Gupta and Chintagunta 1994). Market segmentation as a definition it is a matter of classifying customers into groups, however, it is one of the richest areas in marketing in terms of development of possible bases (variables) and methodologies (Wedel and Kamakura 2000). There has been a huge debate about demographical base's inferiority in predicting consumer behavior, some researchers, for instance, McCarthy et al. (1978) highlighted poor prediction power of socioeconomic and demographic characteristics on purchasing

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behavior but on contrary, there have also been opponent studies emerged. Notably Gupta and Chintagunta (1994) indicated that demographics such as income and household size significantly affect the segment membership probabilities. Since market segmentation is a grouping task, thus there a large variety of methods are available and have been used.

Applications of econometric models and their mixtures have been playing key roles as powerful methodologies in market segmentation and target group selection practice. More precisely, usage of Logit models and its mixtures in segmenting and targeting has been increasingly popular due to its prediction effectiveness. For instance, Currim (1981) developed a hybrid approach, in which clustering and Logit models are combined to investigate customers' behavior in transportation mode choices. Gupta and Chintagunta (1994) employed Logit mixture models to identify segmentation membership probabilities as functions of demographic variables.

However, the majority of studies employing Logit models mainly focused on identifying segments but little or almost no attention paid to how to determine appropriate target segments for competitive brands, which could be interesting as well. Therefore, there are some interesting questions arise, for example if the demographic variables are capable enough to discriminate and predict purchase choices as some researchers claim, if there is any possibility to segment a market in terms of demographics and determine appropriate targets for competitive brands while employing Logit model, if there is possibility it would be very interesting to figure out niche market¹ opportunities out of the possible segments. Thus, the paper aims to answer these questions, in other words, it aims to figure out possible ways to determine appropriate target segments for competitive brands after identifying market segments based on demographic variables. We have chosen five top yogurt brands² in USA to conduct the analysis, academic dataset of panelist demographics and yogurt purchases is provided by IRI.³ We have hypothesized the demographics such as household income, size, and age of household head have superior impact on brand choices. Moreover, we developed hypothesis about the target segments for each brand based on the possible segments, which we will discuss in data description part with more details. In the paper, we have answered all above mentioned research questions and tested the hypothesis are accepted or rejected as the findings suggest.

The paper is structured as follows. The second chapter introduces related literature review about segmentation bases and methods, while the third chapter provides binary Logit model settings and its estimation method. In the 4th chapter, we introduce academic dataset and determine market segments so that we can

¹Niche market is the subset of the market, highly specialized and aiming to survive among the competitions.

²Top five brands are Dannon, Private label, Yoplait light, Yoplait original, and Yoplait whips in yogurt market in the USA according to the dataset.

³IRI (Information Resource Inc), for more information about the company <https://www.iriworldwide.com/>.

develop our hypothesis about the target segments for the brands. Next two chapters provide empirical evidences from the model and conclude the main findings at the end.

15.2 Literature Review

As a definition given by Philip Kotler and Gary Armstrong, market segmentation is a process of dividing a market into smaller segments with distinct needs and characteristics. From the definition, it became obvious that market segmentation needs certain variables (bases) and methods to be determined, thus we studied related studies according to the bases and methods.

15.2.1 *The Variables in Market Segmentation*

Although there have been several variables evolved, they are basically merged to four main categories which are geographical, demographical, psychological, and behavior. According to geographical variables, the segmentation can be conducted nationally, regionally, or locally (Tynan and Drayton 1987). As a result of the limited financial resources and distribution channels to cover larger areas, many smaller companies usually end up with local segments, on contrary larger ones in fact take advantages of this segmentation variable. Advantage of geographical segmentation is that it takes the cultural difference into consideration. However, the segmentation variable is quite limited since it assumes that customers in the same geographical areas have the similar needs, which doesn't actually reveal the underlying needs of customers.

Next segmentation practice is dividing the market into segments in terms of demographic variables such as age, sex, socioeconomic groups, family size, income, occupation, and education (Tynan and Drayton 1987). The demographic variables are referred as the most common variables not just because data for which is readily available but they also describe crucial aspects of consumer characteristics (Kotler and Armstrong 2012). Moreover, the demographic variables can be collected over long time creating a dataset, which plays key role in determining market segments and furthermore define target ones. Nevertheless, there have been plenty of criticisms arise about the variables, addressing that demographic variables such as age, sex, income, and occupation are not good enough to predict consumers' purchase. Stanton (1978) highlighted "*Looking at the demographic variables... rarely is a useful market segment identified by a single market factor*" and McCarthy et al. (1978) concluded that purchase decisions are poorly correlated to demographics. In contrast, there has been an opponent group of researchers who advocate demographics' importance in determining relevant segments. Frank and Bass (1968) and Wheatly et al. (1980) are well known emphasizing demographic

variable's importance. They employed the approach of analyzing groups rather than individual behavior and succeeded in having reasonable findings. Notably, Gupta and Chintagunta (1994) conducted a remarkable study, which indicates demographics such as income and household size significantly affect the segment membership probabilities. Naseri and Elliott (2006) argued that demographic variables have enough predicting powers about consumer purchasing behavior, they authors compared the predictions power of demographic variables to that of other more complex variables and ended up a conclusion that demographics have significantly higher explanatory power than some well-established theories.

The drawbacks in geographic and demographic variables gave a quick rise of psychological variables and obviously, the main advantage of variables is better prediction power for consumer behavior. The main variables pertaining to the psychographic segmentation include consumer activities, interests, opinions, needs, values, attitudes, and personality traits (Tynan and Drayton 1987). In 1975, Wells categorized existing studies into two groups: (1) a psychographic profile based on general lifestyle dimensions, where the psychographic profile drawn from a large set of general lifestyle items and (2) product specific where the psychographic profile drawn from single specific product category (Wells 1975). He summed up his study with a statement that "*discrimination produced by the product specific approach is somewhat sharper than the discrimination produced by the more general segmentation.*" Although, the psychographic variables had received much attention, there are still drawbacks including reliability, validity, applications to practical marketing problems, and contributions to the studies of consumer behavior. Many studies arise to tackle those drawbacks, but still haven't succeeded in suggesting complex solutions. According to behavioral segmentation, the customers are divided into groups on the basis of their use of or response to a product. The concept brand loyalty and its importance as being criterion for market segmentation has been always subject in the behavioral segmentation literature review. According to the some author's studies, brand loyalty can be useful criterion for segmentation, in contrast Bass et al. (1968) re-examined the brand loyalty as a good segmentation criterion for food markets and conclusively reported that brand loyalties are not very useful segmentation criterion. Nevertheless, as always there were some criticisms raised for the brand loyalty segmentation, *what appears to be brand loyalty among consumers may in fact "reflect habit, indifference, low price or non-availability of other brands"* (Kotler 1984). In 1964, Twedt postulated a theory named "Heavy half," it explains in many product fields 50% of the consumers account for 80% of the consumption so that for those high volume consumers the main marketing effort should be directed to. Haley (1968) disagreed with the conclusion of "Heavy half" and stressed out that "*people don't always buy goods for the same reasons, therefore are not equally good prospects for given brands.*" As we have seen all

Table 15.1 Comparison of the segmentation bases according to their advantages and limitations

Variables	Advantages	Limitations
Geographic	For larger (multinational) companies, geographical segmentation is more convenient as the fact that it allows them to consider cultural differences	The segmentation base is quite limited as it assumes that all customers in a geographic area are similar in their needs, which means the variable doesn't really reveal the underlying wants and needs of customers
Demographic	Demographic segmentation is the simplest one to use, most of the database is relatively easy to obtain. Segmenting by customers by demographics is more comprehensive compared to other variables. It can be easily translated into management level as well as sales and customer service staffs, which leads to effective marketing programs	The limitation is that it assumes the customers in the same demographic group share similar wants and needs so that it has been criticized for lacking in understanding and predicting consumer purchases
Psychographic	This type of segmentation reveals underlying needs and motives of buying so that provides better understanding of customers, which leads effective marketing programs	However, the segmentation requires much detailed information about the customer, which is not so difficult for larger firms but medium and smaller ones. Another flaw is that there are some issues arise due to impractical usage of those segments
Behavioral	The variable is usually used in mature markets, where the firms want to find out how to attract non-consumers, activate target group consumers, or convert medium consumers to loyal consumers	The drawback is that it doesn't really determine the reasons of buying; consumers' needs or their lifestyles so that it may lead to ineffective marketing effort. The variable also heavily dependent on more sophisticated models and database to retrieve the results

Source: Study (2015)

segmentation variables have their own advantages and limitations, we combined them into a table to find out which variable is most preferable according to our study purpose (Table 15.1).

While assessing the advantages and limitations we gave higher priorities to the variables, which have enough power in segmentation, predicting customer purchases and the related data is readily available. Not surprisingly, the demographic variables fit the criteria the most as we can see from the table. As some studies witness (Gupta and Chintagunta 1994; Naseri and Elliott 2006), it has enough prediction power and capabilities for segmenting and more importantly, dataset is relatively easy to obtain, which is in fact crucial advantage from the practical point of view. Thus, we have selected the demographic variables to employ in the paper.

15.2.2 *The Methods in Market Segmentation*

Marketing segmentation is a task dividing a market into groups, for which there are many ways to complete it. Common ways of classifying segmentation are according to whether the type and number of segments are known before or after data analysis: (1) a priori and (2) post hoc and according to whether descriptive or predictive⁴ statistical methods are employed (Wedel and Kamakura 2000). When we combine those two different approaches, we end up with four classifications: a priori descriptive, a priori predictive, post hoc descriptive, and post hoc predictive.

In a priori descriptive segmentation, the type and number of segments are known before the data analysis (Wedel and Kamakura 2000). Contingency table has been a popular technique for describing the segments in the earlier years of segmentation literature review. Advantage of the method is that nonlinear and interaction effects can be incorporated. However, a problem of contingency tables is to measure the association among multiple segmentation bases is that higher order interactions are difficult to detect and interpret the tables (Wedel and Kamakura 2000). Often, it is desirable to use the techniques in hybrid segmentation procedures combining a priori with post hoc methods in two stages, first a sample is partitioned on the bases of the variables and second post hoc methods, mostly clustering-based procedures applied to investigate further. In the post hoc descriptive methods, consumers are segmented according to their similarities (homogeneities), for instance, in lifestyle segmentation consumers are divided along demographical and psychographic characteristics firstly then a clustering procedure, for instance, is applied to identify segments similar in their values, activities, interest, and opinions. Clustering methods have been the most popular ones in post hoc descriptive category and the methods have three major distinctions: (1) non-overlapping, (2) overlapping, and (3) fuzzy (Hruschka 1986). Because of the simplicity, non-overlapping clustering mostly exploited in studies and developed more compared to others. Arabie (1979) firstly utilized the overlapping clustering, consequently several methods were started exploiting to tackle overlapping clustering whereas in fuzzy clustering, also more elaborated two methods were emerged: theory of fuzzy sets, which assigns a degree of membership for objects to class and the second set is based on an assumption that data arise from mixture of distributions (Wedel and Kamakura 2000).

Although post hoc descriptive procedures are powerful tools for market segmentation and further steps, computer programs are not yet widely available, besides the methods don't show the predictions of behavior, attitudes, or preference in accordance with the brand attributes, or marketing mix variables. In a prior predictive models are the same with prior descriptive but only differ that it is based on one set of criteria. The models require subsequent use of predictive models to describe the relation between segment memberships and a set of independent

⁴The former one is mostly used when there is no distinction between dependent and independent variables, whereas the latter one is exploited when there is a distinction between dependent (explained one) and independent variables (explaining one).

variables. Wilkie and Cohen (1977) developed two approaches: (1) forward in which background characteristics such as demographics and psychographics are first used to determine a priori segments and then further analysis conducted on the segments to reveal purchase behavior. (2) backward, on contrary the segments firstly formed based on the purchase related variables then the demographics or psychographics is applied to capture general consumers' characteristics. The most popular method in a priori predictive category is discriminant analysis and Logit models. The Logit models have been increasingly used in market segmentation with the growing availability scanner panel data. Currim (1981) developed a hybrid approach, in which clustering and Logit models are combined, more specifically he firstly identified the segments by employing clustering, once the segments identified from each basis Logit model is applied explaining the customer choices as functions of their characteristics.

The author concludes that a hybrid approach mixing clustering and Logit models shows better fit and prediction in comparison with other models. Major limitation of the priori predictive methods is that effectiveness in describing the segment at the first stage is usually low unless the hybrid methods are employed. The post hoc predictive methods, the last category are based on estimated relationship between a dependent variable and a set of predictors (Wedel and Kamakura 2000). Conjoint analysis has been the center of the category due to its ability in grouping of costumers according to how they respond to product features (Wedel and Kamakura 2000). An extension of conjoint analysis, componential segmentation has been considered recently, in the segmentation both of product and respondent profiles are analyzed. So far, we have briefly reviewed the related studies about the popular methods and compared them in terms of their capabilities in Table 15.2.

The aim of the paper is to figure out possible ways to determine appropriate target segments for competitive brands after identifying market segments based on demographic variables. Thus higher priorities are given to the ones that are in accordance with the aim and have enough capabilities to describe segments, more importantly have good prediction power. We have selected contingency table from a priori descriptive category to form yogurt market segments due to its highly usage in lower order interactions and Logit model for determining target segments due to its better prediction power and increasingly usage in segmentation practice.

15.3 Logit Models for Binary Data

As mentioned before, we are studying market segmentation for five competitive brands in yogurt market. However, instead of applying multinomial logit models, we preferred Logit models for binary (dichotomous) data for their better fit and prediction. When the dependent variable has only two possible alternatives (unit and zero), such variable is called binary variable. In our case, we have five yogurt brands (Dannon, Private label, Yoplait light, Yoplait original, and Yoplait whips) as dependent variables, in order to obtain binary variables we treated them individually

Table 15.2 Evaluation of segmentation methods

Methods/criteria	Effectiveness for segmentation	Effectiveness for prediction	Statistical properties	Application known	Availability of programs
<i>A. A priori/descriptive</i>					
Log linear models	(+) (-)	(-) (-)	(+)	(+) (+)	(+) (+)
Contingency tables	(+) (-)	(-) (-)	(+) (+)	(+) (+)	(+) (+)
<i>B. A priori/predictive</i>					
Regression	(-)	(+) (+)	(+) (+)	(+) (+)	(+) (+)
Discriminant analysis, Logit models	(-)	(+) (+)	(+) (+)	(+) (+)	(+) (+)
<i>C. Post hoc/descriptive</i>					
Non-overlapping	(+) (+)	(-) (-)	(-)	(+) (+)	(+) (+)
Overlapping	(+) (+)	(-) (-)	(-)	(-) (-)	(-)
Fuzzy	(+) (+)	(-) (-)	(-)	(+) (-)	(+)
<i>D. Post hoc/predictive</i>					
Clusterwise regression	(+) (+)	(+) (+)	(+) (-)	(+)	(+)
Mixture regression	(+) (+)	(+) (+)	(+)	(+)	(+)

Where: (+) (+) very good, (+) good, (+) (-) moderate, (-) poor, (-) (-) very poor

Source: Wedel and Kamakura (2000)

in a way of counting the number of purchased and not purchased: if the brand is purchased the binary dependent variable will take unit otherwise zero.⁵ To understand the binary dependent variable and set of independent variables, let us consider the following regression model:

$$Y_i = \beta_1 + \beta_2 X_i + u_i \quad (15.1)$$

where, we use X_i to denote a set of independent variables including household income, size, household head age, education, occupation, and marital status, whereas Y_i is an index of brands: Y_{dannon} , Y_{private} , $Y_{\text{y.light}}$, $Y_{\text{y.original}}$ and $Y_{\text{y.whips}}$, the separations of the dependent variables simply create five binary logit models. Since the conditional expectation of Y_i at given X_i , $E(Y_i = 1 | X_i)$ can be interpreted as the conditional probability that the expected event will occur at given X_i that is $P(Y_i = 1 | X_i)$. Therefore, we can conclude that $E(Y_i = 1 | X_i)$ gives the probability of a customer purchase Private label,⁶ for instance, at given X_i . When we take expectation operator from Eq. (15.1), we obtain

⁵We will provide more detailed information about the dependent and independent variables in data description part.

⁶It can be any of the five brands since we are considering them separately.

$$E(Y_i = 1 | X_i) = \beta_1 + \beta_2 X_i \quad (15.2)$$

Here, we have assumed that $E(u_i) = 0$ due to the unbiased estimator condition. If P_i is the probability that $Y_i = 1$ and $(1 - P_i)$ are the probability that $Y_i = 0$ so that $E(Y_i) = 0(1 - P_i) + 1(P_i) = P_i$. If we compare this with Eq. (15.2), we have:

$$P_i = E(Y_i = 1 | X_i) = \beta_1 + \beta_2 X_i \quad (15.3)$$

As we can see $P_i = E(Y_i = 1)$ increases linearly with X_i that is the marginal effect of X_i remains constant, which in fact leads some misleading conclusion. Thus, the problem linearity in (15.3) gives rise to include nonlinear characteristics in the models. Now let us consider the following representation of brand purchase choice:

$$P_i = E(Y = 1 | X_i) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_i)}} \quad (15.4)$$

For the simplicity reason, we rewrite (15.4) as:

$$P_i = \frac{1}{1 + e^{-Z_i}} = \frac{e^{Z_i}}{1 + e^{Z_i}} \quad (15.5)$$

where $Z_i = \beta_1 + \beta_2 X_i$ and Eq. (15.5) is called logistic distribution function. From the equation we can easily see that when Z_i ranges from $-\infty$ to $+\infty$ then P_i will range from zero to unit and that P_i is nonlinearly related to Z_i , therefore it is satisfying the requirement considered earlier but has created estimation problem. In order to estimate, we transform it into linear form as following. If P_i is the probability purchasing brand Private label, for instance, is given by (15.5), then the probability not purchasing the brand is $(1 - P_i)$ and it is $1 - P_i = \frac{1}{1 + e^{Z_i}}$. Thus, finally we can write the following equation combining two probabilities:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad (15.6)$$

where $\frac{P_i}{1 - P_i}$ is simply called odds ratio, which the ratio of the probability that a customer buys Private label over not buying it. To make it easier, we can take logarithm from both sides of the equation and achieve:

$$L_i = \ln \left(\frac{P_i}{1 - P_i} \right) = Z_i = \beta_1 + \beta_2 X_i \quad (15.7)$$

where L_i is called the Logit model, which is not only linear in X_i but also in the parameters. The model has the following features: (1) as P_i ranges from zero to unit, L ranges from $-\infty$ to $+\infty$ and (2) L is linear in X but the P_i is not linear

in X_i . If we say a customer purchases Private label, for instance, $P_i = 1$ and if not, the probability $P_i = 0$, thus we can directly plug those probabilities into the Logit model:

$$L_i = \ln \left(\frac{1}{0} \right) \text{ if a customer purchases } \quad L_i = \ln \left(\frac{0}{1} \right) \text{ if she doesn't purchase.}$$

Obviously, the expressions are misleading thus we can utilize the traditional OLS estimation methodology, however, we can employ Maximum Likelihood Estimation Method (MLE).

As described before, let us say the probability of a customer purchases Private label, for instance, given the customer's demographic variables. We assume that the probability can be presented by the logistic function:

$$P_i = \frac{1}{1 - e^{-(\beta_1 + \beta_2 X_i)}}$$

From the conditions, we observe the outcome $Y = 1$ if a customer buys the brand and $Y = 0$ if she doesn't buy the brand, thus we can write $\Pr(Y_i = 1) = P_i$ and $\Pr(Y_i = 0) = (1 - P_i)$. Now, let us imagine that we have a random sample of n observations and let $f_i(Y_i)$ denote the probability that $Y_i = 1$ or 0, thus the joint probability of observing the nY values is written as:

$$f(Y_1, Y_2 \dots Y_n) = \prod_1^n f_i(Y_i) = \prod_1^n P_i^{Y_i} (1 - P_i)^{1 - Y_i} \quad (15.8)$$

Here, Eq. (15.8) is called as the Likelihood function (LF), we can see that the joint probability density function as a product of individual density functions because each Y_i is drawn independently and each Y_i has the same density function (Gujarati and Porter 2009). Because of the product operator, it is not straightforward for the further steps but if we take logarithm, we obtain log-likelihood function (LLF):

$$\begin{aligned} \ln f(Y_1, Y_2 \dots Y_n) &= \sum_1^n [Y_i \ln P_i + (1 - Y_i) \ln (1 - P_i)] \quad (15.9) \\ &= \sum_1^n [Y_i \ln P_i - Y_i \ln (1 - P_i) + \ln (1 - P_i)] \\ &= \sum_1^n \left[Y_i \ln \left(\frac{P_i}{1 - P_i} \right) \right] + \sum_1^n \ln (1 - P_i) \end{aligned}$$

we incorporate equations of (15.4) and (15.7) into log-likelihood function (LLF), we obtain:

$$\ln f(Y_1, Y_2 \dots Y_n) = \sum_1^n Y_i (\beta_1 + \beta_2 X_i) - \sum_1^n \ln [1 + e^{\beta_1 + \beta_2 X_i}] \quad (15.10)$$

After the transformation, we can see that LLF is now a function of the parameters β_1 and β_2 at known X_i . In ML estimation method, we aim to maximize Eq. (15.10) obtain the unknown parameters in a way that the probability of observing the given Y' is high as possible (Gujarati and Porter 2009). For this purpose, we use First Order Condition (FOC), differentiating the function partially with respect to β_1 and β_2 and set the results to zero then find the solutions. In Appendix 1, we discuss more about the estimation method.

15.4 Data Preparation and Determining Market Segments

We have used an academic dataset provided by IRI⁷ (Information Resources Inc). The academic dataset consists of store sales and consumer panel data for 30 products categories, each store sale database contains 5 years (from 2001 to 2005) of weekly product sales and other marketing information in 47 US markets (Bronnenberg et al. 2008). The dataset not only contains the product sale information but also covers the demographics of households who are purchasing those products. Since the dataset is household panel, a purchaser can be any member in a family, thus only chance to explain the brand choice by the demographic variables was to represent the families by their heads. Out of 47 markets, we have specifically chosen yogurt market database for the paper due to its wider range of availability in retail sales.

15.4.1 Yogurt Market Dataset Description

As mentioned before, the yogurt market has larger number of retail sale purchases compared to other 46 markets. We have selected top five brands that are purchased at the most as binary dependent variables out of overall 95 brands and those are Dannon, Private label, Yoplait light, Yoplait original, and Yoplait whips. When retrieving the binary dependent variables out of the brands, we faced two major issues regarding overlapping purchase and buying more than one brands at the same time, the former one causes selection bias while the latter one makes it difficult to retrieve binary variables. Thus, we sorted and summed up all purchases for each panelist to get rid of overlapping problem, then we figured out maximum purchases for each brand to assign corresponding brand name in this way we were able to retrieve binary dependent variables. After adjusting the dataset, it shrank to 3221 household observations, which was large enough to conduct MLE estimation method that requires higher number of observations. Out of those 3221 household panelists, Dannon made up 799, Private label made up 446, Yoplait light made up 889, Yoplait original made up 828, and finally Yoplait whips made up 259.

⁷For more information about the company <https://www.iriworldwide.com/>.

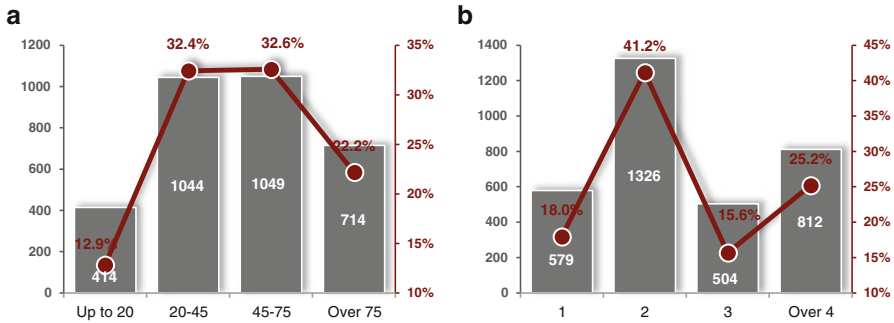


Fig. 15.1 Histograms of household income and size. (a) Histogram of household income (Thousand \$). (b) Histogram of household size

15.4.2 Demographic Variables Description

Out of 36 available demographic variables, we have selected six of them to be consistence with previously studies’ findings and those are family income, family size, marital status, as mentioned before some of the variables are represented by head of the household such as age, education, and occupation rather than the purchaser of the yogurts. As being guarantee to afford goods, family income plays central role in purchasing pattern and becomes one of the crucial demographics (Fig. 15.1).

In the original dataset provided by IRI, there were 12 groups ranging from up to \$10,000 till over \$100,000 annually, however, we have aggregated those groups into four groups: Up to \$20,000 and from \$20,000 to \$45,000 and \$45,000 to \$75,000 as well as over \$75,000 since we have attempted to divide the panelists into equal groups. We can see that 12.9% of the panelists have income up to \$20,000 while 32.4% of them have income starting from \$20,000 to \$45,000 and 32.6% and 22.2% of overall 3221 panelists have income ranging from \$45,000 to \$75,000 and over \$75,000, respectively. Next important variable is family size, we have divided the 3221 households into four groups according to the family size. The most common families in our sample were those who don’t have children as we can see from the figure, 41.2% of households have only two family members while households who have at least one child and more comprised 40.9% of whole sample. The following variable is marital status of heads as shown in the following figure. We have divided the panelists into two very simple groups according to their marital status: (1) married and (2) not married, the latter group contains all other status like single, divorced, widowed, and separated. In our sample, 69.8% of the panelists are married while the remaining share of 30.2% is in all other classification. Now, let us move onto next variables, as noted before there are variables expressed by the heads of the households such as age, education, and occupation of the households’ heads. Let us emphasize age of household heads, out of overall households 26.0% is in a range of 18 to 44, which can be considered as

early adulthood, 26.6 % is in age range of 45–54, which can be considered as middle adulthood, 22.2 and 25.2 % are in age range of over 55, which can be considered as late adulthood.

We have discussed the academic dataset provided by IRI, its structure and adjustments we made to retrieve binary dependent variables. Based on the background about the dataset, we are now able to demonstrate the market segments for the brands and develop hypothesis on the basis of the segments.

15.4.3 *Determining Market Segments and Developing Hypothesis*

In order to construct the segments, we have utilized contingency tables in multiple dimensions of the demographic variables. One of the assumptions to be cleared out here is that we have only selected three variables: household heads' age, income level, and family size out of the six variables because of simplicity reason firstly as well as the fact that correlation⁸ between the brand purchases and those three variables are the highest among the others. The segmentation criteria for the variables were (1) for income: higher (higher than the average income of \$45,000⁹) and lower income, (2) for age: older (older than 54) and younger, (3) for family size: have children living with them and have no children living with them. The age criteria younger than 54 and older than 54 might sound somewhat misleading but according to our sample distribution for aging as we can see from Fig. 15.2b almost the half of panelists are over 54 years old. As a result of the contingency tables, we have ended up with eight¹⁰ possible segments for every brand, more specifically each brand has the same eight segments on the basis of combinations of pre-determined three variables. Finally, the eight segments for the brands are shown in Table 15.3.

As shown in the table, we can interpret that, for example, the first segment is consisting of the consumers (household panelists) who are earning less than the average of \$45,000 annually, younger than 54 years old but have no children under 18 years old (or we could say children living with them). Once the possible segments are built up according to the demographics, we can demonstrate our hypothesis about the suitable target segments for each brand out of the eight segment possibilities. Thus, we have figured out the highest number of purchases to determine the dominant segments for the brands and depicted all of them together in a map, which gives us better picture to see where those brands locate in terms of the demographics. Let us interpret the mappings below and start with the pair of age and income mapping as Fig. 15.3a shows. From the first mapping, the dominant

⁸Please refer to Table 15.7 for more detailed information.

⁹In our sample, the average income level is \$45,000 annually.

¹⁰For each brand $2^3 = 8$ segments are created.

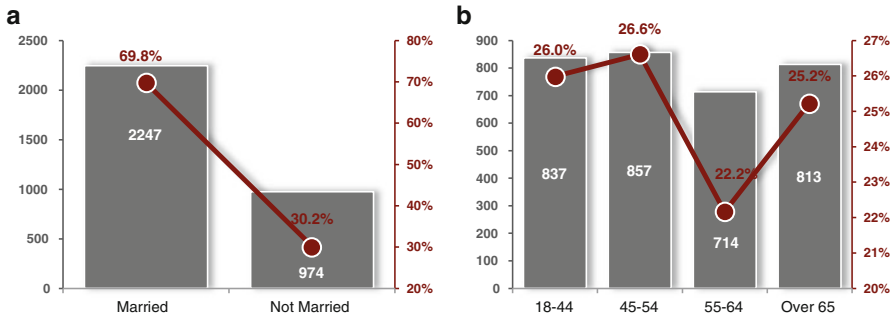


Fig. 15.2 Histograms of households' marital status and age of the households' head. (a) Histogram of marital status. (b) Histogram of age of households' heads

Table 15.3 Segments for the brands

Variables	Age of the heads	Income	Family size
Segment 1	Earning less than \$45,000	Younger than 54	No children under 18 years old
Segment 2	Earning less than \$45,000	Older than 54	No children under 18 years old
Segment 3	Earning less than \$45,000	Younger than 54	Children under 18 years old
Segment 4	Earning less than \$45,000	Older than 54	Children under 18 years old
Segment 5	Earning more than \$45,000	Younger than 54	No children under 18 years old
Segment 6	Earning more than \$45,000	Older than 54	No children under 18 years old
Segment 7	Earning more than \$45,000	Younger than 54	Children under 18 years old
Segment 8	Earning more than \$45,000	Older than 54	Children under 18 years old

Source: All based on the results from contingency table

segments for the brands Dannon and Private label are located at second quarter, where the consumers who are older than 54 and earning lower income than the average¹¹ had tendency to purchase those brands, however, the dominant segment for the brand Yoplait whips is positioned at third quarter, where the consumers not only who are younger but also earning less income. For the remaining two brands such as Yoplait light and original, they are positioned at fourth quarter of the consumers who are younger but earning higher income.

Next mapping is a combination of family size and income level. The brand Yoplait original is placed at first quarter, meaning that panelists who are wealthier and have children chose to buy this brand. While Dannon, Private label, and Yoplait whips are together in third quarter, where the consumers earning lower income but not living with their children are included in, the brand Yoplait light is placed at fourth quarter and it seems like the brand might suitable for the panelists earning higher income and having no children living with them. The last mapping is a combination of family size and age. According to the mapping, the most of the panelists who chose Dannon and Private label are those who are older and not living

¹¹The average household income is \$45,000 annually from the dataset.

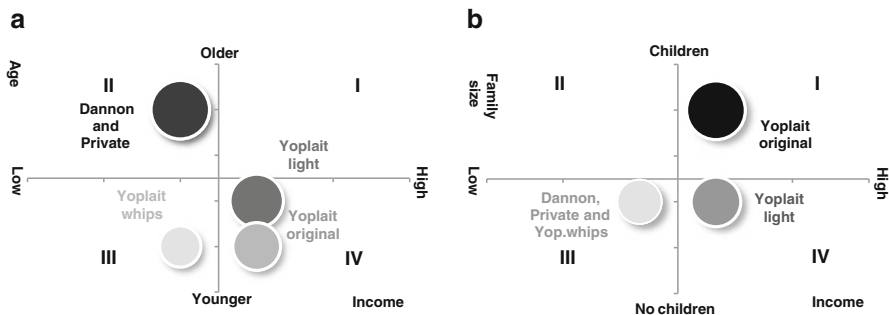
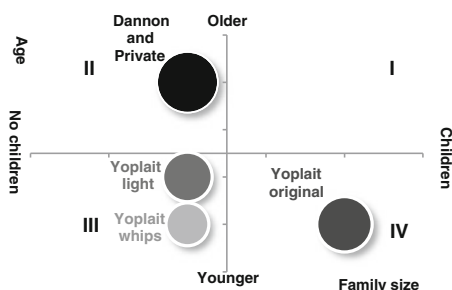


Fig. 15.3 Mapping of brands. (a) Age and income mapping for the brands. (b) Family size and income mapping for the brands

Fig. 15.4 Family size and age mapping for the brands



with their children,¹² whereas it seems like Yoplait light and whips were good choice for younger consumers having no children yet. The last brand Yoplait original is placed in fourth quarter so that those who are younger and having children chose the brand (Fig. 15.4).

After figuring out the dominant targets, we are now able to establish the hypothesis of the paper. In order to have better sense of the association between brand purchases as binary dependent variables and demographics we computed the correlations between them (Table 15.4).

The correlation table indicates age of the household heads, family size and income might have greater influence on yogurt purchase decisions. Aging might have positive impact on Dannon and Private label but negative impact on the remaining ones, for instance. To have more reliable and concrete hypothesis, we depicted the dominant segment for each brand in three dimensions of the demographics to demonstrate hypothesis for target segments for each brand.

As the dominant segment and correlation coefficients suggest, we have hypothesized that for the brands Dannon and Private label, the specific households whose heads are older than 54, earning less than \$45,000 annually and having no children

¹²For Dannon and Private label, because the dominant consumers are older so that most probably their children grew up and started living separately.

Table 15.4 Correlation between brands and variables

Brands/Variables	Age (%)	Education (%)	Family size (%)	Income (%)	Marital status (%)	Occupation (%)
Dannon	8.4	-0.7	-6.3	0.3	2.7	-0.5
Private label	5.6	-1.2	-5.7	-7.3	4.5	2.2
Yoplait light	-1.6	1.8	-0.6	5.1	-3.6	0.2
Yoplait original	-7.8	1.2	7.6	0.2	0.6	0.1
Yoplait whips	-5.3	-2.3	6.0	0.1	-5.1	-2.5
Absolute maximum	8.4	2.3	7.6	7.3	5.1	2.5

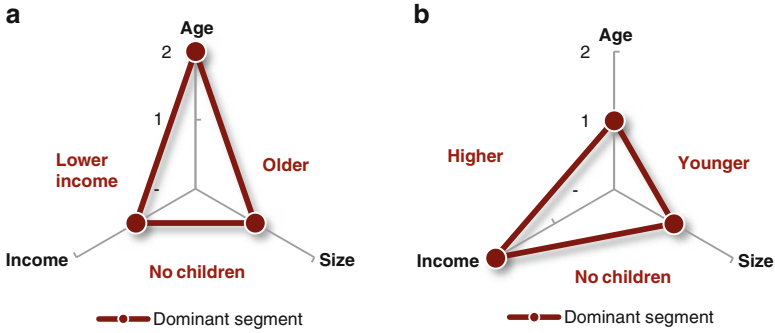


Fig. 15.5 Assumptions segments for Dannon and Yoplait light. (a) Assumption segment for Dannon, Private label. (b) Assumption segment for Yoplait light

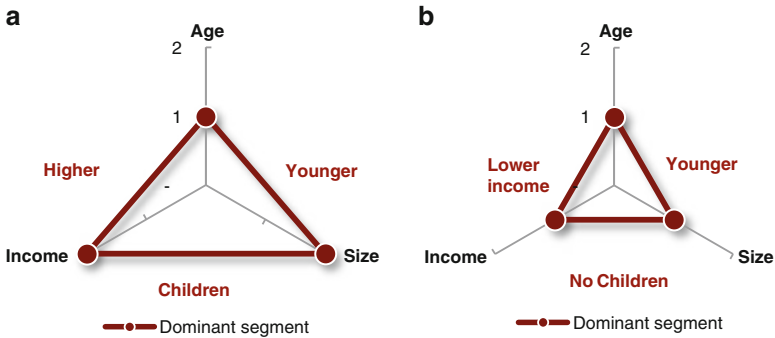


Fig. 15.6 Assumptions segments for Yoplait original and whips. (a) Assumption segment for Yoplait original. (b) Assumption segment for Yoplait whips

living with them, might be the target segment and its characteristics are depicted in Fig. 15.5a. In comparison to Dannon and Private, those who are younger and wealthier but not having children yet might be appropriate target segment for brand Yoplait light. Moreover, we have assumed that household heads who are younger, wealthier, and having children might be good candidate for target segment for Yoplait original, while it seems like those who are younger, earning less but have no children can be target group for Yoplait whips. The issue should be addressed here is that those assumptions are relied heavily on the conclusions from the mappings, some of those assumptions differ with that of correlations, however, we gave more priorities to the contingency table findings (Fig. 15.6).

15.5 Logit Model Estimation

In Binary Logit model estimation, we have estimated Eq. (15.7) by Maximum likelihood estimation method. Predicting power of the models is higher enough for each brand to conclude the demographics discriminate the brand purchases well. For instance, the model for Dannon brand predicts 75.2 % of the all cases whereas the model for brand Private label predicts 86.2 % correctly.¹³ As we addressed before, the interpretation of the estimates in Logit models is not so straightforward because of the odd ratio is in logarithm form, however, we do need to address the signs and the significance of estimates here. In comparison of the five models, it became so obvious that three variables household head age, family size, and income level are statistically significant among the others. Although the variables have dominant influence on the brand decisions that they have different impact on each brand, for instance, aging has positive effect on Dannon and Private label but negative effect on all Yoplait brands as we expected (Table 15.5).

Family size has negative impact on all brands except Yoplait original and whips, when family size increases it is more likely to buy Yoplait original and whips rather than Dannon or Private label, for instance. Moreover, household income has positive impact on Dannon and Yoplait light but negative for the rest. To have better idea of the findings in comparison with the assumptions, we went further investigating post estimation analysis by computing the average probabilities for each brand in terms of all demographics.¹⁴ In Table 15.6, we can see the eight segments and their corresponding predicted probabilities based on the estimation findings.

After computing the predicted probabilities for each segment, we picked up segments that have the highest probabilities to determine optimal target segments for each brand. Thus, the target segment as the model suggests for Dannon is the one consisting of households whose heads are older than 54 and earning more than \$45,000 per year and their children grew up no longer living with them. The target group for Private label, similarly also the heads are over 54 but earning less than \$45,000 annually and have no children living with them. Furthermore, the target segment for Yoplait light bit differs from the previous two brands, the consumers who are under 54 but wealthier and have no children yet can be good candidate. However, Yoplait original should target those who are under 54 and earning more than \$45,000 but have children not yet leave home while those who are also younger than 54 but earning less than the average but have children also not yet leave home should be targeted by Yoplait whips. So far, we have introduced the model estimates and their further computations, based on those findings we are now able to compare those findings with the hypothesis we have developed in the previous chapter.

¹³For the further information, please refer to Table 15.5.

¹⁴According to the Logit estimates, income has negative impact on Yoplait original and whips, which in the beginning seemed like the brands might have the same target segments, however, when computing the average probabilities taking overall influence of three demographics into consideration, it has proven that they have different target segments.

Table 15.5 Logit estimation results for each brand

Variables	Dannon		Private label		Yoplait light		Yoplait original		Yoplait whips	
	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value	Coef	P-value
Constant	1.37	0.01***	1.46	0.02***	0.79	0.09**	2.08	0.00***	0.39	0.67
Age	0.18	0.00***	0.09	0.12*	0.06	0.14*	0.12	0.01***	0.14	0.04***
Family size	0.07	0.17*	0.06	0.36	0.11	0.03***	0.17	0.00***	0.10	0.19*
Income	0.11	0.05***	0.19	0.00***	0.11	0.02***	0.04	0.48	0.16	0.05**
Correct prediction (%)	75.2		86.2		72.4		74.3		92.0	

Note: ***, **, and * indicate the coefficients statistically significant at 20%, 10%, and 5% confidence level, respectively

Table 15.6 Computed probabilities for each segment based on Logit estimation

	Segments	Dannon (%)	Private (%)	Light (%)	Original (%)	Whips (%)
1	Less 45 + less 54 + no children	30.9	14.8	28.9	11.5	48.5
2	Less 45 + over 54 + no children	33.7	15.9	28.4	10.1	45.9
3	Less 45 + less 54 + children	28.9	13.5	28.5	12.9	50.7
4	Less 45 + over 54 + children	31.7	14.6	28.0	11.6	48.0
5	More 45 + less 54 + no children	31.2	12.9	30.1	11.9	47.1
6	More 45 + over 54 + no children	34.0	14.0	29.7	10.6	44.5
7	More 45 + less 54 + children	29.2	11.6	29.7	13.4	49.3
8	More 45 + over 54 + children	32.0	12.7	29.2	12.1	46.6

First of all, let us start with the mapping of age and income, which is depicted in Fig. 15.3a. As we hypothesized that target segments for Dannon and Private label could include the consumers who are older and earning lower than the average, however, as the Logit model claims Dannon should be targeted to those who are older but earning higher than the average. Moreover, according to the hypothesis the dominant or assumed target segments for Yoplait light and original are placed in fourth quarter, which exactly matches what the models suggest, more precisely Yoplait light and original should be targeted to the consumers who are younger but earn more than the average. Finally, the hypothesis for the brand Yoplait whips is also consistent with what the estimation outcomes suggest, in other words as the hypothesis and outcomes indicate the target segment for the brand should be those who are younger and earning less money (Fig. 15.7).

Next mapping is a combination of family size and income, let us move into it. As Fig. 15.3b shows that we have assumed that Yoplait original should be targeted into first quarter, which is again proved by the empirical analysis, meaning the appropriate segment for Yoplait original should include the consumers who are paid higher and have children. For next brand Dannon, it is placed in the third quarter according to the assumptions but as the model suggests, it should shift to the fourth quarter, where consumers who are wealthier but have no children living with them. In contrast, for Private label the hypothesis and what the model suggests exactly fit with each other, the brand should stay at third quarter and should be targeted to those who earn less than the average and have no children living with them. According to the hypothesis, Yoplait whips fit at the third quarter as well but it should be placed in second quarter, where the households having children but earning lower are included. Finally for Yoplait light, the hypothesis matches with what model suggests, thus it should place at the fourth quarter with the consumer richer but no children under 18 years old (Fig. 15.8).

The last comparison is family size and age mappings. We assumed brands Dannon and Private label were mostly preferred by the consumers who are older and don't have children living with them. Not surprisingly, the model findings also

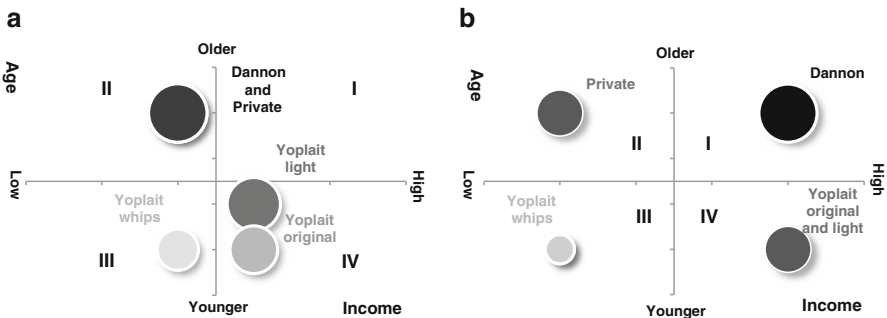


Fig. 15.7 Age and income mapping. (a) Age and income mapping for the brands. (b) Target segment mapping for age and income

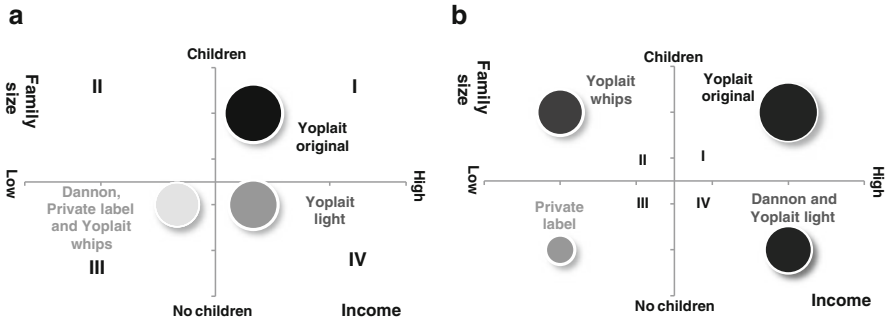


Fig. 15.8 Family size and income mapping. (a) Family size and income mapping for brands. (b) Target segment mapping family size and income

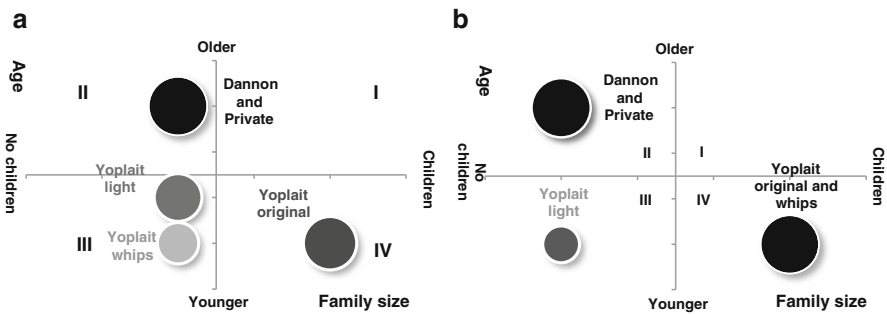


Fig. 15.9 Family size and age mapping. (a) Family size and age mapping for the brands. (b) Target segment mapping for family size and age

suggest the same target segment for those two brands. In addition, the hypothesis about Yoplait light and original exactly match with those what the models suggest, in other words they should be placed at quarter third and fourth, respectively. Finally, for brand Yoplait whips, we assumed it should be positioned in third quarter but according to the highest probabilities, it should place in fourth quarter where panelists who are younger and have children under 18 are included (Fig. 15.9).

After comparing the mapping assumptions with the actual findings from the models, now we are able to combine all the information into one graph for each brand to finalize the most suitable target segments for the brands. Thus, we considered following graphs as the ultimate target segments for brands in three dimensions of the selected demographics. Let us start with Dannon, as we can see from the figure below the appropriate target segment out of eight possible segments is the segment in which consumers who are older but earn higher and no children living with them. For Private label, the assumptions we have made is completely approved by what the model results suggest, the target segment covers consumers older than 54, earning less than the average and also not living with their children as depicted in Fig. 15.10b. Next brand, Yoplait light whose suitable target segment

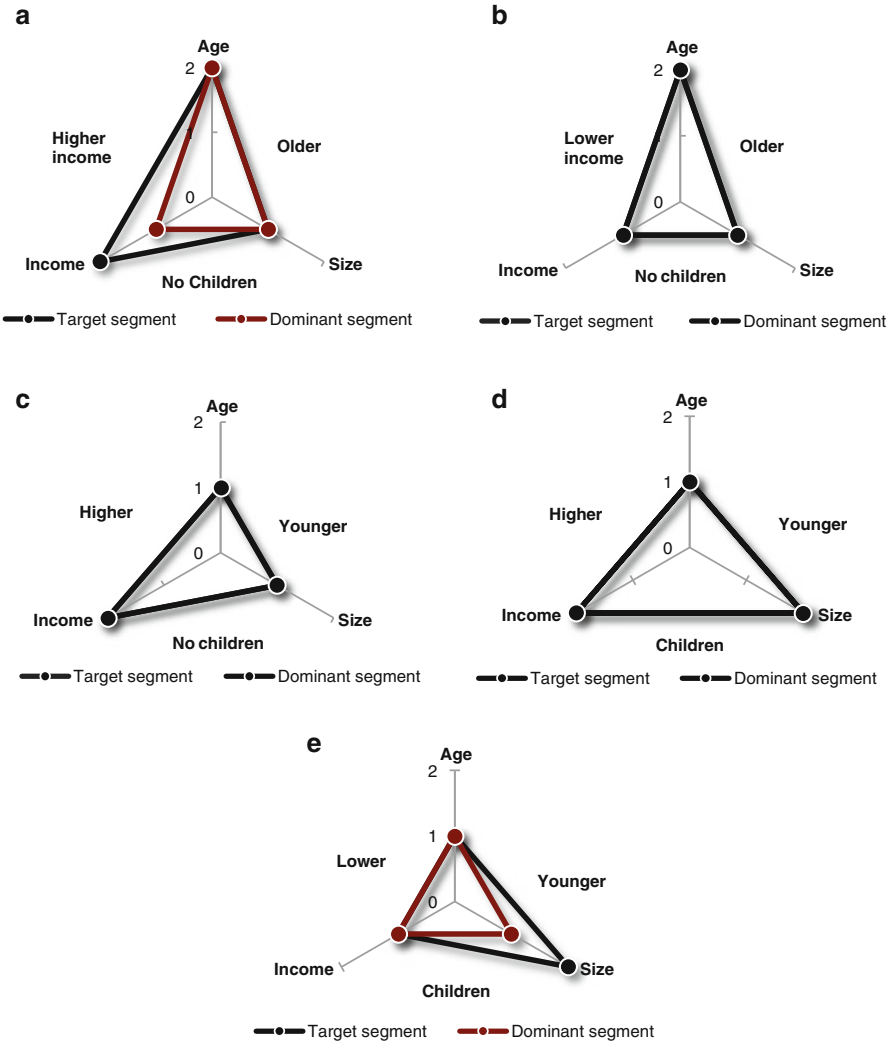


Fig. 15.10 Target segments for brands. (a) Target segment for Dannon. (b) Target segment for Private label. (c) Target segment Yoplait light. (d) Target segment Yoplait original. (e) Target segment for Yoplait whips

would be exactly same with what we have assumed as well, more precisely the target segment for the brand can be those who are paid more than the average, younger but having no children. Not surprisingly, for the next brand Yoplait Original, the assumptions also match exactly with what the model estimates suggest, in other words, the target segment for Yoplait original could cover those who are younger but earn more than the average but have children. As the estimation outputs provide us some proofs about the dominant segment for Yoplait whips, which is bit different

from what we assumed. The suitable target segment for the brand according to the estimates should be those who are younger, earning lower income but having children living with them.

We have finalized target segments out of eight possible segments so that we can now figure out new segment entry possibilities, more specifically niche market possibilities based on the findings we have obtained so far (Table 15.7).

As the table shows, there can be three niche markets consisting of households earning lower than \$45,000 annually, younger but have no children under 18 years old, or households earning also less but older than 54 and have children living with them or households earning more but older and have children living with them.

15.6 Concluding Remarks

The problems of investigating the possible bases of segmentation, identifying segments of households in a population and determining appropriate target segments, have been interesting research subjects in market segmentation practice (Gupta and Chintagunta 1994). The paper aimed to answer those questions: if the demographic variables are capable enough to discriminate and predict purchase choices as some researchers claim, if there is any possibility to segment a market in terms of demographics and determine appropriate targets for competitive brands while employing Logit model, if there is possibility it would be very interesting to figure out niche market opportunities out of the possible segments. The paper completely reached the goal, answering all of the questions and tested the hypothesis are accepted or rejected.

According to the findings, the household income, size, and household head age are the most influential demographic variables that have enough potential to predict customer choices and the finding is consistent with what Gupta and Chintagunta (1994) found in their studies. We have figured out that there can be particular and distinctive target segment for each brand in terms of the significant demographics out of all the possible market segments. More specifically, for Dannon, target consumers should be those who earn more than the average, older but have no children living with them whereas for Private label those who are older and earn less than the average but have no children living with them can be target segment. On contrary, for Yoplait groups (light, original, and whips) brands should be targeted to younger households but different in household income and having children or not. It has shown that it is effective to employ binary Logit models to predict customer purchase choices and based on the prediction, it is easy to determine appropriate target segments for each brand. The interesting fact is that the target segments are all distinctive in terms of the demographics and out of overall eight segments we have found out three niche markets, which are readily available for new entries.

The practical usage of the paper could be first of all, it allows marketers to see the whole market in better picture, more precisely it allows them to describe the market in comparison with the competitive brands on basis of demographics, which

Table 15.7 Segments for the brands

Variables	Age of the heads	Income	Family size	Brands/Niche
Segment 1	Earning less than \$45,000	Younger than 54	No children under 18 years old	Niche market
Segment 2	Earning less than \$45,000	Older than 54	No children under 18 years old	Private label
Segment 3	Earning less than \$45,000	Younger than 54	Children under 18 years old	Yoplait whips
Segment 4	Earning less than \$45,000	Older than 54	Children under 18 years old	Niche market
Segment 5	Earning more than \$45,000	Younger than 54	No children under 18 years old	Yoplait light
Segment 6	Earning more than \$45,000	Older than 54	No children under 18 years old	Dannon
Segment 7	Earning more than \$45,000	Younger than 54	Children under 18 years old	Yoplait original
Segment 8	Earning more than \$45,000	Older than 54	Children under 18 years old	Niche market

in fact enables them not only find out their brand locations but also competitive brand locations. In other words, the analysis allows marketers to verify whether marketing effort is reaching to the target segments they planned to reach or going somewhere else. For competitive markets, it also provides critical information about the competitor brands. Besides that, it also provides crucial information of niche market possibilities for new entries. Thus the analysis can be highly applicable for strategic marketing decisions. Another interesting insight revealed by the paper is when the demographic variables change, the target segments might shift from one brand to another. For instance, when target consumers of Yoplait light, original, and whips get older, they might shift to Dannon or to Private label, the fact gives a quick arise of question, in order to keep the target consumers with Yoplait the marketers should develop alternative or similar product feature competitive to Dannon or Private label for Yoplait brands. It actually provides decisive information for marketing strategy developing and planning. The paper can be extended in such way that more elaborated market segmentation bases can be incorporated, in addition to the demographics variables. In other words, based on the demographic variables psychographic or behavioral variables can be attached to have more precise and narrower segments for the brands.

Appendix 1: Maximum Likelihood Estimation Method

According to the one of the classical assumptions, the normality of disturbance term, we can denote the model's ($Y_i = \beta_1 + \beta_2 X_i + u_i$) mean as $\beta_1 + \beta_2 X_i$ and variance σ^2 . Now let us introduce joint probability density function of $Y_1 Y_2 \dots Y_n$ in condition of the mean and the variance:

$$f(Y_1, Y_2 \dots Y_n | \beta_1 + \beta_2 X_i ; \sigma^2)$$

Once Y_i is independent from each other we can write the probability density function in a such way:

$$f(Y_1, Y_2 \dots Y_n | \beta_1 + \beta_2 X_i ; \sigma^2) = f(Y_1 | \beta_1 + \beta_2 X_i ; \sigma^2) \\ f(Y_2 | \beta_1 + \beta_2 X_i ; \sigma^2) \dots f(Y_n | \beta_1 + \beta_2 X_i ; \sigma^2)$$

When we remember the density function of normal distribution,¹⁵ we will be able to find out the following equation:

¹⁵Normally distributed variable has $f(Y_i) = \frac{1}{\sigma\sqrt{2\pi}} \exp \left[-\frac{1}{2} \frac{\sum (Y_i - \beta_1 - \beta_2 X_i)^2}{\sigma^2} \right]$ density function.

$$f(Y_1, Y_2 \dots Y_n | \beta_1 + \beta_2 X_i; \sigma^2) = \frac{1}{\sigma^n (\sqrt{2\pi})^n} \exp \left[-\frac{1}{2} \frac{\sum [(Y_i - \beta_1 - \beta_2 X_i)^2]}{\sum \sigma^2} \right]$$

The equation is known as Likelihood Function (LF), where β_1 , β_2 , and σ^2 are unknown so that we rewrite the equation into:

$$\text{LF}(\beta_1, \beta_2, \sigma^2) = \frac{1}{\sigma^n (\sqrt{2\pi})^n} \exp \left[-\frac{1}{2} \frac{\sum [(Y_i - \beta_1 - \beta_2 X_i)^2]}{\sum \sigma^2} \right]$$

Our main goal is to maximize the $\text{LF}(\beta_1, \beta_2, \sigma^2)$ in respect of β_1 , β_2 , and σ^2 . To make it easier for taking First Order Condition (FOC), let us take logarithm from both sides of the equation.

$$\begin{aligned} \ln \text{LF} &= -n \ln \sigma - \frac{n}{2} \ln(2\pi) - \frac{1}{2} \frac{\sum (Y_i - \beta_1 - \beta_2 X_i)^2}{\sum \sigma^2} \\ &= -\frac{n}{2} \ln \sigma^2 - \frac{n}{2} \ln(2\pi) - \frac{1}{2} \frac{\sum (Y_i - \beta_1 - \beta_2 X_i)^2}{\sum \sigma^2} \end{aligned}$$

Taking partial derivatives from the equation above to respect of β_1 , β_2 , and σ^2 :

$$\frac{\partial \text{Ln}(\text{LF})}{\partial \beta_1} = -\frac{1}{\sigma^2} \sum (Y_i - \beta_1 - \beta_2 X_i) = 0$$

$$\frac{\partial \text{Ln}(\text{LF})}{\partial \beta_2} = -\frac{1}{\sigma^2} \sum (Y_i - \beta_1 - \beta_2 X_i) (-X_i) = 0$$

$$\frac{\partial \text{Ln}(\text{LF})}{\partial \sigma^2} = -\frac{n}{2\sigma^2} + \frac{1}{2\sigma^4} \sum (Y_i - \beta_1 - \beta_2 X_i)^2 = 0 \quad (15.11)$$

After simplifying first two equations, we obtain:

$$\sum Y_i = n\tilde{\beta}_1 + \tilde{\beta}_2 \sum X_i$$

$$\sum Y_i X_i = \tilde{\beta}_1 \sum X_i + \tilde{\beta}_2 \sum X_i^2$$

Those equations are identical to the equations that were considered in the section Ordinary Least Squares Estimation (OLS), therefore the estimators of MLE ($\tilde{\beta}_s$) are the same as that of OLS so that we can use the same methodologies to derive $\tilde{\beta}_s$. After finding out the estimators, we can derive the last estimate by plugging the previous estimators into equation denoted with (15.11):

$$\tilde{\sigma}^2 = \frac{1}{n} \sum (Y_i - \tilde{\beta}_1 - \tilde{\beta}_2 X_i)^2 = \frac{1}{n} \sum (Y_i - \hat{\beta}_1 - \hat{\beta}_2 X_i)^2 = \frac{1}{n} \sum \hat{u}_i^2$$

In order to make sure the variance $\tilde{\sigma}^2$ is biased estimator or not, let us take expectation from it so that:

$$E(\tilde{\sigma}^2) = \frac{1}{n} E\left(\sum \hat{u}_i^2\right) = \frac{n-2}{n} \sigma^2 = \sigma^2 - \frac{2}{n} \sigma^2$$

According to the desired properties of any estimators, an estimator is unbiased if the mean of its distribution is equal to the value of the parameter it is estimating (Palguta 2015), however, for MLE, it is apparent that it is biased downward because it underestimates the true σ^2 . But if we notice that the sample size n goes to infinity, the mean of $\tilde{\sigma}^2$ would be equal to the true σ^2 so that it would be unbiased, therefore, MLE is much suitable in large samples (asymptotically) to obtain unbiased estimators. Another important property of the estimators is consistency: an estimator is consistent if it converges to the value of the true parameter as the sample size increases (Palguta 2015). The estimators of MLE also have consistent properties when the sample sizes increases.

Appendix 2: Results of Model Estimation

Model 1: Logit, Using Observations 1-3221

Dependent variable: dannon					
QML standard errors					
	Coefficient	Std. error	z	p-value	
Constant	(1.37)	0.50	(2.77)	0.01	yes
Age	0.18	0.04	4.22	0.00	yes
Size	(0.07)	0.05	(1.36)	0.17	Yes
Income	0.11	0.05	1.98	0.05	Yes
Education	(0.08)	0.08	(1.01)	0.31	
Mar	0.13	0.11	1.17	0.24	
Occupation	(0.11)	0.06	(1.89)	0.06	Yes
Race	(0.13)	0.30	(0.42)	0.67	
Mean dependent var	0.2480596	S.D. dependent var	0.4319537		
McFadden R-squared	0.0096331	Adjusted R-squared	0.0051995		
Log-likelihood	-1787.0009	Akaike criterion	3590.0018		
Schwarz criterion	3638.6214	Hannan-Quinn	3607.427		
Number of cases "correctly predicted" = 2422 (75.2 %)					
$f(\beta'x)$ at mean of independent vars = 0.185					
Likelihood ratio test: Chi-square(3) = 29.9727 [0.0000]					

Model 2: Logit, Using Observations 1-3221

Dependent variable: private					
QML standard errors					
	Coefficient	Std. error	z	p-value	
Constant	(1.46)	0.64	(2.28)	0.02	yes
Age	0.09	0.06	1.54	0.12	yes
Size	(0.06)	0.07	(0.91)	0.36	
Income	(0.19)	0.07	(2.96)	0.00	yes
Education	0.06	0.10	0.55	0.58	
Marital status	0.01	0.14	0.11	0.92	
Occupation	(0.06)	0.07	(0.81)	0.42	
Race	0.06	0.35	0.17	0.87	
Mean dependent var	0.14	S.D. dependent var	0.35		
McFadden R-squared	0.01	Adjusted R-squared	0.01		
Log-likelihood	-1283.778	Akaike criterion	2575.56		
Schwarz criterion	2599.87	Hannan-Quinn	2584.27		
Number of cases "correctly predicted" = 2775 (86.2 %)					
$f(\beta'x)$ at mean of independent vars = 0.117					
Likelihood ratio test: Chi-square(3) = 23.2202 (0.0000)					

Model 3: Logit, Using Observations 1-3221

Dependent variable: yopliat_original					
QML standard errors					
	Coefficient	Std. error	z	p-value	
Constant	(0.79)	0.47	(1.67)	0.09	yes
Age	(0.06)	0.04	(1.47)	0.14	yes
Size	(0.11)	0.05	(2.17)	0.03	yes
Income	0.11	0.05	2.24	0.02	yes
Education	0.05	0.07	0.63	0.53	
Marital status	(0.18)	0.11	(1.61)	0.11	yes
Occupation	0.07	0.05	1.23	0.22	
Race	(0.06)	0.28	(0.20)	0.84	
Mean dependent var	0.2760012	S.D. dependent var	0.4470868		
McFadden R-squared	0.0041525	Adjusted R-squared	-6.33E-05		
Log-likelihood	-1889.73	Akaike criterion	3795.4599		
Schwarz criterion	3844.0795	Hannan-Quinn	3812.8851		
Number of cases "correctly predicted" = 2332 (72.4 %)					
$f(\beta x)$ at mean of independent vars = 0.199					
Likelihood ratio test: Chi-square(3) = 10.6923 [0.0135]					

Model 4: Logit, Using Observations 1-3221

Dependent variable: yopliat_original					
QML standard errors					
	Coefficient	Std. error	z	p-value	
Constant	(2.08)	0.48	(4.36)	0.00	yes
Age	(0.12)	0.04	(2.70)	0.01	yes
Size	0.17	0.05	3.38	0.00	yes
Income	(0.04)	0.05	(0.71)	0.48	
Education	0.07	0.07	0.96	0.34	
Marital status	0.19	0.11	1.68	0.09	yes
Occupation	0.10	0.06	1.85	0.06	yes
Race	0.40	0.26	1.52	0.13	yes
Mean dependent var	0.257063	S.D. dependent var	0.4370823		
McFadden R-squared	0.01	Adjusted R-squared	0.01		
Log-likelihood	(1816.96)	Akaike criterion	3649.92		
Schwarz criterion	3698.5357	Hannan-Quinn	3667.34		
Number of cases "correctly predicted" = 2393 (74.3 %)					
$f(\beta x)$ at mean of independent vars = 0.190					
Likelihood ratio test: Chi-square(3) = 27.5036 [0.0000]					

Model 5: Logit, Using Observations 1-3221

Dependent variable: yoplait_whips					
QML standard errors					
	Coefficient	Std. error	z	p-value	
Constant	0.39	0.94	0.42	0.67	
Age	(0.14)	0.07	(2.01)	0.04	yes
Size	0.10	0.08	1.31	0.19	yes
Income	(0.16)	0.08	(1.92)	0.05	yes
Education	(0.22)	0.13	(1.66)	0.10	yes
Mar	(0.45)	0.19	(2.35)	0.02	yes
Occupation	(0.11)	0.09	(1.22)	0.22	
Race	(1.15)	0.72	(1.58)	0.11	yes
Mean dependent var	0.08	S.D. dependent var	0.27		
McFadden R-squared	0.02	Adjusted R-squared	0.01		
Log-likelihood	(886.35)	Akaike criterion	1788.70		
Schwarz criterion	1837.31	Hannan–Quinn	1806.12		
Number of cases “correctly predicted” = 2962 (92.0 %)					
$f(\beta'x)$ at mean of independent vars = 0.072					
Likelihood ratio test: Chi-square(3) = 18.3769 [0.0004]					

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Chapter 16

Social Media Usage in the University Activities

Klaudia Smolaż and Beata Ślusarczyk

Abstract This article was devoted to very actual subject, including exploiting the potential of social media in activity of academies. And so sketch of a character of social media was presented, as an environment, which became a place of functioning of not only Internet users but also various organizations, in it colleges. A level of the application of social media was presented, on the base of secondary and primary examinations, conducted among students of one of the Polish academies. The main findings are directions of social media application in university performance and intensity in using them as well as determining needs and expectations of potential user applications perceiving abilities of exploitation of social media by students.

Keywords Social media • Academies

16.1 Introduction

Development of information technologies, in particular communication, once influences economic and the social area of life. Effective drawing benefits from happening changes requires both competences, which facilitate the optimal use of information and communication technologies (ICT), as well as abilities of the fast adaptation to needs and expectations of contemporary world. Social media are one of the significant examples of ICT development and creating of new forms of functioning of not only private persons but also entire organizations. Particularly growing popularity of social media among Internet users supports the fact that organizations more and more often become involved in functioning in their frames.

Social media are defined as “group being based on Internet applications solutions, which are based on ideological and technological bases Web 2.0, and which enable creating and exchanging of contents generated by users” (Voinea et al. 2015; Kaplan and Haenlein 2010). Such solutions, ranked among this group, are blogs, microblogs, and social networks, e.g., Facebook, YouTube, Flickr, Twitter,

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GoldenLine, or Instagram. Mentioned groups of social media are predestinated in the different level for carrying out different functions. Social media users create contents, make them available, comment, and in this way are active authors of many pieces of information, which spread very quickly. Building the social commitment, communication, which most often assumes the form “a lot of too many,” a speed of the transmission of information are constitutive features of this environment creating valuable relations between users (Sobaih et al. 2016; Ferencová et al. 2014).

Basic advantages of social media environment are more and more often used by various organizations with aim of the conduct of marketing and communication operations and of creating sources of relational capital. Research institutions, which academies are, also more and more often become involved into the active participation in frames of individual kinds of social media. In this article a character sketch of social media and main goals the university can carry out by exploiting them were presented. Moreover, results of own research which consisted of applying social media by students of the Polish public college were presented.

16.2 Exploiting Social Media in Poland and on Polish Academies

More and more people create and make their contents available via social media platforms (Manca and Ranieri 2016). According to examinations of the Center of Examining the Public Opinion (CBOS) in 2015 (state on May 2015), almost two thirds of adults in Poland (64 %) use the Internet. Percentage increase in the number of Internet users over the last decade is 36 %. A number of social media users also increase. The presence in at least one of them declares two thirds of Internet users (66 %, height for 4 percentage points), that is, over two fifth of the whole of adults (42 %, height by 3 points). How results from the declaration, 82 % of registered persons use them regularly (Komunikat z badań CBOS 2015) (Fig. 16.1).

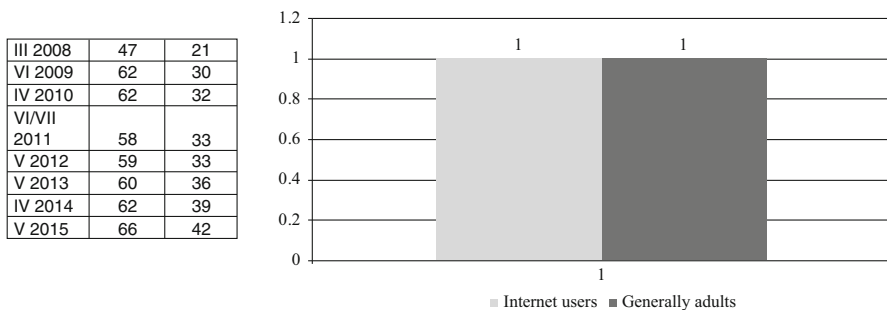


Fig. 16.1 Had you registered in any social media portal, e.g., Nasza Klasa, Facebook, GoldenLine, or similar? (Komunikat z badań CBOS 2015)

Table 16.1 Percentage of people using social media at least once a month in 2014 (<http://www.wirtualnemedi.pl/artykul/facebook-i-youtube-najpopularniejszymi-serwisami-spolecznosciowymi-w-polsce-hyper-social-coraz-mniej-popularne>)

Type of social media	% people in the age of 18 years old
YouTube	92
Facebook	85
Blogger	52
Twitter	28
Instagram	25

Analyzing CBOS results, the largest percentage of Internet users registered in social media constitute people from 18 up to 24 years (92 %), people in the age 25–34 (83 %), and the least are people of over 65 years old (21 %). Users exploit social media mainly to keep the social contact. Almost 55 % of users exploit them for keeping contact with friend, 41 % for refreshing contacts, and only 20 % for establishing new ones. For 39 % of respondents, social media are a transmitter of contents of different kinds: of listening to music, watching films or photographs, and reading texts. Smaller groups, only 26 %, constitute people, which place such materials there. These three kinds of activities are characteristics of the youngest respondents. Findings also showed that social media gained popularity as a place for job hunt. One fifth of Internet users use them for that purpose (21 %, height for 5 percentage points). For smaller groups (17 %), they serve to start professional and business relationships (Komunikat z badań CBOS 2015).

Facebook i YouTube najpopularniejszymi serwisami społecznościowymi w Polsce, hyper social coraz mniej popularne (2015), <http://www.wirtualnemedi.pl/artykul/facebook-i-youtube-najpopularniejszymi-serwisami-spolecznosciowymi-w-polsce-hyper-social-coraz-mniej-popularne> (Table 16.1 and Fig. 16.2).

According to IRC Center examinations summing 2015 up, Facebook is still on the first place in social media. Its share rose from 8 % in year 2011 to 50 % in 2015. However it does not mean that the number of contents on other platforms diminishes—the majority of them grows, forums and blogs, and from 2015 Twitter is the only platform, on which we observe a fall. Examinations showed that despite the diversity of social media platforms, the majority of users start to concentrate on 1–2 chosen. Niżnik W (2015), Social media 2015. Podsumowanie i trendy, (<https://ircenter.com/social-media-2015-podsumowanie-i-trendy/>). In Fig. 16.2 a frequency of using social media was described (2014 data).

The Sotrender company identifies the tendency happening on Facebook, i.e., heights and falls of fans, activities of users, etc. The report contains rankings of 15 major sites according to 15 chosen factors and the change of their position in the relationship to the previous balance sheet (monthly cycle). “Fanpage Trends 02.201” balance sheet, which covers the period from 01 February 2016 to 29 February 2016, also takes Facebook sites of Polish colleges into account. Characteristics of Polish

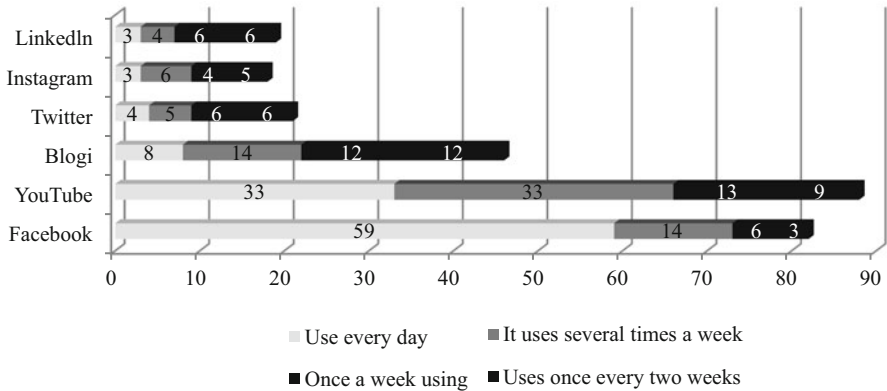


Fig. 16.2 Frequency of using social media Facebook i YouTube najpopularniejszymi serwisami społecznościowymi w Polsce, hyper social coraz mniej popularne (2015), (<http://www.wirtualnemedi.pl/artykul/facebook-i-youtube-najpopularniejszymi-serwisami-spolesznosciowymi-w-polsce-hyper-social-coraz-mniej-popularne>)

colleges on Facebook according to the above examination look as follows (Fanpage Trends 2016):

- Academies which gathered the greatest number of followers are Jagiellonian University (54,636), S. Staszic Mountain-Mining University in Cracov (51,143), and SWPS University (44,692).
- Growth of the number of followers was noticed in the fanpage of the Technical University in Warsaw (+5%), SWPS University (+4%), S. Staszic Mountain-Mining University in Cracov University in Warsaw, Warsaw University of Life Sciences, and The Warsaw School of Economics (+2%).
- The greatest absolute growth of the number of followers gained fanpages for SWPS University (+1542), the Technical University in Warsaw (+1266), and S. Staszic Mountain-Mining University in Cracov (973).
- The greatest number of followers engaged websites of S. Staszic Mountain-Mining University in Cracov (46%, 23,462), the Technical University in Warsaw (59%, 14,410), and SWPS University (15%, 6546).
- The highest levels of interactivity index gained fanpages of the Technical University in Warsaw (74,951), SWPS University (52,042), and S. Staszic Mountain-Mining University in Cracov (43,697).
- The highest levels of relative interactivity values gained fanpages of the Technical University of Warsaw (3021), SWPS University in Sopot (2497), and SWPS University (1137).

The characterization of academies having their sides on Facebook was prepared based on such factors as fans of the site, employed users, interactivity index, and relative interactivity. Fans of the site are users, which got to like the profile of the site. Next, users employed in these academies, in the analyzed period, have done

at least one initiative on the site, e.g., getting to like, commenting, adding a post or photo, or casting the voice in the questionnaire form. For characteristics of sites on Facebook in the examination, interactivity index was used, which was defined as collective rate of all activities within the site, and relative interactivity, which stayed defined as the collective rate of all activities of fans within sites in the chosen period, including the number of fans (Fanpage Trends 2016).

16.3 Characteristics of Social Media in the Aspect of University Functioning

Growing popularity of social media also contributed to the growth of an interest in their potential by various organizations, in it by academies. Application of social media by universities, determining the income and benefits coming from the interactive communication, is more and more frequent a subject of academic publications (Rutter et al. 2016).

Social media are determined as “new” media of social character, which enable to contribute and to disseminate contents between users (both known and unknown) of shared social network (Kulczycki 2012). Social media are also defined as the means of interaction between people, in which they can communicate, cooperate, and share information online through the social dialogue as authors of contents generated by users in virtual communities (Grosseck 2009). Social media are a platform, on which users can together examine the content of the network, to share their experience and to build the relation at different targets, for example, social and educational ones (Jiao et al. 2015; Sobaih et al. 2016). Social media can be characterized as applications being based on the Internet (Kaźmierczyk), enabling creating, making available, and exchanging of data with others (Balakrishnan and Chin Lay 2016) and communication in the model a lot of to many. A constitutive feature of social media is also a multimediansess of contents and a variety of forms, e.g., blogs, forums, portals, or games.

Blogs enable everyone to be interested in the possibility of opened and unrestricted expressing of opinions and views of both concerning different spheres of private and economic life. They have mainly text form with the possibility of interaction by adding comments. Next, e.g., YouTube, Flickr, and SlideShare allow for the resource sharing of multimedia contents, e.g., of video films, photographs, images, presentations, applications, etc. which are stored and made available from the level of network servers. Facebook, forums, Internet messengers, and chats are solutions allowing building and keeping relations between people by forming profiles of personal details. Moreover, Facebook offers additional functions, like e-mail, notice boards, or communicators, which allow for easy spreading of information (Balakrishnan and Chin Lay 2016). The popularity of social networks of Facebook type and functional possibilities of the portal contribute to greater interest in this kind of social media by organizations, which use Facebook for creating the

community brand, through inquiring, distribution, link to the site, and the like. Such applications, e.g., Google docs or wiki, allow contribution or cooperation. They constitute the group of tools supporting the development of the knowledge. Other kinds of social media are microblogs, alert services, and Livestream, which enable current inquiring and referring to news. The most extended forms of social media are virtual game worlds, e.g., World of Warcraft, and virtual social worlds, e.g., Second Life. Virtual game worlds are a kind of community games, in frames of which a possibility of the appearance in the form of personalized avatars and cooperating with oneself, like in real world, exists. However virtual social worlds are interactive, three-dimensional, multimedia environment of the existence of virtual avatars, through which users communicate and exist in virtual world (Kaplan and Haenlein 2010; Kucęba et al. 2013; Sobaih et al. 2016).

A variety of social media forms and their basic features support using their potential by colleges in such areas as marketing communication and creating the image of the college among current and potential stakeholders (Koszembar-Wiklik 2015), encouraging the teaching process (Sobaih et al. 2016; Smolağ et al. 2015) and the scientific development of employees or the cooperation in frames of academic groups (Manasijević et al. 2016).

16.4 Research Methodology and Findings

16.4.1 Research Methodology

Conducted own examinations were aimed at collecting information concerning perceiving the application of social media in functioning of the college by students. Sampling research had intentional character. The examination was conducted in the period January–February 2016 on the group of 147 students of the Technical University in Czestochowa. An independently constructed questionnaire form consisting of 24 closed and half-open questions and the certificate form was a research tool. The questionnaire form was anonymous. Such a sample was not truly representative, and therefore it is possible to treat the examination as the pilot scheme, serving further getting to know the problem in conducted representative researches.

16.4.2 Findings

Analysis of own examinations concerned chosen issues of functioning of the college in frames of social media. Organizations, which exploit the potential of social media, including colleges, are driven by a desire for increasing an interest in their offer in order to reach the greatest number of potential clients. Therefore present students



Fig. 16.3 Do activity of the university on social networks had an influence on your decision about choosing the academy? *Source:* Authors' elaboration

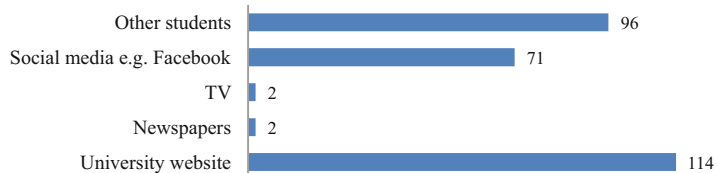


Fig. 16.4 How do you obtain information about the college, on which you study? *Source:* Authors' elaboration

were also asked, whether when choosing the college, the activity of the college on social networks affected their decision on choice of the given academy. For nearly 86 % of respondents, the activity of the college social networks did not affect making a decision of the selection of studying place. Remaining respondents acknowledged that it was a factor, which they considered in deliberations about the continuation of education (Fig. 16.3).

Among respondents, the most popular source of obtaining information about the college was its own website. This reply indicated 114 polled persons. Next respondents most often used information given by other students (96 replies). Social media, as the information carrier, positioned themselves on the third place in this ranking, fulfilling desire for obtaining information of almost a half (71 people) of respondents. Traditional media, such as television or the press, had marginal meaning (Fig. 16.4). Obtaining information about the college is an important component of the process of communication between the college and its students, which considerably influences employment of students into college life and their feeling that the college is caring about their interests and affects the comfort of the learning.

How results in Fig. 16.5 show, among social media, the college, which according to respondents, should be used to contact with students, Facebook has majority (131 readings). The remaining kinds of social media are not so popular as Facebook; only 30 respondents suggested using YouTube. A lower figure of readings had services: Instagram (14), Twitter, and Google plus (12). A few replies gathered LinkedIn (5), Nasza Klasa (3), and Blip (1). These results are comparative with the performance of other units dealing with the evaluation of the most popular kinds of social media.

111 people, the majority of respondents, held a view that the college should have a community profile, because it can in the determined way influence recruiting students. From this group, 45 people hold a view that this service should be Facebook—tool having the greatest reach and popularity—while others did not indicate a specific media. Eight respondents stated that the community profile of

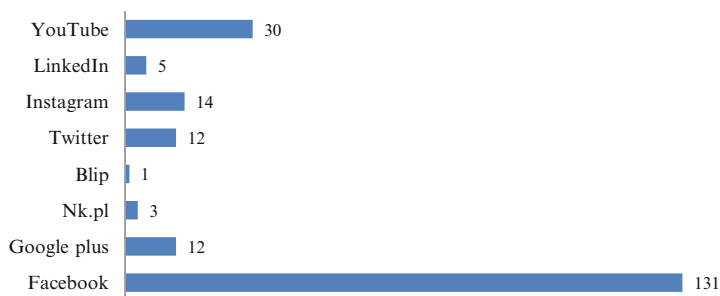


Fig. 16.5 In which social networks the college should have an own profile? *Source:* Authors' elaboration

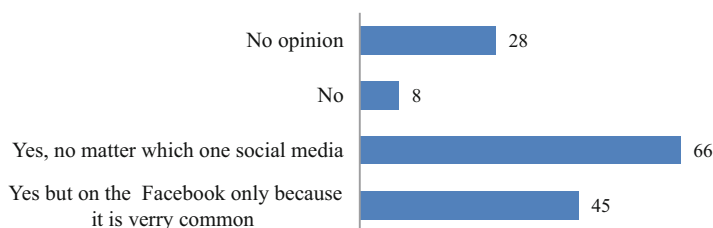


Fig. 16.6 Do you think a fact that the college has its Facebook or other social media profile increases the chance for gaining the greater number of students? *Source:* Authors' elaboration

the college will not contribute to recruit new students, and 28 people acknowledged that they have no definite view about it (Fig. 16.6).

Answering investigating question, from where students obtain information about the college, respondents were asked for choice of only one reply. Almost 45 % of respondents obtain information about activity of the college both in the traditional way, e.g., from notice board, posters placed in the building of the college, or as part of classes, as well as online. Almost 30 % of people subjected to the questionnaire form obtain information of this type exclusively through the Internet; for the counterbalance, only 2 % of respondents never use this source. Only 4 % of respondents obtain information in the traditional way. Results presented in Fig. 16.7 confirm intense power of online transmission, which results from the speed of the access to its sources, topicality, and easiness of obtaining information irrespective of place and time of desire for its searching (e.g., by using smartphones, tablets, mobile devices, etc., with which contemporary students are not parting).

From actions conducted by colleges point view, in frames of social media profile, for its users essential are data, which the college put on its fanpage. Therefore subjects of research analysis were elements, which can be put into composition of the fanpage of a given college. Elements concerning the content of the fanpage were assessed by social media users during examinations in 5-degree Likert scale which let for obtaining the more detailed opinion of respondents. On Fig. 16.8 an evaluation of particular fanpage elements was presented, where 1 means the

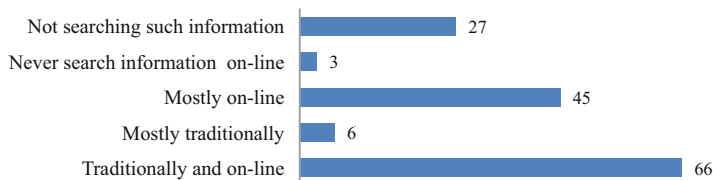


Fig. 16.7 How do you seek information about activity of the college? *Source:* Authors' elaboration

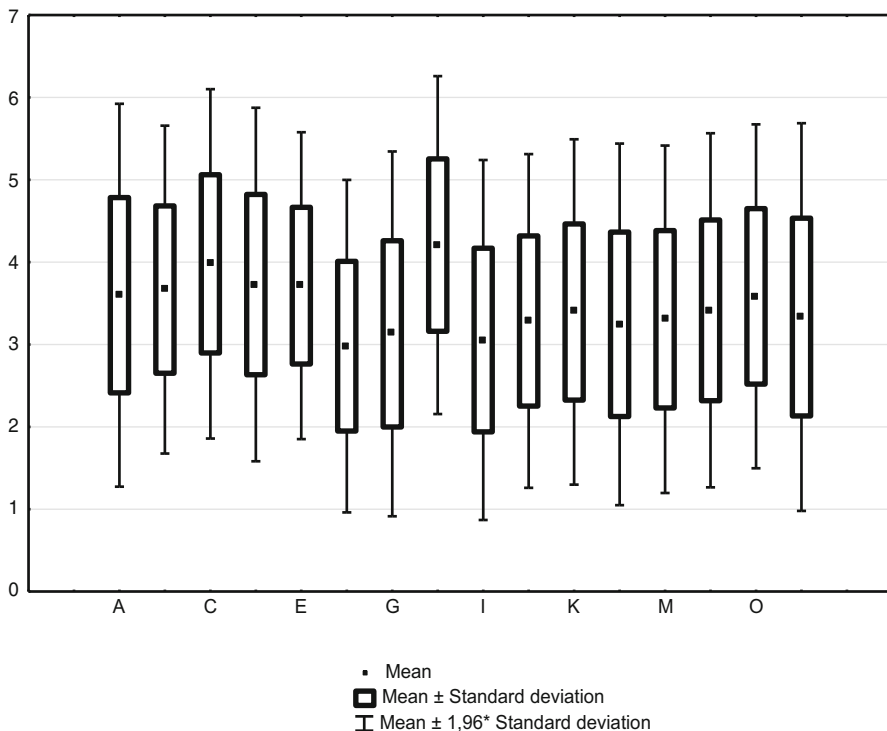


Fig. 16.8 Evaluation of elements of the content of the college profile in social media ($n = 147$) *Source:* Authors' elaboration

unimportant element and 5 very important element. For the purposes of conducted analysis used, symbols from A to P were used, where (Fig. 16.8):

- A—Information about the college
- B—Information about the present activity of the college
- C—Information about degree courses
- D—Possibility of communication/dialogue
- E—Information of additional classes, courses
- F—Films from the most important scientific events

Table 16.2 Descriptive statistics concerning the analysis of the content of the college fanpage

Variable	Descriptive statistics				
	N valids	Medium	Minimum	Maximum	Std. dev.
A	147	3,598,639	1,000,000	5,000,000	1,185,875
B	147	3,666,667	1,000,000	5,000,000	1,015,856
C	147	3,979,592	1,000,000	5,000,000	1,082,041
D	147	3,727,891	1,000,000	5,000,000	1,095,181
E	147	3,714,286	1,000,000	5,000,000	0,950,847
F	147	2,979,592	1,000,000	5,000,000	1,030,158
G	147	3,129,252	1,000,000	5,000,000	1,130,354
H	147	4,206,897	1,000,000	6,000,000	1,046,798
I	147	3,054,422	1,000,000	5,000,000	1,115,165
J	147	3,285,714	1,000,000	5,000,000	1,033,679
K	147	3,394,558	1,000,000	5,000,000	1,069,873
L	147	3,244,898	1,000,000	5,000,000	1,120,126
M	147	3,306,122	1,000,000	5,000,000	1,076,602
N	147	3,414,966	1,000,000	5,000,000	1,096,967
O	147	3,585,034	1,000,000	5,000,000	1,065,290
P	147	3,333,333	1,000,000	5,000,000	1,201,217

Source: Authors' elaboration

- G—Films from the most important entertainment and cultural events
- H—Current information for students about classes
- I—Contents, which can be shared on own website
- J—Contents about cultural events
- K—Contents about sports events
- L—Curiosities about the college
- M—Scientific curiosities/links
- N—Possibility of discussion with other users
- O—Experts' advices
- P—College photos

On the basis of conducted examinations, it turns out that elements assessed at most having a positive effect on a content fanpage of a college are (Table 16.2 and Fig. 16.8):

- Current information for students connected with classes, assessed for the best on the level 4.02
- Current information about degree courses, assessed for the best on the level 3.97
- Possibility of communication/dialogue, assessed for the best on the level 3.72
- Information about extra classes, courses, assessed for the best on the level 3.71

Analysis of evaluation results of elements of the content of the profile of the college in social media showed that 7 of 16 elements, which were marked during examination, had been assessed by respondents on the level of above 3.50, what

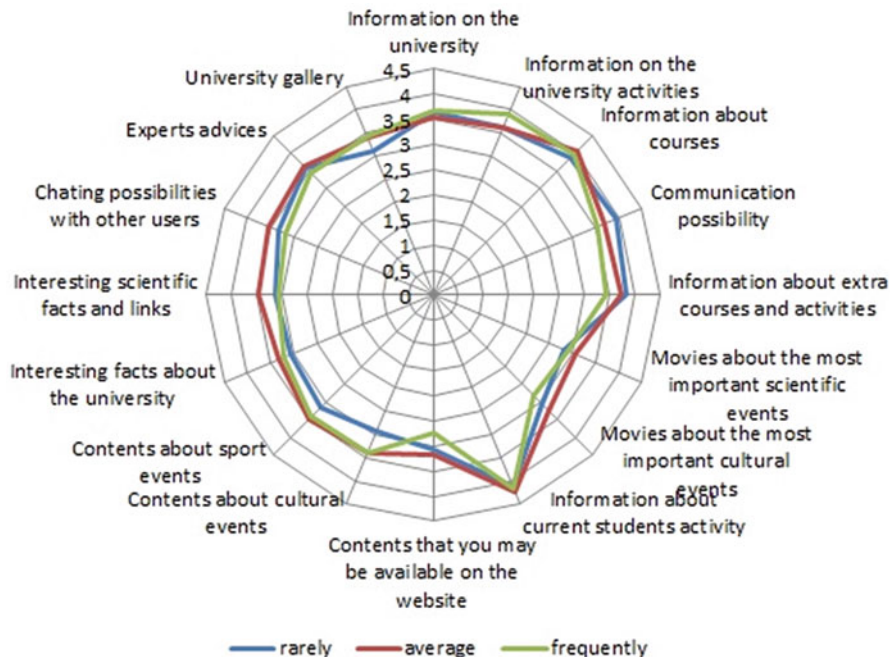


Fig. 16.9 Dependence between the frequency of using social media and the assessment of the profile of the college on Facebook (most rarely answers of using no more than one kind of social media, averagely answers exploiting 2–3 kinds of social media, and most often corresponds to using above four different kinds of social media) *Source:* Authors’ elaboration

provides the fact that there is a group of fanpage elements, which are most useful to users while using the entire group of information included on the profile of the given college. Most low assessed (on the level 2.97) by students was the element, which regards films from scientific landmarks, what can provide that people using the given profile of the college are not interested in them. It can result mainly from the fact that information of this type enjoy popularity mainly of researchers of the college and the group of students involved in scientific groups and constitute valuable sources of information and knowledge for them.

Figure 16.9 shows relations between the frequency of using social media and with evaluation of the profile of the college on Facebook. How results indicate there are no big differences resulting from perceiving the content of the Facebook profile of the college and the frequency of using social media. Such a situation can result from the fact that people participating in the examination represent the group of people from 20 to 25 years. This is so-called Y generation, for which functioning in the world created through social media is a natural area of taken action. This group knows social media specificity for the best and its basic functionality, and the service of the application of this type constitutes no biggest problems for them.

Conducted analysis of elements of fanpage of the college lets for specifying and determining expectations and needs of users, as for the presentation of information and action taken by academics, in which the goal is a proper operation in frames of one of the most popular kinds of social media, which Facebook is.

16.5 Summary

Social media determine considerable potential in functioning of the college. Effectively using their power requires analyzing the specificity of social media, characteristics of its individual kinds, and observation of directions and intensity in using them and of determining needs and expectations of potential users. Information presented in this article show the general state of the knowledge about the possible applications and evaluations of social media on the college. Moreover quoted findings of own applications concern perceiving abilities of exploitation of social media by students of one of the Polish colleges. If it was already recalled in methodological assumptions, presented findings are not representative and nevertheless let for fixing directions of further analyses and deliberations in this area. Surely carrying out a comparative analysis concerning exploiting individual kinds of social media for the realization of basic activities of the college, to which marketing communication and creating the image of the college among current and potential stakeholders, supporting education process, and the development of employees or cooperation within academic groups, will be an interesting challenge.

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Chapter 17

Strategic Management of Costs: A New Tool to Gain Competitive Advantage

Vlora Berisha

Abstract In a dynamic business environment that includes rapid change, the powerful extension of technological development, increased competition, globalization, market segmentation, unsustainable demand, the importance of information, and changing business processes, cost management has become more critical, dynamic, and necessary than ever before. In order to rescue itself from the claws of competition today, every firm must achieve a competitive advantage. Managers need to think competitively and devise and execute an effective strategy. The selection and implementation of an appropriate competitive strategy are the keys to both the short-term and the long-term success of the firm. The purpose of this study is to identify and empirically test the role of cost management tools in achieving the strategic objectives of Kosovo firms.

Keywords Strategic cost management • Competitive advantages • Value chain • Cost drivers

17.1 Introduction

During the past two decades, many firms in both sectors, production and service, are faced with dramatic changes in the business environment. These changes are expressed mainly in the following four aspects: (1) oversupply of most products in domestic and foreign markets, resulting in competition in an increasingly fierce market; (2) the diversity of product demand, consumers are increasingly looking for quality products; (3) international division of labor is becoming closer and closer, the competition tends to be more severe and cruel; (4) new technologies and new technological innovations have become common practice (Sander and Roy 1999).

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Costs have always been one of the key components of the entire business enterprise. They are undoubtedly one of the most important factors on which the company's management is based (Skënder 2008).

In conditions of globalization, technological evolution and innovation in the production process have gained popularity. As a result, cost management's role as a competitive tool is becoming increasingly important, especially in making strategic business decisions. Cost management has been developed precisely because of the changes in the production environment and has a much broader focus than those given traditional cost systems.

Cost management is not related only to the fact that it costs something but also the factors that affect cost such as cycle time, process quality, and productivity. It is not enough simply to reduce costs, but costs must be managed strategically (Cooper 1995). At the same time, it is not intended to diminish the importance of the traditional approach to cost management, which has been very useful for managers to make decisions. But the traditional view cannot advance unless we take into consideration changes in the business environment, which requires a change of approach based on new concepts and new types of thinking.

Cost management methods are important, but equally important is to know how and when to apply them to achieve long-term success. Cost management methods help managers understand behavior and cost structure. Therefore, they can make decisions that will create opportunities to reach firm competitive advantage (Buckingham and Loomba 2001).

The paper is organized as follows. Sections 17.1 and 17.2 included a literature review and analysis of works by well-known authors in the field. Section 17.4 includes the research methodology, hypothesis testing, and analysis of the results. Section 17.5 includes the conclusion and recommendations derived from this research.

17.2 Literature Review

By reviewing the literature, there is a different approach to this issue, a new way of thinking and acting toward cost management as a beneficiary of multiple opportunities and provides assurance of significant success. Various authors, after detailed research and supporting facts, have reasonably concluded that the strategic way of managing costs in most cases is an undisputed necessity which reference should definitely order to achieve the required effect and gained competitive advantage in today's dynamic business environment. Academic authors have stressed that the importance of strategic cost management has grown dramatically in recent years due to intensified competition.

Kaplan and Norton (1997) and Shank and Govindarajan (1997), in general, are honored authors cited most when it comes to achieving competitive advantage through the strategic cost management. Strategic cost management in the literature is discussed from many aspects. Many authors in their research have studied and

paid attention to the various instruments used for strategic management of costs as target costs (Seidenschwarz 1993; Ansari et al. 1997), cost based on activities and management based on activities (Cooper and Kaplan 1998; Turney 1999), benchmarking (Hoffjan 1997; Wagener 2006), or the life cycle of cost (Shields and Young 1991; Coenenberg 1997; Hansen and Moëen 2000; Götze 2004). Thus, in the field of strategic cost management, the majority of studies in the literature focus on tools (instruments) that are applied to cost management (Pong and Mitchell 2005), as well as cost leadership (cost leadership).

Contribution to the development of strategic cost management belongs to Porter (1998). Porter suggested that a firm has a choice of three generic strategies in order to win lasting competitive advantage. They are cost leadership, differentiation, and focus. An important approach to strategic cost management that has gained attention internationally was proposed by Shank and Govindarajan (1993), based on the study of Porter. According to these authors, strategic cost management is discussed through some key concepts such as value chain, cost drivers, and strategic standpoint. Shank and Govindarajan (1993) highlighted some important aspects of cost management in the value chain.

Porter 2000 and Shank and Govindarajan (1988, 1992) presented their concept more clearly on strategic cost management. By using cost-based activities, these authors analyzed value chain for the strategic direction of the cost. A sophisticated cost structure of a company can facilitate the search for sustainable competitive advantages, says Shank and Govindarajan (1993). Mannel (1995), Corsten and Stuhlmann (1996), and Arnaut (1997) focused on objects (resources, processes, and products) and analysis of areas and activities (bringing the cost, the cost structure, and management of the cost) of strategic management of costs.

While in his study, Kajüter (2000) argues that the methods of cost management and cost management structure are two basic conceptual frameworks for cost management. According Kajüter (2000), elements of a cost management system include activities (cost planning and monitoring costs), objects (resources, processes, and products), and techniques that support cost management activities. Kajüter notes that the structure of cost management is an important aspect in the construction of cost management. This includes the assignment of responsibilities (who will carry out the management cost) and the choice of coordination mechanisms. Kajüter (2000) focused on cost planning, cost monitoring, and organizational issues. Some studies point out aspects of organizational behavior and strategic cost management (Shields and Young 1989; Cooper 1995). These studies argue that the factors that affect the successful implementation of cost management methods include behavioral and organizational factors. For example, these factors include support from the most senior management, connection methods of cost management strategies, competitive, connection methods of cost management performance evaluation and reward (compensation), and sufficiency of internal resources, training, dedication, motivation, etc.

According to Horvath and Brokemper (1998), strategic management of costs has emerged as a key element to achieve and maintain a strategic competitive advantage through long-term forecasts and the formation of the level of costs, the structure of

costs, and bringing the cost of products, processes, and resources. They also argue that strategic cost management should define and analyze long-term cost factors (economy of scale, experience, etc.) and their impact on the level of costs, cost structure, and cost behavior. Finally, strategic cost management should be applied from the research stage and development and design phase of the product, in order to avoid costs at the beginning of the product life cycle. Strategic cost management sees products, processes, and people as objects of creative resources to achieve a strategic competitive advantage.

In his study, Hinterhuber (1997) argued that cost management as “a necessary mechanism of action is more strategically important to increase the number of choices for discovering new possibilities or discovering the markets new.” Hinterhuber interviewed executives of European companies about strategic cost management and concluded that strategic cost management should be part of business strategy in order to achieve a radical and long-term growth of the company value.

According to McIlhattan (1992), strategic cost management is the ability of management of costs. While Horngren et al. (2000) noted that cost management is not applied in particular. Cost management has a broad focus. For example, cost management involves continuous reduction of costs.

Horgen and McIlhattan define strategic cost management as a set of actions that managers take to satisfy customers through constant control and reducing costs. Simmonds show that in the literature, strategic cost management is interpreted in different ways. First, it may refer to “competitors.” Simmonds (1981) has developed a conceptual framework that emphasizes the importance of information on competitors (on costs, prices, market share, and so on) in the development and monitoring of business strategy. Later, various authors justify the value of information on competitor to achieve a competitive advantage (Jones 1988; Bromëich 1990; Ward 1992; Moon and Bates 1993).

In recent periods managerial accountants are being seen not only as a financial expert but also as a key adviser to help businesses develop and implement their strategies (Blocher et al. 2010). The essence of cost management is the use of tools to generate information about the planning, decision-making, and control for the short and long term, in order to facilitate the management of the firm to create products and provide services in the most effective and efficient way compared to competitors (Horngren 2003; Hansen and Moëen 2000; Hilton 2000).

Most costing procedures used today were developed in the period stretching between 1880 and 1925. Early developments up to 1915 belonged to the cost method of product identification—determining the feasibility of a business for special products and the use of information for making strategic decisions. From 1925 he devoted a crucial method of calculating the cost of inventory—identification of manufacturing costs by enabling product cost reporting of inventories in financial statements for external users’ needs.

From 1980 onward, many scholars in this field argue that traditional cost management systems are not serving the needs of management and are unsuitable for modern business environment demands. For example, according to Chenhall (1991:2), the traditional methods of cost better adapt to circumstances and situations

Table 17.1 Sample characteristics

Variables	Categories	Absolute frequencies	Frequencies in %
Region/Municipality	Peje	10	71.4%
	Prishtine	2	14.3%
	Gjilan	1	7.1%
	Ferizaj	1	7.1%
The size of firm	0–9	0	0%
Number of employees	10–49	8	57.1%
	50–249	5	35.7%
Level of qualification	Mbi 250	1	7.1%
	Bachelor	8	57.14%
	Master	6	42.9%
Position	PhD	0	0%
	Accountant	9	64.3%
	Financial manager	5	35.71%

when “the markets are safe, the large-scale production is specifically fixed, and there is less pressure in response to requests very flexible to market changes.” The difference between traditional cost management and strategic cost management is explained in Tables 17.1 and 17.2.

Morse (2003), Dekker (2003), Hilton (2000), and Blocher (1999) suggested these tools for strategic management of costs:

These tools are vital for long-term success. Prevailing in the short term is not the only success criteria; firms should try to succeed in the long term by strengthening relationships with customers.

17.3 Methods of Research and Hypotheses

17.3.1 Research Methodology

This research is based on primary and secondary data. The secondary data for this research was provided through extensive references from the literature and of similar research published by other universities. The primary data were provided through a questionnaire, which was designed in accordance with the problematic elements examined in this paper. This presents some intellectual questions to consider this problem:

1. What role do techniques/tools of cost management play in achieving strategic goals and objectives of modern management? From the viewpoint of specialists, there are relevant issues in finance and accounting in Kosovo firms.

Table 17.2 Tools for strategic cost management

Tools	Type
Analysis of the value chain	To survive in today's competitive environment, companies must be oriented about the customers and have first priority to fulfill their needs by creating consumer value on a lower cost than competitors
Costs based on activities	An analytical tool designed to provide accuracy in the allocation of indirect costs
Analysis of the competitive advantage	Determining the strategy that an organization can adopt to distinguish from its rivals
Target costs $C = P - \pi$ Target cost = market price—target profit	Cost management tool for the reduction of total costs of a product along the entire life cycle of its production with the help of research and design. A target cost is the amount of cost that can be included in a product, and it can still be arriving at the firm's profit required of that product at a special sale price
Total quality management	To adopt policies and procedures necessary to meet customer requirements
Just in time	A comprehensive system to purchase materials or produce goods when necessary "in due course"
SWOT analysis	SWOT analysis—systematic procedure to identify the critical factors for the success of an organization
Benchmarking	Benchmarking means the search for those best practices of competitors. The basic idea of benchmarking is that managers can improve the quality by analyzing and then copying the methods of leading companies in various fields. As such, benchmarking is a specific form of environmental inspection
Balanced scorecard	Consisting of a plurality of integrated performance measurements of output stemming from the strategy of the company and are entirely in support of her. It is divided into four main dimensions: financial performance, customer satisfaction, operations and internal innovation, and growth
Theory of constraints	A tool to improve the rate of transfer of material to finished goods

Source: Blocher (1999)

2. What are the constraints that Kosovo firms face in the use and application of tools of strategic management of cost?
3. What are the benefits of using company funds to strategic cost management?
4. What are the strategies applied by Kosovo firms to achieve competitive advantage?

To achieve the objectives of this paper, statistical analysis using an algebraic method of average size variation and absolute indicators is used. The questionnaire consists of five parts. This includes, first, the general information on the company; second, the role of the SCM in achieving contemporary management objectives; third, restrictions to use SCM tools; fourth, benefits from the use of SCM; and, fifth, strategies that bring competitive advantage.

Respondents were asked to express their level of agreement with several statements/allegations made by the interviewer in the role of strategic management techniques to achieve cost management objectives. Respondents were asked to rank their responses according to a Likert scale from 1 to 5 (level of agreement with statements made, where 5 represents full compliance).

17.3.1.1 Hypotheses

Through this paper it is intended to verify these hypotheses:

H1 Cost management techniques play an important and fundamental role in achieving the goals and objectives of modern management.

H2 The application and use of strategic cost management techniques in directing firms to the benefits and achieving a notable success.

H3 Firms in Kosovo face several obstacles and difficulties in the use of tools and techniques of strategic cost management.

H4 Firms can achieve competitive advantage through determination or advantage and the strategies of their choice.

17.3.2 Results of Research and Testing Hypotheses

17.3.2.1 Characteristics of Respondents and Research Results

A sample of 14 respondents participated in the survey. In the questionnaire which was sent to accountants and financial managers in Kosovo firms, the characteristics of the respondents were as follows (Figs. 17.1, 17.2, 17.3, 17.4, 17.5 and 17.6).

Regarding cost management firms, respondents believe that the main purpose of cost management is to increase company performance, ensure financial survival, and achieve competitive advantage. This can be seen in the graph below.

Fourteen firms in Kosovo discussed cost management in all departments. The firms surveyed indicated that cost management is discussed mostly in the finance department and the office of the board of directors' meetings, as seen in the graph below.

Variables	Categories	Absolute frequencies	Frequencies in %
Region / Municipality	Peje	10	71.4%
	Prishtine	2	14.3%
	Gjilan	1	7.1%
	Ferizaj	1	7.1%
The size of firm	0-9	0	0%
Number of employees	10-49	8	57.1%
	50-249	5	35.7%
	Mbi 250	1	7.1%
Level of qualification	Bachelor	8	57.14%
	Master	6	42.9 %
	PhD	0	0 %
Position	Accountant	9	64.3%
	Financial manager	5	35.71%

Fig. 17.1 Distribution of respondents’ demographic characteristics. Source: Author’s calculations



Fig. 17.2 Cost management. Source: Author’s calculations



Fig. 17.3 Departments deciding for cost management. Source: Author’s calculations



Fig. 17.4 Cost determinants. Source: Author’s calculations

While the most important cost drivers firms surveyed are: cost of raw materials, labor cost, cost of operations etc.

The use of cost management tools by firms surveyed is indicated in the table below.



Techniques of Analysis value chain is used by your firm?

Yes		76.8%	11
No		21.4%	3

ABC² Techniques is used by your firm?

Yes		92.8%	13
No		7.14%	1

Countinuous improvement tool is used by your firm?

Yes		92.8%	13
No		7.14%	1

BSC³ techniques is used in your firm?

Yes		42.9%	6
No		57.1%	8

Source: Author's calculations

Fig. 17.5 Cost management tools. Source: Author's calculations

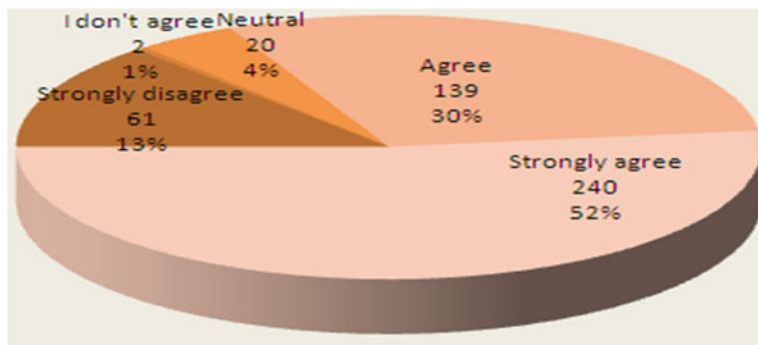


Fig. 17.6 Graphic presentation of the responses of the respondents. Source: Author's calculations

17.3.2.2 The Role of Cost Management Tools in Achieving the Strategic Goals and Objectives of Modern Management

To evaluate the role of cost management tools in achieving the strategic goals and objectives of modern management, the four tables below show the results of the questionnaire (Tables 17.3, 17.4, and 17.5.)

The tables show that respondents believe that four methods of strategic cost management are of great importance in achieving the objectives of strategic

Table 17.3 Value chain analysis

Paragraph	Mean	%	Standard deviation
1. Applying of this technique helps the firm in managing costs and improving the quality of products	4.71	94.2	1.07
2. Application of this technique leads to maximizing the value of activities to the acquisition of raw materials (raw) to product delivery to the customer	4.64	92.8	1.08
3. Applying this technique helps the management to identify unnecessary costs in manufacturing performance and achieving a lower cost with high efficiency	4.07	81.4	1.00
4. Applying of this technique helps in achieving the firm’s competitive advantage by lowering costs	4.14	82.8	1.10
5. Application of this technique leads the firm’s profit growth	4.29	85.8	1.14
General weighted mean = 4.3 total sample (N) = 14 Sig. $\alpha = 0.05$			

Source: Author’s calculations

Table 17.4 ABC and BSC techniques

Paragraph	Mean	%	Standard deviation
6. Applying this technique helps in improving firm performance and achievement of objectives	4.43	88.6	0.65
7. Applying this technique helps the firm to calculate the exact costs of production	4.21	84.2	1.21
8. Management needs for more accurate cost information requires the application of this technique	4.29	85.8	1.14
9. Applying this technique helps all levels of management in the provision of data for more efficient decision-making	4.43	88.6	0.65
10. In this way there are better technical aids in controlling and reducing firm costs	4.57	91.4	0.76
General weighted mean = 4.38 total sample (N) = 14 Sig. $\alpha = 0.05$			
16. Financial perspective of the firm’s application of this technique helps improve the performance meter	2.36	47.2	1.91
17. Application of this technique leads to establishing a better internal control	2.21	44.2	1.72
18. Applying this technique provides strategic gauge in financial and nonfinancial performance of the firm’s management	2.36	47.2	1.91
19. This technique represents a way of thinking and a management tool that helps the company to achieve its strategic objectives	2.21	44.2	1.72
20. By applying this technique, the firm provides comprehensive information and convenient performance	2.36	47.2	1.91
General weighted mean = 2.3 total sample (N) = 14 Sig. $\alpha = 0.05$			

Source: Author’s calculations

management for contemporary firms in Kosovo, where the arithmetic and weighted averages and percentage attest to the importance of these methods for managing these firms. Of the four methods, it is clear that the balanced scoreboard is used at

Table 17.5 Continuous improvement technique

Paragraph	Mean	%	Standard deviation
11. The continuous improvement helps firms in maintaining competitive advantage, increasing sales, and achieving its strategic objectives	4.50	90	1.09
12. Continuous improvement leads to lower losses, reduction of production time, and improvement of the quality of the firm's products	4.21	84.2	1.21
13. Continuous improvement helps to the discovery of the best ways to carry out activities of the firm	4.57	91.4	1.09
14. Continuous improvement leads to lower costs of production and control	4.29	85.8	1.07
15. Continuous improvement leads to increased customer value	3.79	75.8	1.12
General weighted mean = 4.27 total sample (N) = 14 Sig. α = 0.05			

Source: Author's calculations

least in Kosovo entity. The arithmetic mean of the answers of the respondents in this category reached 2.3 consisting of the second option "disagree," and the standard deviation is 1.7.

While the average total of three tables shows the importance of methods for managing modern companies and the achievement of objectives in terms of their strategic methods, if we list according to the results obtained through these methods, ABC comes in the first, then followed by analysis value chain and continuous improvement, while the balance scorecard is the latest.

When we calculate the correlation of coefficients between these four methods of strategic cost management, we have provided the following results.

Table 17.6 shows the correlation among these methods, as it is the correlation between the analysis of the value chain and the method of continuous improvement with (0.68) this correlation which is significant at the level of significance at the 0:01, and shows that the use of these methods together can achieve the expected benefits of management and the use of one of these techniques is linked to the use of other techniques. From all these results the first hypothesis can be accepted, which confirms that the strategic methods of cost management plays an important role in achieving the strategic goals and objectives of modern management (Table 17.7).

The results show that respondents confirm the existence of obstacles and difficulties in the employment of strategic cost management, where the average total arithmetic weighted 4.26, and the standard deviation for the answers of respondents did not show any significant difference in their responses to this part of the questionnaire. According to the results, it is indicated that one of the biggest obstacles to the use of these tools is the "high costs for the use of these techniques compared to traditional methods (4.43)."

From these results, the second hypothesis can be accepted, which confirms that there are many restrictions and difficulties faced by firms in Kosovo for the application and use of methods of strategic cost management (Table 17.8).

Table 17.6 Correlation coefficients

Correlations		Technique AZV	Technique ABC	Technique TPV	Technique BSC
Technique AZV	Pearson correlation	1			
Technique ABC	Pearson correlation	0.113	1		
Technique TPV	Pearson correlation	0.679**	-0.077	1	
Technique BSC	Pearson correlation	0.122	0.207	0.372	1

**Correlation is significant at the 0.01 level (2-tailed)

Source: Author’s calculations

Table 17.7 Obstacles and difficulties faced by firms in the use of strategic cost management

Paragraph	Mean	%	Standard deviation
21. Management’s unwillingness to change current systems used because they are considered sufficient and do not need to change	4.14	82.8	1.10
22. The lack of administrative and financial staff qualified scientifically and practically in the application and use of these techniques and methods	4.29	85.8	1.07
23. The lack of a proper database affects the use of these tools	4.36	87.2	1.15
24. The lack of data not detailed enough and the lack of information about you using these techniques	4.07	81.04	1.14
25. High costs for the use of these techniques compared to traditional methods of management used by the company which were rejected	4.43	88.6	0.94

General weighted mean = 4.26 total sample (N) = 14 Sig. $\alpha = 0.05$

Source: Author’s calculations

Table 17.8 Features and benefits of the use and application of means of strategic cost management

Paragraph	Mean	%	Standard deviation
26. It helps more in the control of production costs	4.57	91.4	0.51
27. It helps to develop better plans for the future	4.50	90	0.52
38. It helps in the decision-making	4.79	95.8	0.43
29. It helps in the process of evaluating the performance of the firm	4.43	88.6	0.51
30. It helps in the process of evaluating the performance of individuals	4.57	91.4	0.65

General weighted mean = 4.57 total sample (N) = 14 Sig. $\alpha = 0.05$

Source: Author’s calculations

The results show that the respondents see the application and use of these methods of strategic cost management as more profitable for firms in Kosovo, where the resulting total average arithmetic was 4.57, and one of the greatest benefits by these results is that the use these methods helps in the decision-making process (4.79).

These results validate the third hypothesis, confirming that there are more benefits from the application of strategic approaches to cost firms in Kosovo.

17.4 Strategies to Achieve Competitive Advantage

Competitive advantage is an advantage over competitors by creating customer value equivalent to a lower cost than competitors. The strategy is a plan to succeed against competitors. The strategy includes the extensive use of technology to reduce costs, a management structure that welcomes change, and a constant focus on customer service. The term “cost management” is widely accepted in the literature to express a new system of accounting information. This system is intended to generate the necessary information in order to assist entities to gain competitive advantage Brierley (2008) (Table 17.9).

According to these results, Kosovo firms mostly use cost-cutting strategy (4.79) together with differentiation and focus on product quality, to achieve competitive advantage. And secondary data and the results of this survey can say that firms can take advantage and achieve competitive advantage through their election strategy, which confirms the fourth hypothesis in this paper (Table 17.10).

Table 17.9 What is the appropriate strategy for your company to provide competitive advantage

Paragraph	Mean	%	Standard deviation
31. Reduce costs/leadership cost	4.79	91.4	0.43
32. Product differentiation	4.07	90	0.47
33. Concentration in the quality of products	4.71	95.8	0.47
General weighted mean = 4.52 total sample (N) = 14 Sig. α = 0.05			

Source: Author's calculations

Table 17.10 Responses of respondents

Respondents	Strongly disagree	I do not agree	Neutral	Agree	Strongly agree
I	5	0	6	19	3
II	5	0	0	10	18
III	5	0	0	19	9
IV	4	0	2	2	25
V	0	1	1	15	16
VI	10	0	1	3	19
VII	7	0	2	4	20
VIII	5	0	3	6	19
IX	5	0	1	8	19
X	5	0	0	8	20
XI	5	0	0	9	19
XII	5	0	0	12	16
XIII	0	0	0	13	20
XIV	0	1	4	11	17
Sum	61	2	20	139	240

Source: Author's calculations

17.5 Conclusions and Recommendations

In today's competitive environment, the development and use of cost information management has an important strategic role in the success of the firm. Strategic cost management should help the company identify and develop superior strategies that will ensure the sustainable competitive advantage.

Through the study of the subject's strategic cost management, it can be concluded that the use of strategic cost management methods has become an undeniable and vital need for all types of businesses and firms in order to survive and grow in light of an increasingly complex and dynamic business environment. Strategic cost management is a more effective tool in developed countries than in developing countries such as Kosovo. Although the implementation of strategic cost management is problematic for Kosovo, the country should nonetheless begin to apply the process because it will create benefits as the country becomes more developed in the future.

Managers of firms are also aware that the application and use of strategic cost management entails difficulties and obstacles. On the other hand, these challenges are surpassed by the advantages and benefits of using cost management tools. Kosovo at present does not have many opportunities for the application of cost management. Nonetheless Kosovo firm's should begin to adopt a new approach to cost management because it is the future of the global economy that will eventually include Kosovo.

This new approach to cost management does not mean that Kosovo firms should completely reject the traditional way of managing costs. Many businesses are obligated to use traditional methods while using traditional products and traditional ways of preserving the market owing to set environmental, geographic, strategic, and practical considerations.

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Chapter 18

The Causal Relationship Between Government Spending and Revenue: An Empirical Study from Greece

Chaido Dritsaki

Abstract This paper examines the relationship between government spending and revenues in Greece for the 1980–2015 period, using cointegration autoregressive distributed lag test (ARDL test) as well as causality test developed by Toda and Yamamoto. The results of cointegration of ARDL test showed that there is a cointegrated relationship between government spending and revenues. Also, causality test showed that there is a unidirectional causal relationship between spending and revenues in Greece with direction from government spending toward revenues.

Keywords Government spending • Government revenue • ARDL bounds testing • Toda and Yamamoto causality test

JEL Classification C50, E23, J24

18.1 Introduction

The relationship between government spending and revenues is one of the ordinary problems on public economics. There are four aspects about the relationship of government spending and revenues. The first one refers that government spending must be expanded according to revenues. Thus, spending should follow revenues. This means that if revenues (taxes) increase, in that case, government can increase spending. So revenues are a remedy for minimizing public deficits. This view is supported by Friedman (1972, 1978) and Blackley (1986) who show that there is positive causal relationship between revenues and spending.

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The second view is supported by Peacock and Wiseman (1961) claiming that increases on government spending generate increases on revenues. They also claim that a large exogenous shock (unstable political situations) will cause increases on government spending thus increases on tax revenues.

The third view is that government can change spending and revenues (taxes) at the same time. This view is supported by Musgrave (1966) and is referred as fiscal synchronization hypothesis which entails that there is a bilateral causality between spending and revenues. Furthermore, Barro (1979) suggested a tax-smoothing model for the hypothesis of tax synchronization.

Finally, the view of Baghestani and McNown (1994) refers that government spending and revenues is determined by long-run economic growth so a causal relationship of revenues and spending is not expected.

The rest of this paper is organized as follows. Section 18.2 is a brief overview of the empirical literature. Section 18.3 describes data and methodology. Section 18.4 presents the empirical results. Finally, Sect. 18.5 gives concluding remarks.

18.2 Literature Review

Even if during the last decades many papers have been published in various countries, the direction of causal relationship between government spending and revenues has not yet been found. Many papers refer on the four aspects mentioned in the previous section. The use of different econometric methods and different periods ended up on different contradictory results. The results also differ as far as the direction of causality is concerned having an effect on the economic policymaking of each government both in long- and short-run level.

For developing countries there have been many studies which examined the relationship between government spending and revenues. Shah and Baffes (1994) on their paper for three Latin American countries (Argentina, Mexico, and Brazil) found a bilateral causal relationship between government spending and revenues for Argentina and Mexico, whereas for Brazil this relationship was unidirectional with a direction from revenues to spending.

Owoye (1995) investigated the causal relationship between revenues and spending for G7 countries. He found a bilateral causality for five out of seven countries, and for Japan and Italy he found a unilateral causal relationship with direction from revenues to spending.

Park (1998) examined causal relationship between government revenues and spending for Korea for the 1964–1992 period. The results showed a unilateral causal relationship from revenues to spending.

Al-Qudair (2005) examined the long-run relationship between public spending and revenues for the Kingdom of Saudi Arabia using Johansen cointegration technique and error correction model for causality testing. Cointegration results showed the existence of long-run relationship between public spending and revenues. Causality testing demonstrates the existence of bilateral causal relationship between government spending and revenues in long- and short-run basis.

Emelogu and Uche (2010) studied the relationship between government spending and revenues in Nigeria using data from 1970 to 2007. Using cointegration techniques such as Engel-Granger two-step method and Johansen procedure, they found a long-run relationship among variables. Afterward, causality test using error correction model showed a one-way causal relationship with a direction from revenues to spending.

The empirical paper of Ali and Shah (2012) in the case of Pakistan for the 1976–2009 period showed that there is no causal relationship between revenues and spending both in long- and short-run level.

Saysombath and Kyophilavong (2013) investigated the relationship between spending and revenues for Lao People’s Democratic Republic during the 1980 until 2010 period. Applying ARDL cointegration procedure in combination with Granger causality, they found a long-run causal relationship between spending and revenues with direction from spending to revenues.

Finally, Nwosu and Okafor (2014) examined the relationship between revenues and spending and divide each one in two groups. Revenues are divided in revenues on oil and non-oil, whereas spending is divided in current and capital. This paper employs data for the 1970–2011 period and Johansen cointegration technique and error correction mechanism. The results of this paper showed that total spending (current and capital) have a long-run and one-way causality relationship with total revenues (oil and non-oil) with a direction from total spending to total revenues.

18.3 Data and Methodology

On Fig. 18.1, total revenues and government spending are presented as percent of GDP for Greece for the 1980–2015 period. On this diagram we have to point out that government spending all through the examined period is larger than revenues (Fig. 18.1).

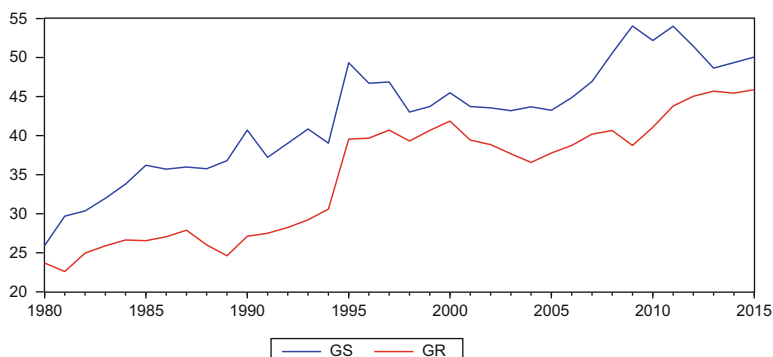


Fig. 18.1 The government spending and government revenues as percent of GDP between 1980 and 2015

18.3.1 Data

The study uses annual time series data and covers the 1980–2015 period. The government spending and government revenues are presented as percent of GDP. Data were obtained from the International Financial Statistics (IFS). All the data used in the study are in logarithmic form. This data transformation occurred in order to reduce the heteroscedasticity problem (see Gujarati 2004). The link between government spending and revenue is specified as follows:

$$GS_t = \alpha_0 + \alpha_1 GR_t + e_t \quad (18.1)$$

and

$$GR_t = \beta_0 + \beta_1 GS_t + \varepsilon_t \quad (18.2)$$

where the GS_t and the GR_t denote government spending and revenue, respectively. The e_t and ε_t are error terms. We expect that α_1 and $\beta_1 > 0$.

Logarithmic transformation of the above equations would leave the basic equations as follows:

$$LGS_t = \gamma_0 + \gamma_1 LGR_t + u_t \quad (18.3)$$

and

$$LGR_t = \delta_0 + \delta_1 LGS_t + v_t \quad (18.4)$$

where $L =$ natural logarithms.

18.3.2 Order of Integration

In this section we test the order of integration of time series. For this test, we use augmented Dickey–Fuller (ADF) test (1979, 1981) and Phillips–Perron (PP) (1988). The results on the test give the opportunity to determine the most suitable test of series cointegration or in other words, the long-run relationship between them.

18.3.3 Cointegration Tests

In this paper, we adopt the autoregressive distributed lag (ARDL) test as it was formed by the papers of Pesaran and Shin (1995) and Pesaran et al. (2001). This test in relation to other cointegration tests has some advantages such as the following:

- It can be used also in series that are not integrated in the same order.
- It has more power when the sample size is small.
- It allows the series to have different lags.
- It determines a dynamic model of unrestricted error within a linear transformation.

The equations for the ARDL approach are the following:

$$\Delta LGS_t = b_0 + \sum_{i=1}^p b_{1i} \Delta LGS_{t-i} + \sum_{j=0}^q b_{2j} \Delta LGR_{t-j} + \varphi_1 LGS_{t-1} + \varphi_2 LGR_{t-1} + \mu_t \quad (18.5)$$

$$\Delta LGR_t = h_0 + \sum_{i=1}^p h_{1i} \Delta LGR_{t-i} + \sum_{j=0}^q h_{2j} \Delta LGS_{t-j} + \pi_1 LGR_{t-1} + \pi_2 LGS_{t-1} + \nu_t \quad (18.6)$$

where p and q are the lag order of variables ΔLGS_{t-i} and ΔLGR_{t-j} , respectively.

We continue with the bounds test on Eqs. (18.5) and (18.6). This test uses F distribution and the null hypothesis of no cointegration of series is the following:

$H_0 : \phi_1 = \phi_2 = 0$ and $H_0 : \pi_1 = \pi_2 = 0$ (no cointegration of series)

against the alternative hypothesis of series cointegration

$H_1 : \phi_1 \neq \phi_2 \neq 0$ and $H_1 : \pi_1 \neq \pi_2 \neq 0$ (series cointegration)

If the bounds test will lead us to series cointegration, we can continue with the estimation of the long-run relationship of series from Eqs. (18.7) and (18.8), as well as the restricted error correction model from Eqs. (18.9) and (18.10).

$$LGS_t = \gamma_0 + \gamma_1 LGR_t + u_t \quad (18.7)$$

$$LGR_t = \delta_0 + \delta_1 LGS_t + v_t \quad (18.8)$$

$$\Delta LGS_t = c_0 + \sum_{i=1}^p c_i \Delta LGS_{t-i} + \sum_{j=0}^q d_j \Delta LGR_{t-j} + \vartheta_1 z_{t-1} + \mu_{1t} \quad (18.9)$$

$$\Delta LGR_t = g_0 + \sum_{i=1}^p f_i \Delta LGR_{t-i} + \sum_{j=0}^q k_j \Delta LGS_{t-j} + \vartheta_2 \lambda_{t-1} + \nu_{1t} \quad (18.10)$$

where p and q are the lag order of variables ΔLGS_{t-i} and ΔLGR_{t-j} of Eq. (18.9) and ΔLGR_{t-i} and ΔLGS_{t-j} of Eq. (18.10), respectively. The terms z_t and λ_t are the error terms which are created by the cointegrating regressions of Eqs. (18.7) and (18.8).

18.3.4 Causality Analysis

On this section we examine the causal relationship between government spending and revenues using a seemingly unrelated regression model. Toda and Yamamoto (1995), in order to investigate causality, developed a method based on the estimation of an adjusted VAR model ($k + d_{\max}$), where k is the optimal time lag on the first VAR model and d_{\max} is the largest integration order on the variables of the VAR model. VAR model of Toda and Yamamoto causality is shaped as follows:

$$\text{LGS}_t = \mu_0 + \left(\sum_{i=1}^k \alpha_{1t} \text{LGS}_{t-i} + \sum_{i=k+1}^{d_{\max}} \alpha_{2t} \text{LGS}_{t-i} \right) + \left(\sum_{i=1}^k \beta_{1t} \text{LGR}_{t-i} + \sum_{i=k+1}^{d_{\max}} \beta_{2t} \text{LGR}_{t-i} \right) + \varepsilon_{1t} \quad (18.11)$$

$$\text{LGR}_t = \phi_0 + \left(\sum_{i=1}^k \gamma_{1t} \text{LGR}_{t-i} + \sum_{i=k+1}^{d_{\max}} \gamma_{2t} \text{LGR}_{t-i} \right) + \left(\sum_{i=1}^k \delta_{1t} \text{LGS}_{t-i} + \sum_{i=k+1}^{d_{\max}} \delta_{2t} \text{LGS}_{t-i} \right) + \varepsilon_{2t} \quad (18.12)$$

where k is the optimal time lag of the first VAR model, and d_{\max} is the largest integration order on the variables of the VAR model. The null hypothesis of no causality is defined for every equation on VAR model. For example, LGR_t variable causes LGS_t variable ($\text{LGR}_t \Rightarrow \text{LGS}_t$) when $\beta_{1t} \neq 0, \forall i$. Toda and Yamamoto test for no Granger causality can be done for every integration order of variables, either they are cointegrated or not, given that the reverse roots of autoregressive polynomial should be inside of the unit circle. Thus, the Toda and Yamamoto causality test will be valid.

18.4 Empirical Results

18.4.1 Order of Integration

The results on Table 18.1 show that series exhibit different integration order. The government spending series is in the null order $I(0)$ in 10% level of significance, whereas the government revenues series is integrated in the first order $I(1)$. Thus, for the long-run relationship of the series, the most suitable is that of Pesaran et al. (2001), the autoregressive distributed lag (ARDL) methodology.

18.4.2 ARDL Bounds Testing Approach

From Eqs. (18.5) and (18.6) of unrestricted error model, we can find the maximum values of p and q lags using the final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC), Hannan–Quinn information

Table 18.1 Unit root tests

Variable	ADF		PP	
	<i>C</i>	<i>C, T</i>	<i>C</i>	<i>C, T</i>
LGS	-2.761(0)***	-3.48(0)***	-2.767[0]***	-3.49[0]***
ΔLGS	-7.554(0)*	-7.752(0)*	-7.585[1]*	-7.881[3]*
LGR	-1.047(0)	-1.903(0)	-1.054[1]	-1.996[1]
ΔLGR	-5.608(0)*	-5.589(0)*	-5.613[1]*	-5.593[1]*

1. *, ** and *** show significance at 1, 5, and 10 % levels, respectively
2. The numbers within parentheses followed by ADF statistics represent the lag length of the dependent variable used to obtain white noise residuals
3. The lag lengths for ADF equation were selected using Schwarz information criterion (SIC)
4. Mackinnon (1996) critical value for rejection of hypothesis of unit root applied
5. The numbers within brackets followed by PP statistics represent the bandwidth selected based on Newey and West (1994) method using Bartlett Kernel
6. *C* = constant, *T* = trend, Δ = first differences, *L* = natural logarithms

Table 18.2 VAR lag order selection criteria

Lag	Log L	LR	FPE	AIC	SBC	HQC
Equation (18.5)						
0	54.294	NA	0.0024	-3.1803	-2.9490	-3.1049
1	54.254	0.0683 ^a	0.0022 ^a	-3.2421 ^a	-3.0571 ^a	-3.1818 ^a
2	54.305	0.0172	0.0026	-3.1164	-2.8389	-3.0260
3	54.319	0.0219	0.0027	-3.0528	-2.7290	-2.9473
4	54.827	0.0537	0.0028	-3.0211	-2.6510	-2.9005
Equation (18.6)						
0	55.839	NA	0.0022	-3.2799	-3.0486	-3.2045
1	55.426	0.6921 ^a	0.0021 ^a	-3.3178 ^a	-3.1328 ^a	-3.2575 ^a
2	55.855	0.0270	0.0023	-3.2165	-2.9389	-3.1260
3	55.864	0.0128	0.0025	-3.1525	-2.8287	-3.0469
4	56.628	0.1337	0.0025	-3.1373	-2.7672	-3.0166

^aDenotes the optimal lag selection

criterion (HQC), and likelihood ratio (LR) criteria. The results of these criteria are presented in Table 18.2.

The results on Table 18.2 show that in all criteria, the maximum number of lags for the series on both equations is 1. The order of optimal lag length on Eqs. (18.5) and (18.6) is chosen from the minimum value of AIC, SBC, and HQC criteria. On Table 18.3 we present the results of these criteria.

The results on Table 18.3 show that ARDL (*p, q*) model with *p* = 1 and *q* = 0 lags is the best for both equations. Continuing on Table 18.4, we employ the error independence test (LM test) until the first order (maximum number of lags).

Table 18.3 Order of optimal lags ARDL (p, q)

ARDL (p, q)	AIC	SBC	HQC
Equation (18.5)			
$(p = 1, q = 0)$	-3.189	-2.965	-3.113
$(p = 1, q_1 = 1)$	-2.733	-2.308	-2.656
Equation (18.6)			
$(p = 1, q = 0)$	-3.199	-2.974	-3.122
$(p = 1, q_1 = 1)$	-2.743	-2.519	-2.667

^aDenotes the optimal lag selection, statistics in bold denote the value of the minimized AIC, SBC, and HQC

Table 18.4 Error independence test (LM test)

Equation (18.5)	
F stat = 1.384	Prob. $F(1,28) = 0.249$
$N^*R^2 = 1.602$	Prob. $X^2(1) = 0.2056$
Equation (18.6)	
F stat = 2.453	Prob. $F(1,28) = 0.142$
$N^*R^2 = 2.672$	Prob. $X^2(1) = 0.121$

$N =$ observations

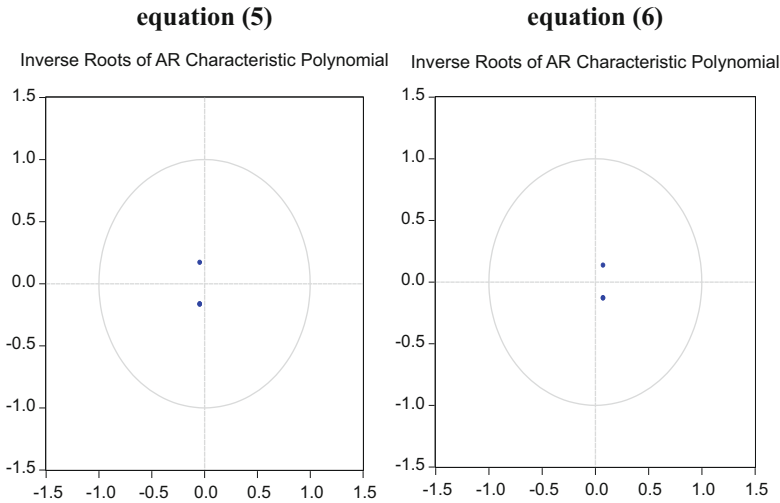


Fig. 18.2 Dynamic stability of models

The results on the table present that errors are not autocorrelated. We continue with the dynamic stability test of ARDL(1,0) model for both equations. This test is employed with unit circle. If reverse roots of Eqs. (18.5) and (18.6) are inside the unit circle, then the models are dynamically stable (Fig. 18.2).

The results of Diagram 2 show that there is a dynamic stability of models on both equations. It is advisable before we continue with bounds test to present the

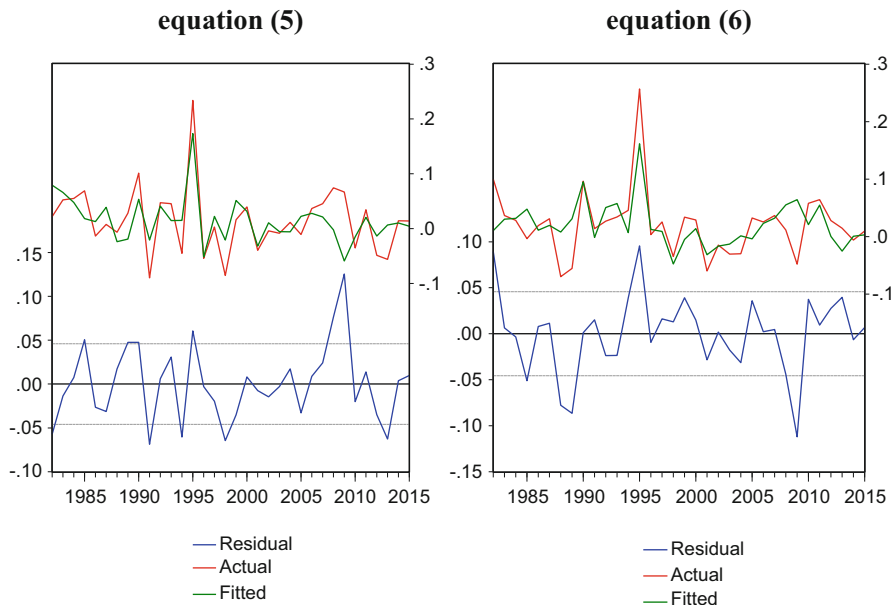


Fig. 18.3 Actual and fitted residuals of models

Table 18.5 Bounds test (Wald test)

Test statistic	Value	df	Probability
Equation (18.5)			
<i>F</i> statistic	4.860*	(2,29)	0.086
Chi-square	5.321	(2)	0.069
Equation (18.6)			
<i>F</i> statistic	2.158	(2,29)	0.137
Chi-square	4.316	(2)	0.1155

Table CI (iii) page 300 of Pesaran et al. 2001 gives lower and upper bounds for 10 %, 5 %, and 1 % level of significance [4.04, 4.78], [4.94, 5.73], and [6.84, 7.84], respectively. *, **, and *** show significance at 1, 5, and 10 % levels, respectively

actual and fitted residuals from both equations using ARDL(1,0) and autoregressive unrestricted error correction model (Fig. 18.3).

We continue by conducting cointegration test of bounds autoregressive distributed lag. In other words, we test if φ_1 and φ_2 as well as π_1 and π_2 coefficients are null on our estimated models (Table 18.5).

The results on the table show that *F*-statistic value is larger only on Eq. (18.5) from the upper bound on Pesaran et al.'s tables (2001) for 10 % level of significance and $(k + 1) = 2$ variables. Thus, we say that there is a cointegrating relationship between the examined series only on Eq. (18.5) for 10 % level of significance.

Table 18.6 Estimation of unrestricted error correction model

Dependent variable = ΔLGS_t		
Short-run analysis		
Variables	Coefficient	<i>T</i> statistic
Constant	0.488***	2.330
ΔLGS_{t-1}	-0.164***	-2.206
ΔLGR_t	0.603***	4.102
LGS_{t-1}	-0.237**	-1.826
LGR_{t-1}	0.114***	2.139
R^2	0.486	
<i>F</i> stat	3.881	
D-w	1.726	
Diagnostic test	X^2	Probability
Normality	2.722 (2)	0.256
Serial corr.	1.602(1)	0.205
ARCH	0.775(1)	0.378

***, **, and * show significance at 1, 5, and 10 % levels, respectively. Δ denotes the first difference operator, X^2 normal is for normality test, X^2 serial for LM serial correlation test, X^2 ARCH for autoregressive conditional heteroskedasticity, and (·) is the order of diagnostic tests

On the following table, the results from the estimation of unrestricted error correction model are presented (Eq. 18.5).

The results on Table 18.6 show that both statistic and diagnostic tests are quite satisfying. Before continuing on the next step, we get the long-run results from the unrestricted error correction model Eq. (18.5).

$$-\left(\frac{LGR}{LGS}\right) = -\left(\frac{0.114}{-0.237}\right) = 0.481$$

So, we can stress that an increase of government revenues by 1 % will cause an increase on government spending by 0.48 % approximately.

We proceed to estimate the long- and short-run relationship of the series on Eqs. (18.7) and (18.9).

The results on Table 18.7 show that both statistic and diagnostic test are quite satisfying. The restricted dynamic error correction model, derived by ARDL bounds test through a simple linear transformation, incorporates the short-run dynamic with long-run equilibrium. The negative and statistical significant estimation of coefficients on error correction terms z_{t-1} on Eq. (18.9) shows a long-run relationship between the examined variables.

On the following diagrams (3) and (4), we examine the dynamic stability of restricted error correction model with Brown et al. (1975) tests (Figs. 18.4 and 18.5).

Table 18.7 Estimation of the long- and short-run relationship

Dependent variable = LGS_t		
Long-run analysis		
Variables	Coefficient	T statistic
Constant	1.181***	5.973
LGR_t	0.722***	12.90
R^2	0.830	
F stat	166.5	
D-W	0.560	
Diagnostic test	X^2	Probability
Normality	0.808 (2)	0.667
Serial corr.	1.987(1)	0.231
ARCH	0.300(1)	0.583
Dependent variable = ΔLGS_t		
Short-run analysis		
Variables	Coefficient	T statistic
Constant	0.020421*	1.839922
ΔLGS_{t-1}	-0.168359*	-1.849982
ΔLGR_{t-1}	0.058175**	2.282945
z_{t-1}	-0.105358***	-2.627097
R^2	0.071897	
F stat	0.774666	
D-W	1.994039	
Diagnostic test	X^2	Probability
Normality	2.534(2)	0.452
Serial corr.	0.007(1)	0.978
ARCH	0.154(1)	0.694

***, **, and * show significance at 1, 5, and 10 % levels, respectively. Δ denotes the first difference operator, X^2 normal is for normality test, X^2 serial for LM serial correlation test, X^2 ARCH for autoregressive conditional heteroskedasticity, and X^2 white for white heteroskedasticity. (·) is the order of diagnostic tests

From the diagrams we can see that there is a dynamic stability on model's coefficients that we examine.

18.4.3 Toda–Yamamoto Causality Test

Table 18.8 presents the results on causality test of Toda and Yamamoto according to Eqs. (18.11) and (18.12).

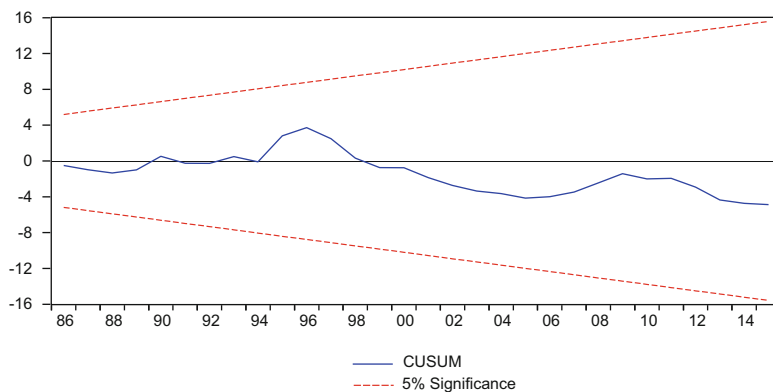


Fig. 18.4 Plot of cumulative sum of recursive residuals

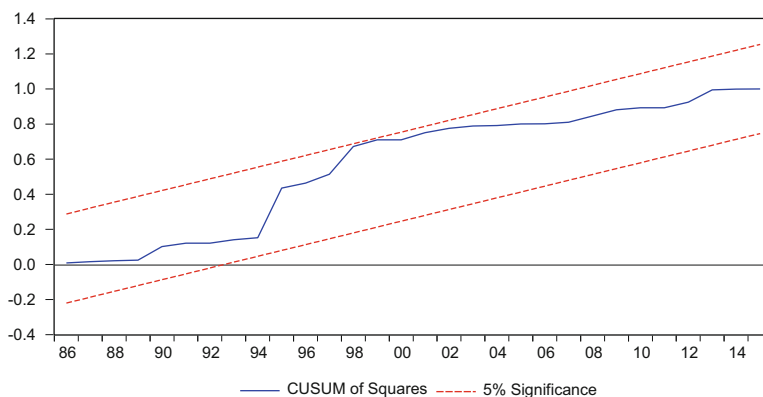


Fig. 18.5 Plot of cumulative sum of squares of recursive residuals

Table 18.8 Toda and Yamamoto no-causality test

Excluded	Lag(k)	Lag($k + d_{\max}$)	Chi-square	Prob.	Direction of causality
Dependent variable: LGS					
LGR	1	1 + 1	0.031	0.984	LGR#LGS
Dependent variable: LGR					
LGS	1	1 + 1	4.175	0.077	LGS \Rightarrow LGR

The $(k + d_{\max})$ denotes VAR order. The lag length selection was based on *LR* sequential modified LR test statistic (each test at 5% level), *FPE* final prediction error, *AIC* Akaike information criterion, *SC* Schwarz information criterion, *HQC* Hannan-Quinn information criterion. ***, **, and * denotes 1, 5, and 10% significance level, respectively. \Rightarrow denotes one-way causality, # denotes no causality. EVIEWS 9.0 was used for all computations

The results on the test show that there is a unidirectional causal relationship between spending and revenues for Greece with direction from government spending to revenues.

18.5 Summary and Conclusions

In this paper we examine the relationship between government spending and revenues in Greece, using Pesaran et al. (2001) cointegration given that data had different integration order. Afterward, we test the direction of causality among the examined variables using the Toda and Yamamoto methodology.

The results of this paper show that there is a long-run relationship between government revenues and spending, while the results of causality show a unidirectional causal relationship with direction from government spending to revenues. This result points out that the increase of government spending, without the respective increase of revenues, will expand budget's deficit. Thus, government will have only one choice and that is borrowing, leading to more debt. Therefore, to stop this policy, the government should:

- Reduce the size of large consecutive spending and turn to investment spending.
- Reduce function's cost.
- Differentiate its economic policy and try to find out other revenue sources (apart from taxes) in a way that will repair the difference between revenues and spending thus reducing budget's deficit.
- Finally, taxes play an important role in the economy. Taxes on various sectors should be reformed in such a way that economy will start with new investment which will bring more revenues.

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Chapter 19

Marketing Ethics and Communication Strategy in the Case of Enron Fraud

Georgia Broni, John Velentzas, and Harry Papapanagos

Abstract Ethical discussion in marketing is still in its nascent stage. Marketing Ethics came of age only as late as 1990s. As it is the case with business ethics in general, marketing ethics too is approached from ethical perspectives of virtue, deontology, consequentialism, pragmatism, and also from relativist positions. However, there are extremely few articles published from the perspective of twentieth or twenty-first century philosophy of ethics. One impediment in defining marketing ethics is the difficulty of pointing out the agency responsible for the practice of ethics. Competition, rivalry among the firms, lack of autonomy of the persons at different levels of marketing hierarchy, nature of the products marketed, nature of the persons to whom products are marketed, the profit margin claimed, and everything relating the marketing field does make the agency of a marketing person just a cog in the wheel. Deprived of agency, the hierarchy of marketing hardly lets one with an opportunity to autonomously decide to be ethical. Without one having agency, one is deprived of the ethical choices.

Keywords Marketing ethics • Communication strategy • Enron

19.1 Introduction

Business ethics is the behaviour that a business adheres to in its daily dealings with the world (Borgerson/Schroeder 2002). The ethics of a particular business can be diverse. They apply not only to how the business interacts with the world at large, but also to their one-on-one dealings with a single customer (Solomon 1997).

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Many businesses have gained a bad reputation just by being in business (Carr 1968, 1970). To some people, businesses are interested in making money, and that is the bottom line (Solomon 1983).

It could be called capitalism in its purest form. Making money is not wrong in itself. It is the manner in which some businesses conduct themselves that brings up the question of ethical behaviour (Solomon 1983). Good business ethics should be a part of every business. There are many factors to consider. When a company does business with another that is considered unethical, does this make the first company unethical by association (Kahneman et al. 1986; Velasquez 1983). Some people would say yes, the first business has a responsibility and it is now a link in the chain of unethical businesses (Kanungo and Mendonca 1996, p. 81).

Many global businesses, including most of the major brands that the public use, can be seen not to think too highly of good business ethics. Many major brands have been fined millions for breaking ethical business laws. Money is the major deciding factor (Kanungo and Mendoca 1996, p. 81). If a company does not adhere to business ethics and breaks the laws, they usually end up being fined. Many companies have broken anti-trust, ethical, and environmental laws and received fines worth millions (Velasquez 1983). The problem is that the amount of money these companies are making outweighs the fines (Solomon 1983). The profits blind the companies to their lack of business ethics and the money sign wins.

19.2 Business Ethics

A business may be a multi-million seller, but does it use good business ethics and do people care? There are popular soft drinks, fast food restaurants, and petroleum agencies that have been fined time and time again for unethical behaviour (Harwood 1996). Business ethics should eliminate exploitation, from the sweatshop children who are making sneakers to the coffee serving staff who are being ripped off in wages. Business ethics can be applied to everything from the trees cut down to make the paper that a business sells to the ramifications of importing coffee from certain countries (Aiken 1991).

In the end, it may be up to the public to make sure that a company adheres to correct business ethics. If the company is making large amounts of money, they may not wish to pay too close attention to their ethical behaviour. There are many companies that pride themselves in their correct business ethics (Stark 1993). But in this competitive world, they are becoming very few and far between. In the increasingly conscience-focused marketplaces of the twenty-first century, the demand for more ethical business processes and actions (known as ethicism) is increasing. Simultaneously, pressure is applied on industry to improve business ethics through new public initiatives and laws. Businesses can often attain short-term gains by acting in an unethical fashion; however, such behaviours tend to

undermine the economy over time. Business ethics can be both a normative¹ and a descriptive discipline. To some extent society regards this as acceptable, but where is the ethical line to be drawn?

¹Normative ethics is the branch of philosophical ethics that investigates the set of questions that arise when we think about the question “how ought one act, morally speaking?” Normative ethics is distinct from meta-ethics because it examines standards for the rightness and wrongness of actions, while meta-ethics studies the meaning of moral language and the metaphysics of moral facts. Normative ethics is also distinct from descriptive ethics, as the latter is an empirical investigation of people’s moral beliefs. To put it another way, descriptive ethics rate practice and a career specialization, the field is primarily normative. In academia descriptive approaches are also taken. The range and quantity of business ethical issues reflects the degree to which business is perceived to would be concerned with determining what proportion of people believe that killing is always wrong, while normative ethics is concerned with whether it is correct to hold such a belief. Hence, normative ethics is sometimes said to be prescriptive, rather than descriptive.

However, on certain versions of the meta-ethical view called moral realism, moral facts are both descriptive and prescriptive at the same time. Broadly speaking, normative ethics can be divided into the sub-disciplines of moral theory and applied ethics. In recent years the boundaries between these sub-disciplines have increasingly been dissolving as moral theorists become more interested in applied problems and applied ethics is becoming more profoundly philosophically informed. Traditional moral theories were concerned with finding moral principles which allow one to determine whether an action is right or wrong. Classical theories in this vein include utilitarianism, Kantianism, and some forms of contractarianism. These theories offered an overarching moral principle to which one could appeal in resolving difficult moral decisions.

In the twentieth century, moral theories became more complex and were no longer concerned solely with rightness and wrongness, but were interested in many different kinds of moral status. This trend may have begun in 1930 with W. D. Ross in his book, “The Right and the Good”. Here Ross argues that moral theories cannot say in general whether an action is right or wrong but only whether it tends to be right or wrong according to a certain kind of moral duty such as beneficence, fidelity, or justice (he called this concept of partial rightness *prima facie* duty). Subsequently, philosophers have questioned whether even *prima facie* duties can be articulated at a theoretical level, and some philosophers have urged a turn away from general theorizing altogether, while others have defended theory on the grounds that it need not be perfect in order to capture important moral insight. In the middle of the century there was a long hiatus in the development of normative ethics during which philosophers largely turned away from normative questions towards meta-ethics.

Even those philosophers during this period who maintained an interest in prescriptive morality, such as R. M. Hare, attempted to arrive at normative conclusions via meta-ethical reflection. This focus on meta-ethics was in part caused by the intense linguistic turn in analytic philosophy and in part by the pervasiveness of logical positivism. In 1971, John Rawls bucked the trend against normative theory in publishing *A Theory of Justice*. This work was revolutionary, in part because it paid almost no attention to meta-ethics and instead pursued moral arguments directly. In the wake of *A Theory of Justice* and other major works of normative theory published in the 1970s, the field has witnessed an extraordinary Renaissance that continues to the present day.

19.3 Marketing Ethics

Marketing ethics overlaps strongly with media ethics, because marketing makes heavy use of media. However, media ethics is a much larger topic and extends outside business ethics. Marketing ethics is a subset of business ethics. Ethics in marketing deals with the principles, values, and/or ideals by which marketers (and marketing institutions) ought to act. Marketing ethics too, like its parent discipline, is a contested terrain. Discussions of marketing ethics are focused around two major concerns: one is the concern from political philosophy and the other is from the transaction-focused business practice. On the one side, following ideologists like Milton Friedman and Ayn Rand, it is argued that the only ethics in marketing is maximizing profit for the shareholder.

On the other side, it is argued that market is responsible to the consumers and other proximate as well as remote stakeholders as much as, if not less, it is responsible to its shareholders (Jones et al. 2005, p. 3; Murphy 2002, pp. 168–169). The ethical prudence of targeting vulnerable sections for consumption of redundant or dangerous products/services, being transparent about the source of labour (child labour, sweatshop labour, and fair labour remuneration), declaration regarding fair treatment and fair pay to the employees, being fair and transparent about the environmental risks, the ethical issues of producer service transparency (being transparent about the ingredients used in the product/service (Murphey et al. 2007), use of genetically modified organisms, content, “source code” in the case of software), appropriate labelling, the ethics of declaration of the risks in using the product/service (health risks, financial risks, security risks, etc.), product/service safety and liability, respect for stakeholder privacy and autonomy, the issues of outsmarting rival business through unethical business tactics, etc., advertising truthfulness and honesty, fairness in pricing and distribution, and forthrightness in selling, etc., are few among the issues debated among people concerned about ethics of marketing practice. Marketing ethics is not restricted to the field of marketing alone, rather its influence spread across all fields of life and most importantly construction of “socially salient identities for people” and “affect some people’s morally significant perceptions of and interactions with other people, and if they can contribute to those perceptions or interactions going seriously wrong, these activities have bearing on fundamental ethical questions”. Marketing, especially its visual communication, it is observed, serve as an instrument of epistemic closure (Borgerson and Schroeder 2008, p. 89).

19.4 Corporate Social Responsibility

19.4.1 *General Remarks on Corporate Social Responsibility*

One of an organization's primary goals is its obligation to operate in a socially responsible manner (Velentzas and Broni 2014). Therefore, the recognition that the vast power of the modern corporation carries with it an equally large responsibility to use that power responsibly is an important message for managers. Here, we examine corporate social responsibility and the related area of managerial ethics. Corporate social responsibility has been a topic of academic study for several decades. Numerous studies have tried to arrive at consensus definition of social responsibility but have failed to do so. Although it difficult to present definition of social responsibility, much of the research attempts to identify various kinds of socially responsive activities, present the list of these activities to the business manager, and then measure and frequency of response to which the activities are practiced by those agencies or people being questioned. Moreover, the concept of social responsibility is a continually evolving concept and means different things to different people (Stange 1994, p. 461).

Corporate social responsibility (CSR) can be defined as the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time. The concept of corporate social responsibility means that organizations have moral, ethical, and philanthropic responsibilities in addition to their responsibilities to earn a fair return for investors and comply with the law. A traditional view of the corporation suggests that its primary, if not sole, responsibility is to its owners, or stockholders. However, CSR requires organizations to adopt a broader view of its responsibilities that includes not only stockholders, but many other constituencies as well, including employees, suppliers, customers, the local community (local self-government), state government, environmental groups, and other special interest groups (Viswesveran et al. 1998). Collectively, the various groups affected by the actions of an organization are called "stakeholders".

The stakeholder concept is discussed more fully in a later section. Corporate social responsibility is related to, but not identical with, business ethics. The economic responsibilities refer to society's expectation that organizations will produce goods and services that are needed and desired by customers and sell those goods and services at a reasonable price (McWilliams and Siegel 2001). Organizations are expected to be efficient, profitable, and to keep shareholder interests in mind. The legal responsibilities relate to the expectation that organizations will comply with the laws set down by society to govern competition in the marketplace. Organizations have thousands of legal responsibilities governing almost every aspect of their operations, including consumer and product laws, environmental laws, and employment laws.

The ethical responsibilities concern societal expectations that go beyond the law, such as the expectation that organizations will conduct their affairs. This means that organizations are not only expected to do more than just comply with the law, but also make proactive efforts to anticipate and meet the norms of society even if those norms are not formally enacted in law. Finally, the discretionary responsibilities of corporations refer to society's expectation that organizations to be good citizens. This may involve such things as philanthropic support of programs benefiting a community or the nation. It may also involve donating employee expertise and time to worthy causes. Corporate policy should state clearly, illegal actions in any form will not be condoned or tolerated by the company. Much of the battle that goes between government, business, and society is a result of the conflict between their different views on economic and social responsibility goals. Today, business cannot operate without contact and interaction with the government and its myriad of rules and regulations. The managers of the corporation must take responsibility to fulfil their duties to their stockholders and to the public (Broni 2010) at large by extending themselves further by making more personal contact among employees, business management, the academic community, and political groups.

This in turn will permit corporate leaders to become influential in political affairs to an extent never before realized (Velentzas and Broni 2010a, b, c). The most convenient way to explore this approach is to consider the supra-legal moral principles that philosophers commonly offer. Five fairly broad moral principles suggested by philosophers are as follows.

19.5 The Case of Enron Fraud

The case of Enron is an important example of using communication strategies to create a virtual profile. The Enron Company was founded in July 1985 by Kenneth Lay and was a result of the merger Houston Gas and Internoth based in Houston, Texas. It started as a local energy company (natural gas). In 1995, executives were determined to make the top Enron energy company worldwide. It expanded in the European energy market, the electricity sector, and the field of communication by providing high quality broadband services and applications. The Kenneth Lay adopted its aggressive growth strategy in order to become a world-renowned company and scope and the ball.

The company Enron was the seventh largest company in America. In 2000 it was elected for the sixth consecutive year by Fortune magazine as the most innovative company in America as it was considered a model new economy. The profits of the company in 2000 reached US \$ 101 billion while the business is spread across 40 countries. The staff was 21 000 employees of whom nine thousands in Europe.

19.5.1 Founding Members and Top Executives

It is very important to refer to the personalities of top executives of the company to grasp that led to the bankruptcy of such a great company.

The company's founder Kenneth Lay maintained a strong friendship with the Bush family and was the main contributor to the first campaign of Bush. He claimed "The Enron treats everyone with absolute integrity, we want to do business with us to believe that we are absolutely reliable".

The General Manager of the company Jeffrey Skilling described in the documentary as an intelligent, adventurous man in his life and in his business. He stated "We like the risk. Because it makes money". Something that characterizes us is to ask why.

CEO of the company Andy Fastow who created fictitious companies and sell them to banks putting as guarantor of these companies to Enron.

From the above it is understood that the company was controlled by smart people but they put as a priority in their immediate personal gain.

According to Grant (1991), the core business strategy features are three:

- (a) The setting of objectives, which are long-term, simple, and acceptable,
- (b) The deep understanding of the competitive environment, and
- (c) The objective evaluation of the company's resources.

From the above, the Enron characteristics are in the second as the objectives of executives and the resource assessment were hypothetical.

19.5.2 Communication Strategy Before the Enron Scandal

The communication strategy of the company was such that it did not give room for doubt by journalists or analysts. The company had a holistic approach of its operational requirements that created the image of a perfect company with an excellent reputation for high returns and profits. The top executives, in press releases and interviews with traditional concepts, were leading the company to be considered novel and innovative and strains of highly intelligent and infallible. In addition to the company prevailing theory of Social Darwinism they were working only the best like scientists and communicators. In an interview Skilling said that employees had been graded between them on a scale from 1 to 5 and whoever took the worst score would be dismissed. Their energy was considered quite harsh by social media but of course no one responded and it was considered a right step in maintaining good image and reputation in such a competitive environment. Even if there were some doubt by a journalist whether the Enron overrated, o Kenneth Lay reassured investors saying: "It is hard to show the world of capital movement especially in

terms of sales. The article was published because there is competition between journals. The criticism is ridiculous”. Finally the representatives of the company and its managers proudly declared that the primary objective of the company is the desire to achieve a profit and that there are no unattainable goals for them.

19.5.3 The Reality

But what happened in reality was far from the image promoted by the company. The Enron was using several front companies in which it gave deficits and debts, to show inflated results. The aim of this falsification of balance sheets was to increase the share and to grow the market value of the company. In most cases, the business strategy is not the result of a planned and rational process but emerges as a compromise (Leandros 2008, p. 41).

The company took high risk to be managed to survive. These risks were leading to unethical acts by employees at all levels. The company was involved in fraud associations with unexplained blackouts in California to put pressure on the government to release electricity. Then they could manipulate the prices and increase the price of electricity for the benefit of Enron. When someone asked Skilling for the involvement in the California case he said “we are angels”. Overcharging of profits and shares, speculation and the big lies of executives led to distorted information and disorientation and confusion efforts. Under these conditions, people experiencing cognitive limits on their ability to achieve their purposes had no perfect knowledge” (Leandros 2008, p. 41). It is obvious that greed and profiteering that took place in the company at some point led to disaster.

19.5.4 The Descent

In August 2001 Skilling declares resignation for personal reasons and later claimed that “On the day I left I believed that the company had good economic situation”.

The Audit-Accounting Andersen company which was responsible for the financial control of Enron, a few days before the Enron announced its bankruptcy, sought the destruction of tons of documents related to the audit of the company.

Simultaneously Lay reassured investors: “The business has very strong bases. The investigation will take a long time compared with our accountants and lawyers but ultimately these issues will expire. Despite the rumours, despite speculation the company is doing well, financially and operationally”. They convinced the lenders about the creditworthiness of the company to report impressive financial statements and to conceal debts of \$ 3.9 billion for the period 1992–2001.

On December 2 of 2001 the company filed for bankruptcy and laid off all employees with employee compensation \$ 4500 while the big executives got bonus.

19.5.5 Communication Strategy After the Enron Scandal

Enron Communication strategy was very different after the scandal for financial fraud company. In times of crises, operators must assume their responsibilities, to avoid making excuses and face problems with realism, responsibility, and honesty.

Lay said “The Enron collapse is a huge tragedy. In such a company existed many executives who had great power and enjoyed extreme confidence. We grieve for the loss of the company”.

Skilling argues: “The Enron destroyed by massive withdrawals in banks”. Communication strategy which followed before and after the scandal is far different from the proper business communication strategy. Unfortunately, in our time, the occasional profit prevails so as the fictional image of the individual to society. A company that aims to increase the profit is not very different from an immoral man who exploits others to promote and enrich. To avoid future similar financial scams we must change the orientation and philosophy of the individual and then the ethics of business.

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Chapter 20

Effectiveness of Use of MCDM Methods in the Terms of Local Self-Government

Roman Vavrek, Rastislav Kotulic, Peter Adamisin, Elena Sira, and Ivana Kravcakova Vozarova

Abstract The public administration perceived as executive action of the state, i.e., basic statutory subject in the Slovak Republic consists of two parts—state administration and self-government. The basic unit of self-government is the municipality. The basic unit of government is the municipality. The municipality is an economic entity and basic self-governing unit of local self-government, which manages its own property under the Law, disposes with own financial resources, and prepares its own budget. Municipal indebtedness significantly determining its action constitutes a single criterion laid down by law for evaluating its financial performance and necessity to establish a recovery mode or receivership in the municipality. The contribution discusses the selected methods of multi-criteria decision making, which are based on determining of the ranking according to the identified criteria which have a direct impact on the overall result. On the basis of previous utilization of describing methods in the various fields of the economy, the contribution explores the possibility of their use in the evaluation of the management of municipalities, i.e., the application in terms of local self-government. By choosing the right methodology it is possible to evaluate the quality of municipalities management and provide a way for a more efficient use of public funds. This analysis provided the space for comparison of these methods and confirmed their possible use in local self-government in the evaluation of management of municipalities.

Keywords MCDM methods • Local self-government

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20.1 Public and Local Self-Government in the Slovak Republic

According to various authors to determine and define the public administration is very difficult. The possible reason behind this might be that the science of the administrative law with its rural approach and the perspective of a single department was and still is not able to comprehensibly embrace such a complex topic as the public administration. The term public administration was coined in the time of the Roman law. According to Frumanova (2012) at that time, the term public administration represented the administration of the human society in a state with a state system. A key role in public administration has the effective use of public funds to provide public services (Tej and Jakubek 2015).

According to Pekova (2004), the public administration stands for a total of various executive bodies on individual levels of the government with different job descriptions, responsibilities. Currently, the public administration presents the representative of a community of citizens, their interests, and preferences. At the same time, it represents the plurality of the democratic system in the given municipality and participates on the creation of conditions for the social economic development of the municipality and maximizing of the economic prosperity in the scope of the given area.

Several authors (Provaznikova 2009; Siegl et al. 2011) consistently use the following scheme as an illustration of the constitution of the public administration (Fig. 20.1).

Municipality is considered to be the basic unit as is defined by the law (Act on municipal establishment) as “independent local self-governing and administrative unit of the Slovak Republic.” It associates individuals residing on the territory. It is a legal entity managing its own property, own income which has its competencies (Bondor and Muresan 2012).

In the scope of the Slovak Republic, the economy of municipalities is amended by the law (Act on budgetary rules of local government), which considers the indebtedness of the municipality as the only economy evaluating criterion and that obliges the municipality by the following condition: “The municipality is obliged to establish a recovery mode, if the sum of its overdue liabilities exceeds 15 % of actual current income of the municipality of the previous financial year and, if did

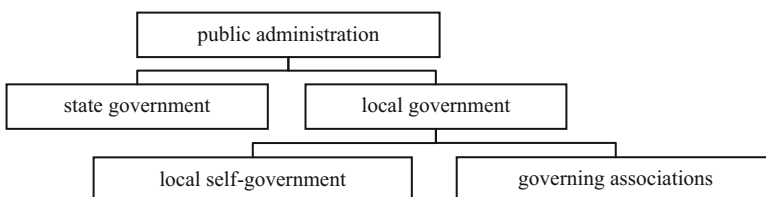


Fig. 20.1 Narrow concept of the public administration

not pay any recognized liability within 60 days from the date of its maturity.” The absence of a complex system in the economy of municipalities presents a basis for the analysis of the possible introduction of such evaluation.

20.2 Efficiency of Units of the Local Self-Government

The increasing of the quality on the level of municipalities and thus the efficiency as well is possible according to Provaznikova (2009) apart from procedures and practices below with the help of the competition, the improvement of budgetary economy, and the public monitoring.

The literature mentions several ways of measuring of the effectiveness of the public administration, with different authors focusing one individual method alone, or in a group. One of these authors is Soukopova (2011), who divides the methods used for evaluating the effectiveness into two groups—empirical methods and theoretical methods. The latter group is subsequently divided into quantitative methods (statistical methods) and qualitative methods, which include the group of single-criterion and multi-criteria methods.

This part of article identifies the list of individual methods of the measuring of the efficiency, or its profits (the most important include their short description). This division is based on the complexity of used methods and identifies five categories of methods:

1. Single-criterion assessment method,
2. Multi-criteria assessment method,
3. Comparative methods,
4. Management assessment method,
5. Further selected assessment methods.

Single-criterion methods of evaluation, as the name suggests, are based on the assessment of a single selected criterion (indicator). This assumption offers this method as easily realized, however, it also the most misinterpreted. These methods include the financial indicators and the “input–output” methods.

These methods were created for requirements of the private sector, i.e., businesses, but their modification is possible to be used for the assessment of the efficiency of the public sector. Financial indicators (described also as methods of monetary assessment of investments in literature) are divided into dynamic and static based on the application of the temporal aspect during its calculation (add another two groups—uncertainty methods and non-profit oriented methods) (Jencova and Litavcova 2012). The common characteristic of “input–output” methods is the assessment of costs, in monetary terms; these methods (CMA, CBA, CEA, CUA) are described in detail by Vavrek et al. (2014).

The assessment of the efficiency based on multi-criteria presents a more complicated variant, but on the other hand, this assessment states more about the real status of the efficiency of the private or public sector. The primary advantage of

these methods is considered the fact that they do not force to reduce the non-economic criteria into economic criteria for the price of sensitive, sometimes even controversial operations (Rektorik et al. 2007). These methods include: 1. Scale and range (can be used individually or as a part of another method), 2. Methods for the determination of weights (method of equal importance, method of ranking, scoring method, Fuller method, and Saaty method), 3. Methods based on partial evaluation of variations (weighted sum approach method, base variant method), and 4. Methods based on pairwise comparisons of variations (lexicographical method, the AHP method, and the TOPSIS method).

The method of equal importance is unable to determine a higher or lower importance of assessed criteria, i.e., all criteria are assessed equally. The method of ranking is based on the information of the ordinal nature, where individual indicators are ascribed a point value on the basis of their preferences. The scoring method is similar to the previously mentioned one; however, it operates with cardinal variables of preferences of individual indicators. The principle of the Fuller method is based on the allocation of points to each pair member of assessed indicators and on the following sum of gained points. The Saaty method has a similar basis as the Fuller method, with the distinction of assessing the size of the preference and not only the direction of the preference of pairs of criteria. The weighted sum approach method is suitable mainly for the determination of quantitative criteria; it further implies a linear functionality of profits on criteria (indicators). The basis of the base variant method is the determination of the best, or beforehand desired values and the subsequent calculation of the profit function of each alternative. The lexicographical method is based on the assumption that the most important criterion has the highest impact. In case of the concordance, the second or next-in-line criterion is taken into account. The AHP method takes into consideration all elements that influence the result (ties between them and the intensity of their mutual influence) in the problem solving. The TOPSIS method is based on the selection of a variant that is closest to the beforehand set ideal variant and at the same time is the furthest from the base variant.

Comparative methods present the basis of management methods. According to Pekova (2004), these are based on the local or institutional comparison of costs of the production of public estates. Their use presupposes a correct selection of comparative values. The highest possible objectivity of the comparison requires that comparative values are of the same scope and are applied to the same constant (comparison in time, space). Management methods are known to the private sector for a long time. They are used for the increase of the quality of leadership, which together with modernization represents the main premise of the increased efficiency of the utilization of financial resources (benchmarking, BSC, CAF model, SWOT analysis, etc.), that are studied by, for example, Horvathova and Suhanyiova (2012); Kiselakova (2010).

In the next part, as further possible tools for utilization of the assessment of efficiency of the economy of municipalities methods of WSA and TOPSIS were analyzed as representatives of multi-criteria assessment methods.

20.3 Multi-Criteria Assessment Methods

Multi-criteria assessment methods might present a suitable tool in situation in which the decision on the application of the variant or its assessment is based on several criteria. Through the utilization of these methods it is possible to identify the best variant, rank variants from the best to the worst, or evaluate their efficiency (Soukopova 2011)

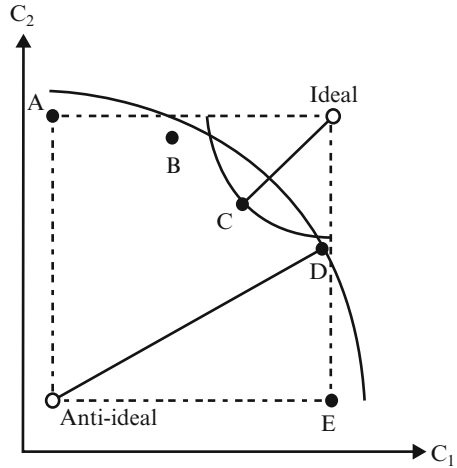
The objective of the multi-criteria decision making is according to Listiak (2012) on the basis of selected criteria to choose one variant that reaches the most acceptable characteristics. However, the fulfillment of this objective requires a vast amount of data that may not be available. Individual methods differ inter alia in whether they provide ordinal or cardinal information on the ranking of individual variants (or the importance of individual criteria) and whether they require ordinal or cardinal information on individual variants towards individual criteria (or the preference of individual criteria by the contractor) for its utilization. A different objective of these methods is described by Faltova et al. (2012), according to whom the objective is to lead the decision maker to the best alternative. Specifically implemented possibilities from which the selection is made are labeled variants and perspectives, according to which these variants are assessed are labeled as criteria. Individual methods of multi-criteria assessment were utilized in various spheres that include health care, business environment, analysis and selection of financial products, analysis of the planning of traffic building, environmental sphere, or at the assessment of the lighting of public open spaces. In the scope of multi-criteria methods, the following were selected WSA method (weighted sum approach method) and TOPSIS method.

20.3.1 Weighted Sum Approach Method (WSA Method) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS Method)

The WSA method represents a method suitable especially for comparative criteria. Minarik (2010) considers its main asset the maximization of profits of individual variants. The method is based on the construction of a linear function of profits on the scale of 0–1 (0—zero profits, 1—the highest profits). Overall profits represent the weighted sum of partial profits according to individual criteria. The procedure of the utilization of the method is described by Fiala et al. (1994) in these steps: 1. Compilation of the criterion matrix and vector weights construction, 2. Transformation of maximization criteria into minimization ones, 3. Calculation of profits of the alternative according to the selected criterion, and 4. Calculation of overall profits of the alternative.

The TOPSIS method represents the rational and relatively simple method whose basic assumption is that the alternative that is the most preferred does not have to

Fig. 20.2 Graphical representation of the TOPSIS method



represent the alternative that is closest to the so-called ideal solution. The basis is also the highest distance from the base (anti-ideal) variant thus the worst variant (Yilmaz and Harmancioglu 2010) (Fig. 20.2).

To illustrate, the above presented graph describes five alternatives (A, B, C, D, and E) as results of the decision on the basis of two criteria. The graph also identifies the ideal and base (anti-ideal) variant. It is clear that in the case of the utilization of the Euclidian distance ($p = 2$) while maintaining same weights of assessed indicators, the C point is the closest to the ideal variant and the D point is the farthest one. The TOPSIS method further addresses the dilemma of the selection of the suitable alternative in these cases.

Just as the WSA method, this method is based on cardinal information and consists of the determination of the minimum distance from the ideal variant. The procedure of the TOPSIS method is similarly described by Vavrek et al. (2014); Vavrek et al. (2015) and main steps can be identified as follows.

The first step in the application of the TOPSIS is the creation of the criterial matrix that represents the ranking of alternatives according to respective criteria that were defined prior (characteristics):

$$D = \begin{pmatrix} X_1 & X_2 & \dots & X_j & \dots & X_n \\ A_1 & x_{11} & x_{12} & \dots & x_{1j} & \dots & x_{1n} \\ A_2 & x_{21} & x_{22} & \dots & x_{2j} & \dots & x_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ A_i & x_{i1} & x_{i2} & \dots & x_{ij} & \dots & x_{in} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ A_m & x_{m1} & x_{m2} & \dots & x_{mj} & \dots & x_{mn} \end{pmatrix} \tag{20.1}$$

with: $A_i = i$ alternative,

x_{ij} = value of the j criteria that is reached by the i alternative

In the next step, the matrix is normalized with the use of the equation:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^j x_{ij}^2}} \tag{20.2}$$

The obtained matrix of data is multiplied by the weight of respective criteria through the equation.

$$v_{ij} = w_{ij} \times r_{ij} \tag{20.3}$$

with: v_{ij} = weight normalized value

w_{ij} = weight of criterion

This obtained normalized matrix includes values that allow determining PIS and NIS. These variants may represent actual alternatives as well as hypothetical alternatives (composed of the best or worst gained results, respectively). The identification of PIS and NIS is possible to chart through the equation:

$$H_j = \max (w_{ij}), D_j = \min (w_{ij}) \tag{20.4}$$

with: H_j = PIS, D_j = NIS

The distance between the obtained PIS and NIS is calculated according to:

$$d_i^+ = \left[\sum_{j=1}^k (w_{ij} - H_j)^2 \right]^{1/2}, d_i^- = \left[\sum_{j=1}^k (w_{ij} - D_j)^2 \right]^{1/2} \tag{20.5}$$

with: d^+ = distance from the PIS

d^- = distance from the NIS

From the perspective of alternatives, there is the minimum desired distance from PIS (d^+) and the maximum distance from NIS (d^-).

The main criterion according to which the ranking of alternatives is made is represented by the relative distance (proximity) from PIS that with the use of the equation below takes into account both identified distances from the previous step.

$$c_i = \frac{d_i^-}{d_i^- + d_i^+} \tag{20.6}$$

with: c_i = relative proximity to the PIS

The last step is the ranking based on the actual relative proximity of the alternative to PIS. The best evaluated alternative (municipality) is the alternative with the highest value reached.

20.3.2 *Advantages and Disadvantages of Multi-Criteria Assessment Methods?*

The advantage of multi-criteria methods is considered by Soukopova (2011) the possibility to reach apart from the economic perspective, even social, cultural, etc., perspective. In the case of criteria of a non-market character, multi-criteria methods seem as more suitable. The important is specifically the character of selected criteria that determines the utilization of the selected method.

The objective of selected criteria in the ideal case is to describe and monitor the system as a whole and offer basic information to the decision maker and the public. In general, there are recognized three important criteria functions (Listiak 2012):

- The set of criteria has to be able to describe the status and the performance of the analyzed system (the object of the assessment),
- Individual evaluations, applications should lead to the increase of the information value of the set of criteria,
- The set of criteria should be able to detect changes (economic, environmental, social, and cultural).

Criteria should be selected and defined taking into account the higher mentioned functions. In case of incorrect selection of criteria it is possible that the evaluation of incorrect parameters, functionalities of incorrect assumptions, intentional distortion even falsification of results, redirection of attention, or excessive confidence in the object of assessment can be made.

20.4 Conclusion and Discussion

This article presented a short description and inclusion of municipalities as basic units of local self-government, and it identified selected methods of multi-criteria decision making for the application of their assessment (Table 20.1).

The above-mentioned methods (TOPSIS method, WSA method) offer a possible alternative, however, for their meaningful utilization there are several questions to be answered:

Table 20.1 Pro and cons of WSA method and TOPSIS method

	+ (Positive)	– (Negative)
WSA method	Maximization of profits Accounted results min, max	Linear function of profits Distorting extreme values
TOPSIS method	Ideal solution and anti-ideal solution Complexity	Maximization character of criteria Calculation scale

- How to verify results gained through methods of multi-criteria assessment?
- How to choose suitable criteria that would be acceptable for individual municipalities, the state or other subjects?
- What should be the requirements for such set of criteria? (from the perspective of municipalities, the state, or other subjects)
- How to correctly determine the weight of criteria in case of their selection? Is a uniform distribution appropriate, so should all indicators of the same weight?

The aim of the future research is to answer these stated questions through application of selected methods at assessment of the economy of municipalities, and to compile a set of criteria for a complex verification of the economy of municipalities in the Slovak Republic.

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Chapter 21

Credit Risk Measurement Using VaR Methodology

Katarina Valaskova, Anna Siekelova, and Ivana Weissova

Abstract The risk reflects the uncertainty associated with expected returns. Credit risk causes that the issuer of an obligation may not be able to repay its debt and interests. It expresses credibility, reliability, and ability of securities issuers to get their liabilities. A measurement of credit risk is most often the assessment of specialized agencies that give a specific rating to every company. Potential failures or changes in reliability (rating) of the debtor, of counterparties in transactions with derivatives, and bond issuers cause formation and growth of credit risk which uses value at risk as a basic risk measurement. The contribution defines the specific methodology of credit risk measuring—value at risk, its theoretical knowledge and variants, as well as methods of value at risk calculation. Value at risk is considered to be the most modern type of a risk measure. An example is depicted in the last part of the contribution to illustrate and explain the methodology of value at risk calculation in practice.

Keywords Credit risk • VAR

21.1 Introduction

The main aim of any business is to deliver a value—profit for an owner. Risk management is used to increase this value and to stabilize a position of a company in the market. Risk management is a complex process, and its main task is to identify those areas of business which are exposed to a risk, define and evaluate them, and take measures to eliminate those risks or to minimize them to an appropriate level (Grublova 2010). Processes of risk management are quite new parts of businesses, and they are adopted mainly because of the pressure of competitors and of quickly changing market conditions. A revolution in this field was the establishment of

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the risk measure value at risk (VaR) which makes not only the risk quantification easier but also its understanding (Spuchlakova et al. 2014). The risk management has spread around the world and is an integrated element of every business.

Value at risk is a maximum possible loss in a given time period that can occur with a specified degree of confidence caused by negative development of a risk factor (Kliestik et al. 2014). Let X be a random variable presenting the loss. VaR at a confidence level α in a time period T may be defined by a following formula:

$$P(X < \text{VaR}_\alpha^t(X)) = \alpha. \quad (21.1)$$

And so we want the loss $\text{VaR}_\alpha^t(X)$ in a time horizon t only with a low probability $1 - \alpha$.

If F is a distribution function of X , for $u \in (0, 1)$, then the quantile function X is defined as follows:

$$F^{-1}(u) = \inf \{x, F(x) \geq u\}. \quad (21.2)$$

VaR_α^t at a level $\alpha \in (0, 1)$ is defined as an α -quantile of X distribution by a formula

$$\text{VaR}_\alpha^t(X) = F^{-1}(\alpha) \quad \text{or} \quad 1 - \alpha = \int_{\text{VaR}_\alpha^t(X)}^{\infty} f(x) dx, \quad (21.3)$$

where $f(x)$ is a density of X distribution.

This value of a defined risk refers only to one time period; that is why we can mark it as VaR_α^t or simply VaR_α . It is important to realize that another time period has different value of VaR. For instance, to calculate the market value, the time period of a day (or 10 trading days) is used; operational and credit risks are measured in a horizon of a year (Kollar and Kliestik 2014). The reason of different time horizons is the data availability which is needed to calculate VaR and so to react to its changing value. In a case of a market risk, we usually consider the day value of instruments (exchange rates, price of securities), and during the day, we can make decisions based on VaR and thus eliminate highly risky assets. To compare, the implementation of measures of operational risk takes weeks or months. Various interpretations of VaR are of a vital importance: $\text{VaR}_{0,95}^{1 \text{ year}} = 1,000,000$ means that with a probability of 95 %, the loss caused by a searched risk does not exceed 1,000,000 in a period of a year. Thus, over the period of 100 years, ceteris paribus, the loss of 1,000,000 should be exceeded five times. Considering the market risk $\text{VaR}_{0,95}^{1 \text{ day}} = 1,000,000$, it presents that with a probability of 95 %, tomorrow's value of the portfolio of some assets will not be lower of more than 1,000,000 compared to tomorrow's expected value of the portfolio.

VaR is easy to calculate and interpret as it is the value measured in monetary units, and it is usable to measure any types of risk. On the other hand, it is estimated based on the historical data, and so it cannot predict any future extreme

losses, e.g., the economic crisis of 2008 (Frajtova-Michalikova et al. 2015). It is not a coherent risk measure and so VaR cannot be used to evaluate the effect of a portfolio diversification. Coherent risk measure is a real function f defined on a set of random variables $L(\Omega, A, P)$, and if $\forall X, Y \in L; \forall \alpha \in R$, then $X \leq Y \Rightarrow f(X) \leq f(Y)$ is a monotonic function, $f(X + Y) \leq f(X) + f(Y)$ subadditivity, $f(\alpha X) = \alpha f(X)$ positive homogeneity, and $f(\alpha + X) = \alpha + f(X)$ translation invariance (Spuchlakova et al. 2015). It shows, at a given level of probability, only the value that will not be exceeded, but there is not any information about its extent.

21.2 Variants of Value at Risk

21.2.1 Conditional Value at Risk

Conditional value at risk (CVaR) is a solution of some problems with VaR. It determines the extent of loss in its mean value if the value at risk is exceeded:

$$\text{CVaR}_\alpha(X!) = E(X | X \geq \text{VaR}_\alpha(X)). \tag{21.4}$$

Although, CVaR is only a theoretical solution of the problem, because in majority of cases, there are not appropriate data to set a relevant estimation. Unlike VaR it is a coherent risk measure.

If X is a loss with a density $f(x)$, then conditional value at risk is expressed as (Smeskal and Rais 2009)

$$\begin{aligned} \text{CVaR}_\alpha(X) &= E(X | X \geq \text{VaR}_\alpha(X)) \\ &= \int_{-\infty}^{\infty} xf(x | X \geq \text{VaR}_\alpha(X)) dx \\ &= \int_{-\infty}^{\infty} x \frac{P(X \leq x, X \geq \text{VaR}_\alpha(X))}{P(X \geq \text{VaR}_\alpha(X))} dx \\ &= \frac{1}{1 - \alpha} \int_{\text{VaR}_\alpha(X)}^{\infty} xf(x) dx. \end{aligned} \tag{21.5}$$

21.2.2 Quantile Value at Risk

Quantile value at risk (QVaR) at a confidence degree α and β is defined as a value at risk at a confidence level β of a random variable with a conditional distribution

$\{X | X \geq \text{VaR}_\alpha(X)\}$. $\text{QVaR}_{\alpha,\beta}(X)$ provides the information about a situation when $\text{VaR}_\alpha(X)$ is exceeded. The probability of loss over $\text{QVaR}_{\alpha,\beta}(X)$, if $\text{VaR}_\alpha(X)$ is exceeded, is

$$P(X \geq \text{QVaR}_{\alpha,\beta}(X) | X \geq \text{VaR}_\alpha(X)) = \frac{P(X \geq \text{QVaR}_{\alpha,\beta}(X), X \geq \text{VaR}_\alpha(X))}{P(X \geq \text{VaR}_\alpha(X))} = 1 - \beta, \quad (21.6)$$

because

$$P(X \geq \text{QVaR}_{\alpha,\beta}(X), X \geq \text{VaR}_\alpha(X)) = P(X \geq \text{QVaR}_{\alpha,\beta}(X)) = (1 - \alpha)(1 - \beta). \quad (21.7)$$

It follows that

$$P(X < \text{QVaR}_{\alpha,\beta}(X)) = 1 - (1 - \alpha)(1 - \beta) = \alpha + \beta - \alpha\beta, \quad (21.8)$$

and thus $\text{QVaR}_{\alpha,\beta}(X)$ is $\alpha + \beta - \alpha\beta$ quantile of X .

21.2.3 Cash Flow at Risk

Cash flow at risk is a variant of VaR which predicts the size of deviation between expected and real cash flows. It is estimated based on a cash flow scheme.

21.2.4 Earnings at Risk

Earnings at risk measures the difference between the real net profit and the expected profit due to changes in risk factors.

21.2.5 Parametric Value at Risk

According to Delianedis and Geske (2003), we can assume that the distribution function of a random variable X , presenting the possible loss, has the following form:

$$F(x) = G\left(\frac{x - \mu}{\sigma}\right), \quad (21.9)$$

where μ is a mean value of X , the so-called position parameter, and σ is a volatility of X . This type of the distribution function belongs to normal distribution, so when using (1.1) and (2.6), we get

$$P(X < \text{VaR}_\alpha^t(X)) = P\left(\frac{X-\mu}{\sigma} < \frac{\text{VaR}_\alpha^t(X)-\mu}{\sigma}\right) = G\left(\frac{\text{VaR}_\alpha^t(X)-\mu}{\sigma}\right) = \alpha, \quad (21.10)$$

$$\frac{\text{VaR}_\alpha^t(X)-\mu}{\sigma} = G^{-1}(\alpha) \Rightarrow \text{VaR}_\alpha^t(X) = \mu + \sigma u_\alpha,$$

where u_α is an α -quantile.

VaR calculated as mentioned above is related to one period (usually to a day). It has to be taken into consideration that for another period the mean value and also the volatility can change. There are two situations to consider (Blaha 2001). Firstly, the mean value does not change over the period and the variance changes proportionally. Then, the variance for a time period T is

$$\sigma_T^2 = T\sigma^2. \quad (21.11)$$

It follows that

$$\text{VaR}_\alpha^T(X) = \mu + \sqrt{T}\sigma u_\alpha. \quad (21.12)$$

Secondly, if the mean value changes proportionally, then

$$\text{VaR}_\alpha^T(X) = T\mu + \sqrt{T}\sigma u_\alpha. \quad (21.13)$$

Previous formulas may be used only if we assume that changes of X values have normal distribution with zero mean value. Otherwise, there is an approximation.

21.2.6 Nonparametric Value at Risk

Nonparametric VaR is based on a huge number of historical data and instead of theoretical quantile the empirical one is used. Let's have the day losses X_1, \dots, X_T . By the data systematization, we get a systematic random selection $X_{[1]} \leq \dots \leq X_{[T]}$ from an unknown distribution. Then, the empirical α -quantile (Cisco and Klietnik 2013) is defined as

$$\text{VaR}_\alpha^T(X) = \tilde{u}_\alpha = \begin{cases} X_{[[T\alpha]+1]} & T\alpha \notin N \\ \frac{1}{2}(X_{[T\alpha]} + X_{[T\alpha]+1}) & T\alpha \in N. \end{cases} \quad (21.14)$$

The probability $\alpha \in (0, 1)$ that the loss will be higher than \tilde{u}_α is $1 - \alpha$.

21.2.7 VaR Portfolio

Let's have only one asset with a revenue distribution $N(0, \sigma^2)$. This assumption is often considered, despite the fact that it is not always fulfilled, as the mean value of revenues tends to be insignificant compared to the volatility (Dowd 1998). Then,

VaR (considering only one time period) can be calculated using the formula

$${}^p\text{VaR}_\alpha = I_0 u_\alpha \sigma, \quad (21.15)$$

where I_0 is a start value of a portfolio and u_α is a relevant quantile.

If there are more assets in a portfolio, we have to consider the mutual interaction among them, the so-called diversification effect. Let's have the portfolio of N assets; r_i is an expected revenue of i th asset in one period, i.e.,

$$r_i = \frac{P_i(t_1) - P_i(t_0)}{P_i(t_0)}, \quad (21.16)$$

where $P_i(t_0)$ and $P_i(t_1)$ are prices of the i th asset at the beginning of successive periods. Generally, r_i is a risk factor which enters the portfolio revenues linearly. Let w_i be a weight of i th asset in the portfolio; then the total portfolio revenue is

$$r_p = \sum_{i=1}^N w_i r_i = w^T r, \quad (21.17)$$

where $r = (r_1, \dots, r_N)^T$ and $w = (w_1, \dots, w_N)^T$. The variance of the portfolio revenue is

$$\sigma(r)^2 = w^T \sum w = \sum_{i=1}^N w_i^2 \sigma_i^2 + \sum_{i=1}^N \sum_{\substack{j=1 \\ j \neq i}}^N w_i w_j \rho_{ij} \sigma_i \sigma_j, \quad (21.18)$$

where σ_i^2 is a variance of revenues of the i th asset, ρ_{ij} is a correlation coefficient between the revenues of the i th and j th asset and

$$\sum = (\sigma_{ij})_{i,j=1}^N \quad (21.19)$$

is a covariance matrix, and σ_{ij} is a covariance of revenues of i th and j th asset.

If we assume a normal distribution of revenues of individual assets with the zero mean value, then the revenue of total portfolio (linear combination of these revenues) also has the normal distribution. VaR of the total portfolio is

$${}^p\text{VaR}_\alpha = I_0 \sigma(r) u_\alpha, \quad (21.20)$$

where I_0 is a start value of a portfolio and u_α is a relevant quantile of normal distribution.

21.3 Methods of VaR Calculation

Direct calculation of VaR is possible only if the distribution of a risk factor is known. In that case, VaR is a relevant quantile of the risk factor distribution. It is very rare in practice and so the methods based on historical data are used. Every method is based on observed data, but its main disadvantage is that it assumes the same future development as in the past. And it is not always true. That is the reason why the outer circumstances should be considered (Misankova and Kral 2015).

21.3.1 Absolute Historical Simulation

The value of portfolio is given as a function $V(X)$ where X is a vector of factors which influence the total value of portfolio. The $V(X)$ function is the sum of share prices or the sum of share prices multiplied by their exchange rates. We would like to calculate VaR on the basis of the data available from the last N days (Gavlakova and Kliestik 2014).

We have the values of factors influencing the value of portfolio of the last N days, i.e., vectors X_1, \dots, X_N . We count the values $V(X_1), \dots, V(X_N)$. We consider N hypothetical values of portfolio in the past period N . We have to determine intraday changes in the portfolio value $\Delta V(X_n) = V(X_n) - V(X_{n-1})$, $n = 2, \dots, N$. The nonparametric method of VaR is then used to calculate value at risk. It determines that the tomorrow's expected value of portfolio will not be lower or more than VaR (taking the given confidence level into account). Tomorrows' value is calculated as

$$E(V(X_{N+1})) = V(X_N) + \frac{1}{N-1} \sum_{i=2}^N \Delta V(X_i), \quad (21.21)$$

which is the sum of today's price of portfolio and the estimation of the mean value of intraday changes.

21.3.2 Relative Historical Simulation

Similar to the absolute simulation, we also assume the knowledge of risk factors

$$X_{i,j}, \quad i = 1, \dots, N, \quad j = 1, \dots, K \quad (21.22)$$

where index i is a day membership and j is an order of this factor (Kollar and Bartosova 2014). This simulation is based on the estimation of risk factors for the next day using historical intraday percentage changes:

$${}_{N+1}X_{i,j} = \frac{X_{i,j}}{X_{i-1,j}} X_{N,j}, \quad j = 1, \dots, K, \quad i = 2, \dots, N \quad (21.23)$$

Vector ${}_{N+1}X_{i,j}$ is the $(n-1)$ th scenario. The portfolio value is calculated for every scenario and then today's value is deducted. This process sets $N-1$ estimations of changes of the portfolio value, and finally VaR is again calculated by the nonparametric VaR method.

21.3.3 Monte Carlo Simulation

This method is based on a generation of a huge number of possible values of portfolio. We assume that the portfolio value is a function of risk factors X_1, \dots, X_k which influence it and changes of values of these parameters have normal or lognormal distribution (Caouette et al. 1998). The mean value of intraday changes of the portfolio value is zero. The process of Monte Carlo simulation is then:

1. Count today's portfolio value $V(X) = V(X_1, \dots, X_k)$.
2. For the risk factors is generated a vector of correlated values from normal or lognormal distribution $Y = V(Y_1, \dots, Y_k)$, so we get possible changes of risk factors.
3. Generated values help determine the possible portfolio value

$$V(X, Y) = V(X_1 + Y_1, \dots, X_k + Y_k)$$

4. The possible change of the portfolio value is set as $V(X) - V(X, Y)$.
5. Repeat steps 2–4 N -times.
6. Then, using the nonparametric method, value at risk is calculated from N possible values.

Next step is to determine a vector of possible changes of risk factors Y . Historical data is used to estimate a covariance matrix $\Sigma = (\sigma_{ij})_{i,j=1}^k$ of changes of values of individual risk factors, where σ_{ij} is a covariance of elements X_i and X_j , i.e.,

$$\sigma_{ij} = \text{cov}(X_i, X_j) = E(X_i - EX_i)(X_j - EX_j) \quad (21.24)$$

The covariance may be estimated by a selective covariance which is an impartial and a consistent estimation of original covariance, and for random variables A and B with their realizations, $A_i, B_i, i = 1, \dots, n$ is defined as

$$\hat{\sigma}_{A,B} = \frac{1}{n-1} \sum_{i=1}^n (A_i - \bar{A})(B_i - \bar{B}) \quad (21.25)$$

It is evident that matrix Σ is symmetric, and if we assume that it is positive definite, i.e., $\mathbf{x}^T \Sigma \mathbf{x} > 0$ for all nonzero vectors x of a relevant type, then we can divide

this matrix to upper and lower triangular matrices; one is a transposition to the other $\Sigma = \mathbf{U}^T \mathbf{U}$ (where \mathbf{U} is an upper triangular matrix) which is known as Cholesky decomposition.

Then, the vector of values of noncorrelated random variables \mathbf{e} with normal distribution is generated. It is applied that covariance and correlation matrices are unit matrices:

$$\sigma^2(\mathbf{e}) = E(\mathbf{e} - E\mathbf{e})(\mathbf{e} - E\mathbf{e})^T = E(\mathbf{e}\mathbf{e}^T) = \mathbf{I} \quad (21.26)$$

If $\mathbf{Y} = \mathbf{U}^T \mathbf{e}$, then the covariance matrix \mathbf{Y} is

$$\sigma^2(\mathbf{Y}) = E(\mathbf{Y}\mathbf{Y}^T) = E(\mathbf{U}^T \mathbf{e}\mathbf{e}^T \mathbf{U}) = \mathbf{U}^T E(\mathbf{e}\mathbf{e}^T) \mathbf{U} = \mathbf{U}^T \mathbf{I} \mathbf{U} = \Sigma \quad (21.27)$$

And so the correlation matrix \mathbf{Y} corresponds to the correlation matrix of changes of risk factors.

Another option to estimate changes of risk factors is to use a multivariate distribution. If the variable X has the distribution $\phi(X) = N_k(\mu, \Sigma)$ and Y has the distribution $\phi(Y) = N_k(0, \mathbf{I}_k)$, then $\phi(\mu + \Sigma^{1/2} \mathbf{Y}) = \phi(X)$.

An adequacy of VaR estimation is assessed by various methods, for example, stress testing or back testing (Saunders 1999). They consider the attributes of VaR, which were required by its determination, relevant which are the confidence level α and the time period T (number of observations) of VaR estimation.

21.4 Application of VaR to Measure Credit Risk

The impetus for the development of models based on the methodology of value at risk to measure and manage credit risk was the development of VaR models to measure and manage market risk.

The basic principle of VaR models lies in the fact that the maximum loss may be estimated at a certain confidence level. The calculation of the market risk VaR (in the Slovak Republic primarily currency and interest risks) is based on a normal distribution of prices or profits and losses. The main parameter influencing the value of VaR is a volatility of prices (interest rates or exchange rate). VaR is calculated using the following formula (confidence level of 99 %):

$$1 - \text{day value of VaR} = (\text{Norm sin } v(0.99)\sigma = 2.33\sigma. \quad (21.28)$$

When taking few-day period of holding into account, then

$$t - \text{day value of VaR} = \sqrt{t} 2.33\sigma \quad (21.29)$$

For purposes of calculating the capital requirement of market risk, calculation of VaR value is multiplied by the coefficient 3 or 4 (based on the regulator dispositions) particularly to enable to compensate different types of distribution and to eliminate emergencies (Misankova et al. 2014). If VaR concept really reflects the risks arising from fluctuations in prices, the question is why the coefficients are chosen so high, i.e., why the add-up is so high (if coefficient 4 is used, it means that the 10-day VaR at the confidence level of 99 % equals to $(\sqrt{t} \cdot 9.32)$ standard deviations from the expected value.) It is only a matter of the regulator to choose the appropriate value of coefficient for multiplication.

A prerequisite to calculate VaR is the information about the change of prices which help deduce the approximate shape of the distribution and the volatility of price changes (Kliestik et al. 2015). As it may be seen, the application of this concept to measure credit risk is accompanied by several problems:

- In most cases it is difficult to observe the current price and to determine the actual cost of the loan, as these instruments are not usually traded.
- As we do not have accurate information about the pricing of loans in a time period, we cannot deduce their volatility.
- There is also a problem with the assumption of normality of the distribution of profits and losses.

21.4.1 Illustrative Example of VaR Calculation

Value at risk in this example is calculated using the technical document of CreditMetrics as a base (Morgan 1997). Consider a single BBB-rated obligation which matures in 5 years. The risk horizon is 1 year; therefore, we are interested in the range of values that the obligation can take at the end of the year. We assume that the probabilities are known and the year-end values are calculated, as shown in Table 21.1.

Then, the real distribution of values of the obligation at the end of the year is depicted in Fig. 21.1.

The expected loss (profit) is a difference between actual market price and expected value at the end of the year period. The expected value of the credit is 146.683 €. The table, as well as the graph, depicts that there is a probability of 6.22 % ($0.34 \% + 0.22 \% + 1.49 \% + 4.17 \% = 6.22 \%$) that the price of the obligation will drop to 140.088 € and less and so the unexpected loss will be more than 6.595 € ($146.683 - 140.088$). On the other hand, there is a probability of 93.78 % that the price of the obligation will be higher than 140.088 € (in this case 147.112 € and more) in a year horizon and the loss will not be more than 6.595 €. The value at risk in this case is 6.595 € at a confidence level of 93.78 %.

There is also a probability of 99.44 % ($100 \% - 0.34 \% - 0.22 \%$) that the value of the obligation will not drop below 127.795 €.

In this particular case, the confidence level is given by the limitations which are derived from the rough distribution based on the discrete changes of the obligation price depending on the rating.

Table 21.1 Input data for VaR calculation

End of the year rating	Probability of the rating occurrence (%)	Hypothetical price of an obligation (€)
AAA	0.03	154.853
AA	1.28	152.862
A	9.23	150.871
BBB	83.24	147.112
BB	4.17	140.088
B	1.49	127.795
CC	0.22	122.416
D	0.34	83.214
Mean value 146.683€		

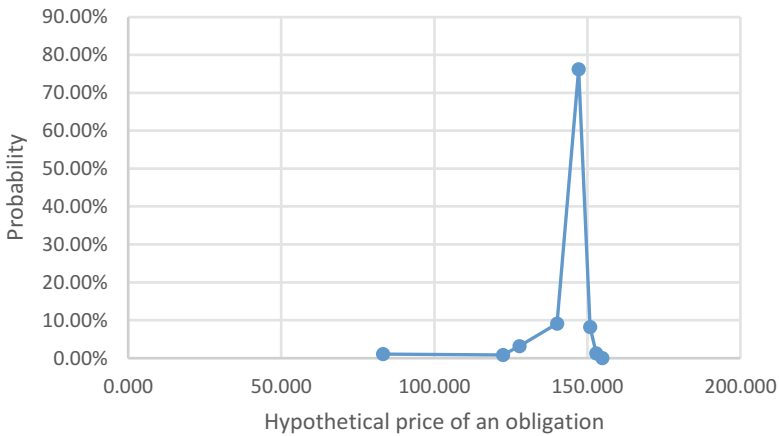


Fig. 21.1 Distribution of the obligation value

Scenarios are not so finely defined to allow the estimation of VaR at the confidence level of 99.9 % which is the value used to calculate VaR of credit risk. If we would like to calculate some needed values, we can use the simple linear interpolation method. For the calculation of VaR at the confidence level of 99 %, we would apply (linear interpolation between the values of 0.56 % and 2.05 %, i.e., 122.416 € and 127.795 €):

$$\frac{122.416 - 127.795}{0.9944 - 0.9795} \times (0.99 - 0.9795) + 127.795 = 124,004 \text{ €} \quad (21.30)$$

Value at risk at a confidence level of 99 % is then 22.68 € (146.683–124.004).

The value of VaR calculated on the basis of the real distribution can be compared to the value of VaR which is calculated based on an assumption of the normal distribution of profits and losses. Standard deviation in this illustrative example is 4.93984.

$$\text{VaR (99\%)} = (\text{Normsinv}(0.99)\sigma) = (2.33)(4.93984) = 11.51 \text{ €} \quad (21.31)$$

From the example it is clear that the value of VaR in both cases differs significantly.

The first approach has some imperfections due to its rough distribution of scenarios. In the real world, it is obvious that prices may acquire any values and these eight presented prices present only a tiny fraction. This imperfection could be reduced by more detailed differentiation of ratings and thus a greater number of potential values of receivables (obligations) at the end of the year. However, it is questionable if it is correct to divide credit risk into very small categories (it is necessary to realize that the assignment of the rating is based on subjective criteria and the more detailed the differentiation, the less clear the definitions of individual rating grades and the larger the space of a subjective evaluation of an analyst).

The second approach is based on the assumption of normal distribution of prices, which is also very misleading assumption. A typical distribution of a credit value is skewed to one side (asymmetric distribution) and there is also a tail. Both these problems could be significantly reduced, if there was a liquid market of credits and these loans were regularly revalued.

21.5 Conclusion

Risk management is very important for the existence and well functioning of businesses, especially banks and financial institutions as their failure could have a significant impact on the financial system and economy in general. In the past two decades, the concept of value at risk has become a cornerstone of managing both market and credit risks.

Value at risk as an estimation of the maximum probable loss is, for the management of banks and financial institutions, a summary of all possible risks in a single number that do not require any deeper mathematical and statistical knowledge. VaR has spread since the early 1990s from market risk to other forms of risk (credit risk or operational risk) which only starts to grow in their importance while managing risks of banks and other financial institutions. VaR also includes a calculation of risk for nonlinear instruments, such as financial derivatives or options.

Despite the popularity of the value at risk, its main disadvantage is the insufficient probable loss, the one that occurs out of the selected quantile. These losses can highly exceed VaR, and they can also cause that the institutions with different risk profile have the same VaR which can lead to hiding or reduction of the actual

portfolio risk. Similar behavior appeared in the past and it led to very dangerous and risky strategies. Therefore, the regulators have the right to multiply the VaR, measured at the confidence level of 99 %, by a constant 3 or 4.

In this paper we depicted the basic algorithms and definition of value at risk; we presented the basic methods of its calculation as well as the variants of its use. The illustrative example helps to understand the methodology of VaR calculation, reveals the differences between two types of its calculation, and points out the imperfections and suggestions of their elimination.

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Chapter 22

The Effects of Country-of-Origin on Consumers' CSR Perceptions, Behavioral Intentions, and Loyalty

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Abstract The present study investigates the impact of country-of-origin on Greek consumers' corporate social responsibility (herein CSR) perceptions, behavioral intentions, and loyalty. Towards this end, two surveys were conducted, one for domestic and one for foreign companies. Results suggest that consumers expect from companies to respond to their legal, ethical, and discretionary responsibilities irrespective of their country-of-origin. However, Greek consumers demand from domestic companies to respond in a higher extent to their economic goals compared to their foreign counterparts. Moreover, they tend to favor national companies since they were found to be more willing to pay a higher price for domestic than for foreign products. Consumer loyalty was also affected by a company's country-of-origin as consumers exhibited higher loyalty levels for products of domestic than of foreign corporations. Finally, several practical implications are discussed at the end of the paper.

Keywords Corporate social responsibility • Consumers' expectations • Country-of-origin • Willingness to pay a premium price • Loyalty • Domestic • Foreign companies • Greece

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22.1 Introduction

Corporate social responsibility (herein CSR) has been the focus of research for many decades with researchers being interested in investigating whether companies implement “context-specific organizational actions and policies that take into account stakeholders’ expectations and the triple bottom line of economic, social, and environmental performance” (Aguinis 2011, p. 855) and how these actions affect companies’ profitability and consumer perceptions. Part of this interest stems from the importance consumers assign to CSR initiatives undertaken by companies. In fact, consumers expect companies to act in a social responsible manner. Furthermore, empirical evidence suggests that consumers are influenced by CSR actions of companies. As Carroll and Shabana (2010) note, companies who invest in CSR can attract customers, build long term relationships as well as enhance their customers’ loyalty.

An interesting stream of CSR studies examine consumers’ perceptions of CSR activities by companies. For example, several researchers have looked at the effects of CSR on variables such as company and product evaluations (Brown and Dacin 1997; Mohr and Webb 2005), intentions (Sen and Bhattacharya 2001; Mohr and Webb 2005), trust (Maignan et al. 1999; Stanaland et al. 2011), perceived reputation (Stanaland et al. 2011), and customer loyalty (Maignan et al. 1999; Crespo and del Bosque 2005; Stanaland et al. 2011).

Although there are a considerable number of empirical studies which investigate the consequences of consumers’ perceptions of CSR actions, the impact of country-of-origin on CSR has not received much attention. To the best of our knowledge only the study of Han (2015) has examined the impact of country-of-origin on consumers’ expectations of CSR initiatives. Hence, the purpose of the present study is to examine whether consumers’ expectations of CSR activities differ between domestic and foreign companies. Specifically, the objectives of the present study are two-fold: First, to delineate the effects of country-of-origin on consumers’ perceptions of CSR activities, behavioral intentions, loyalty and second, to examine the relationships between consumers’ CSR perceptions, behavioral intentions, and loyalty.

22.2 Measurement of Corporate Social Responsibility

According to the work of Bowen (1953), which is considered to be the first publication on CSR issues, CSR is related to the actions of businessmen that are in line with the desires and values of the society. Often CSR is faulty related only with companies’ actions about environmental protection and philanthropy. These conceptualizations of CSR are narrow and do not consider the multi-dimensional nature of the construct. As Carroll (1979) stated, CSR activities should be oriented towards “the economic, legal, ethical, and discretionary expectations that society has

of organizations at a given point of time" (p. 500). The economic aspect of CSR is related to a company's orientation towards productivity and profitability. The legal responsibilities of companies refer to society's expectations for companies to act according to the legal system and requirements. The ethical dimension suggests that companies should comply with the ethical norms and values of the society while the discretionary aspect of CSR includes the philanthropic contributions of companies and provision of voluntary services (Carroll 1999).

Several researchers have developed multi-dimensional instruments in order to measure consumers' perceptions towards CSR activities of organizations. Maignan (2001) using the framework of Carroll (1979) developed a four-dimensional scale that captures consumers' desire for economic, legal, ethical, and discretionary actions of companies. In particular, the economic factor consisted of items that measured perceptions about the necessity for companies to be oriented towards profit maximization, cost production control, long term success, and economic performance. The legal dimension captured consumers' desire of companies to follow the principles of the regulatory system, to obey the law even if this will hurt economic performance, to carry out their contractual obligations, and to ensure that their employees act according to the law. The ethical dimension included items that assessed consumers' demand from companies to act in an ethical way even if these actions will operate in the detriment of economic performance, to follow their well-defined code of ethics, and not to compromise their ethical values for the execution of business goals. Lastly, the discretionary element of Maignan's scale evaluated consumers' desire for companies to actively engage in activities that support social causes such as supporting philanthropic activities, participating in public affairs management, and solving social problems.

Another scale for the measurement of CSR was developed by Castaldo and Perini (2004) and was comprised by three factors, namely environmental, consumer, and employee. Specifically, the environmental factor assessed perceptions about the extent to which a company is considered sensitive to environmental issues. The consumer dimension measures the degree to which consumers believe that a company is oriented towards consumer satisfaction and protection whereas the employee dimension evaluates the extent to which a company is perceived as a responsible employer that respects equality, avoids discrimination, and implements safety policies.

David et al. (2005) operationalized perceived CSR as a three-dimensional scale that consisted of three elements: moral, discretionary, and relational. Moral CSR actions refer to perceptions about whether a company treats fairly its employees, respects human rights, competes fairly with competitors, protects the environment, and communicates the truth in times of crisis and problems. The discretionary dimension is related to a company's support of community and public health programs, contribution to social problems (i.e., hunger), and issues about children and family. Furthermore, the relational aspect of CSR included perceptions about the extent to which a company builds long term relationships with customer as well as engages in two-way communication.

Ten years later González-Rodríguez et al. (2015) validated a three-factor scale that was comprised of the following factors: economic, social, and environmental. The economic factor evaluated whether consumers' purchasing decisions are influenced by practices such as job creation, profit maximization, low pricing of products/services, market leadership, and high investments in advertising. The social dimension incorporated practices like respect for human rights, provision of help for developing countries, training of employees, quality of life improvement, avoidance of discrimination, collaboration with schools, institutions, and universities, sponsorships of social and cultural activities, cooperation with NGOs, and charity organizations. Moreover, the environmental factor takes into account whether a company is interested in the quality and safety of products, tries to reduce the waste of resources and emissions of toxics, protects biodiversity and limited natural resources, promotes recycling, has an ethical code of conduct, and informs customers about the products' composition.

Recently, Fatma et al. (2016) also measured consumers' perceptions towards CSR using the same three dimensions as González-Rodríguez et al. (2015); however, the composition of the dimensions is different. Fatma's et al. economic factor is similar to Maignan's (2001) economic dimension and refers to the responsibilities of companies regarding economic survival, long term success, economic performance, control of cost production, and provision of information to shareholders about the economic situation of the company. The social factor includes practices that help companies solve social problems, improve the well-being of society, donate, favor disadvantaged, provide employees with equal opportunities, and support philanthropic causes. Finally, the environmental factor includes perceptions of consumers regarding the extent to which a company uses renewable energy in the production process, respects the environment, uses and produces environmental friendly materials and products, has environmental certification, and reports the environmental practices.

Based on the preceding analysis it can be argued that the instruments developed by researchers to measure consumers' perceptions of CSR activities are comprised by similar factors. However, there is an inconsistency in the battery of items used to measure each factor/dimension. In the present study the scale developed by Maignan (2001) was utilized since it is the most widely accepted.

22.3 Conceptual Framework

More and more consumers prefer to support local companies and buy locally produced products and services while they view with suspicion and distrust multinational companies. As Park and Ghauri (2015) note local consumers view foreign companies as "exploiters" of domestic resources that try to pursue their profit maximization strategies. Under this climate of hostility CSR emerges as an important task for multinational companies who wish to reverse the skepticism of consumers in the host countries. In addition, CSR actions become imperative

for multinational companies since “governments, consumer groups, and social organizations worldwide are demanding increased social accountability by multinationals” (Miles and Munilla 2004, p.6). In line with the above is the study of Han (2015) who revealed that Korean consumers hold greater expectations from European companies compared to domestic in regard to the economic, legal, and ethical responsibilities. Based on the aforementioned the following hypotheses are developed:

H1 Greek consumers will expect foreign companies to be committed to (a) economic, (b) legal, (c) ethical, and (d) discretionary responsibilities in CSR activities in a higher extent compared to their domestic counterparts.

Many countries under the devastating effects of global crisis try to encourage their citizens to “buy domestic” products (Chan et al. 2010) thus enhancing the levels of consumer ethnocentrism. According to Shankarmahesh (2006) ethnocentric consumers tend to prefer domestic products irrespective of their price or quality due to feeling of nationalism and patriotism. Hence, a consumers' loyalty towards the nation might have a halo effect on his/her loyalty towards domestic products. In other words, consumer ethnocentrism is closely related to consumers' loyalty for domestic products (Wong et al. 2008). Moreover, Knight (1999) found that ethnocentric consumers are more willing to pay a premium price for domestic products compared to foreign. Given that the present study is conducted in Greece where consumer ethnocentrism is high it is suggested that consumers will be more willing to pay a premium price and will exhibit higher levels of loyalty for domestic than for foreign products. Thus, the following hypotheses can be developed:

H2 Greek consumers will be more willing to pay a price premium for domestic than for foreign products.

H3 Greek consumers will exhibit higher levels of loyalty for domestic than for foreign products.

Companies which engage in CSR activities are viewed more favorably by consumers. Moreover, for many consumers a company's involvement in CSR tasks is an important criterion that affects their purchasing decisions. The significant impact of CSR on consumers purchasing intentions has been highlighted by a number of researchers (Sen and Bhattacharya 2001; Mohr and Webb 2005). In other words, a consumer will prefer to buy from a company that acts in a social responsible manner. Furthermore, CSR activities help companies build long term relationships with customers by enhancing their loyalty. Empirical evidence suggests that consumers' loyalty is influenced by their perceptions about a company's CSR commitment (Maignan et al. 1999; Stanaland et al. 2011; Crespo and del Bosque 2005). To put it another way, great expectations about a company's CSR activities will lead to high purchasing intentions which in turn will improve consumers' loyalty. Hence, the following hypotheses are introduced:

H4 Consumers' expectations of (a) economic, (b) legal, (c) ethical, and (d) discretionary responsibilities will significantly influence their willingness to pay a price premium .

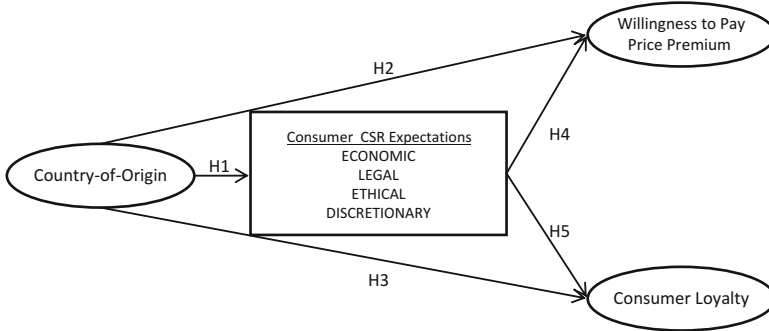


Fig. 22.1 Conceptual model of the study

H5 Consumers' expectations of (a) economic, (b) legal, (c) ethical, and (d) discretionary responsibilities will significantly influence their loyalty.

Figure 22.1 illustrates the conceptual model that will be tested by the present study.

22.4 Methodology

In order to achieve the study's objectives two surveys were conducted to two groups of consumers. Two versions of the same paper-and-pencil questionnaire were designed to collect data (one for domestic and one for foreign companies). The questionnaire was organized into three sections. The first section measured consumers' perceptions of CSR activities using the 16-item scale developed by Maignan (2001). Specifically, on a five-point scale consumers rated the extent to which they believed that (domestic/foreign) companies must engage in the 16 CSR activities. The second section included questions regarding respondents' loyalty, and willingness to pay a price premium. Willingness to pay a price premium and loyalty were measured using the scales developed by Castaldo and Perrini (2004). It should be noted that three items were used to assess loyalty and three to evaluate consumers' willingness to pay a higher price. Responses to the items were made on a five-point Likert scale ranging from (1) totally disagree to (5) totally agree. Finally, the third questions consisted of the demographic variables such as gender, age, marital status, education, and income.

The questionnaire for domestic companies was distributed to 101 respondents while for foreign companies was completed by 100 subjects. We used non-probability sampling techniques and specifically, convenience sampling since the two surveys were conducted at public places such as streets, cafes, and shopping malls in a Northwestern city of Greece. The surveys took place during September

Table 22.1 Demographic characteristics of the study's samples

		Greek	Foreign
Gender	Male	50	52
	Females	51	48
	Chi-square: 0.125(sig = 0.724)		
Age	18–25	52	58
	26–35	28	28
	26–45	13	11
	46–55	7	3
	Over 56	1	0
	Chi-square: 3.089 (sig = 0.543)		
Marital status	Single	84	83
	Married	5	9
	Married with children	10	8
	Other	2	0
	Chi-square: 3.366 (sig = 0.339)		
Education	Primary school	4	2
	Secondary school	48	44
	Bachelor's degree	43	50
	Master	5	2
	Other	1	2
	Chi-square: 2.982 (sig = 0.561)		
Monthly income	Less than 1000€	36	44
	1001–2000€	32	32
	2001–3000€	16	10
	3001–4000€	5	6
	4001–5000€	3	2
	Over 5000€	9	6
	Chi-square: 3.071 (sig = 0.689)		

2015. Special care was taken so as the two groups of respondents (one for foreign and one for domestic companies) are similar in terms of demographic characteristics. Table 22.1 shows the demographic characteristics of each sample.

Based on Table 22.1, we had an equal representation of the two genders in both samples. Moreover, the majority of respondents in both samples were single, aged between 18 and 35 years old, completed secondary education or were Bachelor's graduates, and earned up to 2000€ per month. Chi-square tests were conducted to test whether the two samples differed in their demographic characteristics (see Table 22.1). Results indicate that the two samples (respondents who answered the questionnaire for domestic companies versus respondents who answered the questionnaire for foreign countries) did not differ at 0.05 level of significant in terms of gender ($\chi^2 = 0.125$, sig = 0.724), age ($\chi^2 = 3.089$, sig = 0.543), marital status ($\chi^2 = 3.366$, sig = 0.339), and monthly income ($\chi^2 = 3.071$, sig = 0.689). Hence, the two samples are homogeneous and results regarding their CSR perceptions are comparable.

Table 22.2 shows the mean values and the standard deviations for the items that comprise the four CSR dimensions (economic, legal, ethical, and discretionary) across the two samples.

Based on the mean values it can be argued that consumers require from Greek companies to respond mainly to their economic obligations while from foreign companies desire to set as a priority their legal responsibilities.

Table 22.3 shows the mean values and the standard deviations for the items that measure consumers' loyalty and willingness to pay a premium price across the two samples.

Based on Table 22.3, Greek consumers exhibited higher levels of loyalty for domestic companies compared to foreign, while they seem more willing to pay a higher price for Greek products rather for products of multinational companies.

Next, in order to test H1 we developed four summative scales, one for each of the CSR dimensions (i.e., economic, legal, ethical, and discretionary). The internal consistency of the four summative scales was assessed using Cronbach's alpha. The values of Cronbach's alpha for the CSR scales are presented in Table 22.2. Based on the results, the internal consistency of the scales was deemed as satisfactory as alpha values exceeded the 0.60 criterion. Then independent samples *t*-tests were conducted to test whether consumers' expectations for economic, legal, ethical, and discretionary responsibilities differ between domestic and foreign companies (see Table 22.4).

Based on the findings, significant differences ($p < 0.05$) were found in the mean scores of the economic dimension between domestic and foreign companies ($t = 4.432$, $p = 0.000$). Specifically, consumers' hold greater expectations from Greek companies in regard to their economic responsibilities ($M = 16.23$) compared to their expectations from foreign corporations ($M = 14.80$). Interestingly, no significant differences were observed ($p > 0.05$) in the mean scores of consumers' expectations between domestic and foreign companies for the legal ($t = -0.286$, $p = 0.775$), ethical ($t = 1.195$, $p = 0.234$), and discretionary ($t = 1.603$, $p = 0.111$) responsibilities. Thus, H1a could not be rejected while H1b, H1c, and H1d were rejected.

In regard to H2 and H3, again two summative scales were constructed for willingness to pay a premium price and loyalty after assessing their internal reliability. The Cronbach's alpha values for the two scales were 0.83 and 0.71, respectively, indicating a good internal reliability. Next, two independent samples *t*-tests were conducted to examine whether consumers' willingness to pay a premium price and loyalty differ between domestic and foreign products (see Table 22.5).

As Table 22.5 shows, significant differences ($p < 0.05$) exist in the mean scores of consumers' willingness to pay a premium price between domestic and foreign products ($t = 7.110$, $p = 0.000$). Looking at the mean values it can be concluded that Greek consumers are more willing to pay a higher price for Greek ($M = 8.75$) as opposed to foreign products ($M = 6.20$). Hence, H2 is accepted. Similarly, consumers' loyalty differs significantly ($p < 0.05$) between domestic and foreign products ($t = 5.337$, $p = 0.000$). As a result, Greek consumers are more loyal to domestic products ($M = 8.74$) compared to their foreign counterparts ($M = 6.99$). Thus, H3 is accepted.

Table 22.2 Mean values and standard deviations for consumers' CSR perceptions

	Domestic		Foreign	
	Mean	Standard deviation	Mean	Standard deviation
Economic responsibilities ($\alpha = 0.61$)				
Maximize profits	3.65	0.96	3.16	1.06
Control their production costs strictly	4.18	0.65	3.91	0.79
Plan for their long term success	4.33	0.81	3.97	0.78
Always improve economic performance	4.05	0.90	3.76	0.88
Legal responsibilities ($\alpha = 0.67$)				
Ensure that their employees act within the standards defined by the law.	3.91	1.04	4.14	0.93
Refrain from putting aside their contractual obligations	4.11	0.99	4.07	0.99
Refrain from bending the law even if this helps improve performance	3.51	1.25	3.30	1.18
Always submit to the principles defined by the regulatory system	3.77	1.07	3.93	0.98
Ethical responsibilities ($\alpha = 0.77$)				
Permit ethical concerns to negatively affect economic performance	3.54	1.10	3.46	1.20
Ensure that the respect of ethical principles has priority over economic performance	3.74	1.02	3.60	1.04
Be committed to well-defined ethics principles	3.88	0.88	3.77	0.76
Avoid compromising ethical standards in order to achieve corporate goals	3.79	1.02	3.59	1.17
Discretionary responsibilities ($\alpha = 0.73$)				
Help solve social problems	3.86	1.04	3.50	1.09
Participate in the management of public affairs	3.29	1.05	3.15	1.02
Allocate some of their resources to philanthropic activities	3.77	1.02	3.87	0.99
Play a role in our society that goes beyond the mere generation of profits	3.68	1.09	3.39	1.02

Table 22.3 Mean values and standard deviations for consumers' CSR perceptions

	Domestic		Foreign	
	Mean	Standard deviation	Mean	Standard deviation
Loyalty ($\alpha = 0.71$)				
The products of ... companies are always my first choice	3.25	1.10	2.54	0.77
If the products of ... companies were not available at the store, I would not buy other brands	2.43	1.03	2.11	1.01
I consider myself to be loyal to products from ... companies	3.04	0.99	2.34	0.99
Willingness to pay a premium price ($\alpha = 0.83$)				
Buying products of ... companies seems smart to me even if they cost more	3.13	1.11	2.11	0.88
I'm ready to pay a higher price for products of ... companies	2.74	1.05	2.08	0.97
I'd still buy products of ... companies even if other brands reduced their prices	2.87	1.06	2.01	0.95

Table 22.4 Results of independent samples *T*-tests for CSR dimensions

	Mean values			
	Economic	Legal	Ethical	Discretionary
Domestic	16.23	15.31	14.96	14.61
Foreign	14.80	15.44	14.42	13.91
<i>T</i> -value (Sig)	4.432 (0.000)	−0.286 (0.775)	1.195 (0.234)	1.603 (0.111)

Table 22.5 Results of independent samples *T*-tests for willingness to pay a premium price and loyalty

	Mean values	
	Willingness to pay a premium price	Consumers' loyalty
Domestic	8.75	8.74
Foreign	6.20	6.99
<i>T</i> -value (Sig)	7.110 (0.000)	5.337 (0.000)

Table 22.6 Main effects of CSR dimensions

Path	Standard direct effects	Critical ratios	Significance
Economic→WTPP	0.182	1.862	0.063
Economic→Loyalty	0.216	2.134	0.033*
Legal→WTPP	−0.287	−1.500	0.134
Legal→Loyalty	−0.025	−0.128	0.898
Ethical→WTPP	0.222	1.052	0.293
Ethical→Loyalty	−0.246	−1.140	0.254
Discretionary→WTPP	0.050	0.325	0.745
Discretionary→Loyalty	0.370	2.226	0.026*

*Significance at $p < 0.05$

To test H4 and H5, that is the effect of the four CSR dimensions on willingness to pay a premium price and loyalty, a structural equation analysis was conducted. Structural equation modeling analyzes and examines simultaneously more than one relationship among multiple dependent and independent latent and/or observable variables (Jöreskog et al. 1999). The overall chi-square statistic of the measurement model was significant [$\chi^2(195) = 304.58, p = 0.000$], which is accepted for large samples. The goodness-of-fit indices of the model exceeded the 0.90 criterion [CFI (Comparative-fit-Index) = 0.923, IFI (Incremental-Fit Index) = 0.924]. Moreover, the RMSEA value was smaller than the accepted by the literature threshold of 0.07 (RMSEA = 0.053). Based on the above results, it can be suggested that the hypothesized model showed a reasonably good fit to the data.

Support for the hypotheses was examined based on the significance of the standardized estimates of the path coefficients which are shown in Table 22.6.

The hypotheses testing concluded that consumers' willingness to pay a price premium was not affected in a significant manner by any of the four CSR dimensions. Hence, H4 was rejected. In regard to H5, results indicate that the eco-

conomic dimension of CSR is a significant ($p < 0.05$) predictor of consumers' loyalty ($b = 0.216$). Moreover, the discretionary dimension had also a significant influence ($p < 0.05$) on loyalty ($b = 0.370$). However, the legal and ethical dimensions did not affect loyalty. Thus, H5a and H5d were accepted and H5b and H5c were rejected. Hence, one can conclude that consumers' loyalty will increase as long as their expectations of economic and philanthropic responsibilities of companies will increase as well. The relationships between the economic and philanthropic dimension with loyalty were weak in strength.

22.5 Conclusions

Contemporary consumers expect companies to behave in a socially responsible manner. Moreover, they are turning their backs on multinational companies while simultaneously are interested in supporting their domestic companies. Under the threat of economic crisis, Greek consumers are becoming more and more ethnocentric and their buying decisions are influenced by a company's country-of-origin. In this high ethnocentric environment, what Greek consumers expect from domestic as well as from foreign companies regarding CSR? Are these expectations different based on the company's country-of-origin? How consumer loyalty and buying intentions are affected by the country-of-origin? These are some of the research questions addressed by the present study. Specifically, the aim of the present study was to test whether consumers' expectations of CSR, willingness to pay a higher price, and loyalty differ between domestic and foreign companies. Moreover, the present study examined the effect of consumers' CSR expectations on (a) willingness to pay a premium price and (b) loyalty.

Results indicate that consumers' expectations regarding the legal, ethical, and philanthropic responsibilities of companies are not differentiated based on the companies' country-of-origin. Thus, they require from companies to respond to their legal, ethical, and philanthropic responsibilities irrespective of their country-of-origin. In contrast, Greek consumers expect from domestic companies to be more oriented towards the improvement of their economic performance. This finding could be attributed to the fact that consumers in the face of economic crisis desire their national companies to have robust economic performance and to increase their profits in order to revitalize the Greek market and economy.

In addition, evidence of high consumer ethnocentrism and national loyalty were also found in Greek consumers who are willing to support domestic companies by paying higher prices and re-purchasing their products. On the contrary, Greek consumers are becoming less supportive of foreign companies. Another finding of the present study is the significant impact of consumers' CSR expectations on loyalty. It seems that consumers will favor companies which respond to their economic and philanthropic obligations. Hence, Greek consumers' loyalty is related to a company's profitability and philanthropic profile.

The present study has several managerial implications. As results suggest, companies irrespective of their country-of-origin should implement CSR initiatives that focus on their economic, legal, ethical, and discretionary obligations towards the society. Companies wishing to enhance their customers' loyalty need to improve their economic performance and pursue philanthropic initiatives. This becomes imperative especially for foreign companies which operate in Greece and want to counterbalance Greek consumers' ethnocentrism and preference for domestic products. As far as Greek companies are concerned, it is herein suggested that they start responding to consumers expectations of profitability and performance so as to rebuild consumers' confidence. A robust economic performance in conjunction with a philanthropic orientation is the main key to create loyal customers.

The main limitation of the present study stems from the convenience nature of the two samples. Moreover, the small samples used in the study add bias to the representativeness of the results. Additional research could be directed towards the investigation of other antecedents of consumers' CSR perceptions.

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Chapter 23

Symptoms of Depression and Status in the European Labour Market

Alexander Tarvid

Abstract This study uses three rounds of European Social Survey to study the effects from the status in the labour market of individuals from general population on the strength of their depression symptoms. Particular interest is in the comparison of the mismatched (over- and undereducated) to other kinds of status. Mismatch is defined by a normative (ISCO-based) measure. The main result is that not only overeducation but also (though to a smaller extent) undereducation is associated with an increased presence of depression symptoms. Health, income, personality, religion, the frequency of watching news on TV and partner's status in the labour market are among the independent variables.

Keywords Depression • Skills mismatch • Overeducation • Undereducation • Partner effects • Television • Religion • Health

23.1 Introduction

Depression is a relatively widespread mental illness with severe economic and health impact. Cuijpers et al. (2007) estimate that in the Netherlands, the annual total per capita costs of a major depression disorder are \$192. However, they also show that the total costs for minor depression are \$160, which is only slightly lower,¹ and nearly all of these costs are indirect costs. Overall, the indirect costs of depression were estimated to constitute around 85 % of its total costs (Hu et al., 2007; Sobocki et al., 2007). They mostly include work productivity loss (Wang et al., 2003), sick leave and early retirement (Sobocki et al., 2007), and financial strain or major losses (Judd et al., 1996).

¹Judd et al. (1996) showed that there is no substantial difference between the socio-economic effects from subsyndromal depression symptoms and major depression.

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Depressive symptoms not only affect the behaviour in the labour market, but are also themselves affected by one's position in the labour market. That is in particular true about the states of unemployment and overeducation. For instance, the literature unanimously concludes that overeducation leads to more symptoms of depression, while the undereducated have the same risk of having these symptoms as the well matched (Bracke et al., 2013; Johnson and Johnson, 1997; Lagaert, 2014). Nevertheless, the effects from skills mismatch on depression symptoms have not been studied widely. In a broader context, to the best of my knowledge, no attempt has been made to comprehensively analyse the effects from one's position in the labour market—including skills mismatch, unemployment and retirement—on the strength of depression symptoms (but see Bracke et al., 2014).

Moreover, several particularities in the relationship between overeducation and depressive symptoms have been overlooked. Firstly, depression is to a large extent driven not only by the position in the labour market, but also by one's health status (Mokrue and Acri, 2015; Park et al., 2016; Williamson and Schulz, 1992). Secondly, income, if it is included in the model, itself is influenced by skills mismatch,² so that if both income and mismatch are included in the model, the effects from mismatch can be biased. This paper takes both issues into account. As Bracke et al. (2013) and Lagaert (2014), it uses European Social Survey (ESS) data and uses the same CES-D 8 instrument to measure the extent of depressive symptoms, but compared with them, it adds the information from ESS Rounds 6 and 7 to Round 3 data. It also includes the variables on religion, which is important for the presence of depression as such and in case of poor physical health in particular (Braam et al., 1997; Wink et al., 2005), and the exposure to news, politics or current affairs on TV, which also affects the mental state (Johnston and Davey, 1997; Potts and Sanchez, 1994). Thirdly, partner's status in the labour market—in particular, overeducation and undereducation—can also influence the extent of depression both directly and indirectly—primarily, through household income. This potentially important variable has been overlooked in the literature, but is included in the models analysed here.

The paper proceeds as follows. The next section presents the related literature on the causes and mediators of depression. Section 23.3 discusses data and methods used. Results are presented in Sect. 23.4. The last section concludes.

23.2 Related Studies on the Causes of Depression

The results on the relationship between position in the labour market and mental health can be divided into two groups: those considering unemployment and those considering mismatch. The literature generally agrees that unemployment

²This effect is due to a common result that the overeducated earn less than the well matched with the same level of education (Korpi and Tählin, 2009; Rubb, 2003; Verhaest and Omev, 2012).

is not only correlated with, but also causes, mental health problems, including depression (Buffel et al., 2016; Paul and Moser, 2009). The unemployed have less pronounced symptoms of depression than the inactive, while the retired have an even fewer symptoms, but still more than the employed (Buffel et al., 2015). In the 50–65 age group, the early retired show stronger symptoms of depression than the employed (Buffel et al., 2016). Macro-level labour market situation also plays a role: depression scores are higher in countries with higher increase in unemployment both in general (Buffel et al., 2015) and in the older age group (Buffel et al., 2016).

Nevertheless, taking a job for which one is overeducated is not a good way out of unemployment.³ De Grip et al. (2008) show that while the *fact* of job–education mismatch (both over- and undereducation) is unrelated to cognitive abilities or cognitive decline (with age), the *extent* of current mismatch is associated with lower cognitive abilities after 6 years. Other studies show that overeducation is associated with more pronounced symptoms of depression, while undereducation is not. This result holds for different measures of mismatch: normative (Bracke et al., 2013), statistical (Bracke et al., 2013, 2014) and subjective (Johnson and Johnson, 1997).⁴

Religion is a frequently mentioned buffer against depression. Religious affiliation, general and/or organisational religious involvement and religious salience are associated with fewer depression symptoms and lower risk of depressive disorder (McCullough and Larson, 1999). Moreover, greater religiousness helps faster remission of depressive symptoms, as do religious-based psychological interventions (Koenig, 2009). The buffering effects from religion are lasting, affecting the risk of depression after 10 years (Miller et al., 2012) or even 30 years (Wink et al., 2005). Nevertheless, Koenig (2009) notes that religious beliefs and practices are also often linked to neurotic and psychotic disorders.

It was shown that people with depressive disorders (both major depressive disorder and dysthymia), especially if comorbid with anxiety disorders, tend to spend more time watching TV in general, even after controlling for general physical activity level (Wit et al., 2011). The amount of TV watching is associated with weaker mental health (Hamer et al., 2010). Hammermeister et al. (2005), however, showed that it does not affect the psychosocial health of men and only long watching time has an effect for women. That does not mean that watching TV is always detrimental—Potts and Sanchez (1994) showed that persons already in depressive moods watch TV to escape unpleasant feelings such as loneliness. Watching TV news, in contrast, was repeatedly shown to have negative psychological effects. It stimulates negative feelings and dampens positive feelings, thus, exacerbating depressive moods for those already depressed (Potts and Sanchez, 1994). Watching negative-valenced news raises anxiety and sad mood and facilitates catastrophising

³Out of the mental health context, it was shown that there is a substantial lock-in into overeducation once getting such job (Baert et al., 2013; Voßemer and Schuck, 2016), although it is easier to find a job with an experience of overeducation than with an experience of unemployment (Baert and Verhaest, 2014).

⁴See, e.g., Sparreboom and Tarvid (2016) for a short overview of the existing measures of mismatch.

personal worries (Johnston and Davey, 1997). Moreover, bringing anxiety, total mood disturbance and positive affect rapidly back to the levels before watching news requires directed psychological intervention (Szabo and Hopkinson, 2007).

23.3 Data and Methods

As already noted, I use data from the European Social Survey (ESS), Rounds 3, 6 and 7 (Norwegian Social Science Data Services, 2006, 2012, 2014), as depressive symptoms are measured only in these rounds. This is a representative biennial survey of more than 30 European countries (although not all of them are present in every round). Round 3 was fielded in 2006–2007, Round 6 in 2012–2013 and Round 7 in 2014–2015.

The dependent variable is self-reported depression assessed using an eight-item version of the CES-D scale, which was developed to measure the level of depressive symptomatology in epidemiological studies of the general population (Radloff, 1977). The reliability and validity of this measure in ESS data were shown elsewhere (Karim et al., 2015; Van de Velde et al., 2009, 2010a,b).

The key independent variable is a categorical variable measuring respondent's status in the labour market. In principle, one could use a dummy for overeducation (comparing with the non-overeducated) or two dummies for over- and undereducation (comparing with the well matched). I decided to include the maximum number of observations to compare the relative position of the mismatched but employed with all other kinds of status in the labour market. For instance, it was shown that the unemployed face a worse attitude from hiring employers than the overeducated (Baert and Verhaest, 2014), but do the unemployed also have more depression symptoms than the overeducated? Thus, in addition to being well matched, overeducated and undereducated, the variable includes categories for being inactive (unemployed but not seeking a job), unemployed (seeking a job), retired and having other status (incl. engaged in education, community or military service, housework, permanently sick or disabled). Mismatch is measured by a normative ISCO-based measure (see Sparreboom and Tarvid, 2016).

A related variable is the respondent's partner's status in the labour market. It is measured for the partner with which the respondent lived at the moment of fielding the questionnaire, irrespective of the legal status of the relationship. In case there is a partner, the categorical variable shows whether the partner is over- or undereducated, well matched, retired or has other status (including being unemployed or inactive due to a low number of such observations). In case there is no partner, the variable shows whether the respondent is widowed, has never been married or had a different reason of not living with the current or last partner. Note that the last category includes the case of being married but living apart for any reason.

The model also includes respondent's sex, age and age-squared, ESS round as time fixed effects, a dummy for any of the respondent's parents having tertiary education as a proxy for social class. The factors that are hypothesised to reinforce

depression through negative effect on the prospects in the labour market include being a member of a group discriminated against in the country (self-reported), being an immigrant, having a medium-term (at least 3 months long) unemployment experience in the last 5 years and living in a rural area—all of these are dummies. Another factor that should increase depression is the length of viewing news, politics or information on current affairs on TV on an average weekday, which is represented by a categorical variable.

A categorical variable representing the place of religion in the respondent's life is constructed from two variables, answering questions *Do you consider yourself as belonging to any particular religion or denomination?* (yes/no) and *Regardless of whether you belong to a particular religion, how religious would you say you are?* (11 options, from *not at all* to *very religious*). The variable that will be used here has three categories: (1) not belonging to a religion, (2) belonging to a religion but not being very religious ('yes' to the first question and any of the first 10 answer options to the second question) and (3) belonging to a religion and being very religious. I also include three personality variables, as defined by Sparreboom and Tarvid (2016). Shortly, they are based on self-reported presence of 12 personality traits, each of which is recoded into a dummy variable that equals one if the respondent is 'very much like' the description of a particular trait. The 12 dummies are then combined into three factors: social orientation, achievement orientation and openness to experience.⁵

Special attention is given to two blocks of variables. The first block is related to health. While ESS Round 7 contains many health-related variables, only a handful of those are available in all three ESS rounds used in this paper. The variable measuring the degree of disability (*Are you hampered in your daily activities in any way by any long-standing illness, or disability, infirmity or mental health problem? If yes, is that a lot or to some extent?*) should certainly be included in the model, as it allows to measure the effects on depression from severe chronic health problems. However, another variable—subjective health, answering the question *How is your health (physical and mental) in general?* with five options, from very good to very bad—cannot be included in the model as is, because it is affected by the degree of disability.⁶ Thus, the relationship with disability should be separated from subjective health. Instead of the latter, the model includes residuals after regressing subjective health on the degree of disability. Ordered logit sub-models are run on the country–round–sex sub-samples to minimise bias coming from heterogeneity across countries, time and sex. The whole process is as follows:

1. Run ordered logit
2. Predict probabilities for each outcome

⁵Social orientation is based on the importance to be treated equally, follow rules, help people and be loyal to friends. Achievement orientation is based on the importance to be rich, show abilities, get respect and be successful. Openness to experience is based on the importance to be creative, try new things, make decisions freely and seek adventures.

⁶See, e.g., Jang et al. (2004) and Park et al. (2016) on subjective health mediating the relationship between disability or chronic illness and depression.

3. Calculate the expected value
4. Subtract the expected value from the observed value
5. Standardise the result

Then the standardised residuals are attached to the respective observation in the pooled sample, which allows to include them in the depression model.

The second is related to household income. The measurement of household income in ESS changed in Round 4 from absolute intervals to country-specific income deciles, so it is impossible to include this variable in the model. While one could, in principle, try doing adjustment work, I would argue that instead of that, in application to depression modelling, it would be more relevant to control for the effects of *subjective feeling about* household income instead of household income as such. This variable, gauging the response to the question *Which of the descriptions comes closest to how you feel about your household's income nowadays?* with four options—living comfortably, coping, finding it difficult and very difficult, is consistently defined in all rounds. However, it cannot be used in the model directly, because it is affected by many other independent variables, in particular, mismatch. Because income is a controlling variable and not the factor of primary interest in this paper, I include residuals from the ordered logistic regression of the feeling about household income on several independent variables.⁷ The explanatory variables in the income sub-model include respondent's and their partner's status in the labour market, whether at least one of the respondent's parents has higher education, being an immigrant, living in a rural area, the three personality variables (attempting to decrease unobserved heterogeneity), and the severity of disability. As in case of subjective health, the sub-model is run on the country-round-sex sub-samples, the standardised residuals are obtained analogously and attached to the respective observation in the pooled sample, which allows to include them in the depression model.

The descriptive statistics of these variables are included in Tables 23.1 and 23.2. All these variables are included in a three-level linear mixed effects model with country- and region-level⁸ random effects. All countries available in Rounds 3, 6 and 7 are pooled, and design weights are applied. Models are run for the whole sample and separately by sex.

⁷Tarvid (2013) used a similar measure to approximate individual's ability in ESS data. The measure used here is different in several respects. Firstly, Tarvid (2013) used residuals from the regression of the *actual* household income (more specifically, the decile of the country's income distribution where the income falls), and not *feeling* about the income. Secondly, the sub-sample was restricted to respondents bringing a substantial part of household income, while this study does not include this restriction. Thirdly, explanatory variables did not include mismatch, while the respondent's status in the labour market is included as an independent variable here. Thus, the residuals of the income model may not necessarily reflect the respondent's ability and, hence, should not be interpreted as such.

⁸A common variable that consistently defines a country's region in all rounds and contains enough observations in every region to allow for statistical inference for sub-samples was generated.

Table 23.1 Descriptive statistics: binary and continuous variables

	Total	Male	Female
Depression	0.241 (0.173)	0.219 (0.160)	0.260 (0.180)
Female	0.536 (0.499)		
Higher education of parent	0.206 (0.404)	0.209 (0.407)	0.202 (0.402)
Member of discriminated group	0.070 (0.255)	0.070 (0.255)	0.070 (0.255)
Immigrant	0.089 (0.285)	0.085 (0.279)	0.092 (0.290)
Recent 3-month unemployment experience	0.148 (0.355)	0.150 (0.357)	0.146 (0.353)
Rural area	0.364 (0.481)	0.372 (0.483)	0.356 (0.479)
Age	46.630 (17.346)	46.115 (17.374)	47.076 (17.309)
Residual of low income	0.005 (0.997)	0.004 (0.975)	0.006 (1.016)
Social orientation	0.198 (0.232)	0.195 (0.234)	0.201 (0.231)
Achievement orientation	0.091 (0.195)	0.095 (0.201)	0.088 (0.189)
Openness to experience	0.175 (0.245)	0.177 (0.246)	0.173 (0.244)
Non-disability subjective health	0.020 (0.989)	0.019 (0.986)	0.021 (0.991)

Mean values reported, standard deviations are in brackets

23.4 Results

Table 23.3 shows the results of three sex-specific models. The Basic model contains only the key variable of interest (respondent's status in the labour market), basic demographics (sex and age) and time fixed effects. The Full model adds all other explanatory variables, excluding health factors. The Health model adds subjective health and the extent of disability.

The models allow to substantially decrease the initial importance (in terms of the size of coefficients) of the respondents' status in the labour market for the strength of their depression symptoms. In the Basic and Full models, the well matched (the reference category) have the fewest depression symptoms, while the inactive and unemployed have the highest exposure to depression. The retired show more depression symptoms than the mismatched, but as soon as health variables

Table 23.2 Descriptive statistics: categorical variables

	Total (%)	Male (%)	Female (%)
Labour-market status			
Inactive	1.7	1.9	1.6
Unemployed	4.7	5.1	4.3
Overeducated	6.4	6.3	6.5
Undereducated	13.7	16.5	11.3
Well matched	34.2	36.9	31.9
Retired	20.6	20.2	20.9
Other	18.7	13.1	23.4
ESS round			
Round 3 (2006–2007)	34.9	34.5	35.4
Round 6 (2012–2013)	42.6	42.3	42.8
Round 7 (2014–2015)	22.5	23.3	21.8
Partner's labour market status			
Overeducated	4.2	4.3	4.1
Undereducated	7.3	6.5	8.0
Well matched	25.2	23.5	26.7
Retired	1.5	1.6	1.4
Other	1.8	2.8	1.0
No partner (widowed)	7.2	3.0	10.8
No partner (never married)	22.5	25.8	19.7
No partner (other)	30.4	32.5	28.5
News watching on TV on avg. weekday			
Does not watch	11.3	10.5	11.9
<1 h	66.4	65.1	67.6
1–2 h	17.3	18.9	16.0
2–3 h	3.4	3.9	3.1
3 h+	1.5	1.7	1.4
Religious status			
Not part of religion	41.8	46.1	38.0
Part of religion	53.1	50.1	55.8
Part of religion, very religious	5.1	3.8	6.2
Hampered in daily activities by health issues			
A lot	5.5	5.0	5.9
To some extent	19.0	17.4	20.4
No	75.5	77.6	73.7

are added to the model, the retired become *less* depressed than the well matched in the overall model. In sex-specific models, the relevant variable loses statistical significance but still has a negative sign. Thus, it can be concluded that the presence of depression symptoms in the retired people relative to the well matched in their job is primarily related to having more health problems. Otherwise, if health is not an

Table 23.3 Results after mixed effects linear models

	Total			Male			Female		
	Basic	Full	Health	Basic	Full	Health	Basic	Full	Health
Status in labour market (rel. to Well matched)									
Inactive	0.079***	0.052***	0.034***	0.090***	0.058***	0.041***	0.070***	0.047***	0.027***
Unemployed	0.073***	0.045***	0.033***	0.075***	0.045***	0.034***	0.072***	0.045***	0.032***
Overeducated	0.014***	0.009***	0.005***	0.011***	0.006**	0.004*	0.018***	0.012***	0.007***
Undereducated	0.007***	0.006***	0.002*	0.007***	0.006***	0.002	0.009***	0.007***	0.004*
Retired	0.033***	0.014***	-0.007*	0.033***	0.015***	-0.006	0.038***	0.016***	-0.005
Other	0.045***	0.035***	0.009***	0.061***	0.047***	0.014***	0.038***	0.028***	0.006***
Female	0.031***	0.029***	0.029***						
Age	0.003***	0.004***	0.002***	0.005***	0.006***	0.003***	0.002***	0.003***	0.001***
Age ² /100	-0.002***	-0.004***	-0.002***	-0.004***	-0.005***	-0.003***	-0.001	-0.002***	-0.001***
ESS Round (rel. to Round 3 (2006–2007))									
Round 6 (2012–2013)	-0.017***	-0.017***	-0.015***	-0.016***	-0.016***	-0.014***	-0.019***	-0.019***	-0.016***
Round 7 (2014–2015)	-0.024***	-0.023***	-0.022***	-0.024***	-0.024***	-0.022***	-0.024***	-0.023***	-0.022***
Higher education of parents									
		-0.008***	-0.003		-0.005*	0.000		-0.011***	-0.005
Partner's status in labour market (rel. to Well matched)									
Overeducated		0.005*	0.002		0.002	-0.002		0.007*	0.005
Undereducated		0.001	0.000		-0.002	-0.004		0.003	0.002
Retired		0.005	0.001		0.001	-0.006		0.012	0.010
Other		0.022***	0.015***		0.020***	0.015***		0.029***	0.019**
No partner (widowed)		0.106***	0.090***		0.124***	0.110***		0.097***	0.081***
No partner (never married)		0.041***	0.034***		0.045***	0.039***		0.034***	0.029***
No partner (other)		0.030***	0.024***		0.024***	0.019***		0.035***	0.028***
Residual of low income		0.025***	0.021***		0.022***	0.019***		0.026***	0.022***
(Residual of low income) ²		0.004***	0.002***		0.004***	0.003***		0.003***	0.002***
Member of discriminated group		0.054***	0.036***		0.048***	0.035***		0.059***	0.037***
Immigrant		0.018***	0.016***		0.018***	0.016***		0.019***	0.017***
Recent 3m. unempl. experience		0.023***	0.017***		0.025***	0.019***		0.021***	0.016***
Rural area		-0.005**	-0.006		-0.005**	-0.007***		-0.005*	-0.006***

(continued)

Table 23.3 (continued)

News/politics watching on TV on avg. weekday (rel. to <1h)										
Does not watch			0.009***	0.008***		0.009***	0.007**		0.009***	0.008***
1–2 h			0.004*	0.001		0.008***	0.005**		0.000	–0.002
2–3 h			0.013***	0.007*		0.016***	0.011***		0.010	0.004
3 h+			0.027***	0.014***		0.039***	0.025***		0.016*	0.004
Religious status (rel. to Not part of religion)										
Part of religion			–0.007***	–0.005***		–0.006***	–0.005**		–0.006***	–0.005***
Part of religion, very religious			–0.008*	–0.012***		–0.013**	–0.013***		–0.006	–0.012***
Social orientation			0.014***	0.008*		0.005	0.001		0.022***	0.014***
Achievement orientation			0.009	0.011**		0.007	0.007		0.012	0.014**
Openness to experience			–0.058***	–0.044***		–0.054***	–0.041***		–0.060***	–0.046***
(Non-disability subjective health)				–0.038***			–0.035***			–0.041***
(Non-disability subjective health) ²				0.003***			0.003***			0.004***
Hampered in daily activities by health issues (rel. to No)										
A lot				0.186***			0.166***			0.199***
To some extent				0.088***			0.080***			0.094***
Constant		0.141***	0.094***	0.162***	0.112***	0.060***	0.140***	0.187***	0.154***	0.210***
Random effects										
Country: sd(constant)		0.049	0.047	0.049	0.049	0.047	0.048	0.051	0.048	0.050
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Region: sd(constant)		0.013	0.010	0.010	0.013	0.011	0.011	0.013	0.010	0.010
		(0.003)	(0.002)	(0.002)	(0.004)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)
sd(residual)		0.158	0.153	0.142	0.148	0.143	0.134	0.166	0.160	0.148
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
N		111,819	111,819	111,819	51,871	51,871	51,871	59,948	59,948	59,948
AIC		–94,724	–103,148	–119,680	–51,255	–55,260	–62,148	–44,582	–48,888	–58,372
BIC		–94,579	–102,783	–119,276	–51,131	–54,932	–61,785	–44,456	–48,555	–58,003

*** p < 0.01, ** p < 0.05, * p < 0.10. Regressions are based on 32 countries (Albania, Austria, Belgium, Bulgaria, Cyprus, Czech Rep., Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Kosovo, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, the UK and Ukraine). Design weights are applied at the lowest (individual) level

issue, the retired have better mental health, at least as approximated by depression. The presence of depression in people with all other kinds of status in the labour market is the third largest (after the inactive and unemployed) in the Basic and Full models, and it remains there for the whole sample and for men even in the Health model, but drops in importance below overeducation for women. However, controlling for health factors allows to decrease the size of the effect 4.4 times for men and 6.3 times for women.

Mismatch in the labour market—both overeducation and undereducation—leads to more depression symptoms. The overeducated generally have more depression symptoms than the undereducated. The overeducation coefficient is around twice higher than the undereducation coefficient for women in all three models. For men, the relationship is less stable. The overeducation coefficient is around 1.5 times higher than the undereducation coefficient in the Basic model, both have the same values in the Full model, but their ratio increases to two in the Health model with the undereducation effect losing significance. Hence, in the whole sample, the overeducated are twice more depressed than the undereducated in the Basic model, 1.5 times more depressed in the Full model and 2.5 times more depressed in the Health model. While adding health-related factors drives the effect from undereducation for men to insignificance, the effect for women and overall are still significant.

There is a clear grouping of the six kinds of status in the labour market in how strongly they affect the depression of men and women. Being employed in a mismatched job has around twice higher effect for women than for men. The effect from retirement is similar across sex. In contrast, the three kinds of status related to not working but not being retired lead to more depression for men than for women. The difference is especially strong for inactivity (1.5 times) and other status (2.3 times), but is less pronounced in case of unemployment.

The effects from partner's status in the labour market are present only in case of not working and simultaneously not being retired, and the effect is stronger for women than for men. Thus, given the respondent's status in the labour market, whether their partner is or is not mismatched does not affect the strength of respondent's depression symptoms—in case the health state is controlled for. If it is not (in the Full model), women (but not men) are more depressed when their partner is overeducated, the magnitude of the effect being around twice smaller than if the respondent himself or herself is overeducated. Not having a partner, however, is associated with even stronger depression than having a partner who is not working. As one would expect, the largest effect is for the widowed, but it is followed by never being married, while having no partner for any other reason has the smallest effect of the three. The latter effect is stronger for women, while being widowed or never married puts a heavier burden on the mental health of men.

In general, results show that women have more depression symptoms than men. Depression symptoms become quadratically more pronounced with age. Across ESS rounds, depression becomes less frequent, however. Respondents from higher social class, approximated by at least one parent having higher education, have fewer depression symptoms.

The variables gauging possible negative factors, as expected, increase depression, and their effects have similar magnitude for men and women. These include the portion of negative feelings about present household income unexplained by a subset of other explanatory variables (see Sect. 23.3 for details), being a member of a discriminated group or an immigrant and having at least a 3-month unemployment experience in the last 5 years. Contrary to expectations, people living in rural areas are less depressed, as compared with towns and big cities. However, it is important to note that the status in the labour market is controlled for in the model,⁹ so after taking into account the differences in the availability and quality of jobs in rural areas and cities, life in rural areas is indeed more calm.

The length of watching news, politics and current affairs on TV on an average weekday has several noteworthy effects. Firstly, people who do not watch these programmes on TV at all are more depressed than those who watch them less than an hour a day. This should perhaps be interpreted in the context of the reasons of not watching them, which can be divided into two groups: lack of interest and having no time. One could argue that the former reason should be unrelated to depression, unless it is a part of general lack of interest in life and in contrast to the latter. Thus, the likely reason we see a positive coefficient on not watching news on TV is that the respondent does not have time for that, which, in turn, triggers higher stress levels and, hence, leads to higher depression levels.¹⁰ This finding is universal for both men and women, which cannot be said about the effect of watching news for more than 1 h a day. For men (and, hence, in the whole sample), watching news on TV longer leads to progressively higher depression levels. For women, on the contrary, the length of watching news is generally unrelated to the strength of depression symptoms. Nevertheless, in the Full model, women watching news longer than 3 h a day do have higher depression; the magnitude of the effect is the same as for men watching news for 2–3 h.

Religion is a buffer against depression for both men and women. Simply belonging to a religion or denomination has a similar magnitude of the buffer effect as the catalysing effect of overeducation. Seeing oneself as very religious in addition to belonging to a religion has a 2.5 times stronger effect, once health is controlled for.

Personality factors, as one would expect, are more important for women than for men. For both sexes, openness to experience is associated with lower depression, but this is the only factor of the three that is significant for men. For women, the other two factors—social orientation and achievement orientation—are associated with higher depression levels. Note that while the magnitude of social orientation coefficient decreased after adding health factors, achievement orientation became significant (although the change in the coefficient was not that substantial).

⁹But recall that living in a rural area is an explanatory variable in the sub-model of feeling about household income.

¹⁰See, e.g., Hakanen et al. (2008) and Sanne et al. (2005) on how excessive job demands accompanied with insufficient resources increases depression through higher stress levels.

Finally, health factors play an expected role. Respondents with better subjective health unrelated to disability feel less depressed, and the relationship has quadratic form. On the other hand, people with more disability are more open to depression. Both health factors have a stronger impact on women than on men.

23.5 Discussion and Conclusions

In this study, it was shown that status in the labour market has an important relationship with the strength of depression symptoms. The inactive, unemployed, overeducated and undereducated have more depression symptoms than the employed in appropriate jobs, while the retired have fewer symptoms, once other health factors are controlled for. Moreover, if a partner of an individual is overeducated, the individual also tends to show more depression symptoms. This adds to the well-known depression-decreasing effects from cohabiting and being married.

Previous literature already showed that overeducation is associated with depression symptoms. A major result of this study is that undereducation also leaves a negative footprint on the mental health of the person, although it is not as strong as that from overeducation. It is, thus, incorrect to say that underinvestment in education is exclusively beneficial if the person is able to get a job that normally requires a higher level of education. The relationship is most likely to follow from the feeling of inferiority relative to the well matched in the same job, fearing to be substituted in the job by someone with right credentials or the pressure from management to get the required education coupled with lack of time or ability to do it.

It was also shown that the effects from mismatch (but not the mismatch of partner) are still statistically significant after controlling for well-known important mediators of depression: the exposure to news on TV, religion, personality and health. These were typically not controlled for in any of the previous studies focused on one's position in the labour market.

A major limitation of this study is the cross-sectional nature of data, which makes it impossible to show the direction of causality between mismatch and depression. In particular, it concerns overeducation: are people diving into depression first and then choosing a job for which they are overeducated or do both actions occur in the reverse order? One could argue that the current result—that the inactive have stronger depression symptoms than the unemployed, who have them stronger than the mismatched—favours the former order (i.e., depression due to an overly long search for a job moves the person into overeducation), but that needs to be checked in further studies.

Another limitation is that few contextual factors are taken into account. While the paper brings back many of the factors ignored in other studies, it does not include macroeconomic variables (although it has country- and region-level random effects) or industry. This was done on purpose, however, to show the

overall European picture. Moreover, regional unemployment level was included into previous versions of the model but was not significant. Further studies should expand on the contextual variables.

Finally, only ISCO-based mismatch was used here, and it would be interesting to check whether the same result (significant coefficient on both over- and undereducation) holds also for statistical (mean-based) mismatch measure.

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Chapter 24

Univariate GARCH Model Generated Volatility Skews for the CIVETS Stock Indices

Coenraad C.A. Labuschagne, Niel Oberholzer, and Pierre J. Venter

Abstract The CIVETS countries consist of Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa. They are emerging market countries that are most likely to rise quickly in economic standing. In this paper GARCH, GJR-GARCH and EGARCH models are used to explore the daily closing values for selected CIVETS equity indices. Return volatility, the persistence thereof and the best fitting model for volatility forecasting are determined. The results obtained for the GARCH models indicated that the GJR-GARCH model was the best fitting model for the equity indices of Colombia and Egypt. The EGARCH model was the best fitting model for the equity indices for Indonesia, Turkey and South Africa, whilst the result obtained delivered no clear best fitting model for the Vietnamese VN-Index. In addition, there is evidence of the leverage effect for all the Indices included in this study with the exception of the Vietnamese VN-Index. The presence of leverage effects implies that a negative shock will lead to greater volatility. A comparison is also made between the option prices produced by constructing the implied volatility skews of options generated by these models, both by inclusion of the Global Finance Crises (GFC) period and by exclusion of the period of the GFC.

Keywords GARCH • CIVETS • Equity indices • IGBC index • JKSE index • VN-Index • EGX 100 • XU 100 index • FTSE/JSE all share index

24.1 Introduction

The CIVETS countries consist of Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa. They are emerging market countries that are most likely to rise quickly in economic standing. There are important similarities between these countries,

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which include: (1) they all have a relative young population, (2) they are perceived to have well-developed and sophisticated financial systems and (3) they have the potential for high growth in domestic consumption.

These countries are widely spread around the world, resulting in exposures to different local, regional and international economic and political factors. These factors may influence equity market volatility on a local, regional or international basis which may influence the future risk and return perception of investors, both locally and internationally.

Volatility modelling of equity indices of the CIVETS countries was presented in Oberholzer and Venter (2015). In their study, the following indices were selected for each CIVETS country:

- Colombia: IGBC Index.

The IGBC Index is capitalisation-weighted Index of the liquid and highest capitalised stocks traded on the Colombia Stock Exchange;

- Indonesia: JKSE.

The Jakarta Stock Price Index (JKSE) is a modified capitalisation-weighted Index of all stocks listed on the regular board of the Indonesia Stock Exchange;

- Vietnam: VNI.

The Vietnam Stock Index (VN-Index) is a capitalisation-weighted Index of all the companies listed on the Ho Chi Minh City Stock Exchange;

- Egypt: EGX 100 Price Index.

The EGX 100 Price Index tracks the performance of the 100 active companies, including both the 30 constituent-companies of EGX 30 Index and the 70 constituent-companies of EGX 70 Index on the Egyptian Stock Exchange;

- Turkey: XU100.

The XU100 tracks the performance of the top 100 companies on The Istanbul Stock Exchange. It is a capitalisation-weighted Index; and

- South Africa: FTSE/JSE All-Share Index.

The FTSE/JSE All-Share Index represents 99 % of the full market capital value, i.e., before the application of any invest ability weightings, of all ordinary securities listed on the main board of the Johannesburg Stock Exchange.

In this paper we consider the best fitting GARCH family model, news impact curves generated from the different GARCH family models and implied volatility skews for the equity indices of the CIVETS countries. The volatility skews are generated by means of the Duan, Gauthier, Simonato and Sasseville (DGSS) models for EGARCH and GJR-GARCH processes. A comparison is made between the

option prices produced by constructing the implied volatility skews of options generated by these models, both by inclusion of the GFC period and by exclusion of the period of the GFC.

24.2 Literature Review

The understanding of global capital markets, its integration and volatility behaviour is of great importance, as it directly influences capital cost and investment decision (Tabajara et al. 2014). Capital cost and investment decision play a major role in the economic development of any economy.

Korkmaz et al. (2012) considered the return and volatility spill over effects between the equity markets of the CIVETS. That study determined that the volatility spill over effect for the CIVETS countries is very small, but on occasion, the CIVETS equity markets display high degree of co-movement. Korkmaz et al. (2012) concluded that the causal relationships between the CIVETS equity markets are reflective of the presence of intra-regional return and volatility interdependence.

Wallenius (2013) investigates the impact of macroeconomic news announcements on the CIVETS equity markets. Wallenius (2013) divided Europe macroeconomic news announcements into four groupings: (1) prices (2) real economy (3) money supply and (4) business climate and consumer confidence. The author concluded that all four groupings of Europe macroeconomic news announcements impacted the CIVETS equity markets and that it should be considered as possible risk factors when investing in the CIVETS.

The impact of macroeconomic announcements of the CIVETS equity markets was also investigated by Fedorova et al. (2014). In their study the authors determine that European announcements of GDP, retail sales and unemployment have a significant impact on equity market volatility and, in certain instances, even on equity returns. Fedorova et al. (2014) concur with Tripathy and Garg (2013), Wallenius (2013), Tabajara et al. (2014), and Oberholzer and Venter (2015) that negative shock generates greater volatility shocks. The authors concluded that leverage effect should be considered in asset pricing, portfolio selection and the assessment of investment decision in respect to macroeconomic data releases.

Aboura (2003) used a Monte Carlo simulation to generate volatility skews by making use of the GARCH option pricing model by Duan (1995). The findings showed that there is a severe mispricing when it comes to short term call options and deep out of the money options. However, for long term options the volatility skews tend to be more stable. Labuschagne et al. (2015) used a similar approach using EGARCH and GJR-GARCH models to generate volatility skews for the BRICS securities exchanges. The results were compared to volatility skews generated using a risk-neutral historic distribution model. Findings showed that the GARCH model generated option prices produce smoother and more reliable volatility skews, this is because of the number of calibrated parameters when it comes to asymmetric GARCH models.

24.3 Data

The data used in this study was the closing values for the Colombian IGBC Index, the Indonesian Stock Price Index, the Vietnamese Stock Index or the VN-Index, the Egyptian EBX100 Price Index, the Istanbul Stock Exchange National 100 Index XU100 and FTSE/JSE All-Share Index. The historical time series was analysed as one dataset for the period 1 February 2006 until 18 March 2015. The dataset was obtained from Thomson Reuters Eikon. The dataset was analysed by making use of the univariate GARCH type family models. Daily values were used in the analysis. The volatility skews of 30 day options on the indices under consideration are presented.

24.4 Methodology

Three GARCH family models were used, namely GARCH, GJR-GARCH and EGARCH. The GARCH (Bollerslev 1986; Bollerslev et al. 1993) model predicts the period's variance by using the weighted average of the long term historical variance. The forecast variance from the last period (the GARCH term) and the information regarding the volatility observed in the previous period (the ARCH term). The second model that was used is the EGARCH model (Nelson 1991).

The EGARCH model explicitly allows for asymmetries in the relationship between the return and volatility. Under the EGARCH model specification, negative shocks will result in a greater increase in volatility when compared to the effect of a positive shock. The EGARCH model highlights this empirically with equity indices which result in a “leverage effect” (Bollerslev 2011).

By parameterising the logarithm of the conditional variance as opposed to the conditional variance, the EGARCH model also avoids complications from having to ensure that the process remains positive. This is especially useful when conditioning other explanatory variables. Meanwhile, the logarithmic transformation complicates the construction of unbiased forecasts for the level of future variances (Bollerslev et al. 1993; Bollerslev 2011).

GJR-GARCH model formulation is interrelated to the Threshold GARCH, or TGARCH model proposed independently by Zakoian (1994) and the Asymmetric GARCH, or AGARCH, model of Engle et al. (1990). When estimating the GJR model with equity Index returns, it is characteristically found to be positive, thus implying that the volatility increases proportionally more following a negative than positive shocks. This asymmetry is sometimes referred to in the literature as a “leverage effect” (Engle et al. 1990; Engle and Ng 1993; Engle 2003).

According to Asteriou and Hall (2011) the GARCH (Eq. (24.1)), GJR-GARCH (Eq. (24.2)) and EGARCH (Eq. (24.3)) models can be specified as follows:

$$h_t = \gamma_0 + \delta_1 h_{t-1} + \gamma_1 u_{t-1}^2 \quad (24.1)$$

$$h_t = \gamma_0 + \delta_1 h_{t-1} + \gamma_1 u_{t-1}^2 + \xi_1 u_{t-1}^2 \mathbb{I}_{\{u_t < 0\}} \tag{24.2}$$

$$\log(h_t) = \gamma_0 + \delta_1 \log(h_{t-1}) + \gamma_1 \left| \frac{u_{t-1}}{\sqrt{h_{t-1}}} \right| + \xi_1 \frac{u_{t-1}}{\sqrt{h_{t-1}}} \tag{24.3}$$

According to Brooks (2014), a news impact curve can be defined as the graphical representation of the degree of asymmetry of volatility to positive and negative shocks. The plot illustrates the next period volatility (h_t) that would arise from various positive and negative values of u_{t-1} , given the calibrated parameters.

A volatility skew is a curve in the XY -plane obtained by plotting implied volatility versus strike price. To free a volatility skew of the unit of currency of the strike price, the strike price K is substituted by moneyness, i.e., K/S_0 , where S_0 is the first observed price of the stock in the data sample. See Kotze et al. [8] for more information on volatility skews.

The asset return dynamics in the model of Duan et al. [5] in the real-world measure are given by

$$\ln\left(\frac{S_{t+1}}{S_t}\right) = r + \lambda \sqrt{h_{t+1}} - \frac{1}{2} h_{t+1} + \sqrt{h_{t+1}} \varepsilon_{t+1}, \quad \text{for } t = 0, 1, 2, \dots$$

which, in the risk-neutral measure of the Black–Scholes–Merton option pricing model, can be written as

$$\ln\left(\frac{S_{t+1}}{S_t}\right) = r + \frac{1}{2} h_{t+1} + \sqrt{h_{t+1}} \varepsilon_{t+1}, \quad \text{for } t = 0, 1, 2, \dots$$

For the GJR-GARCH process, we define

$$h_{t+1} = \gamma_0 + h_t \left[\delta_1 + \gamma_1 (\varepsilon_t - \lambda)^2 + \xi_1 \max(0, -\varepsilon_t + \lambda)^2 \right],$$

and for the EGARCH process

$$\ln(\sigma_{t+1}^2) = \gamma_0 + \delta_1 \ln(\sigma_t^2) + \gamma_1 [|\varepsilon_t - \lambda| + \xi_1 (\varepsilon_t - \lambda)],$$

where

$$\varepsilon_{t-1} = \varepsilon_{t-1} + \lambda,$$

is a standard normal variable under the risk-neutral measure and λ is a constant unit risk premium. Under the risk-neutral measure the asset return dynamics of the Duan model are equivalent to the one time period asset return dynamics of the Black–Scholes–Merton model. In this paper, a Monte Carlo simulation will be performed, by simulating n sample asset price paths given by the specifications above. This will be used to price a 30 day European call option, volatility skews will be obtained from the option prices computed using the Monte Carlo simulation of risk-neutral stock price paths. The EGARCH and GJR-GARCH model generated volatility skews will be compared.

24.5 Results

24.5.1 GARCH Family Models

The log returns of the stock indices show signs of volatility clustering. The volatility of all the indices is high during the global financial crisis. The volatility of the Vietnamese index is fairly high from 2006 until the end of 2010, it seems to decrease thereafter (Fig. 24.1).

The histograms below show signs of leptokurtosis (fat tails). This is a common occurrence when it comes to financial returns data. In addition, the returns series do not look normally distributed (Fig. 24.2).

The descriptive statistics in Table 24.1 confirm our expectations. The Jarque–Bera probability is less than 0.05; this suggests that we can reject the null hypothesis of a normal distribution. Hence we can conclude that the log returns of the CIVETS indices are not normally distributed. Furthermore, the distributions are slightly negatively skewed and the kurtosis for each index is greater than three, this is evidence of a leptokurtic distribution.

The Augmented Dickey–Fuller unit root test in Table 24.2 indicates that the log returns of the CIVETS stock indices are stationary at level, with a one percent level of significance.

The ARCH LM test in Table 24.3 indicates that there is evidence of ARCH effects at a one percent level of significance. Therefore we can estimate the GARCH family models discussed in the previous sections.

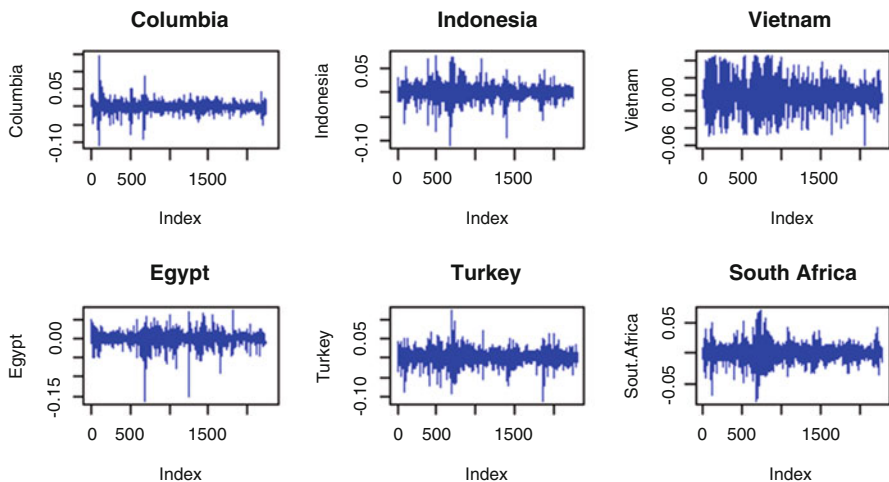


Fig. 24.1 Log returns of the CIVETS stock indices

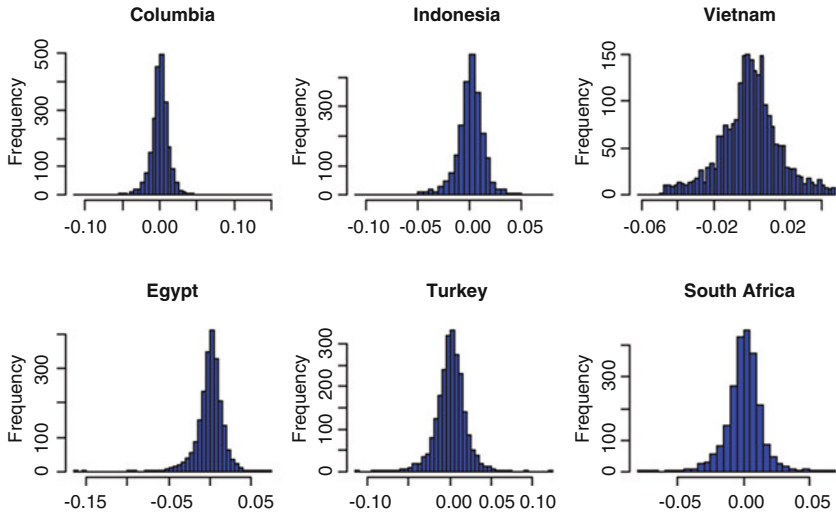


Fig. 24.2 Histograms of the CIVETS log returns

Table 24.1 Descriptive statistics

	Colombia	Indonesia	Vietnam	Egypt	Turkey	South Africa
Mean	0	0.0007	0.0003	0	0.0003	0.0005
Median	0.0005	0.0015	0.0005	0.0014	0.0007	0.0009
Maximum	0.1469	0.0762	0.0465	0.0729	0.1213	0.0683
Minimum	-0.1105	-0.1095	-0.0605	-0.1623	-0.1106	-0.0758
Std. Dev.	0.0138	0.0147	0.0166	0.0164	0.0178	0.0131
Skewness	-0.2935	-0.6798	-0.1345	-1.4718	-0.2641	-0.1826
Kurtosis	16.8276	10.0465	3.7045	13.6511	6.6497	6.6401
Jarque-Bera	17909.77	4821.844	54.1385	11335.95	1311.723	1281.477
Probability	0	0	0	0	0	0
Sum	0.0557	1.5304	0.6395	0.0941	0.6977	1.0461
Sum Sq. Dev.	0.4293	0.4826	0.6266	0.6013	0.7327	0.3934
Observations	2244	2247	2285	2228	2315	2298

Source: Researchers analysis

When examining the coefficients of the estimated GARCH models in Table 24.4, it is clear that the sum of the coefficient of the lagged residual and the lagged conditional variance is less than, but close to one. This implies that shocks to the conditional variance will be persistent (Brooks 2008). The ξ_1 coefficients of all the models with the exception of Vietnam are statistically significant and of the correct sign. According to Asteriou and Hall (2011) this is evidence of asymmetries in the news. More specifically, bad news increases volatility more than good news. Furthermore, the AIC and SIC indicate that a GJR-GARCH model is the best fit for Columbia and Egypt, the EGARCH model is the best fit for Indonesia, Turkey and

Table 24.2 ADF unit root test

	Colombia	Indonesia	Vietnam	Egypt	Turkey	South Africa
ADF	-41.9911***	-43.0015***	-36.9814***	-38.2139***	-46.8864***	-47.2503***
ADF with intercept	-41.9818***	-43.0753***	-36.9817***	-38.2054***	-46.8885***	-47.2961***
ADF with intercept and trend	-41.9892***	-43.0736***	-36.9835***	-38.1976***	-46.8796***	-47.2858***

*(***) [***]; Statistically significant at a 10(5)[] % level

Sources: Researchers analysis

Table 24.3 ARCH LM Test

Return data	F-statistic	Obs*R-squared
Colombia	409.9558***	346.8677***
Indonesia	117.2081***	111.4893***
Vietnam	414.3708***	350.9988***
Egypt	164.9923***	153.7402***
Turkey	30.1777***	29.8147***
South Africa	103.4894***	99.1104***

*(**) [***]: Statistically significant at a 10(5)[1] % level

Sources: Researchers analysis

South Africa. When the GARCH models applied to the Vietnamese stock index are considered, it is evident that the AIC suggests that an EGARCH model is the best fit. However, the SIC indicates that a GARCH model is the best fit.

24.5.2 News Impact Curves

In the graphs above, we consider the news impact curves of the best fitting GARCH models as suggested by the AIC. This gives an indication of how conditional volatility arises for different values of u_{t-1} . This illustrates the degree of asymmetry of volatility. The AIC suggests that asymmetric GARCH models are a better fit. This is evident in the news impact curves illustrated below. The best fitting model suggested by the AIC of Columbia and Egypt is specified by using an indicator function. Furthermore, the best fitting model of the other indices is specified using the smoother exponential function, this allows for the leverage effect to be exponential. This is shown clearly by the news impact curves below. In addition, the news impact curve of Vietnam seems fairly symmetric, this is intuitive because the leverage coefficients are statistically insignificant (Fig. 24.3).

24.5.3 Volatility Skews

The EGARCH and GJR-GARCH processes are used to model the returns of various indexes from the CIVETS countries. These returns are in turn used to value the price of options in the Black–Scholes–Merton framework. Two different sets of data were used—one including the data from the Global Financial Crisis (GFC) and the other without. The effects of the GFC are then traced by firstly pricing the options, then converting the options into the implied volatility state in order to be able to compare the different volatility skews without having a conflict of currency conversions. The following central bank rates are used a proxy for the risk-free interest rate of each CIVETS member. The results are found below (Table 24.5).

Table 24.4 Coefficients of the GARCH models

Model	Return data	γ_0	δ_1	ξ_1	AIC	SIC
GARCH(1,1)	Columbia	9.65E-06	0.2075***	0.7357***	-6.188	-6.1778
	Indonesia	3.82E-06	0.1345***	0.8546***	-5.957	-5.9456
	Vietnam	8.96E-06	0.1868***	0.7847***	-5.6458	-5.6357
	Egypt	6.10E-06	0.1901***	0.8075***	-5.6931	-5.6828
	Turkey	1.07E-05	0.1129***	0.8558***	-5.3925	-5.3826
	South Africa	2.00E-06	0.0995***	0.889***	-6.185	-6.175
GJR-GARCH(1,1)	Columbia	1.15E-05	0.0966***	0.7281***	0.1924***	-6.2074
	Indonesia	5.05E-06	0.0721***	0.851***	0.1069***	-5.9646
	Vietnam	9.17E-06	0.1752***	0.7827***	0.0251	-5.6454
	Egypt	8.08E-06	0.098***	0.8055***	0.1438***	-5.709
	Turkey	1.34E-05	0.0446***	0.8461***	0.1292***	-5.4104
	South Africa	2.08E-06	0.0131	0.9058***	0.1322***	-6.2064
EGARCH(1,1)	Columbia	-0.9349	0.3349***	0.9249***	-0.1095***	-6.2073
	Indonesia	-0.455	0.2368***	0.9686***	-0.0853***	-5.9722
	Vietnam	-0.7252	0.3311***	0.9453***	-0.0141	-5.647
	Egypt	-0.5447	0.276***	0.9608***	-0.0989***	-5.7086
	Turkey	-0.5611	0.1977***	0.9505***	-0.0953***	-5.4116
	South Africa	-0.2509	0.132***	0.9837***	-0.107***	-6.2118

*(***) [***]: Statistically significant at a 10(5)(1) % level

Sources: Researchers analysis

The given bold values indicate the minimum AIC or SIC, which implies a better fitting model

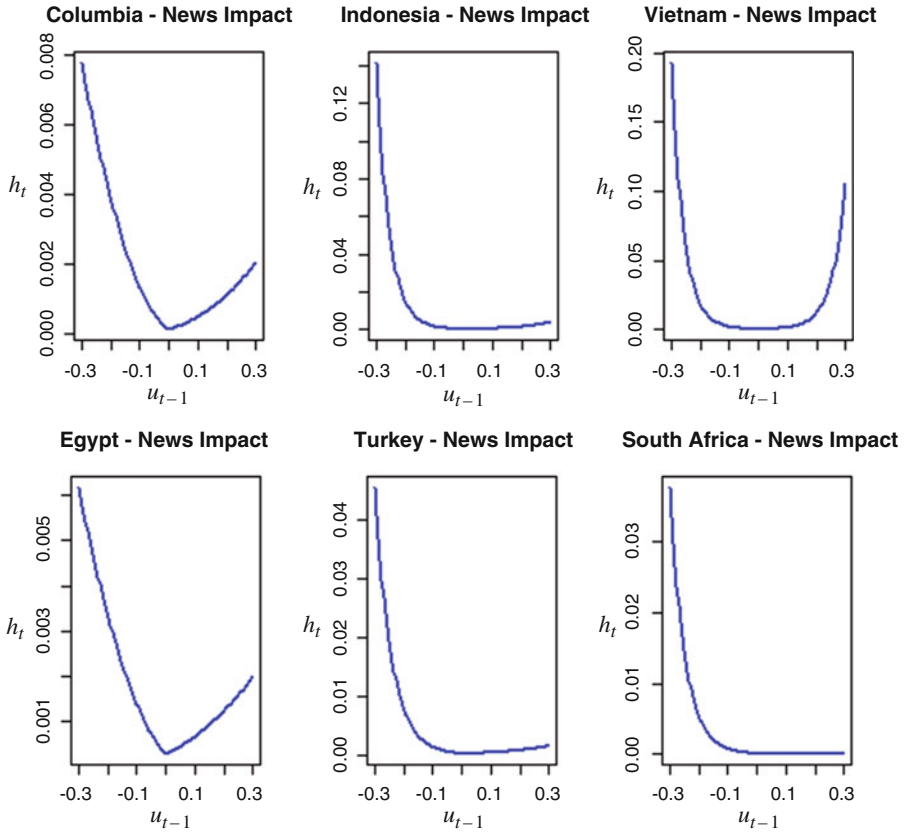


Fig. 24.3 News impact curves of the best fitting models suggested by AIC

Table 24.5 Proxies used for risk-free rates

Country	Risk-free rate
Columbia	4.50 %
Indonesia	7.50 %
Vietnam	8.00 %
Egypt	8.75 %
Turkey	7.50 %
South Africa	5.75 %

24.5.3.1 Exclusion of GFC Data for Calibration of GARCH Processes

The corresponding implied volatility skews generated are similar in shape for both the EGARCH and GJR-GARCH processes. The options tend to be more expensive at lower levels of moneyness. The rankings of the level of the implied volatility skews are generally the same for both the EGARCH and the GJR-GARCH calibrated models, with the exception of the Egyptian EGX 100 index.

The Colombian IGBX index has the lowest implied volatility skew, which also coincides with the lowest interest rate. Vietnam, however, has the second highest interest rate from the CIVETs, but has the highest implied volatility skew for the EGARCH calibrated model. This may indicate that there is less liquidity in the Vietnamese market, which causes the prices of options to increase. On the other hand, Egypt has the highest interest rate, yet the index's implied volatility skew lies below that of others. This might indicate liquidity in Egypt's markets.

The JKSE index and the FTSE/JSE ALSI index are closer together for the GJR-GARCH process than for the EGARCH process. For the GJR-GARCH process the VNI and the EGX 100 Index are below the XU 100 Index, but above the XU 100 Index for the EGARCH process.

Next, the EGARCH and GJR-GARCH calibrated implied volatility skews are depicted for 30 day options and the data for the period of the GFC is included for the calibration of the EGARCH and GJR-GARCH processes used to construct the volatility skews in the following figures. The data used consists of daily closing prices starting from the first trading date in 2006, until the 18th March 2015.

24.5.3.2 Inclusion of GFC Data for Calibration of GARCH Processes

The corresponding implied volatility skews generated are similar in shape for both the EGARCH and GJR-GARCH processes.

The FTSE/JSE ALSI index moved away from the IGBX index when using the GJR-GARCH process. The EGX 100 Index, the VN-Index and the JKSE Index are much closer together when using the GJR-GARCH process. The JSKE index and the FTSE/JSE ALSI index are closer together for the GJR-GARCH process than for the EGARCH process. For the GJR-GARCH process the VNI and the EGX 100 Index are below the XU 100 Index, but above the XU 100 Index for the EGARCH process. Generally the options become more expensive when including data from the GFC. This is caused by the return distribution which changes slightly when including data from the GFC. The indexes are generally more volatile in periods of financial turbulences such as the GFC, which in turn causes the return distribution to gain fatter tails. If the underlying asset has fatter tail distributions, then the price of the options will increase, since a positive payoff is more likely. Hence, the prices of the options increase, and since the implied volatility is a direct indication of the price of the options, the implied volatility increases. The effect is not very drastic, as the financially turbulent time series data is truncated by financially stable time series data, thus diminishing the effect of the GFC data.

All the volatility skews in Figs. 24.4, 24.5, 24.6 and 24.7 seem to have higher implied volatility for lower strikes and lower implied volatility for higher strikes. The natural hedge suggested for a skew with such a shape is to buy puts in order to protect value and sell calls to offset the prices of the puts.

Generally a higher interest rate will cause the implied volatility skews to become higher. However, if a country has a high central bank rate but a low implied volatility skew, then this may imply that the markets are more liquid, which causes the

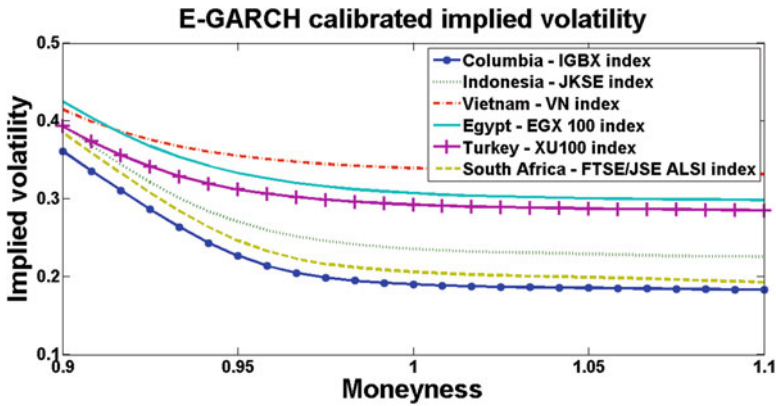


Fig. 24.4 The EGARCH calibrated implied volatility skews are depicted for 30 day options starting on the 18th March 2015. To calibrate the EGARCH process, daily closing prices from the 1st Jan 2009 until the 18th March 2015 were used

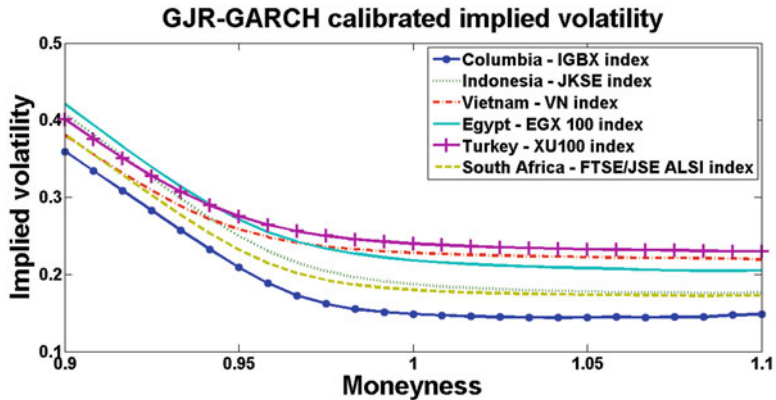


Fig. 24.5 The GJR-GARCH calibrated implied volatility skews are depicted for 30 day options starting on the 18th March 2015. To calibrate the EGARCH process, daily closing prices from the 1st Jan 2009 until the 18th March 2015 were used

options to trade at cheaper levels, and thus the implied volatility is less. Similarly, if a country has a low interest rate, but a high implied volatility level, then the implications might be that the markets are less liquid, which in turn causes the option to trade at higher levels, and thus the implied volatility is greater.

Increasing the interest rate will move the implied volatility skews up, while a decrease in the interest rate will shift the implied volatility skews down. The lower levels of moneyness are generally more sensitive to movements in the interest rates than the higher levels of moneyness.

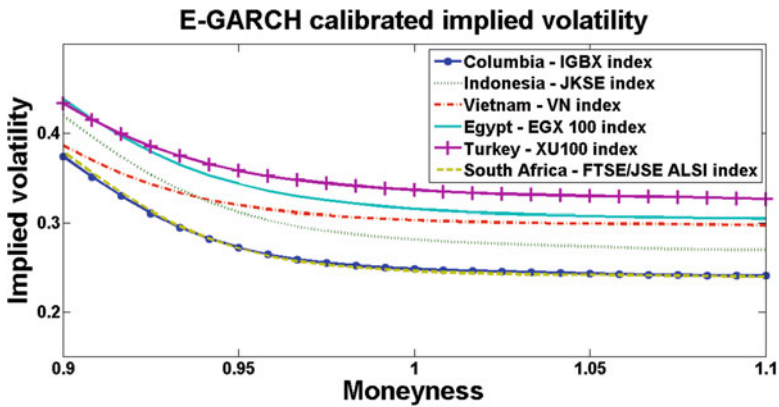


Fig. 24.6 The EGARCH calibrated implied volatility skews are depicted for 30 day options starting on the 18th March 2015. To calibrate the EGARCH process, daily closing prices from the 1st Jan 2006 until the 18th March 2015 were used

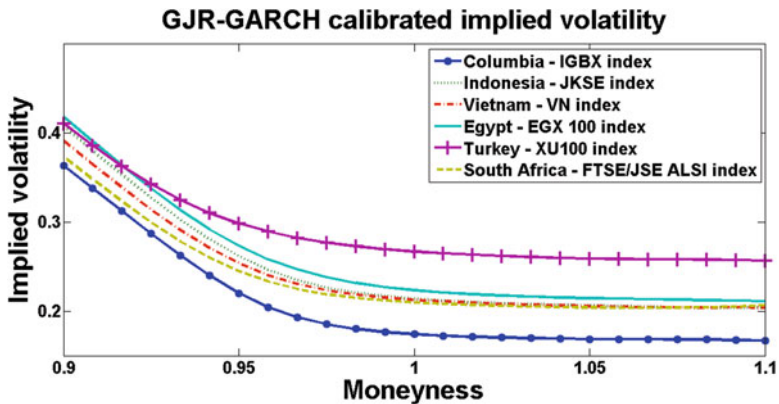


Fig. 24.7 The GJR-GARCH calibrated implied volatility skews are depicted for 30 day options starting on the 18th March 2015. To calibrate the EGARCH process, daily closing prices from the 1st Jan 2006 until the 18th March 2015 were used

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Chapter 25

Business Process Reengineering in Emergency Departments (EDs): Evidence from Two Hospitals

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and Chatzoudes Dimitrios

Abstract Business process reengineering (BPR) supports the alignment of organizational processes with organizational goals while providing better services to customers. In the present study, the operations' processes, used by two emergency departments (EDs) of different Greek hospitals, are analyzed using simulation models. All the necessary data were collected adopting the observation method. More specifically, the start-finish time for each separate phase of the visit of each patient in the ED was recorded. All simulation models concerning patient flow were analyzed, so as to determine the most appropriate, according to the specific characteristics of each ED. The main objective of this applied research is to identify the main problematic areas within this process and then to provide specific suggestions that might improve the quality of healthcare services, in terms of waiting time and services provided. In each of the two cases (EDs), an alternative patient flow strategy was developed, aiming to increase efficiency without increasing cost. The improvements that were made with the use of the simulation models were noteworthy. The most significant improvement, for both EDs, is the reduction of patient waiting time.

Keywords Business process reengineering • Emergency departments • Simulation • Waiting time • Patient flow

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25.1 Introduction

Business process reengineering (BPR) can be defined as “the fundamental rethinking and radical redesign of a business process to obtain dramatic and sustained improvements in critical, contemporary measures of performance, such as cost, quality, service and speed” (Hammer and Champy 1993, p. 90). The rising attention toward reengineering lies in the fact that it proposes an alternative approach of how organizations should be studied and improved (Irani et al. 2002).

In most countries, the health sector is considered as one of the largest sectors of economic activity, with increasing costs (Helfert 2009). Therefore, in the light of these ever-increasing costs, health organizations are seeking ways to achieve cost reduction (Helfert 2009) and increase the quality of their provided services (Shim and Kumar 2010).

Although, it is difficult for public organizations, like hospitals, to fully grasp the concept of quality (Halachmi and Bovaird 1997), however, due to the rapid changes taking place in their external environment, public organizations should focus on processes and technology (Teng et al. 1996), reduction of bureaucracy (Barzelay 1992), better service provision to citizens (Barzelay 1992), cost reduction, increased efficiency, and competitive advantage development (Shim and Kumar 2010). On the same vein, health organizations should focus, among others, on better resource utilization, cost reduction, and process time execution (Jansen-Vullers and Reijers 2005). Consequently, BPR can significantly contribute to the improvement of hospital process performance, in terms of cost, time, quality, and flexibility (Vanwersch et al. 2011).

In Greece, there is a lack of studies examining service provision from the emergency departments (EDs) of hospitals. As indicated by Anterioti and Antoniou (2014), only very few studies have dealt with the development of a comprehensive program concerning quality assurance of hospital services. The present study aims to make specific proposals toward the reengineering of the processes utilized by two EDs with different characteristics, which will enable them to provide better services to their patients. In that direction, a detailed examination of their processes has been conducted by the members of the research team. Moreover, their bottlenecks were identified, and various simulative scenarios were considered. The proposed solutions have been implemented in other (non-Greek) hospitals and are being adjusted for the first time, in order to fit with the conditions Greek EDs are facing.

The present study contributes to the existing literature for the following reasons: (a) There are no other studies conducted in Greece, regarding the reengineering of processes of two EDs with distinct characteristics. (b) Studies about BPR in the health sector that have been carried out in Greece are focusing, mostly, on service quality (e.g., Polysos et al. 2005; Papagiannopoulou et al. 2008). The present study takes under consideration the specific problems encountered in each ED and provides the most suitable alternatives for each unique case. (c) The study is timely, given the Greek economic crisis: EDs act as a safety net for people who cannot afford access to private healthcare institutions (Lydakakis et al. 2013). (d) BPR studies

conducted in Greece are, mainly, focusing on various public service organizations, banks, and private organizations (Darkofiki 2013; Syros 2005). The present research examines the EDs of the public health sector, which involve patients experiencing severe health problems or even death.

25.2 Literature Review

According to Kumar and Shim (2007), most EDs around the world are facing numerous challenges, mostly associated with resource deficiency and increased citizen demand for better services. The main problems of EDs are: long waiting time (Aboukanda and Latif 2013), large percentage of patients leaving the hospital without being examined (Chan et al. 2005), and lack of resources, both in technical equipment and personnel (Shim and Kumar 2010).

Greek public hospital EDs are, usually, overcrowded (Anterioti and Antoniou 2014; Lydakis et al. 2013). Overcrowding has its roots on insufficient primary care structures, lack of organized EDs, increased patient attendance, the current financial crisis, and increasing patient transfers from the private to the public sector (Lydakis et al. 2013). According to Lucas et al. (2009), most of the problems of the EDs in Greece are directly related with organizational inefficiencies in patient-flow management.

Many researchers that have implemented reengineering programs or analyzed their impact on many international hospitals have reported significant improvements in patient satisfaction, productivity, and efficiency (Caccia-Bava et al. 2005). On the same vein, Foy (2003) reported a significant reduction of medical errors and a decrease in process execution time. Moreover, according to Jansen-Vullers and Reijers (2005), the implementation of reengineering projects in the healthcare sector, in conjunction with the use of information technology (IT) systems, leads to increased efficiency, improved levels of patient satisfaction, and reduction in mortality indicators.

From a practical standpoint, Caccia-Bava et al. (2005) argue that the implementation of a reengineering program is expected to reduce resource and space requirements, make better use of materials, improve transport of both people and materials, empower employees, and enhance interfunctional communication. All the above can reduce process expenses, decrease process execution time, and improve quality (Khandelwal and Lynch 1999).

A wide range of tools can be used during BPR implementation and substantially contribute to improved process performance. The most significant of these tools are benchmarking (Zairi and Sinclair 1995; Gunasekaran and Kobu 2002), mapping (Paper and Chang 2005), Key Performance Indicators (KPI) (Wetzstein et al. 2008), and simulation (Gunasekaran and Kobu 2002).

According to Warren et al. (1995), simulation models can be used in order to assess the potential value and feasibility of alternative designs, providing a basis for redesign decisions that are inherent in BPR. Additionally, the use of simulation

models allows the assessment of the degree in which each scenario (alternate design) is applicable (Warren et al. 1995). This is conducted with the collection of appropriate quantitative data (e.g., cost, cycle time, time of service, use of resources) (Gunasekaran and Kobu 2002; Warren et al. 1995).

Usually, the first step in simulation models is the analysis of the processes currently employed. This analysis results in the development of a dynamic model depicting the current state. The next step concerns the evaluation of the experimental results and their alternatives (Lin et al. 2002), while in the final stage, the more efficient scenario is chosen (Gunasekaran and Kobu 2002). As argued by Gunasekaran and Kobu (2002), process reengineering using simulation models is one of the less time-consuming and inexpensive procedures, due to its potential to model an entire system and check a plethora of different scenarios.

Several empirical studies have been conducted aiming at improving the efficiency of hospital organizations. These studies focus, primarily, on improvements in patient flow, during the process of examination, in order to reduce waiting time (Khandelwal and Lynch 1999; Netjes et al. 2009; Bertolini et al. 2011; Medeiros et al. 2008). Moreover, the relevant literature includes studies which provide suggestions on how to improve various management practices used by health organizations (Guo 2004; Helfert 2009; Patwardhan and Patwardhan 2008).

As mentioned above, one of the most significant problems during patient examination in EDs is overcrowding (Sharoda et al. 2010). In that direction, Sharoda et al. (2010) focus on the efficient management of patient flow. They propose the establishment of a fast-track unit in EDs, especially for patients who are not diagnosed as emergencies. The aim is to reduce waiting time for those with actual life-threatening problems but, at the same time, not affect the quality of provided health services (Sharoda et al. 2010). The same proposal has been made by various other studies (e.g., Aboukanda and Latif 2013; Medeiros et al. 2008). According to Sharoda et al. (2010), the establishment of a fast-track unit is proposed by the majority of researchers, since it is expected to reduce waiting and service time, improve material utilization, and make better use of available personnel. Nevertheless, according to Banerjee et al. (2008), a fast-track unit is mainly proposed in cases where the patients who are not diagnosed as emergencies are those who complain the most about the waiting time.

Another significant change associated with patient flow during the examination process focuses on the transport of patient blood samples (Sharoda et al. 2010). In EDs, waiting time significantly increases because of the need to carry samples for various laboratory tests. This extra time can be reduced by using i-stat technology which is included in the point-of-care testing method. According to the i-stat method, testing can be performed while the patient is in the ED, by using wireless devices. In about 2 min after the taking of the blood sample, the results are displayed in the screen of the i-stat device. It is easily understandable that by this method, the period waiting for the results decreases, compared to other alternative methods. Also, according to Kirtlands et al.'s (1995) research, when using i-stat devices, which is a type of point-of-care method as mentioned before, the length of stay (LOS) of the patients in EDs is reduced by 8.4 min.

Organizational changes, such as task combination, are proposed by Netjes et al. (2009), while Khandelwal and Lynch (1999) suggest a more active involvement of the nursing staff in the examination process. Other organizational changes include the issue of referrals or medical release forms by the nursing staff (Pallin and Kittell 1992), the placement of a permanent supervisor in the ED (Mpaizouni 2015; Karampinis and Koukoulitsios 2006; Teng et al. 1996), staff empowerment and development of cross functional teams (Teng et al. 1996), and continuous personnel training (Teng et al. 1996; Paper and Chang 2005). Moreover, Medeiros et al. (2008) suggested that a second supervisor should be located at the triage (or fast-track area) of the ED, in order to act as a link between the nursing staff and the patients. Propp's (2012) goal was paperless EDs, so he proposed the usage of the Health Medical Record in order the duration of the registration process to be diminished or even eliminated. Also, Handel et al. (2011) and Martinez et al. (2012) introduced the radio-frequency identification (RFID) technology in EDs for the better tracking of personnel, patients, and equipment. The above suggested methods can support the reorganization of the whole emergency department, which is the main role of BPR (Hammer and Champy 1993).

25.3 Methodology

In order to collect the necessary primary data, the observation method was used. Moreover, a structured questionnaire was also used to collect primary data from patients, regarding the problems they are faced with during their stay in ED. The two hospitals that participated in the present pilot study were chosen because of their differences in size, number of patient attendance, patient flow, and location (these are explained in more detail in Sect. 25.4).

More specifically, the members of the research team observed the whole process recording all relevant events from the arrival of every patient in the emergency department, until his/her departure from the hospital or the admission in another clinic. The two selected hospitals exhibit different characteristics and will be described as ED1 and ED2.

The duration of all events that took place during the whole examination process was timed. These events were: (a) waiting time, from the moment of arrival, until the admission in the examination room; (b) examination time, duration of stay in the examination room; and (c) overall patient stay in the ED including the time of laboratory testing. The observation period for ED1 was equivalent to 15 working days and the sample consisted of 156 patients, whereas the observation period for ED2 was equivalent to 12 working days and the sample consisted of 136 patients.

Data analysis was conducted with the use of the simulation software "Architecture of Information Systems" (ARIS). This specific software was selected because it can be used both for mapping and simulation of processes (Scheer and Nüttgens 2002; Wang et al. 2009). According to Wang et al. (2009), ARIS is able to present the dynamic analysis in order to reveal the weaknesses of the model.

25.3.1 Description of Patient Flow

25.3.1.1 Description of Patient Flow/ED1

Upon entering the emergency department (ED), the patient fills out a general form (including personal data). This form is provided by the administrative personnel. When the form is filled and returned, the administrative personnel register the patient on the appropriate information system used by the hospital. The next step includes the triage procedure, which is performed by the nursing staff: a priority number is provided to each patient, corresponding to the examination room in which he wishes/needs to go. The triage procedure in ED1 is conducted in accordance with the Australian triage system (5-point grading system), where 1 represent very crucial cases and 5 represent mild cases (patients that are not at serious risk). After triage, each patient enters the waiting area of the emergency department. Outside each examination room, there is a board displaying priority patient numbers.

After the examination conducted by the medical personnel, there are two possible outcomes: (a) the patient departs the ED and (b) the patient remains in the ED for further testing. In the second case, the samples that need to be analyzed are being transferred by the patients to the corresponding laboratories. In case a patient cannot move around, samples are being transferred by members of the staff.

After receiving the results of the laboratory tests, there are three possible outcomes: (a) the patient departs the ED (after discussing the results with a member of the medical personnel), (b) the patient remains in a recovery room for a short period of time, and (c) the patient is imported to another clinic of the hospital.

25.3.1.2 Description of Patient Flow/ED2

Upon entering the emergency department (ED), the patient waits in the appropriate area outside the examination room. As in ED1, the nursing staff performs the triage procedure. Once again, the Australian triage system (5-point grading system) is being used. When patients do not face immediate danger, priority is given according to their arrival time.

After entering the examination room, the nursing staff records the personal data of each patient. In case the patient is at risk, the doctor makes a referral for further tests; otherwise, the patient departs the ED. Once again, the samples that need to be analyzed are being transferred to the corresponding laboratories by the patients (in case they can move) or by members of the staff (in case they cannot). After the patient discusses the results with a member of the medical personnel, he departs the ED.

25.3.2 Detection of Problems in the Examination Process

In order to detect problematic areas in each of the two emergency departments, a structured questionnaire was administered to patients departing from each hospital. The aim of the research team was to identify areas that decrease patient satisfaction, so as to suggest specific and customized solutions. The sample for ED1 included 75 patients, while the sample for ED2 included 68 patients. The empirical results indicate that each ED is a unique case and a joint reengineering solution should not be developed. In other words, the reengineering solution should take under consideration the particular characteristics of each ED.

25.3.2.1 Detection of Problems in the Examination Process/ED1

One of the major issues highlighted by patients is overcrowding. Taking under consideration that, on a daily basis, only an average of 150–200 patients are graded emergencies (grades 1 and 2 in the Australian triage system), overcrowding during waiting time seems logical.

Moreover, patient overcrowding has a negative effect on laboratory testing. Although the referral for examination is sent automatically to the corresponding laboratory, valuable time is lost in the process of sample transfer. Approximately 70% of the patients are not considered emergencies and, therefore, they carry their own samples in the laboratories. This process is time-consuming and inefficient. Finally, the results obtained from the statistical analysis revealed that the majority of the cases are not characterized as emergencies, even by the patients themselves.

25.3.2.2 Detection of Problems in the Examination Process/ED2

Long waiting time in receiving the laboratory tests and, eventually, being able to depart from the hospital is being highlighted as the most important issue. In addition, empirical results indicate that the number of patients referred for laboratory tests is quite significant.

25.4 Simulation Models and Results

Based on the specific problems identified in each ED, various scenarios were simulated. The initial simulation models represent patient flow in each ED, for 1 full day (08:00–08:00 of the next day). The events are presented with the use of various components of the simulation program ARIS 9.2 Simulation Tool.

25.4.1 Simulation Model and Results/ED1

ED1 is an autonomous division of a hospital located in an urban area. It has a full occupancy of medical specialties and manages approximately 700–800 cases each day. Upon entering the ED, the patient fills out a general form with his personal information (2 min). Data input by the administrative personnel takes another 5 min. The triage procedure lasts 3 min. The average waiting time for examination is 42 min, while the average duration of the examination is approximately 18 min. The total period of stay in ED1 is 2 h and 18 min. These times were measured (via the observation methodology) over 15 working days on a sample of 156 randomly selected cases (patients) (Fig. 25.1a).

The main problem of ED1 is increased waiting time. For this reason, the events that take place after patient examination, such as the laboratory tests, were not analyzed. After all necessary considerations and analysis, it was decided to propose the development of a fast-track unit for the patients who are not diagnosed as emergencies, as suggested by the relevant literature (Sharoda et al. 2010; Aboukanda and Latif 2013; Medeiros et al. 2008).

In the improved model (see Fig. 25.1b), the events taking place before triage were not altered. After the triage process, there is a branching with two probabilities. According to the relevant literature (Askitopoulou 2009), a major issue during triage is the low number of emergencies, compared with the number of patients who are classified in categories 4 and 5 (approximately 85 %).

First of all, there is a significant drop in waiting time for patients in categories 4 and 5 (see Table 25.1 for more details). Despite the fact that the duration involving patients in categories 1, 2, and 3 remained the same, it is expected that these patients will now receive better service. In other words, the medical staff will be able to devote more time in the most urgent cases. Finally, there is a significant increase in the number of patients completing their visit at the ED. Therefore, a fall of the length of stay in ED1 could be assumed.

25.4.2 Simulation Model and Results/ED2

ED2 is located in a provincial town and, therefore, operates on a daily basis. Upon entering the ED, the patient waits outside the examination room. The nursing staff performs the triage procedure, according to the severity of each case. The average waiting time for examination is 12 min. After entering the examination room, the nursing staff takes 17 min to enter the personal data of each patient in the information system of the hospital. The duration of laboratory tests, including sample transfer, laboratory analysis, reporting, and diagnosing, lasts about 60 min. The length of stay in ED2 lasts 1 h and 25 min. These times were measured (via the observation methodology) over 12 working days on a sample of 136 cases (patients).

The main problem of ED2 is the length of laboratory testing. Therefore, the use of i-stat devices is being proposed. In the improved model (see Fig. 25.2b), waiting and examination times remained the same. According to the relevant literature, the use of

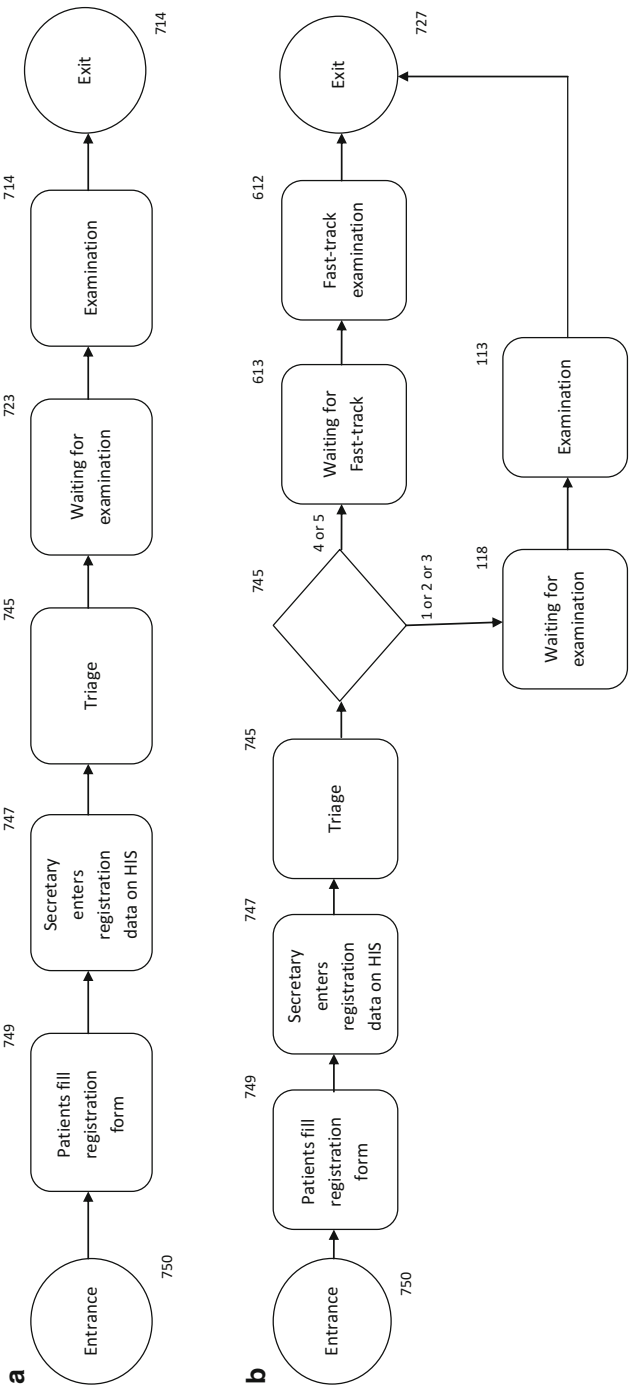


Fig. 25.1 (a) Initial model/EDI; (b) improved model/EDI

Table 25.1 Comparison between the initial and improved models/ED1

	Allocation of time in the initial model	Estimated allocation of time in the improved model	
	All categories	Categories 1, 2, 3	Categories 4, 5
Filling form	3 %	6 %	
Entering data in HIS	7 %	14 %	
Triage	4 %	4 %	8 %
Waiting time	60 %	60 %	58 %
Examination	26 %	26 %	14 %
Total length of stay (LOS)	2 h and 18 min	2 h and 18 min	Reduced by 16–23 % ^a
Number of patients being examined	714	115	612

^aThe reduction is reported by previous studies that have implemented fast-track units and timed the reduction in length of stay (LOS)

i-stat devices reduces waiting time by almost 70 % (Galloway et al. 1999). Another study by Kendall et al. (1998) reported a reduction of time spent in laboratory tests by 55 %. Due to the lack of concrete conclusions on this issue, the results of Galloway et al. (1999) are being adopted.

As mentioned above, there is a reduction in the duration of laboratory testing for all patients. In addition, there is a small increase in the total number of patients being served by ED2. Therefore, it could be concluded that the improvement will not reduce the total length of stay in ED2, but it will contribute to the improvement of service provision, since diagnosis will be timely (see Table 25.2).

25.5 Conclusions

Firstly, the empirical observation of the processes utilized by each hospital concluded that each emergency department (ED) has a different *modus operandi*. More specifically, there are differences in (a) the average duration of patient stay, (b) the average duration of the same events, and (c) the order of several events. This is due to the different characteristics of each hospital, but it can also be attributed to the unique challenges that they are faced with.

In general, the processes that were examined revealed the existence of several problems and inefficiencies. The adoption of more flexible processes is expected to provide better coordination and improve communication between medical staff and patients. The implementation of the proposed changes would result in a decrease in the number of errors and an improvement in execution time.

The present study examined the unique challenges in the examination process of two EDs. More specifically, ED1 is overcrowded and faces problems in managing patient flow and long waiting time. Overcrowding is caused by the plethora of

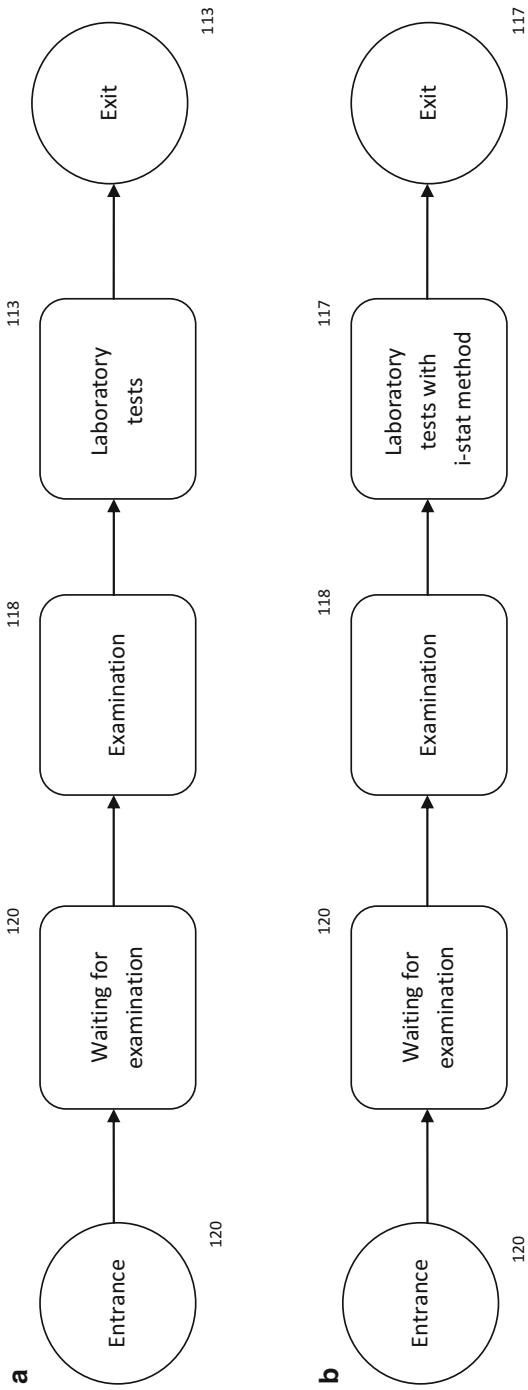


Fig. 25.2 (a) Initial model/ED2; (b) improved model/ED2

Table 25.2 Comparison between the initial and improved models/ED2

	Distribution of process events' duration (24 h) of the initial model	Estimated distribution of process events' duration (24 h) of the improved model
Waiting	13.9 %	31.9 %
Examination and reporting data	66.7 %	44.6 %
Laboratory tests	19.4 %	23.5 %
Total length of stay	1 h and 25 min	1 h and 25 min
Number of patients being examined	113	117

patients that visit the ED without actually requiring immediate medical attention. Additionally, overcrowding forces the medical personnel to devote less time in each patient, causing additional dissatisfaction. On the other hand, the medical staff of ED2 has the tendency to make too many referrals for laboratory tests (much more than the expected average), causing delays in the completion of these tests and the final departure of patients from the hospital. Moreover, costs are increased, both for technical equipment and laboratory personnel.

The improved model for ED1 reduced waiting time and length of stay. The improved model for ED2 reduced the duration of laboratory tests and made a slight increase in the number of patients being examined.

25.5.1 Managerial Implications

From a managerial point of view, timely processes are expected to increase patient satisfaction and erase many of the overall challenges in each of the two EDs. More specifically, the implementation of flexible and easily manageable processes is expected to increase organizational efficiency and improve overall performance.

In particular, by implementing a fast-track unit in ED1, there will be significant improvements in the total length of stay (LOS). Medeiros et al. (2008) observed an improvement in total length of stay of approximately 23 %, Considine et al. (2008) reported a reduction of about 16 %, while Sharoda et al. (2010) spoke of a significant reduction, but without providing specific percentages. Still, it can be argued that the reduction of waiting time will increase patient satisfaction (Rodi et al. 2006). Finally, it should be noted that the fast-track unit is proposed for peak hours, i.e., when crowding of patients is mainly observed, because otherwise it may result in increased costs for the hospital (Considine et al. 2008).

Regarding ED2, the proposal for i-stat implementation will reduce the required time for final patient diagnosis (Kendall et al. 1998; Fermann and Suyama 2002). Consequently, there will be an improvement in information management practices and an increase in the efficiency of the decision-making process (Kendall et al. 1998). Fermann and Suyama (2002) argue that the implementation of i-stat reduces significantly the expenses for laboratory tests. Therefore, the hospitals will be

expected to make better use of their laboratory staff and reduce overall costs (Gault and Hardling 1993). Finally, patient satisfaction is increased and overall length of stay is decreased (Fermann and Suyama 2002).

It should be stressed, though, that no generally applicable “medicine” exists. Each hospital and each ED is unique and the options available, as well as their effective implementation, differ significantly. Therefore, top management should carefully consider all the characteristics of their hospital, ED, personnel, infrastructure, and patients, before adopting specific “remedies”—solutions for improving the efficiency and effectiveness of their EDs.

25.5.2 Limitations and Future Research

The main issue of the present study is the relative small sample size. Moreover, the data that were collected with the use of the observation methodology are not entirely accurate. Objective barriers limited the data collection process. Different medical departments present different waiting times and durations. In this survey, the average time was used.

During the stay of the members of the research team in each ED, the staff attempted to meet the demands of patients, something which was often not feasible, due to shortcomings or overcrowding. At this point, it should be noted that a major problem during patient examination is created by the spatial planning of EDs. This topic should be further investigated.

Furthermore, in the second ED (rural area), patient arrival and departure seemed to be very problematic: there were some cases of patients with mobility issues who waited over 2 h for an ambulance. In some other cases, patients with mobility issues were forced to stay the night in the hospital, since the ambulance could only take them home the following day. These process and resource shortages should be further investigated.

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Chapter 26

Assessment of Innovative Capacity of the Region

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Abstract Reference points of innovative development of Russian economy are particularly relevant, outlined in the Concept of Long-Term Social and Economic Development of the Russian Federation in modern conditions. However the regional dimension should be taken into account in the formation of an effective national system due to the territorial characteristics and federal structure. From the perspective of the authors, assessment of innovative potential is the most important procedure in the management of innovative development of the economy of the region. Identification of strengths and weaknesses in resource supply of area allows you to define the priorities of innovative development and justify the use of specific instruments of innovation policy in the region. In this paper we propose author's method of assessment of the region's innovation potential, based on mathematical and statistical tools. We made the comparative analysis of the innovation potential of the regions of Central Federal District, and analysis of the structure of the regional innovative potential of the Kursk region. The dynamics of the innovation potential of the Central Federal District of subjects for 2005–2015 were considered. Possible measures to enhance the innovative capacity of the region in view of its structural features were defined.

Keywords Region • Economy of the region • Innovation • Region innovation system • Innovation potential of the region

26.1 Introduction

The basis of the effectiveness of the national is its innovative potential economy as well as the natural and human resources.

Today the formation of innovation-based economy in Russia restrains a number of factors. Firstly, imbalance in sectoral structure of industry and, as a consequence

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of extremely low export diversification does not allow to fully participate in the international exchange of high-tech (Merzlyakova 2015a, p. 52).

Secondly, the condition of the material and technical base impedes increase of innovation activity of enterprises. First of all, we are talking about the state of fixed assets experiencing enormous need for a full-scale renovation.

Thus, according to the Federal State Statistics Service, depreciation of fixed assets manufacturing industries exceeds 40 %. In this case 13–14 % of fixed assets is fully exhausted their resources (Gurakova 2010, p. 111; 4, p. 8; 8, p. 26). The massive rearmament in the majority is the only option for the industrial sector.

Thirdly, the lack of demand for research and development of the business sector has a negative impact on the development of science. It is undisputed that it is scientific knowledge and intellectual potential of society are the generator of ideas embodied in the form of innovation (Treshchevsky et al. 2016; Alekseev et al. 2014, p. 28; Harchenko 2009, p. 36). However, due to the low susceptibility of the private sector to innovate offered by the scientific results are often not use.

The above-mentioned problems in combination with the aggravation of the political situation in the global space and the introduction of economic sanctions against Russia once again emphasize the importance of innovative development of the Russian economy.

Special place in the formation of the national innovation system (NIS) took a regional dimension, given the complex federal structure of the country and the heterogeneity of the social and economic level of development of its subjects. Moreover regionalization of innovation is closely linked to the processes of globalization.

National boundaries are often blurred taking into account the existing possibilities of companies to move their production operations around the world, taking into account the local advantages of specific regions (Gumba et al. 2007, p. 36; Emelianov et al. 2011, p. 85; Kokin et al. 2012, p. 129; Titova et al. 2015). In this regard, the formation of a competitive innovation environment in the region should promote the recruitment and retention of both Russian and foreign investors.

To justify the use of specific innovation policy instruments need a comprehensive assessment of the innovation potential of the region in order to identify the strengths and weaknesses of the resource provision of the subject. Resource possibilities to determine the choice of targets and priorities of innovation development of the region (Kolmykova 2012, p. 54; Kolmykova and Merzlyakova 2013, p. 21).

26.2 Methods of the Structural Evaluation of Regional Innovation Potential

The authors proposed a method of structural evaluation of regional innovation potential (RIP), according to which seven resource blocks can be identified (Merzlyakova 2015b, p. 143).

1. The human potential of the region allows us to analyze how regional innovation system is provided by qualified scientific personnel and intellectual resources. The need for evaluation of this block caused by the involvement in the innovation process practically every member of the modern society. This involves not only the ability to develop and implement new scientific ideas and the subsequent development and innovation, but also on the formation of their needs.
2. The scientific potential of the region characterizes the level and scale of research and development in the subject, expressed, including in the establishment of advanced manufacturing technologies.
3. Technical and technological potential determines the possibilities of production in the region of innovation of competitive products, including high-tech. In modern conditions, one of the limiting factors of growth of innovative activity of industrial enterprises stands condition of fixed assets, which should be considered in the analysis of the structural unit.
4. Industrial and production potential of the region is based on an assessment of the volume of industrial production in the region, the rate of growth, and innovation orientation.
5. The financial and economic potential of the region characterizes the internal costs of research, development and innovation, the cost of technological innovation, as well as the overall level of economic development of the subject, expressed, for example, at rate of GRP per capita.
6. Investment potential of the region is the basis of the attractiveness of the territory for potential investors. There are several methods for calculating the index. But in this context, we restrict to more important indicators that reflect the volume of investment activity in the region.
7. Information and communication potential of the region allows to evaluate the level of development and the extent of information systems in the region.

Each block includes four indicator descriptions which are presented in Table 26.1.

The sequence of the structural evaluation of regional innovation potential consists of five main stages.

The first step is the collection of statistical data, resulting in a set of absolute and relative basic indicators required for the calculation. Evaluation of RIP is totally based on publicly available data of the Federal State Statistics Service, which emphasizes the universality of the developed technique. The next step is computed values calculated partial indicators (RFI), with the definition of specific gravity/share (if required) and subsequent valuation.

It seems appropriate to carry out a valuation metrics using a linear scaling to bring the performance to comparable mean.

Further, integral partial indicators are calculated based on the calculated values of particular indicators for the analyzed period. Principle of the calculation is based on the calculation of the arithmetic mean calculation of particular indicators of the corresponding resource block. Formulas for each specific unit are shown in Table 26.1.

Table 26.1 The system of evaluation of regional innovation potential

Block	Indicator
Human potential (HP)	HP ₁ —the ratio of personnel engaged in R&D, to the number of employed in the economy (%);
	HP ₂ —the ratio of the number of researchers with advanced degrees to the total number of researchers (%);
	HP ₃ —number of students per 10,000 people. Population at year-end (pers.);
	HP ₄ —issue of postgraduate doctoral studies (with a thesis) (pers.).
Scientific potential (SP)	SP ₁ —the ratio of the number of institutions that perform scientific R&D, the total number of enterprises and organizations (%);
	SP ₂ —patents in the Russian Federation (pcs.);
	SP ₃ —the ratio of the number of patents granted to the number of patent applications filed (%);
	SP ₄ —number of advanced production technology (pcs.).
Technique and technological potential (TTP)	TTP ₁ —the proportion of organizations implementing technological innovation in the total number of organizations (%);
	TTP ₂ —used advanced production technology (pcs.);
	TTP ₃ —the ratio of the value of fixed assets to the number of employed in the economy (%);
	TTP ₄ —the degree of depreciation of fixed assets (%).
Industrial and production potential (IPP)	IPP ₁ —the ratio of shipped goods, works, and services to the economically active population (%);
	IPP ₂ —the share of innovative products, works, and services in the total volume of shipped goods, works, and services (%);
	IPP ₃ —the ratio of volume of shipped innovative products, works, and services to GRP (%);
Financial and economic potential (FEP)	FEP ₁ —the ratio of expenditure on technological innovation to GRP (%);
	FEP ₂ —the ratio of the cost of R&D to the GRP (%);
	FEP ₃ —GDP per capita (%);
	FEP ₄ —net financial result (profit minus loss) of organizations (mln. Rub.).
Investment potential (IP)	IP ₁ —investments in fixed capital per capita (rub.);
	IP ₂ —the index of physical volume of investments in fixed assets (%);
	IP ₃ —volume of foreign investments (thousands of US dollars, etc.);
	IP ₄ —the share of own funds of organizations in the structure of investment in fixed assets (%).
Information and communication potential (ICP)	ICP ₁ —the proportion of organizations used information and communication technologies, the total number of organizations surveyed (%);
	ICP ₂ —the proportion of organizations used global information networks, the total number of organizations surveyed (%);
	ICP ₃ —the proportion of organizations used special software, the total number of organizations surveyed (%);
	ICP ₄ —the number of personal computers per 100 workers (pcs.).

At the last stage the complex integral index of evaluation of innovative potential is calculated. RIP is calculated as the seventh root of the product of seven private capacities.

A structured approach to the assessment of RIP allows taking into account the degree of readiness of resource supply and a separate block and innovation system in the region as a whole in the design, creation, commercialization, and transfer of innovation. With the help of assessment RIP possible to determine the degree and nature of its impact on the economy of the region, on the basis of which it can be adjusted trajectory of regional development (Risn 2016, p. 53; Silka 2013).

26.3 Approbation of Methods

In a research innovation potential levels of the subjects of the CFA were calculated for the years 2005–2015 using the structural evaluation of regional innovation potential. The results are shown in Table 26.2.

So, throughout the study period the highest value of RIP was appropriated to Moscow, which is quite natural, given the level of maintenance of the subject of financial, investment, intellectual, information and research resources. The three leaders also included Moscow and Kaluga regions. The lowest values correspond to the performance of Smolensk, Tambov, Bryansk, and Kostroma regions, respectively.

Table 26.2 Innovative potential of subjects of CFD

Region	2005	2009	2010	2011	2012	2013	2014	2015
Belgorod	0.197	0.174	0.193	0.186	0.179	0.178	0.179	0.176
Bryansk	0.149	0.148	0.144	0.133	0.154	0.150	0.151	0.154
Vladimir	0.213	0.190	0.194	0.186	0.190	0.207	0.211	0.216
Voronezh	0.248	0.229	0.240	0.221	0.248	0.258	0.266	0.273
Ivanovo	0.151	0.159	0.158	0.139	0.144	0.165	0.167	0.169
Kaluga	0.237	0.260	0.300	0.267	0.299	0.316	0.334	0.344
Kostroma	0.133	0.091	0.125	0.110	0.116	0.116	0.125	0.124
Kursk	0.152	0.158	0.156	0.160	0.172	0.191	0.200	0.213
Lipetsk	0.146	0.188	0.198	0.184	0.169	0.193	0.195	0.201
Moscow	0.342	0.316	0.348	0.325	0.349	0.377	0.395	0.408
Oryol	0.184	0.133	0.183	0.166	0.156	0.154	0.163	0.158
Ryazan	0.172	0.140	0.172	0.168	0.179	0.191	0.207	0.221
Smolensk	0.121	0.152	0.158	0.140	0.146	0.168	0.173	0.178
Tambov	0.148	0.155	0.135	0.158	0.177	0.187	0.197	0.217
Tver	0.145	0.206	0.206	0.186	0.176	0.204	0.204	0.205
Tula	0.170	0.165	0.179	0.158	0.185	0.193	0.202	0.209
Yaroslavl	0.211	0.207	0.232	0.222	0.228	0.228	0.234	0.234
Moscow city	0.625	0.585	0.592	0.591	0.635	0.617	0.626	0.635

Research of dynamics of RIP of Kursk region has showed positive trends of steady growth: (1) the human potential of the region, due to the growing proportion of staff engaged in research and development, the total number of employed in the economy, and increasing the number of students per 10,000 person population; (2) technical and technological capabilities through increased innovation activity of enterprises of Kursk.

26.4 Conclusions and Recommendations

Thus, the measures aimed at improving integrated RIP are necessary, taking into account the structural features. To do this, use the available potential, and identify internal opportunities and growth prospects, in order to accelerate the development, manufacturing, commercialization, and transfer of innovation in the region.

One of the possible options for enhancing the effectiveness of the management of the region innovation system is the formation of the strategy of innovative development of the subject. This step includes the following stages:

1. The wording of the goals and priorities of innovation development. General purpose, as a rule, serves the region's economy transition to an innovative path of development. Due to the fact that a particular region can claim to leadership at every stage of the innovation process, as well as, given the limited resources in the provision of innovative development, formulated the strategic priorities is to focus in a number of key areas. Firstly, the further development of the growth points that are already present in the subject and those fully supplied or available resources can be achieved without significant difficulty. Secondly, the maximum reduction in the backlog at those stages of the innovation process, which are at a low and very low level of development (e.g., stage of commercialization or transfer of innovation in terms of the lack of necessary infrastructure).
2. The choice of target indicators of implementation of innovative strategies that can match the performance evaluation system of innovation potential of the region.
3. Determination of the mechanism of the impact on the region's innovation system. The instruments of the system implementation of the strategy in favor of normative-legal, institutional, infrastructural, and financial support for innovative activities.

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Chapter 27

Education Democracy and Dictatorship

Rizwan Ali and Gao Leifu

Abstract In the battle between democracy and dictator, this study aims to analyze the role of education in this battle overall and gender wise. Furthermore, it investigates whether and how different political regimes classified as democracy and dictatorship affects the education sector of Pakistan. The results show that primary and middle school education do support significantly the dictator type of government in Pakistan. It is observed that female enrollment in middle school supports the dictator over the democratic. We also find that dictator promoted education equally for males and females. Overall dictators perform better in the development of education of Pakistan.

Keywords Democracy • Dictator • Education and middle schools

27.1 Introduction

Pakistan, since its foundation in 1947, faced a challenge in addressing the basic needs of its citizens i.e. education and political stability. Many writers even few official documents acknowledge education to be basic need. Increasing educational attainment plays vital role to reduce the conflict risk, especially countries like Pakistan that have well-known education problem. The conventional wisdom, since Dewey (1916), views high level of education attainment as a prerequisite for democracy. The relative performance of democracy and dictatorship in enriching a country's education has been hotly debated for years.

If one takes closer look at the pattern from recent years, there are empirical evidences of democracies with good and with poor economic records and there are examples of dictatorship with the good and with the poor economic records. Recent research work, for instance, by Barro (1999) and Przeworski et al. (2000), agrees with the Dewey view. Meanwhile a review article (Przeworski and Limongi 1993)

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revealed 18 studies with 21 findings in the literature. Eight of findings document that democracy grower faster but another 8 find in favor of democratic regimes and remaining five discover no difference.

Brown and Hunter (2004) provide evidence that Latin American democracies have spent more on the primary education. Lake and Baum (2001) conclude that democratically governments provided significantly higher services. The recent study Glaeser et al. (2004) explored that changes in schooling predict changes in democracy and other political institutions.

The relationship between democracy and economic growth has been studied intensively. Many studies in literature take regime type as one of the many factors that affect the economic growth including education. They reveal different conclusions on the relationship between the democracy and growth but many of them find the broad differences between the performance of democracy and dictators.

For example, Brown and Hunter (2004) conclude that elected governments may have incentive to spend more resources to the primary education because a broader segment of voters benefit from this area. Alesina and Perotti (1997) highlight the importance of political stability as “what influences growth is not so much the type of regime (dictatorship or democracy) but regime instability, that is, the propensity to coups and major changes of government.”

Furthermore, a dictator with large winning coalitions especially when they have small selectorates may follow the growth enhancing policies. A collapse of the governments significantly lowered the economic growth; single part dictators have higher investment ratios but do not faster than party less regimes. Our research on the relationship between regime type and education performance focuses on the comparative success of democracy and dictatorship in increasing education facilities among male and female at all levels.

27.2 Data and Methodology

In order to test our hypothesis, we use the regime wise data for the education sector which yields separate observations of total number of institutions at all level, primary school, middle school, high school, arts and science colleges, professional colleges and universities overall, and gender wise over the period of 1956–2007. The data of these variables has been obtained from the State Bank of Pakistan and Economic survey of Pakistan. To test the proposed hypothesis, Logistic Regression and Ordinary Least Square regression (OLS) has been used.

The following logistic model is used:

$$P(GS = 1) = a + b_1 \text{ Prim. Inst. Total} + b_2 \text{ Mid. Inst. Total} + b_3 \text{ High. Inst. Total} + b_4 \text{ Art \& Sci. Inst. Total} + b_5 \text{ Prof. Inst. Total} + b_6 \text{ Uni. Inst. Total} \dots \text{Model (1)}$$

$$P(GS = 1) = a + b \text{ Prim. Female} + b_2 \text{ Mid. Female} + b_3 \text{ High. Female} + b_4 \text{ Art \& Sci. Female} + b_5 \text{ Prof. Female} \dots \text{Model (2)}$$

$$P(GS = 1) = a + b \text{ Prim. Male} + b_2 \text{ Mid. Male} + b_3 \text{ High. Male} + b_4 \text{ Art \& Sci. Male} + b_5 \text{ Prof. Male} \dots \text{Model (3)}$$

$$P(GS = 1) = a + b_1 \text{ Prim. Enroll. Total} + b_2 \text{ Mid. Enroll. Total} + b_3 \text{ High. Enroll. Total} + b_4 \text{ Art \& Sci. Enroll. Total} + b_5 \text{ Prof. Enroll. Total} + b_6 \text{ Uni. Enroll. Total} \dots \text{Model (4)}$$

$$P(GS = 1) = a + b \text{ Prim. Enroll. Female} + b_2 \text{ Mid. Enroll. Female} + b_3 \text{ High. Enroll. Female} + b_4 \text{ Art \& Sci. Enroll. Female} + b_5 \text{ Prof. Enroll. Female} \dots \text{Model (5)}$$

$$P(GS = 1) = a + b \text{ Prim. Enroll. Male} + b_2 \text{ Mid. Enroll. Male} + b_3 \text{ High. Enroll. Male} + b_4 \text{ Art \& Sci. Enroll. Male} + b_5 \text{ Prof. Enroll. Male} \dots \text{Model (6)}$$

Following OLS models is estimated:

$$\text{Total Number of Student Enrollment} = a + b_1 GS + b_2 GDPG + b_3 \text{ Per Capita Income} \dots \text{Model (7)}$$

27.3 Results and Discussion

Table 27.1 reveals the role of overall education institutions to the democracy–dictatorship. Overall model is significant at 1% with the acceptable explaining power. The *p*-values of professional colleges and universities support the dictatorship style of the government that is unusual for the rest world but it is true in case of Pakistan. A massive development has been done by the last dictator from 1992 to 2008. He promoted the technical education rather than the traditional education during his era.

Table 27.2 shows that how gender wise education institutions affect the democracy–dictatorship. Model-2 results show that those female primary schools are significantly support the democratic government while female middle schools

Table 27.1 Model-1 role of education institutions to democracy–dictatorship

Number of Obs.			54
Prob > χ^2			0.001
Pseudo R^2			0.307
GS	Odds ratio	SE	$P > Z$
Prim. total	0.95	0.32	0.12
Mid. total	0.78	0.42	0.64
High. total	0.81	0.62	0.79
Art and Sci. total	1.01	0.01	0.41
Prof. total	0.97	0.01	0.06
Uni. total	1.33	0.18	0.04

Table 27.2 Role of gender wise education institutions to the democracy–dictatorship

Model-2 total institutions for female				Model-3 total institutions for male			
Number of Obs				53	Number of Obs		54
Prob > χ^2				0.012	Prob > χ^2		0.023
Pseudo R^2				0.21	Pseudo R^2		0.19
GS	Odds ratio	SE	$P > Z$	Odds ratio	SE	$P > Z$	
Prim.	0.88	0.05	0.03	0.96	0.03	0.11	
Mid.	2.53	1.06	0.03	1.96	0.95	0.16	
High.	0.33	0.34	0.28	0.66	0.43	0.53	
Art & Sci.	1	0.01	0.51	1	0.01	0.52	
Prof. College.	0.98	0.01	0.23	0.98	0.01	0.13	

significantly like the dictator government. This interesting phenomenon was expected because in all dictator regimes they promoted the female education. By looking at the male institutions we find none of the studied educational levels are significant.

By looking at Table 27.3 we found that enrollment in primary schools and high schools significantly matters for the democratic form of the government. This is true as democratic government spend lot of money to the primary level of education to get more vote in future as argued by the Brown and Hunter (2004) and Pakistan is no exception.

The estimated female student’s enrollment Eq. (5) supports many previous studies. Middle school enrollment supports the dictator form of the government that is quite consistent we observed in model-4. By looking at model-6 results we find that only high school enrollment for males significant and they support the democracy government. The reason behind these interesting facts is that dictator is our country does the things which should be done by the democratic governments. And dictator by doing this always got the people support and in many worst situations people welcome the dictator (Table 27.4).

Table 27.5 shows how government style (democracy–dictatorship) and economic development affect the education enrollment in the country. Overall model is

Table 27.3 Model-4 role of overall enrollment to the democracy–dictatorship

Number of Obs			47
Prob > χ^2			0
Pseudo R^2			0.45
GS	Odds ratio	SE	$P > Z$
Prim. total	0.96	0.02	0.064
Mid. total	1.04	0.07	0.524
High. total	0.91	0.05	0.073
Art and Sci. total	1	0	0.11
Prof. total	1	0	0.679
Uni. total	0.99	0	0.122

Table 27.4 Role of gender wise student enrollment to democracy–dictatorship

Model-5 total institutions for female				Model-6 total institutions for male			
Number of Obs				47	Number of Obs		47
Prob > χ^2				0	Prob > χ^2		0
Pseudo R^2				0.44	Pseudo R^2		0.37
GS	Odds ratio	SE	$P > Z$	Odds ratio	SE	$P > Z$	
Prim.	0.97	0.06	0.661	0.97	0.016	0.82	
Mid.	1.31	0.19	0.059	1.17	0.17	0.273	
High.	0.68	0.2	0.183	0.91	0.05	0.051	
Art and Sci.	1	0	0.214	1	0	0.441	
Prof. College.	0.99	0	0.454	1	0	0.9133	

Table 27.5 Model-7 role of government style and development on education

Number of Obs.			51
Prob > F			0
R -squared			0.82
Adj R -squared			0.81
Total std.	Coef.	SE	$P > t$
Per. capita Inc	16.07	1.1	0
GDP growth	−20857.7	10103.56	0.045
GS	76558.06	48177.72	0.119
Const	172520.7	64654.99	0.01
VIF			
Variable	VIF	1/VIF	
Per. capita Inc	1.11	0.9	
GS	1.1	0.91	
GDP growth	1.05	0.95	

significant at 1% with very good explanation of 0.81. The model is consistent with the previous findings that student's education likes the dictatorship style of Government in Pakistan. This is not true in well-supplcated and developed countries, a strand of literature available against this review but Pakistan is a unique country in this respect. In this country, democracy governments are very corrupt and they do not put lot of efforts to educate the people of the country.

27.4 Conclusion

This study is unique because it revealed very interesting results for Governance in Pakistan, from the independence day to 2010. Existing studies showed that education supports the democracy and democratic governments spend a lot for the development of the education. But in case of Pakistan it is not true due to more than one reason, this is the reason many educational institutions came into existence in dictator regimes.

First and the most reason behind this fact is that all the democracy governments are always trying to make happy their big supports by giving more subsidies. As in Pakistan elections are controlled by few groups who have controlled on general people and they force them to vote to their party.

Secondly literacy rate in Pakistan is very low and democratic governments by their do not want to educate people because if they get educated they will get sense of good and bad. And in future they will not choose the corrupted and bad character people as their leaders. Thirdly due to insufficient spending on the sector, there is lack of infrastructure and resources. In contrast, as dictators do not need the support of the groups, they do their job in a good way and they force the institutions to do their job as per standard. As dictator came with the argument that democratic governments are not doing well so they come forward to do things better, they build infrastructure and promote the education to let people get educated and choose their good leaders. They also promote and provide equal education to male and females. The latest era of last dictator General Pervez Musharraf is evident of the development in all sectors along with the education. Due to these developments people do call dictator upon democratic governments that is true for the Pakistan might be surprising for the rest of world.

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Chapter 28

Are We Better Off Working in the Public Sector?

Yi Wang and Peng Zhou

Abstract This paper critically reviews the literature on public sector wage premium, especially in the developed countries like the USA and the UK. It is found that the pay advantage is persistent over the latest half century, but it started to decline since the late-1990s; in particular, females tend to enjoy a higher wage premium than males. A key technical problem of estimating wage premium is selection bias, because the sector choice is endogenously determined by individual characteristics and job attributes. The main prevailing methods in the current literature are categorised into four main types, and a sample dataset from the Labour Force Survey (UK) in the latest decade is used to apply and compare these methods. The findings suggest that Blinder–Oaxaca and OLS seem to underestimate the wage premium by 2 %, compared to propensity score matching method.

Keywords Public sector wage premium • Decomposition • Treatment effect • Propensity score matching

JEL Classification C21, C35, J31, J45

28.1 Introduction

In the UK, 50 % of government spending goes to wages, and the public sector employs about 20 % of the total UK workforce (Chatterji et al. 2010). The public sector is the largest employer in the UK, and has influential impact on the whole economy. The efficiency, effectiveness and equity of the public sector are of great

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interest to both theorists and practitioners. In particular, the recent financial crisis and economic recession revived the debate over the need to restructure the public sector, while wage premium in public sector is the centre of this debate.

According to neoclassical paradigm, any pay differential in competitive markets must reflect differences in worker characteristics and job attributes. After controlling for these factors, there should not be systematic pay differential between public sector and private sector. However, in practice, pay differential across sectors exists almost in all economies and across all periods, even after controlling for these factors. Disney (2007) summarises that this wage premium results from different occupational composition, pay structure, market power and worker preferences.

The central research question of this paper is how to estimate the wage premium in public sector. From the first glance, the question seems quite simple, but the answer depends on various dimensions, such as time period, geographic area, gender, age, education, occupation, etc. Moreover, simple method based on OLS is subject to selection bias problem: the choice of working in public sector may not be exogenous, because there may be omitted variables that affect both a worker's sector choice and her wage. In other words, if the individuals working in the two sectors are not randomly sampled, then simple regression results are misleading because we are not comparing like with like. Simple OLS ignores the fact that the sector in which an individual is working, unlike race and gender, depends on decisions made by rational economic agents and is therefore endogenous. Neglecting this selectivity effect will give a wrong picture of the relative earnings position of public sector workers.

This paper first reviews the literature on public sector wage premium over the last 50 years, focusing on developed countries. In Sect. 28.3, selection bias problem, which is the central issue in estimating public sector wage premium, is discussed in detail. Section 28.4 classifies and compares the main methods in literature. Section 28.5 describes the sample data, which is used in Sect. 28.6 to draw comparison between methods. Section 28.7 concludes.

28.2 Literature Review

The public—private pay differential has been a central issue in labour economics and policy making since Smith (1976). Pay comparability between public and private sectors is important for both efficiency and equity arguments. Regarding efficiency, government needs to know whether it pays no more than is necessary to attract an adequate worker. For equity, the individual workers in both private and public sectors want to know if they are equally paid, and a fair pay scheme will lead to a more competitive labour market across sectors. However, a vast literature across time and countries shows that there are systematic pay differentials between private and public sectors, especially in the developed countries such as the USA, Canada and the UK. This section provides a comprehensive review on the most influential literatures, and some important papers are summarised in Table A1.

Table A1 Key literature

Literature	Data	Country	Period	Method
Smith (1976)	US Census	USA	1960 and 1970	Type 1
Gunderson (1979)	Canadian Census	Canada	1971	Type 1
Robinson and Tomes (1984)	Social Change in Canada Survey	Canada	1979	Type 3
Venti (1987)	Current Population Survey	USA	1982	Type 1 Type 3
Poterba and Rueben (1994)	Employer Cost Index; Current Population Survey	USA	1979–1992	Type 1 Type 2
Disney and Gosling (1998)	General Household Survey and British Household Panel Survey	UK	1980s–1990s	Type 1 Type 2
Blackaby et al. (1999)	Labour Force Survey	UK	1993–1995	Type 1 Type 2
Melly (2005)	Current Population Survey	USA	1973–1989	Type 1 Type 2
Ramoni-Perazzi and Bellante (2006)	Current Population Survey	USA	1992–2000	Type 3 Type 4
Chatterji et al. (2010)	British Workplace; Employee Relations Survey	UK	2004	Type 1 Type 2
Gibson (2009)	International Social Survey Program Work Orientations Survey	New Zealand	2005	Type 4
Voinea and Mihaescu (2011)	Household Budget Survey	Romania	2004–2009	Type 1 Type 2
Blackaby et al. (2012)	Labour Force Survey	UK	1994–2011	Type 1

Initially, it is noted that, during the 1960s, the federal pay systems in the USA were reformed to achieve the purpose of narrowing pay differentials from comparable works in the public and private sector. The seminal paper of Smith (1976) marks a milestone in this topic, and the results indicate that the federal workers were consistently paid more than their counterparts in the private sector in the USA during the 1960s. One of the influential contributions of this paper is that the observed pay differential is decomposed into two parts. One part is due to the differences in personal characteristics between the two types of workers and the other can be considered as economic rent in the public sector. Gunderson (1979) applies the same methodology to Canadian census, with a particular focus on the wage premium in terms of gender and income distribution. Evidence shows that females enjoy a higher wage premium of working in the public sector. Moreover, the public sector pay advantage is found larger for low-wage workers, resulting in the basic policy dilemma that reducing the public sector wage premium may conflict with the goal of raising low-wage workers.

Carow (1981), Bellante and Long (1981) and Quinn (1982) challenged the validity of this decomposition noting that “we can never fully capture all worker-specific differences” (Venti 1987). In other words, the unexplained component of pay differential between public and private sectors may be more properly interpreted as unobserved individual differences and job attributes. For example, it may be due to the nonpecuniary job attributes or “fringe benefits”, such as stability of employment, opportunity for internal promotion, unique nature of public service, pace of work, the bureaucratic work environment, and so on. People with different tastes may prefer to work in one sector to the other because of these nonpecuniary aspects, and the sector choice may reflect the fundamental differences in people’s perception of the two types of job.

Based on this argument, Venti (1987) finds that wage equality between similar workers in the public and private sectors was not achieved in the USA in 1982. After adjusting for both observed and unobserved individual characteristics, the basic conclusions in previous studies are actually strengthened, i.e. there is an even higher wage premium in the public sector. Females working in the public sector earn 22 % higher than their counterpart in the private sector, while males earn 4 % higher than those in the private sector. Evidence shows that if nonpecuniary benefits are ignored, the public sector wage premium is likely to be underestimated. Venti (1987) also formulates and estimates a model permitting prediction of the pay differential that eliminates implicit queues for public sector jobs, noting that labour market in the two sectors does not always clear. The estimates suggest that “elimination of queues would be achieved by reducing the federal wages for males about 16 % and for females by about 42 %”. To achieve this, the reduction in the public sector wages is substantial, indicating a huge potential for efficiency promotion in the public sector.

Meanwhile, there is an alternative focus in literature to investigate the impacts of union status on the wage premium in public sector. This strand of literature has brought awareness of the problem of selection bias and the role of multiple-equation model in this field. The effect of unions on wage is identified by the seminal papers of Lewis (1963) and Freeman and Medoff (1981) for the USA, and Parsley (1980) for the UK. Ashenfelter and Johnson (1972) and Schmidt (1978) show that the positive effect of unions on wage estimated in single-equation model can be eliminated in a simultaneous equations framework. Lee (1978) proposes an explicit model of endogenous choice on union status, which is then used to correct for selection bias. This idea is actually very similar to Heckman selection model. Robinson and Tomes (1984) is the first study that allows for the determination of union status in estimating public sector wage premium. It is found that the choice of union status is strongly affected by the expected wage gain from joining the unionised sector, and evidence suggests a larger union gains in the public sector than in the private sector. Therefore, the major reason for the public sector wage premium may be the stronger public sector unions. This study has cured the drawback of the exclusion of union status in the previous Canadian study by Gunderson (1979).

Following a series of papers, including Chamberlain (1994) and Buchinsky (1994) in the early 1990s, quantile regression emerges as a popular technique to parsimoniously describe the conditional wage distribution. This technique was

immediately adopted in the studies of public sector wage premium by Poterba and Rueben (1994), who find that the relative wages of women employed in the two sectors changed very little during the 1979–1992 period, while the relative wages of men rose nearly 8%. This paper also explores the distribution of wage premium in terms of education level. Evidence shows that the advantage for highly educated workers to work in the public sector disappeared in the 1980s, while those with at most a high school education still enjoy a significant wage premium. Another important conclusion from quantile regression is that the magnitude of wage premium is sensitive to the choice of quantile, but the change in the wage premium is not substantially affected.

Disney and Gosling (1998) apply quantile regression technique to the UK data, and find a clear evidence of a downward trend in the public sector wage premium over the 1980s and 1990s, as quoted in Fig. 28.1. It is reported that wage premium for women is again persistently higher and more significant than that for men during this period. The wage premium has virtually disappeared for males by the mid-1990s. Moreover, the higher-paid workers in the public sector enjoy higher wage premium than lower-paid workers, which suggests returns to education is different across sectors. At the same time, Mueller (1998) uses the same technique to study the public–private sector pay differentials in Canada, as an extension to the previous work (Gunderson 1979). Similar conclusions are drawn—females and individuals at the lower tail of the wage distribution have higher wage premium. One remarkable contribution of this paper is to take into account the role of public sector unions, which tend to have higher bargaining power than private sector unions. Hence, it is a comprehensive combination of previous studies in this area. Whilst these practices recognise the importance of the distribution of earnings, the underlying framework only focuses upon the role of predicted earnings and as such ignores the significance of the distribution of unobserved (residual) factors between workers. Seeing that,



Fig. 28.1 Public sector wage premium by gender (Disney and Gosling 1998)

Blackaby et al. (1999) combine quantile regression with the decomposition method proposed by Juhn et al. (1993) to capture the distribution of unobserved factors. Their findings are entirely consistent with the stylised facts in the USA by Poterba and Rueben (1994) and Mueller (1998). However, the role of “economic rent” turns out to be less important in accounting for the pay differentials across sectors.

Entering the twenty-first century, the public sector wage premium is less significant, but the wage premium for females is still consistently higher than males. Latest literature places a special focus on the gender difference and regional difference. Chatterji et al. (2010) find that the gap for male employees is less than half that for females in the UK. The major component of the earnings gap between men and women in the UK is associated with the gender effect, which suggests that the Equal Pay legislation has not been fully effective in either sector. As shown in Blackaby et al. (2012), the earnings gap is significantly negative for men working in London and South East in the UK (see Fig. 28.2), ranging from -16% (2000–2002) to -10% (2008–2010). In addition to region and gender, this study also investigates the wage premium in terms of firm size, education level and specification of the earnings equation, providing a comprehensive robustness check.

Moreover, Allington and Morgan (2003) conduct a literature review on the UK-based studies, not only on microeconomic studies, but also on macroeconomic studies using aggregated data on average earnings between the two sectors, including Trinder (1981), Elliot and Murphy (1987), Elliott and Duffus (1996) and Nickell and Quintini (2002). One of the advantages of using macrodata is that a longer sample period is available for time-series analysis. However, the underlying demographic characteristics may change over time and therefore must be taken into account. Macrodata evidence also suggests that the benefits of working in public

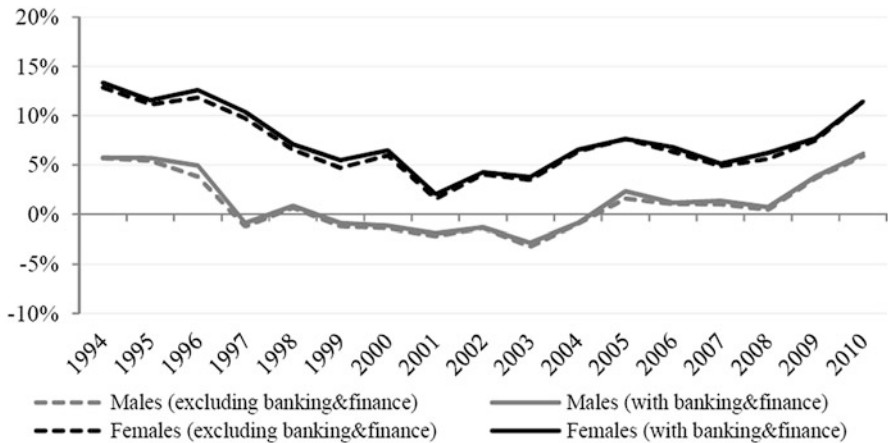


Fig. 28.2 Public sector wage premium by gender (Blackaby et al. 2012)

sector were greater for females and manual workers in the 1970s and 1980s, while the premiums have gradually become penalties by the end of the 1990s, especially for males and highly skilled workers.

Different from a commonly observed public sector wage premium in the developed countries, literature on developing countries, however, is less conclusive. For some transitional economies, the public sector wage premium is found negative, such as Corbo and Stelcner (1983) for Chile, Adamchik and Bedi (2000) for Poland, Leping (2005) for Estonia, and Jovanovic and Lokshin (2004) for Russia. In contrast, countries like Tanzania (Lindauer and Sabot 1983), Côte d'Ivoire (Gaag and Vijverberg 1988), Haiti (Terrell 1993) and China (Yu and Chen 2010, Yin and Gan 2009) show a positive wage premium similar to the developed countries, including the features in terms of gender and education level.

To summarise, public sector wage premium is strongly supported from the 1960s to mid-1990s on both sides of Atlantic, especially for females and low skilled/educated workers than their counterparts working in the private sectors. However, the overall wage premium has diminished since the late-1990s, suggesting a more competitive labour market across sectors. In particular, males in the public sector are more likely to have wage penalties, while females still enjoy a positive wage premium of working in the public sector.

There are four main reasons for the wage premium. First, private firms are profit maximisers, while public sector employers are more like vote maximisers. There is usually a wage floor for public sector wage to compete with private employers for workforce, so the disadvantaged group (e.g. females, low skilled workers) tends to benefit more from this protection. In contrast, the disadvantaged workers in private sector do not face such protection because profit is private firms' foremost objective, but the advantaged workers (e.g. males, highly skilled workers) may create more fortune in private sector than in public sector. Second, unions are usually more pervasive and have stronger bargaining power in public sector, imposing a greater pressure on wage, especially for disadvantaged workers. Third, the demand for public sector services is usually regarded as inelastic, so the demand for labour in public sector will also be inelastic. As such, a positive wage premium is possible and will be passed on to the customers, i.e. taxpayers. Finally, the magnitude of wage premium also depends on the phase of business cycle. Private sector wages are more sensitive to economic fluctuations, while public sector wages are less volatile.

To understand the evolution of the methods in this field, a crucial concept is selection bias, which is in fact also a fundamental problem for the whole applied microeconomics. Indeed, selection bias is the main reason for developing new methods in the empirical literature of public sector wage premium in the latest half century. Hence, the next section of this paper will go through this important issue before summarising the methods applied in existing literature.

28.3 Selection Bias

It is common in applied microeconomics and also in the whole social science that the data collected may not be random. In other words, the probability of being sampled for each individual is different. Since the object in question is human beings, who are free to make their own decisions, the individuals under observation are usually not sampled in the way carried out in natural science. This induces an obvious consequence that the observed individuals may not represent the whole population, so the estimated relationships based on the non-random sample are biased.

In this sense, selection bias can be treated as a data problem. That is to say, it causes distortion of a statistical analysis, due to the method of collecting data. As a result, non-randomly selected samples are used instead of randomly selected samples to estimate behavioural relationships. If this data problem is not taken into account, then the estimates are biased and conclusions drawn are misleading. In fact, these estimates can only reflect the behaviour in a subsample represented by the observed individuals. The conclusions are not generalisable to the whole population.

Alternatively, selection bias problem can also be regarded as a model specification error (Heckman 1979). Given that the non-randomly selected samples are not random, then this non-randomness must be caused by some latent factor. If this latent factor is omitted, then the original behavioural relationship must be false, because of the endogeneity of some regressors, i.e. the error term (containing the omitted variable) is correlated to some regressors.

If the selection bias problem is treated as a data problem, then a straightforward solution is to change the way of interpreting the estimates. It must be made clear that the conclusions drawn from the regressions are only valid within the specific range represented by the sample. For example, the estimated return on education is only for those who are working, rather than for the whole labour force.

In contrast, if the selection bias problem is treated as an omitted variable problem, one obvious remedy is to use or construct some proxy for the missing selection effect. In particular, Heckman (1979) proposes an influential two-equation model to deal with selection bias problem, along with many alternative methods. Also, in the light of this insight, other solutions to omitted variable problem can also be utilised, such as instrumental variables regression.

In general, selection bias problem may be caused by three reasons. The first possible reason is also called “self-selection bias”, which refers to the situation where individuals themselves have some latent characteristics to affect the probability of being sampled. In the context of wage premium in public sector versus private sector, researchers may run regression directly on all the observable individual characteristics and job attributes, including the sector choice. However, the choice of working in public sector is not like race or gender, which is determined naturally and cannot be chosen. In contrast, people have freedom to choose in which sector they work. That is to say, the observed individuals working in public sector may not be randomly sampled from population. There is a certain unobserved tendency or propensity leading them to the sector being chosen, and this latent factor must take

different values for different individuals. Following Heckman's interpretation, this unobserved factor is the omitted variable, resulting in the selection bias.

The second reason causing selection bias is the non-randomness due to the decisions taken by data analysts, which is just the second reason identified by Heckman (1979). Different from the first type which is caused by the observed, this type of selection bias is caused by the observer. It is common in empirical research that the researcher may drop some observations on purpose. Qualitative studies relying on small samples, collected by approaches such as questionnaires and interviews, are usually subject to this type of selection bias. This sort of problem can be avoided if the researcher is better informed about the data structure, so that stratification could be used in sampling to mitigate this risk.

The third reason for selection bias is due to the observability or tractability of some part of the population. The difference from the other types is that it is the nature of the data, rather than the action of the analyst, that leads to the omission of some data points. This type of selection bias often occurs when there is a threshold for individuals to be observed. For example, to estimate the return on education, the sample can only encompass those who are working, because wages are observable only when people are employed. However, for those who are unemployed, their wages are equal to zero, and it does not mean, of course, the return to education for them is equal to zero. The wages of the unemployed individuals are not observable, and they are not likely to be a random group from the population. Therefore, omitting them will also induce selection bias.

The most important type of selection bias in analysing public sector wage premium is the first one, because the self-selection bias problem cannot be easily overcome simply by careful interpretation or better sampling design, as one would do to deal with the other two types. However, technically all the three types can be solved in the similar way by the methods developed in literature.

28.4 Methodology

In general, there are four main types of method to obtain public sector wage premium in microeconomic literature. The first type is decomposition-based method, which calculates the proportion of overall average pay differential purely owing to the economic rent of working in public sector. This type of method includes Blinder–Oaxaca decomposition as adopted in the earliest literatures (Smith 1976, Gunderson 1979) and the later extensions by Juhn et al. (1993) and Melly (2005). The second type is single-equation-regression-based method, which directly estimates the coefficient of the dummy variable describing whether or not working in public sector based on a wage determination equation. The simplest way is running OLS as in Blackaby et al. (2012), but instrumental variables (IV) and quantile regression are also commonly used to correct for the bias due to omission of variables. The third type is multiple-equation-regression-based method, mainly including the approach developed by Lee (1978) or Heckman (1979) and treatment

effect model. This type of method addresses the problem of selection bias explicitly by a selection equation accounting for the sector choice, so that the estimated coefficients in the earnings equation are unbiased. The fourth type is matching-based method, which calculates the wage premium by finding the counterpart individuals in the two sectors in terms of a certain matching criterion. The most popular matching-based method is propensity score matching (PSM), as used in Ramoni-Perazzi and Bellante (2006) and Gibson (2009).

This classification emphasises the direct method of estimating/calculating wage premium. Nevertheless, it is worth mentioning that there are overlapping techniques used in different types of method. Also, from a more general perspective, the second type and the third type belong to the same higher order category, regression-based method, while the first type and the fourth type are closer because wage premium is obtained by calculation rather than estimation. The following two paragraphs explain the links and differences of the four types of methods in detail.

Note that both the second type and the third type aim to estimate wage premium directly by specifying an earnings equation following Mincer (1974) human capital model. The only difference is that the multiple-equation-regression-based method corrects for the selection bias using another regression, while single-equation-regression-based method either ignores the problem of omitted variables (OLS and quantile regression) or deals with it otherwise within the single-equation framework (IV). In the regression-based method, there will be self-selection bias if people working in different sectors have unobservable characteristics and propensities for working in the public sector, as discussed in the previous section. To remove endogeneity caused by selection bias or omitted variable, IV could be used, but valid instruments are very rare. Quantile regression is another extension to single-equation regression to mitigate the bias by painting a more complete picture about the effect of regressors on the distribution rather than just the mean of wage. In contrast, Heckman selection model and treatment effect model are two-equation methods. The first stage is to regress the choice of working in the public sector on a set of exogenous variables, and the second stage is to generate a proxy regressor to be used in the earnings equation to solve the problem of omitted variable in estimating public sector wage premium.

Also note that the first type (decomposition) and the fourth type (matching) obtain the wage premium in ways other than direct regression, but regression forms the basis for decomposition or matching. For example, to decompose the overall difference between private and public sector wages, two separate regressions are needed to estimate the coefficients for each sector. Therefore, the first step of decomposition-based method may be exactly the same as regression-based method. For matching-based method, a probit or logit regression is needed to calculate the propensity, which will then be used as an index to summarise individual characteristics for matching. Again, this first step of matching-based method may be exactly the same as the first step of regression-based method. The key to distinguish one method from another is therefore not the econometric techniques per se, but the purpose of the techniques.

In addition to these techniques based on cross-sectional data, there are also various methods in estimating the wage premium using techniques for time-series data and panel data (Disney 2007). For example, Disney and Gosling (2003) use the privatisation programme of the 1990s in the UK as a natural experiment to avoid the problems of self-selection and measurement error. This enables them to use panel data methods to control for individual unobserved differences that do not change over time. However, the application of these methods depends on the data availability. Given this limitation, cross-sectional methods are still the most popular choice. Therefore, the following subsections are devoted to analysing the mechanism, advantages and disadvantages of the four types of cross-sectional methods.

28.4.1 Decomposition-Based Method

The earliest methodology is based on simple OLS regressions, respectively, for workers in public and private sectors, as in Smith (1976). Then the overall average pay differential can be decomposed into two portions:

$$\begin{aligned} \overline{\ln w^G} - \overline{\ln w^P} &= \overline{\mathbf{x}^G} \widehat{\boldsymbol{\beta}}^G - \overline{\mathbf{x}^P} \widehat{\boldsymbol{\beta}}^P \\ &= \overline{\mathbf{x}^G} \widehat{\boldsymbol{\beta}}^G - \overline{\mathbf{x}^G} \widehat{\boldsymbol{\beta}}^P + \overline{\mathbf{x}^G} \widehat{\boldsymbol{\beta}}^P - \overline{\mathbf{x}^P} \widehat{\boldsymbol{\beta}}^P \\ &= \underbrace{\overline{\mathbf{x}^G} (\widehat{\boldsymbol{\beta}}^G - \widehat{\boldsymbol{\beta}}^P)}_{(i)} + \underbrace{(\overline{\mathbf{x}^G} - \overline{\mathbf{x}^P}) \widehat{\boldsymbol{\beta}}^P}_{(ii)} \end{aligned}$$

The first portion (i) is due to the sectoral difference in coefficients or returns, while the second portion (ii) is due to different individual characteristics. The latter term (ii) is called “legitimate” pay differential because it reflects difference in characteristics of individuals, such as education, experience, etc. In contrast, the first term (i) is considered as wage premium or economic rent, which reflects the pure pay differential paid for the same characteristics. This method is in fact an application of Blinder–Oaxaca decomposition (Blinder 1973; Oaxaca 1973).

However, the validity of OLS regression in the first stage depends on two key assumptions. First, given observed individual characteristics, workers are randomly distributed across sectors. Second, pay differentials do not represent differences for nonpecuniary job attributes of each sector. Obviously, both assumptions do not hold, because the choice of sector is endogenous and sectors offer fundamentally different nonwage job attributes. Venti (1987) decomposes the pay differential between the public and private sectors into four sources: first, economic rent or overpayment by government employers; second, observed productivity or skill differences; third, unobserved productivity or skill differences; and fourth, equalising differences in pay for nonpecuniary job attributes. The original approach used in Smith (1976) only distinguishes the first two, while the latter two are ignored.

Regarding the third source ignored by Blinder–Oaxaca decomposition, one extension is to take into account the unobserved characteristics, based on Heckman selection model (Terrell 1993). If the earnings equation omits some unobservable characteristics that are related to the choice of working in public sector, then the OLS estimates are subject to self-selection bias. Heckman selection model (detailed in Sect. 28.4.3) enables one to control for this omitted variable by constructing a regressor (inverse Mills ratio) from the selection equation. Hence, there is one more component (iii) compared to Blinder–Oaxaca decomposition:

$$\begin{aligned}
 \overline{\ln w^G} - \overline{\ln w^P} &= \overline{\mathbf{x}^G \hat{\boldsymbol{\beta}}^G} + \widehat{\gamma^G \widetilde{\lambda}^G} - \overline{\mathbf{x}^P \hat{\boldsymbol{\beta}}^P} - \widehat{\gamma^P \widetilde{\lambda}^P} \\
 &= \overline{\mathbf{x}^G \hat{\boldsymbol{\beta}}^G} - \overline{\mathbf{x}^G \hat{\boldsymbol{\beta}}^P} + \overline{\mathbf{x}^G \hat{\boldsymbol{\beta}}^P} - \overline{\mathbf{x}^P \hat{\boldsymbol{\beta}}^P} + \widehat{\gamma^G \widetilde{\lambda}^G} - \widehat{\gamma^P \widetilde{\lambda}^P} \\
 &= \underbrace{\overline{\mathbf{x}^G} (\hat{\boldsymbol{\beta}}^G - \hat{\boldsymbol{\beta}}^P)}_{(i)} + \underbrace{(\overline{\mathbf{x}^G} - \overline{\mathbf{x}^P}) \hat{\boldsymbol{\beta}}^P}_{(ii)} + \underbrace{(\widehat{\gamma^G \widetilde{\lambda}^G} - \widehat{\gamma^P \widetilde{\lambda}^P})}_{(iii)}
 \end{aligned}$$

Another extension of Blinder–Oaxaca decomposition is proposed by Juhn et al. (1993), who take into account of the distribution of residuals, based on quantile regression (detailed in Sect. 28.4.2.3). The overall *observed* wage difference across sectors can be decomposed in three components, using the quantile rather than the mean of the dependent variable:

$$\begin{aligned}
 \ln w^G - \ln w^P &= \mathbf{x}^G \widehat{\boldsymbol{\beta}}^G + \widehat{\varepsilon}^G - \mathbf{x}^P \widehat{\boldsymbol{\beta}}^P - \widehat{\varepsilon}^P \\
 &= \mathbf{x}^G \widehat{\boldsymbol{\beta}}^G - \mathbf{x}^G \widehat{\boldsymbol{\beta}}^P + \widehat{\varepsilon}^G + \mathbf{x}^G \widehat{\boldsymbol{\beta}}^P - \mathbf{x}^P \widehat{\boldsymbol{\beta}}^P - \widehat{\varepsilon}^P \\
 &= \underbrace{\mathbf{x}^G (\widehat{\boldsymbol{\beta}}^G - \widehat{\boldsymbol{\beta}}^P)}_{(i)} + \underbrace{(\mathbf{x}^G - \mathbf{x}^P) \widehat{\boldsymbol{\beta}}^P}_{(ii)} + \underbrace{(\widehat{\varepsilon}^G - \widehat{\varepsilon}^P)}_{(iii)}
 \end{aligned}$$

This method (JMP decomposition hereafter) is usually based on separate quantile regression for each sector. The first term (i) and the second term (ii) are similar to those in Smith (1976), except for the interpretation is in terms of some specified quantile rather than mean. In addition to the identified contributions from difference across sectoral returns and individual characteristics, there is an extra term (iii) corresponding to an unmeasured component of the difference and consists of unidentified sectoral and individual effects.

A problem of JMP decomposition is that it does not account for heteroskedasticity of the error term (Melly 2005). If the error term is independently, identically and normally distributed, then JMP decomposition is efficient. However, if this assumption does not hold, this procedure will produce misleading results. Based on DiNardo et al. (1996) and Lemieux (2002), Melly (2005) develops an extension to JMP decomposition to deal with heteroskedasticity. First, quantile regression is used to estimate the conditional wage distribution. Then, the conditional distribution is integrated over the range of regressors to obtain an estimate of the unconditional distribution.

28.4.2 *Single-Equation-Regression-Based Method*

Inclusion of a dummy variable describing whether or not the individual is working in the public sector may seem to be the most straightforward method of estimating the public sector wage premium. It ranges from the simplest OLS to more complicated procedures such as IV and quantile regression. The advantage of this type of method is that an explicit “return” to working in public sector can be estimated. In contrast, the decomposition-based method only provides a relative measure of the proportion of wage difference which can be explained by just working in public sector. However, the main disadvantage of this type of method is that it is usually subject to selection bias.

28.4.2.1 OLS Regression

If there is no endogeneity resulting from selection bias or omitted variables, a single-equation OLS regression would answer the research question. The earnings equation or wage determination equation is usually developed based on human capital theory (Becker 1964) and return on education (Mincer 1974). In particular, to estimate the public sector wage premium, intercept dummy or slope dummy or both can be added into the benchmark equation to capture the difference across sectors.

$$\ln w_i = \mathbf{x}_i\boldsymbol{\beta} + \gamma D_i + \varepsilon_i$$

In the equation above, $\boldsymbol{\beta}$ is a vector of coefficients measuring the “returns” to the individual characteristics \mathbf{x}_i , such as education, experience, age, gender, marriage, and so on. D_i is the dummy variable, which is equal to 1 if the individual works in public sector and 0 if works in private sector. Thus, γ is the public sector wage premium to be estimated.

This method is applied by some recent studies, such as Chatterji et al. (2010), Dolton and Makepeace (2011) and Blackaby et al. (2012). Despite the inaccuracy due to selection bias, OLS provides a convenient tool to paint the rough picture of public sector wage premium in terms of a variety of dimensions, such as gender, age, region and education.

28.4.2.2 IV Regression

It is arguable that the wage equation is misspecified due to omitted variables, such as ability and other unobservable propensities which affect the choice of working in public sector. This self-selection bias leads to endogeneity problem, and OLS estimator will be biased.

Since the biasedness of OLS regression can be interpreted as endogeneity or omitted variable problem, one straightforward approach to this is to use instrumental

variables. Voinea and Mihaescu (2011) use the variable “whether there are any family members working in the public sector”. Another example is Disney and Gosling (2003), who construct an instrument based on the difference in propensity to work in the public sector after and before the privatisation programme.

However, due to data availability, it is difficult to find valid and strong instruments in practice. The inefficiency and large standard errors caused by weak instruments may bring even bigger problem than the biasedness of OLS.

In a broad sense, IV regression can also be treated as a multiple-equation method (detailed in Sect. 28.4.3). Remember that IV regression is also called “two-stage least squares” in the sense that all the endogenous variables should be regressed on the instruments in the first stage, and apply OLS to the orthogonised variables are used to estimate the coefficients. The first stage of IV acts like the multiple-equation method, with the purpose of removing correlations with error term from the endogenous variables. It is categorised in the single-equation-regression-based method, because IV method does not involve a strict modelling of relationship between endogenous variables and exogenous instruments. The relationship used in the first stage may be purely statistical correlation without any economic sense. Therefore, orthogonisation (the first stage) in IV estimation is more a statistical procedure than an economic modelling.

28.4.2.3 Quantile Regression

While least squares regression techniques (including OLS and IV) estimate the partial effect of a regressor on the *mean* of dependent variable, quantile regression investigates the partial effect of a regressor on the specified *quantile* of the dependent variable. The specified quantile could be median or any percentile of the distribution of the dependent variable. Hence, quantile regression provides more information of the conditional distribution of wage.

Similar to the advantage of median over mean, quantile regression is more robust against outliers. One crucial assumption of OLS is that the error term has precisely the same distribution whatever values may be taken by the components of the regressors. This case is referred to as a pure location shift, since it assumes that regressor affects only the location of the conditional distribution of the dependent variable, not its scale or any other aspect of its distributional shape. However, in most practical cases, regressors may influence the conditional distribution of the response variable, such as expanding its dispersion, stretching one tail and compressing the other, and inducing multimodality. Explicit investigation of these effects via quantile regression can provide a more nuanced view of the stochastic relationship between variables, and therefore a more informative empirical analysis. In particular, the quantile regression coefficients in the earnings equation can be interpreted as rates of return to skills at different points of the wage distribution (Buchinsky 1994).

This idea of quantile regression was first proposed in the eighteenth century by Boscovich and subsequently developed by Laplace and Edgeworth. A good

introduction of quantile regression can be found in Koenker and Hallock (2001). Technically speaking, least squares regression is to minimise the symmetrically weighted sum of squares of residuals, and quantile regression is to minimise the sum of asymmetrically weighted absolute residuals. For the p th quantile:

$$\hat{\beta} = \arg \min_{\beta} \left[\sum_{i \in \{i: y_i \geq \mathbf{x}_i \beta\}} p |y_i - \mathbf{x}_i \beta| + \sum_{i \in \{i: y_i < \mathbf{x}_i \beta\}} (1 - p) |y_i - \mathbf{x}_i \beta| \right].$$

Note that quantile regression is usually used as the basis in the decomposition-based method, especially in JMP decomposition method.

28.4.3 Multiple-Equation-Regression-Based Model

The original purpose of this method is to solve the problem of selection bias problem, which can be interpreted as an omitted variable problem (Heckman 1979). Heckman selection model is usually applied to construct a proxy for the omitted latent variable in order to solve the selection bias problem. Another popular method within multiple-equation framework is treatment effects model, which considers the effect of an endogenously chosen binary treatment, conditional on two sets of regressors. Other methods with simultaneous equations system also exist in literature, but Heckman selection model and treatment effects model are the most popular techniques.

28.4.3.1 Heckman Selection Model

There are several ways of estimating the Heckman selection model, but Heckman's two-step procedure (also called "Heckit model") is the most common method. The first stage is to estimate a "selection equation", with the endogenous variable determined by a variety of exogenous regressors. Usually, probit is used because the error term is assumed to have a standard normal distribution. Following that, for each observation in the selected sample, compute the inverse Mills ratio $\hat{\lambda}_i$, which is used to account for the selection bias in the outcome equation. Note that $\Phi(\bullet)$ is the cumulative distribution function of the standard normal distribution and $\phi(\bullet)$ is the corresponding probability density function. The second stage is to run OLS on the original equation, including $\hat{\lambda}_i$ as an additional regressor.

$$\text{Selection Equation: } \Pr(D_i = 1 | \mathbf{z}_i) = \Phi(\mathbf{z}_i \boldsymbol{\alpha} + \varepsilon_{1i}) \Rightarrow \hat{\lambda}_i \equiv \frac{\phi(\mathbf{z}_i \hat{\boldsymbol{\alpha}})}{\Phi(\mathbf{z}_i \hat{\boldsymbol{\alpha}})}$$

$$\text{Outcome Equation: } y_i = \mathbf{x}_i \boldsymbol{\beta} + \gamma \hat{\lambda}_i + \varepsilon_{2i}$$

The coefficient of $\widehat{\lambda}_i$ is defined as $\gamma = \rho\sigma$, where ρ is the correlation coefficient between the two error terms, and σ is the adjusted standard error of the outcome equation. That is to say, if the error term in the selection equation (ε_{1i}) is correlated to that in the outcome equation (ε_{2i}), then OLS estimator is biased due to omitting the inverse Mill ratio. However, if the coefficient γ of selection bias ($\widehat{\lambda}_i$) is not significant, which implies a zero correlation coefficient (ρ), then there is no selection bias and OLS is unbiased.

The two-step procedure discussed above is consistent and asymptotically normal, but it is by nature a limited information maximum likelihood (LIML) estimator, which is less efficient than the full information maximum likelihood (FIML) estimator. However, the latter requires a stronger assumption that the error terms in the two equations are jointly normally distributed. Also, convergence problem is usually encountered in FIML procedure, so two-step procedure is a more popular choice.

As shown in Sect. 28.4.4, the first stage of Heckman selection model might be exactly the same as that of PSM, i.e. a probit regression to obtain the fitted value of propensity for working in the public sector. However, the purposes of this step are different. In Heckman selection model, the first stage is used in the second regression to estimate the wage premium in order to remove selection bias problem. In contrast, in PSM, the fitted propensity is used as the matching criterion to link individuals in different sectors. The first stage only serves as providing a matching criterion, rather than a serious estimation.

28.4.3.2 Treatment Effects Model

The treatment effect model is also based on two equations, but it explicitly includes the choice of working in public sector as an endogenous regressor. The endogeneity is removed by running another regression based on the selection equation. In contrast, in Heckman selection model, the sector choice is not included in the outcome equation, i.e. earnings equation in this case.

$$\text{Selection Equation: } D_i^* = \mathbf{z}_i\boldsymbol{\alpha} + \varepsilon_{1i}$$

$$\text{Outcome Equation: } y_i = \mathbf{x}_i\boldsymbol{\beta} + \gamma D_i + \varepsilon_{2i}$$

In the second equation, D_i is a binary decision variable which is assumed to stem from an unobservable latent variable:

$$D_i = \begin{cases} 1, & \text{if } D_i^* > 0 \\ 0, & \text{otherwise} \end{cases}$$

The variance–covariance matrix for the two error terms ε_{1i} and ε_{2i} is:

$$\text{var} \begin{bmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \end{bmatrix} = \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}$$

Similar to Heckman selection model, there are also two ways of estimation, i.e. the consistent two-step estimator and full information maximum likelihood estimator. The likelihood function is given in Maddala (1983) and Greene (2012).

28.4.3.3 Simultaneous Equations Model

Another early attempt to correct for selection bias using multiple-equation method is Venti (1987). He develops a simultaneous equation model, with a job acceptance decision equation (demand), job offer decision equation (supply), as well as equations describing the probabilities of working in the two sectors. Maximum likelihood is applied to estimate this simultaneous equation model. In fact, the essence of the method proposed by Venti (1987) coincides with the two-equation Heckman selection model, in the sense that the endogenous variable in one equation is fitted by another equation to “exogenise” the variable.

An innovative aspect of his method is that the labour supply does not need to equal the labour demand, i.e. there may be a queue waiting to work in public sector. This enables to measure the degree of distortion in public sector wage, because there should be little queue if there is no public sector wage premium.

28.4.4 Matching-Based Method

The question is to know the wage premium between public and private sectors, and a key principle is to compare like with like. It is not meaningful to compare a highly educated individual in public sector with a very low educated individual in private sector, since these two persons are different in various dimensions, i.e. “comparing oranges with apples”. Unfortunately, naive method of using simple descriptive statistics will result in the problem of selection bias. Of course, the most ideal way is to use the wage of an individual if he works in public sector minus the wage of the same individual if he works in private sector. However, it is impossible to observe the “counter-fact” of the wage if he works in the other sector. Nevertheless, it is possible to find the closest match for him in the other sector to mitigate the selection bias.

An individual, whether he works in public sector or private sector, has several dimensions of properties, such as sex, age, education, region, industry, occupation, etc. It is almost impossible to find an exact match for an individual with so many dimensions of characteristics. As a result, it is attractive to use a single-valued “propensity score” to summarise these characteristics, and match individuals in the

two sectors in terms of this propensity score. Once matches are found, it is then easy to estimate the average treatment effect for the treated (ATT), average treatment effect for the untreated (ATU) and the average treatment effect (ATE).

In the context of sectoral pay differential, “working in public sector” can be regarded as “treatment”, so those working in private sector as “control group”. The ATT here can be interpreted as “the wage difference if one changed his current work from public sector to private sector, given that he is actually now working in the public sector”. The ATU can be interpreted as “the wage difference if one changed his current work from private sector to public sector, given that his is actually now working in the private sector”. The ATE is just an average between ATT and ATU. In practice, there are two steps to obtain the treatment effects (ATT/ATU/ATE).

Firstly, the propensity score for each observation in both public and private sectors is to be obtained. Logit or probit regression can be used for this purpose, with “working in public sector” as the dependent variable and a variety of exogenous variables (such as sex, age, education, industry, etc.) as the independent variables. The predicted probability of working in public sector is used as the propensity score.

The second step is to choose the algorithm of matching individuals in the two groups. The most popular approach is to use Nearest Neighbour with Calliper. That is to find the two individuals with closest propensity scores in the two sectors, but only use them when the difference of propensity scores are within the preset calliper range. In most studies, a convention of 0.01 is used as the range within which matches are valid.

The range of propensity scores with both “control group” (those working in private sector) and “treated group” (those working in public sector) is referred to as “common support”. While there are cases where the range of propensity scores for the control group is different from that of the treated group, it is called “off common support”. Only matches within the common support are used to estimate the treatment effects.

28.5 The Data

In this section, a sample dataset from the UK Labour Force Quarterly Surveys (LFS) for 2001–2011 is used to conduct an experimental practice using some of the methods reviewed above. This dataset only include individuals whose economic activity is known, accounting for a 25 % random sample of individuals aged 20–64 years. Full-time students, unpaid family workers, and people on government training schemes are excluded. A detailed description of the variables used in this paper can be found in Table A2.

Another feature of wage is that the mean is greater than the median for both measures of wages and for all the years. That implies the wage distribution is not symmetric, but positively skewed. That is to say, there are slightly more low income people than high income people in the sample.

Table A2 Description of variables

Variable name	Description
gender	Female = 0 and male = 1
married	Married (and living together) or cohabiting, heterosexual
white_ghm	White ethnic group using ethcen6
ww	Real weekly gross pay
ln_ww	Natural log of real weekly gross pay
wh	Real hourly gross pay
ln_wh	Natural log of real hourly gross pay
child	One or more dependent children in family aged 0–4
qualdgroup	Highest qualification (0 lowest, 5 highest) includes vocational qualifications
	0 No qualifications
	1 Other qualifications
	2 GCSE A*-C or equivalent
	3 GCE A Level or equivalent
	4 Higher education
	5 Degree or equivalent
age	Age in years
regiongroup	Categorical variable for region of work (Standard Regions)
	1 North
	2 Yorks and Humberside
	3 North West
	4 East Midlands
	5 West Midlands
	6 East Anglia
	7 London
	8 South East
	9 South West
	10 Scotland
	11 Wales
	12 N. Ireland
	13 Overseas
ftime_ptime	Works full time or part time (in main job) or not at all
	0 Not working
	1 Part-time Worker
	2 Full-time Worker
public_sector	Works in public sector

(continued)

Table A2 (continued)

Variable name	Description
sic92_sector	Industry sector using SIC92 (same as SIC 2003)- 9 categories
	1 Agriculture, farming & fishing
	2 Energy & water
	3 Manufacturing
	4 Construction
	5 Distribution, hotels & restaurants
	6 Transport & communication
	7 Banking, finance & insurance
	8 Public admin, education & health
	9 Other services
10 Workplace outside UK	
soc2000_1_digit	Occupation groups, SOC2000, 9 groups
	1 Managers and senior officials
	2 Professional occupations
	3 Associate professional and technical
	4 Administrative and secretarial
	5 Skilled trades occupations
	6 Personal service occupations
	7 Sales and customer service occupations
	8 Process, plant and machine operatives
9 Elementary occupations	
year	Year using calendar data. (Jan to Dec). Equals refwky
manual	Manual worker dummy
ftime	Works full time
married_same	Same sex couple, civil partners or cohabiting
edage	Age when completed continuous full-time education
workexp	Work experience = age – edage

The hourly wage data is further disaggregated by gender to show a rough picture of the pay differential between public sector and private sector, as shown in Table 28.2.

Table 28.1 summarises some important descriptive statistics of wages (weekly and hourly) for the whole sample. The hourly wage is calculated based on the weekly wage and weekly working hours. It is arguable that hourly wage is preferred in analysis because of the existence of part-time workers, who tend to work less and earn less on weekly basis. However, their hourly wages are not necessarily less than those who work in full-time mode.

The evolution of wage in different sectors is graphed in Fig. 28.3. There are three stylised facts consistent with other literature. Firstly, a persistent pay differential is observed over the latest decade between public sector and private sector. Secondly, the pay differential (gap between solid line and dashed line) for females is greater than males. Thirdly, the average wage for males is higher than that for females.

Table 28.1 Descriptive statistics of wage (aggregate)

	Year	<i>N</i>	Mean	SD	P25	P50	P75
Weekly wage	2001	9191	423.63	312.03	220.80	364.16	554.45
	2002	11,082	425.71	315.06	222.54	363.82	554.58
	2003	10,655	428.54	322.73	218.04	362.57	563.74
	2004	9066	433.91	311.10	228.74	371.33	558.72
	2005	8129	446.75	327.08	234.36	381.21	578.82
	2006	9399	438.42	318.85	227.60	372.47	573.66
	2007	9633	442.44	318.42	237.31	376.01	577.24
	2008	9218	443.24	325.74	229.92	373.97	570.81
	2009	8640	449.90	330.57	233.61	380.87	577.77
	2010	8046	433.51	319.02	223.66	366.86	562.48
	2011	7732	419.33	309.07	212.30	349.78	543.32
Hourly wage	2001	9191	11.76	7.72	6.86	9.69	14.28
	2002	11,082	11.84	7.70	6.94	9.81	14.42
	2003	10,655	12.05	7.93	6.96	9.85	14.71
	2004	9066	12.11	7.45	7.18	10.07	14.80
	2005	8129	12.55	7.96	7.35	10.39	15.35
	2006	9399	12.30	7.63	7.25	10.24	15.28
	2007	9633	12.40	7.74	7.29	10.26	15.33
	2008	9218	12.44	8.16	7.19	10.24	15.29
	2009	8640	12.73	8.12	7.42	10.55	15.56
	2010	8046	12.33	7.94	7.10	10.20	15.19
	2011	7732	11.96	7.58	6.90	9.78	14.97

The descriptive statistics are informative, but the evidence does not control for the differences between individuals, such as education, age, work experience, etc. The following section will apply the main methods introduced in Section 0 to this sample.

28.6 Results

This section applies the decomposition-based method (type 1), single-equation-based method (type 2) and matching-based method (type 4) to draw a simple comparison.

28.6.1 Decomposition-Based Method

The simplest decomposition-based method is applied here by separately estimating the earnings equation for the two sectors, and then decomposes the difference in log

Table 28.2 Descriptive statistics of pay differential by gender

Year	Statistics	Female		Male	
		Private	Public	Private	Public
2001	<i>N</i>	3283	1814	3259	835
	Mean	9.62	11.19	13.58	14.33
	Median	7.76	9.56	11.14	12.95
2002	<i>N</i>	3971	2256	3889	966
	Mean	9.79	11.35	13.55	14.50
	Median	7.96	9.85	11.18	13.01
2003	<i>N</i>	3748	2253	3703	951
	Mean	9.91	11.56	13.81	14.79
	Median	7.85	10.02	11.34	13.43
2004	<i>N</i>	3104	1950	3147	865
	Mean	10.00	11.89	13.59	14.78
	Median	8.16	10.34	11.25	13.05
2005	<i>N</i>	2872	1823	2726	708
	Mean	10.38	12.43	14.21	15.28
	Median	8.25	10.94	11.69	13.78
2006	<i>N</i>	3241	2109	3137	912
	Mean	10.18	12.02	13.89	14.99
	Median	8.24	10.57	11.42	13.21
2007	<i>N</i>	3258	2199	3272	904
	Mean	10.20	12.24	14.08	14.62
	Median	8.25	10.79	11.44	13.48
2008	<i>N</i>	3063	2090	3176	889
	Mean	10.43	12.06	13.98	14.75
	Median	8.12	10.55	11.38	13.11
2009	<i>N</i>	2889	1967	2978	806
	Mean	10.60	12.48	14.27	15.24
	Median	8.44	11.08	11.51	14.00
2010	<i>N</i>	2658	1813	2807	768
	Mean	10.26	12.40	13.69	14.36
	Median	8.28	10.87	10.97	13.08
2011	<i>N</i>	2589	1702	2716	725
	Mean	9.72	12.02	13.44	14.33
	Median	7.79	10.40	10.81	13.02

wage using Blinder–Oaxaca method. The earnings equation is:

$$\ln w_i = cons + \mathbf{ind}_i \cdot \boldsymbol{\beta}_1 + \mathbf{job}_i \cdot \boldsymbol{\beta}_2 + \varepsilon_i$$

Here, the regressors are classified into two groups. The first group \mathbf{ind}_i is a vector of individual characteristics, including gender, race, marital status, age, age squared, work experience, work experience squared, migrant dummy, and education. The

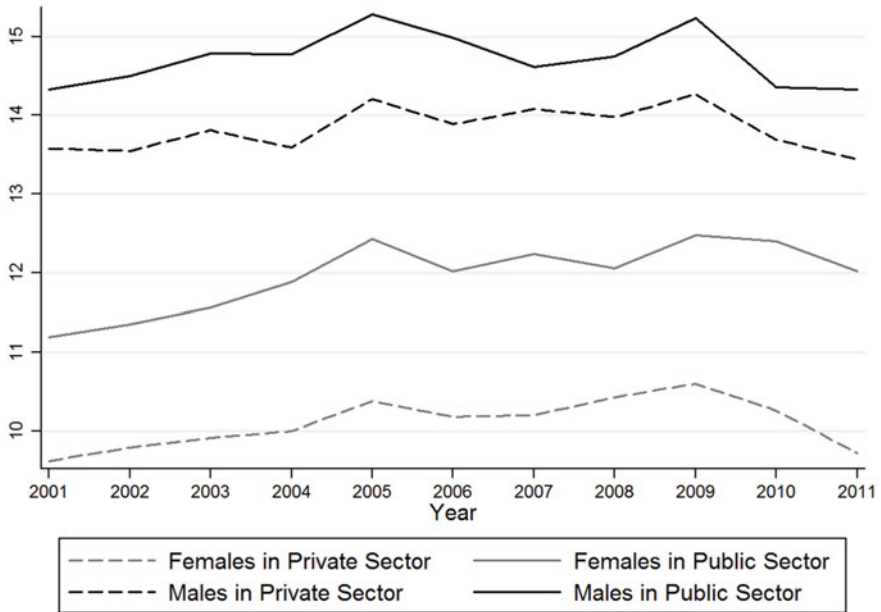


Fig. 28.3 Pay differentials by gender and sector

second group \mathbf{job}_i is a vector of job attributes, including full-time dummy, London dummy, industry dummies, manual dummy and occupation dummies.

Only the results for the latest year (2011) are reported in Table A3, together with the means of regressors. Apply the basic Blinder–Oaxaca decomposition, it is found that the observed difference in hourly wage between sectors ($\ln w^G - \ln w^P = 14.78\%$) can be explained by (i) the economic rent of working in public sector $\bar{\mathbf{x}}^G (\hat{\boldsymbol{\beta}}^G - \hat{\boldsymbol{\beta}}^P)$, about 5.70 % and (ii) the difference in characteristics or job attributes $(\bar{\mathbf{x}}^G - \bar{\mathbf{x}}^P) \hat{\boldsymbol{\beta}}^P$, about 9.08 %. Thus, the majority of the pay differential is not due to economic rent.

28.6.2 Regression-Based Method

The simplest single-equation-regression-based method applies OLS to estimate the coefficient of the dummy variable describing “whether or not the individual is working in public sector”. The specification of the earnings equation is as follows:

$$\ln w_i = \text{cons} + \mathbf{ind}_i \cdot \boldsymbol{\beta}_1 + \mathbf{job}_i \cdot \boldsymbol{\beta}_2 + \gamma D_i + \varepsilon_i$$

Table A3 Separate OLS regressions and means of regressors

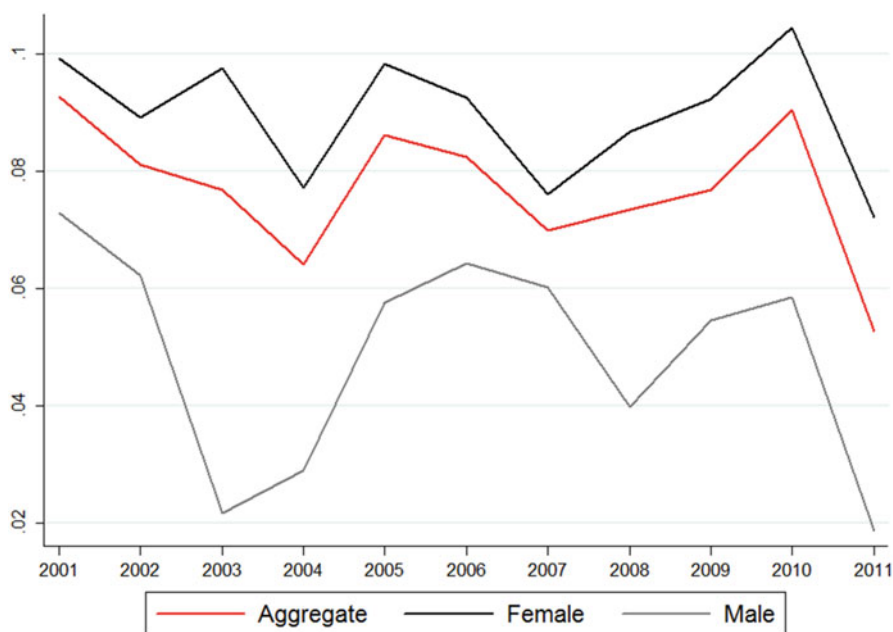
	b_private	b_public	x_private	x_public
gender	0.13576056***	0.10638071***	0.51197	0.298723
white_ghm	0.14600859***	0.033303	0.91951	0.923774
married	0.07872509***	0.028824	0.659943	0.710754
married_same	0.097486	0.077324	0.015457	0.015657
age	0.002655	0.015385	42.16211	44.24186
age2	0.000174	9.77E-05	1905.01	2069.686
migrant	-0.07563054**	0.002633	0.140622	0.091059
workexp	0.01770808**	0.000549	24.06843	25.68068
workexp2	-0.00060081***	-0.00037**	732.2516	796.8986
edu2	0.043986	0.001462	0.099717	0.043675
edu3	0.05207	0.064019	0.236004	0.189122
edu4	0.1213203***	0.045708	0.240339	0.183354
edu5	0.17503091***	0.1426798**	0.101037	0.155336
edu6	0.27791935***	0.2142656***	0.258247	0.401319
ftime	0.10706657***	0.021736	0.743638	0.690565
london	0.25796582***	0.13465755***	0.122526	0.115369
sic2	0.42351608***	-0.04294	0.016965	0.000824
sic3	0.26698344***	(omitted)	0.158341	0.001236
sic4	0.26038379***	-0.15758	0.054854	0.015657
sic5	0.062031	-0.36057	0.240905	0.009065
sic6	0.2720678***	-0.16088	0.072573	0.034611
sic7	0.28209275***	-0.15832	0.215834	0.031314
sic8	0.16259897*	-0.24466	0.180019	0.861558
sic9	0.15240556*	-0.37326	0.051461	0.045323
occ2	0.1134004***	-0.18367197***	0.15099	0.36918
occ3	-0.00676	-0.30119293***	0.136098	0.157808
occ4	-0.20678997***	-0.54574463***	0.129312	0.142563
occ5	-0.29375621***	-0.50805638***	0.095193	0.023486
occ6	-0.43329963***	-0.65792944***	0.086334	0.161516
occ7	-0.34441149***	-0.49082682***	0.10311	0.016893
occ8	-0.41949656***	-0.65964219***	0.070688	0.013185
occ9	-0.48662426***	-0.72169***	0.115363	0.070457
manual	0.014968	-0.07476	0.350374	0.171843
_cons	1.3481198***	2.2215103***	1	1

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

There is only one additional regressor compared to the earnings equation in decomposition-based method, i.e. the sector dummy for working in public sector, D_i .

Table 28.3 OLS estimates for wage premium

Year	Aggregate		Female		Male	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
2001	0.0927	0.0124	0.0992	0.0143	0.0729	0.0226
2002	0.0811	0.0113	0.0890	0.0134	0.0622	0.0200
2003	0.0768	0.0115	0.0975	0.0138	0.0216	0.0203
2004	0.0640	0.0122	0.0772	0.0142	0.0289	0.0220
2005	0.0860	0.0129	0.0982	0.0150	0.0576	0.0236
2006	0.0823	0.0121	0.0924	0.0145	0.0643	0.0213
2007	0.0699	0.0117	0.0761	0.0137	0.0602	0.0214
2008	0.0733	0.0126	0.0867	0.0149	0.0398	0.0226
2009	0.0768	0.0128	0.0923	0.0144	0.0545	0.0243
2010	0.0903	0.0129	0.1043	0.0152	0.0585	0.0232
2011	0.0527	0.0150	0.0720	0.0180	0.0186	0.0260

**Fig. 28.4** OLS estimates for wage premium

OLS regression is conducted for each year, and the results are summarised in Table 28.3. As implied by the standard errors, the wage premium is significant in aggregate and female regressions for all years. However, it is not significant for males in the years 2003, 2004, 2007 and 2011.

The estimated wage premium is 7.69 % for the whole sample, with female wage premium being about 9 % and male about 5 %. The changes of the wage premium over the sample period are shown in Fig. 28.4. Evidence shows that the main source

of fluctuations in public sector wage premium comes from males, while females enjoy a quite persistent and stable wage premium of working in public sector. The pattern of change is very similar to the findings in Blackaby et al. (2012), especially the peak observed for the year 2010.

As discussed in Section 0, OLS is likely to be biased due to endogeneity of the sector dummy variable D_i . Therefore, IV regression could be used to solve this problem if there are good candidates for instruments. In this paper, the dummy variable describing “whether the individual has one or more dependent children in family aged under 5 years old” is used as the instrument for D_i .¹ However, the estimated wage premiums have large standard errors and are not significant (output omitted). Thus, the values do not make much sense. This experiment reinforces the argument in Sect. 28.4.2.2 that the validity of IV relies on the availability of good instruments.

28.6.3 Matching-Based Model

The PSM method applied in this paper is based on the STATA programme written by Edwin and Barbara (2003). As discussed in Sect. 28.4.4, working in public sector is interpreted as the “treatment”, which is endogenously determined by a variety of individual characteristics and job attributes. The propensity for each observation can be estimated by the fitted probability from a probit or logit regression.

The average treatment effect (ATE) is presented in Table A4 and graphed in Fig. 28.5. Evidence shows that there is a consistent positive public sector wage premium around 5% for the whole sample. However, this advantage is mainly for females working in public sector, while the wage premium for males fluctuates above and below zero. This finding is again consistent with the literature.

One problem with PSM is that the distributions of propensity score between public sector and private sector are substantially different. That causes the common support problem in matching. For example, Fig. 28.6 graphs the propensity score histogram by treatment status for the year 2011. As one can see, the distribution of propensity score for those who are working in public sector (the treated group) are more skewed towards 1, while the distribution for those who are working in private sector (the untreated group) are more skewed towards 0. Ramoni-Perazzi and Bellante (2006) also find that the data is too heterogeneous to be used to compare wages across sectors based on PSM.

¹In fact, there is no good instrument in the dataset available. Many other variables are tried, but none of them are valid.

Table A4 Average treatment effect by gender

Year	Aggregate	Female	Male
2001	0.091554	0.090115	-0.05211
2002	0.057408	0.077855	0.097914
2003	0.036051	0.046172	-0.05692
2004	0.043293	0.040377	0.190285
2005	0.110228	0.084649	-0.00649
2006	0.045548	0.102088	0.040447
2007	0.046635	0.086106	0.050608
2008	0.035177	0.071557	-0.03678
2009	0.10714	0.123181	0.183311
2010	0.051372	0.10308	0.041288
2011	0.072362	0.117673	-0.23001

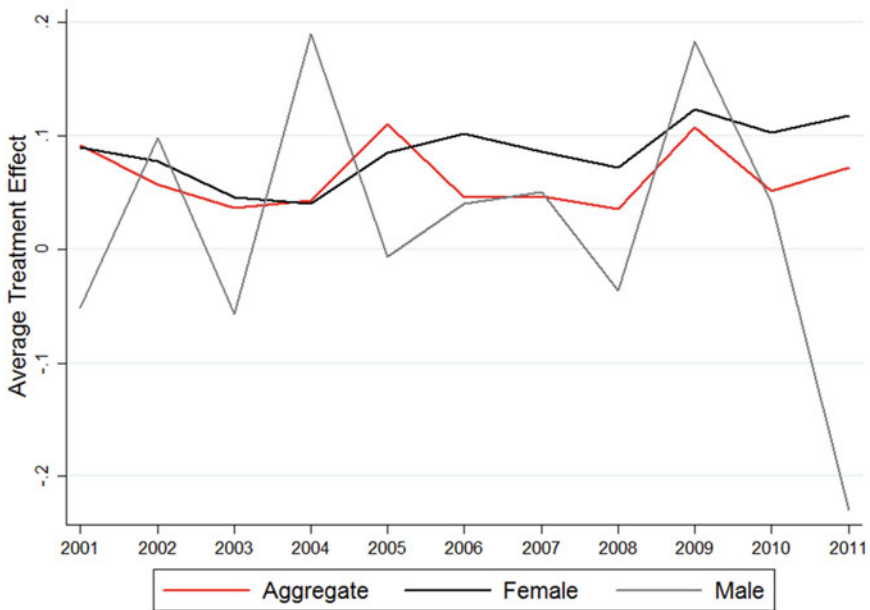


Fig. 28.5 Average treatment effect by gender

28.7 Conclusion

This paper conducts a comprehensive literature review on public sector wage premium across the world since 1960s. During the latest half century, a persistent positive wage premium is observed in developed countries, such as the USA and the UK, while this phenomenon is not a common stylised fact in developing countries. This wage premium starts to diminish since the late-1990s, especially for males, but females working in public sector still enjoy a positive and stable wage premium

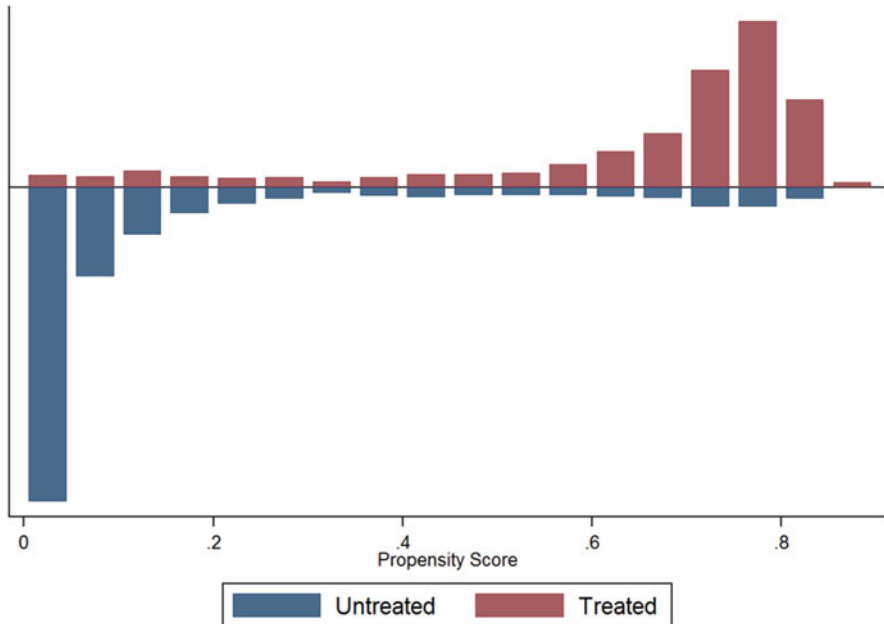


Fig. 28.6 Distribution of propensity score (2011)

compared to their counterparts working in private sector. In addition to gender difference, the public sector wage premium also differs across different groups in terms of occupation, education level, region and other criteria. A common feature is that the disadvantaged group (e.g. females, low skilled workers) in labour market tends to benefit more from working in public sector, because of the floor wage set by unions. In contrast, this benefit means less for the advantaged group (e.g. males, highly skilled workers), since their earnings are much higher than the floor wage. Reversely, highly skilled workers may find working in private sector more attractive, because incentive pay scheme is less adopted in public sector.

The problem of selection bias is reviewed, given its crucial role in estimation of wage premium and the whole applied microeconomics literature. Four types of selection bias are discussed, with a special focus on the self-selection bias problem. It is noted that the choice of working in public sector is endogenously made by individuals, so the sector dummy in OLS will cause bias.

The methodology section compares the most popular methods in estimating the wage premium, ranging from the earliest decomposition-based method, to regression-based method and matching-based method. Note that these methods may overlap in some procedures. For example, different regression techniques can be used in the first stage of decomposition-based method or matching-based method. However, the purposes of regression are different. For decomposition-based method, regression is used to extract the proportion of observed pay differential, which can

be interpreted as economic rent, i.e. wage premium. For regression-based method—both single-equation and multiple-equation—regression can directly provide an estimate for the wage premium. For matching-based method, regression is used to construct a comprehensive matching criterion to find the counterpart for each observation.

A sample from the LFS (2001–2011) is used to compare decomposition-based, regression-based method and matching-based method. This paper focuses on the wage premium in terms of real hourly wage, which is assumed to be determined by two sets of regressors, including individual characteristics and job attributes.

The findings are consistent with literature, in that a significant wage premium for the aggregate sample is supported, especially for females. The advantage for males, however, is diminishing in the latest decade, and sometimes there are even pay penalties. According to decomposition-based method (Blinder–Oaxaca), the public sector wage premium is about 5.70 % for 2011. Interestingly, regression-based method (OLS) results in a very similar estimate 5.27 %. However, matching-based method (PSM) gives a much higher estimate 7.24 %. It is arguable that the first two methods are both based on OLS, which is subject to self-selection bias. The omitted variable causes a negative effect on the estimated wage premium, compared to matching-based method.

This paper only applies the simplest techniques to analyse the most basic issues related to public wage premium. There are two directions in which future research can go. First, in terms of technique, more advanced econometric skills, such as quantile regression, Heckman selection model, and treatment effect model, can be applied to reduce the selection bias in regression, so that a more precise and reliable estimate can be obtained. Second, in terms of content, wage premium in different dimensions can be investigated, in addition to gender. Depending on the data availability, wage premium across regions, education levels, occupations, and firm sizes can be studied to provide detailed information for policy making and reforms. Moreover, the microdata findings can also be incorporated into microfounded structural models in labour economics.

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Chapter 29

Innovation and Regulatory Holdup: The Case of Shale Gas

Anastassios Gentzoglanis

Abstract The shale gas industry is at the crossroads. The current regulatory frameworks have not lived up to expectations as the recent experiences in Europe (France) and North America (Quebec) demonstrate. Although the patterns of regulation and the approaches used in both continents are, in some respects, similar, still some important differences do exist. To better understand the reasons for such a performance, the paper examines best practices in nanotechnology and financial industries. Five lessons emerge from this analysis, and they are applied in the context of shale gas industry. Disruptive technologies create a “knowledge gap” between the industry and regulatory agencies, and this makes the latter less effective. This is reflected in their inability to develop a regulatory framework that is flexible and capable of taking into account the rapid pace of technological changes that occur in this industry. Also, both countries were unsuccessful in making their regulation credible essentially because they have not taken into serious consideration the environmental, health, and equity issues. Nonetheless, France performs better than Quebec in the harmonization of its regulation with the rest of its trading partners, but France still needs to make further advances in this area. Unless regulators develop new regulatory frameworks that take into account the five lessons learned from the analysis of other dynamic industries with disruptive technologies, they will not be able to appease the opposing interest groups, and this may negatively affect the shale gas industry and a country’s growth and development.

Keywords Shale gas • Regulation • Disruptive technology • Europe • North America • Knowledge gap

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29.1 Introduction

The recent technological developments in shale gas industry, chiefly hydraulic fracturing, have been described as revolutionary “promising to transform not only the prospects of the gas industry but of world energy trade, geopolitics and climate policy.” These technological developments create new conditions for the industry and new challenges for the regulators. The production of shale gas is, most often, in places where no physical infrastructure exists to transport it, and this provides opportunities for new entry in the transport segment of the market (Andrews et al. 2009). To minimize costs, gas distributors may switch providers and choose the ones who are situated closer to them. This may lead to breach of long-term contracts with *sitting* gas transportation companies with obvious consequences on the degree of sunkness of their costs (Sweeney et al. 2010). Given the sheer potential of the market and the fact that shale gas is located closer to residential dwellings, the environmental impact and the risks from shale gas extraction are very high (Howarth et al. 2011; Plikunas et al. 2012). Environmentally conscious citizens are vividly objecting to the further development of the shale gas industry (Lechtenboehmer et al. 2011; Bramley 2011) and moratoriums to further exploration have been imposed in Canada (Quebec) and parts of the USA and a ban in France and other countries. Shale gas exploration companies are complaining about governments’ inaction or about the ways governments and regulators are handling the whole issue. Shale gas companies have already invested millions of dollars in exploration, but because of public pressures, they cannot neither intensify nor pull out with compensation their investments. Bloomberg (2011) has recently reported that the shale gas industry is facing “chaos.” Thus, the regulatory vacuum and the requirement for shale gas companies to stop further exploration have created the well-known *holdup* problem.

Policymakers and regulators strive to develop new regulatory oversight models, but their approaches are mistrusted by both the industry and the citizens. Policymakers and regulators are caught between two strongly opposed interest groups, and this leads to further inaction. Each group believes that the governments and regulators are “captured” by their respective “constituencies.” This inaction creates more uncertainty with high opportunity costs. Theoretically, regulators’ and policymakers’ inaction may be explained by assuming an asymmetry in the “learning curve” between the industry and regulators. In dynamic industry environments with rampant emerging technologies, this asymmetry creates leaders (the industry) and “laggards” (the regulators). But the transition of the shale gas industry from its current state, let’s say α , to tomorrow’s unknown state, let’s say β , is determined jointly by the investment decisions of the industry and the regulatory framework that regulators set up. Although it is interesting to model the interplay of industry strategies and regulation by adopting a dynamic game-theoretic approach, this is not the approach adopted here. By contrast, one can get more insights by studying some examples of other dynamic industries with emerging technologies. Then, lessons can be drawn that may provide guidance to develop a regulatory framework that will be able to handle the issues that the emerging technologies

create in the shale gas industry. The examples from nanotechnologies and finance and brokerage industries are few illustrative cases that pinpoint to the necessity of regulation to be proactive and develop means to enhance its regulatory capacities to handle situations of emerging technologies. These lessons from other industries are thus useful to regulators, policymakers, and the shale gas industry alike.

This paper purports to review the literature on the relationship between regulation and emerging technologies and examine past experiences with other industries. The analysis goes along the recent Executive Order of the US S&T Department concerning guidelines for regulation and oversight of emerging technologies. The preliminary results show that at least five lessons emerge:

- (a) Public trust in technologies and regulations are important for smoother acceptance of the technology by the public.
- (b) Regulators should move before the industry and adopt a regulatory framework that inspires confidence.
- (c) The regulatory framework must be flexible during its initial stages of development but not too flexible to be considered as biased to one group or the other.
- (d) Environmental and social concerns should be addressed from the outset in the new regulatory oversight mechanism (the case of RIIO model in the UK is an illustrative example).
- (e) International (interregional) coordination of the regulation is essential in taking into account the environmental externalities and provides more transparency and fairness in treatment of all parties concerned.

The regulatory frameworks that take into account these five lessons mitigate risks and enhance economic growth.

By examining the current situation of the shale gas industry in North America and Europe and putting it in the context of the lessons drawn from other industries, it appears that energy regulators and policymakers have not yet learned these lessons. For instance, policymakers and energy regulators in Canada and France have been very slow to develop a regulatory framework that respects the lessons learned from other industries with emerging technologies, and as a result their shale gas industries are in a stalemate situation (moratoriums and bans with important consequences on costs and potential benefits from the development of this new industry).

Section 29.2 of this paper deals with the characteristics of the shale gas technologies, their impact on market structure, and performance and presents the methodology used in this paper. It also presents the evolution and regulation of shale gas industry in Quebec and France. Section 29.3 analyzes the interplay between regulation and disruptive technologies and makes a brief review of the literature. Section 29.4 presents best practice examples from nanotechnology and the financial and brokerage industries. It examines the role of regulation in emerging technologies and compares the regulatory frameworks in France and Quebec in the light of the lessons drawn from the best practices in other industries. Section 29.5 concludes and offers policy recommendations.

29.2 Main Characteristics and Market Potential of the Shale Gas Industry

Natural gas is relatively clean and abundant source of energy. It is widely used by households and firms and because of its “cleanness” it contributes to preserve the environment. Thanks to the new extraction technologies (shale fracture), the supply of natural gas in North America has increased tremendously lately. According to recent estimates, the current shale gas reserves are high enough to last over many years (100 and even more). Figure 29.1 shows the evolution of natural gas production by source.

The shale gas industry is more developed in the USA than in Canada. Nonetheless, Canada has a great potential for developing this industry in the future given that important reserves exist in almost every part of Canada (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia). Currently, British Columbia is the main producer of shale gas, but Quebec’s huge reserves, if fully exploited in the future, will have a great impact on the industry’s structure, conduct, and performance. Under current industry structure, natural gas flows from West (BC and Alberta) to East (Ontario and Quebec, the two largest markets). Gas pipelines have designed to run from West to East, and long-term contracts have been signed among producers (dealers) in the West and buyers in the East. If shale gas is produced in Quebec, and given its proximity to the East of the USA, an important regional market for shale gas may be created, jeopardizing the viability of the older network in the West.

Figure 29.2 shows the multiplicity of natural gas markets in North America. Prices differ according to the region.

The development of the shale gas in Eastern Canada and the USA is expected to make winners and losers. It is true that in every business environment competition, changes in consumers’ preferences and government policies create winners and

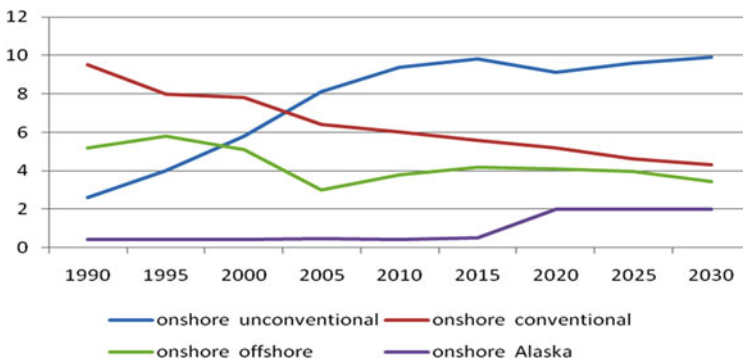


Fig. 29.1 Natural gas production by source (TCF/year) (trillions/year). Source: EIA, 2008 <http://www.nrcan.gc.ca/energy/sources/natural-gas/1349>

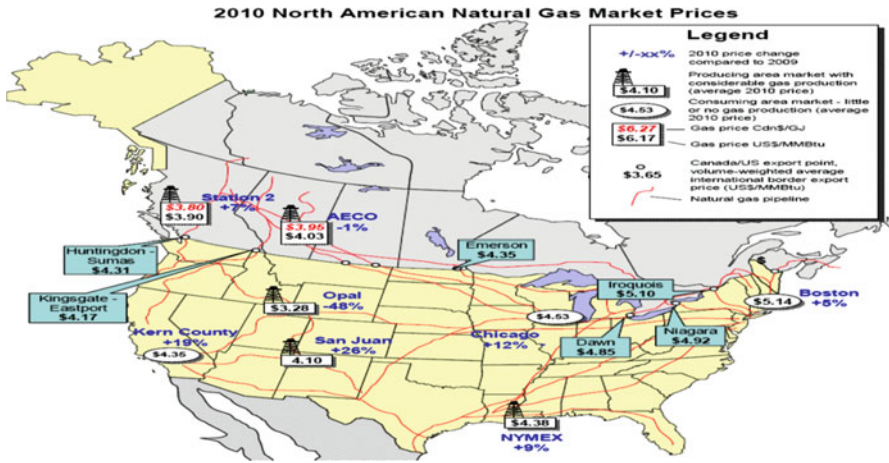


Fig. 29.2 Natural gas markets and prices in North America. Source: <http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/energy/files/pdf/eneene/sources/crubru/revrev/pdf/revrev-09-eng.pdf> p. 19

losers, but in shale gas industry, it is the arrival of new *disruptive technology* (shale fracture) that sets the pace of change. When disruptive technologies are introduced, the shocks they create are sets tremendous, and the industry shake-ups that follow have important ramifications on markets and society. In these circumstances, regulation may play a role in putting order in the market by specifying the rules of the game and establishing an even-leveled field for established firms and newcomers. In the case of the shale gas industry, the impetus of this disruptive technology may be greater than in other industries which have witnessed disruptive technologies like the information and communication technologies industry and the Internet. This is because, contrary to other disruptive technologies which do not have major environmental impact, the new disruptive technologies in the shale gas industry have important ramifications on the environment at the exploration and extraction levels, albeit the consumption of shale gas is innocuous to the environment (environmentally friendly).

In Canada, the regulation of the shale gas industry is under provincial jurisdiction, and there are therefore as many regulatory regimes as the number of provinces. Since the potential for shale gas is much higher in Quebec and because of its sheer size and the impact would have on the regional North East market, the analysis of this paper concentrates its attention chiefly to this market. For comparative purposes, the case of France is analyzed.

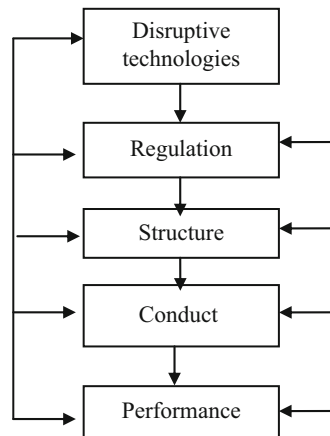
It is true that when demand is increasing, disruptive technologies have less disturbing effects on incumbents and new entrants, but the very sheer size of the market and the potential for increasing market shares intensify competition at the retail level. This has an effect on the backward activities of firms specialized in the prospection, exploration, and exploitation of the shale gas. The higher the extraction rate, the greater the impact on the environment particularly when the

new technologies are intensive polluting ones. Most of the times, shale gas is found close to residential urban and/or rural areas which have more sensitive ecosystems. Not surprising, environmentalists and simple citizens have reacted negatively to the initial investments the shale gas industry made for the prospection of gas reserves. This has created a risky business environment for firms already involved in the industry and the new entrants. These risks and uncertainties are exacerbated particularly when there is no an appropriate regulatory framework that will guide investment and guarantee a sustainable development of nation’s resources and its long-run growth.

The traditional industrial organization (IO) paradigm linking structure (S), conduct (C), and performance (P), the S-C-P model, is useful in analyzing the impact of new technologies on major stakeholders in the shale gas industry. The original IO paradigm does not deal with dynamic competition emanating from new technologies. It rather considers technology as an exogenous variable which affects firms only marginally given that they adopt it gradually absorbing thereby any shocks that new technology may create. The approach adopted in this paper is different. It modifies the original IO model assuming that new technologies are indeed disruptive, and they affect directly not only the firms in the industry but also the existing regulations and legal frameworks. In the original model, regulation does not interact with new technologies, but in its modified version, regulation is a function of disruptive. Thus, technology affects regulation and regulation affects S, C, and P. And yet, innovations may have a direct impact on S, C, and P too. Figure 29.3 illustrates the modified version of S-C-P paradigm.

In the original IO model, industry-specific regulations (cost of service (CoS), price caps, etc.) or economy-wide regulations (environmental) affect the S-C-P of the industry, and the feedback effects affect regulation in turn. In this paper, disruptive innovations “destroy” the past, in the sense of Shumpeter, and create an entirely new business environment which is unknown to firms, its customers and suppliers, and particularly to regulators. During a transitional period, the regulatory

Fig. 29.3 The modified version of S-C-P paradigm



agencies and governments are in an “agnostic” phase, and the asymmetries are at their highest levels. During this initial phase, little is known about the new technologies, and it is difficult to make a full evaluation of their impact on industry and society. As new technologies become mature, the regulatory agencies are better positioned to take stalk and introduce regulations that protect the industry and the consumer. This industry-consumer-protection regulation is more balanced and has more chances to succeed and get accepted by consumers and firms alike. At this stage, regulators and the government should educate (inform) stakeholders so that the objectives and the impact of the new industry become clear. Society benefits more by this “evolutionary” model of knowledge and regulation compared to the one where conflicts of interest disturb the sustainable development of the industry and society.

29.2.1 Shale Gas’ Regulation in Quebec

Quebec does not have a unique regulatory agency to regulate the emerging complex shale gas industry. This is true for every other province in Canada but British Columbia (BC) whose OGC (Oil and Gas Commission) oversees the developments of the province’s shale gas industry. Notwithstanding, the regulations of BC’s OGC concerning fracking operations are not fully developed yet. Actually, the OGC does not have specific regulations pertaining to fracking, although shale gas exploration firms do need authorizations before any drilling or fracking. Under the Oil and Gas Activities Act (OGAA), which was implemented in late 2010, the OGC got more powers and expanded its scope to include compliance and enforcement powers and the capacity to set operational and safety standards.¹ In spite of these advances in regulation, BC still lacks a comprehensive regulatory framework for its shale gas industry.

Although BC’s shale gas industry is already quite developed with many multinational energy firms very active in the exploration and exploitation (China, South Africa, France, Korea, and France are among the most important investors), the development of the shale gas industry in other provinces is just starting. Among the Canadian provinces, Quebec has the greatest potential in shale gas exploration and exploitation. It is estimated by the industry that there could be up to 25 trillion cubic feet of recoverable gas in the Quebec portion of the Utica Shale (Montreal—Quebec City corridor). Quebec’s shale gas industry potential is high and so are the challenges it faces. Given that shale gas is situated in the most densely

¹The Board has exercised this power to make regulations related to consultation and notification requirements, geophysical activities, drilling and production activities, pipeline and liquefied natural gas facilities, and fees, levies, and security.

Table 29.1 The shale gas industry and its potential effects

Area	Impact	Classical trade-offs	Possible remedies
Security and reliability	+		Consistent and comprehensive environmental regulation and monitoring
GDP growth	+		
Development of the energy industry	+		
Investment in infrastructure	+		
Exports (balance of payments)	+		
Foreign exchange	+		
Price	-		
Environment	-	Sustainable development issues	
• Water pollution	-		
• Air pollution	-		
• Fauna and flora	-		
Health and other hazards	-		
Social	-		
Ethical/moral	-		

populated areas,² the dilemmas concerning the type of policies and regulations to be adopted are the most challenging. These policies concern the problems that shale gas extraction generates in sensitive areas such as health, water, air pollution (CO₂), fauna and flora, etc. Since hydraulic fracturing technology is so pervasive and has important ramifications on social and economic life, it needs a single regulatory mechanism to deal with all these issues. Quebec’s existing regulation with respect to shale gas industry is inadequate, outdated, and completely fragmented. The current regulations are patchy, and various Ministries and regulations are responsible for different aspects of the industry (Table 29.1). This fragmentation of regulation complicates matters, creates uncertainties, increases risks, and makes the business environment difficult to understand, for both the industry and the general public. Quebec needs a comprehensive legislation with respect to the shale gas industry and a regulator with the specific mandate to regulate this industry.

To illustrate the complexity, more than 400 companies, small and large, have obtained exploration permits and leases from the Quebec Ministry of Sustainable Development, Environment, and Parks, frequently without a prior examination of

²The formation known as Utica Shale is mostly concentrated in Quebec’s lowlands, to the south of the St. Lawrence River, between Montreal and Quebec City.

their capacity to fulfill specific standards with respect to health hazards, water contamination, and other environmental issues. Surface and underground water approvals as well as permits to dispose wastewater and to flare natural gas are handled by the same Ministry. No permits are required by the Ministry for water withdrawal of less than 75 cubic meters per day.

29.2.2 *Shale Gas' Regulation in France*

France is another interesting jurisdiction where the development of the shale gas industry is at its infancy, but its potential is very important within the European Union (EU). Like Quebec, France has not yet developed a single and unified regulatory framework to regulate this nascent industry. Contrary to what happened in Quebec, France has granted,³ in 2010, a limited number of permits for hydraulic fracturing (61 permits in total), but after a strong popular opposition to hydraulic fracturing, the French government put a moratorium on shale gas drilling, in March 2011.

On the surface, France has adopted a tougher stance than Quebec to contraveners. Under its new law, adopted in July 2011,⁴ all the permits which were planning to use hydraulic fracturing were canceled. The law also foresaw penalties up to 75,000 euros and one year imprisonment to contraveners. In October 2011, France withdrew three licenses belonging to Total SA⁵ and Schuepbach Energy because the two companies insisted in using hydraulic fracturing to liberate the natural gas.

The French and Quebec experiences with shale gas demonstrate that there are governance and regulatory failures and important deficits in the decision-making process. Regulatory practice around the world has shown that strong, transparent, and independent regulatory agencies set up *before* industry restructuring, and, in the case of the shale gas industry, *before* its development, are important ingredients for success. The new technologies used in the shale gas industry have pervasive ramifications and important environmental, health, social, and economic consequences. The latter has to be explained to the public before any authorization of permits for shale gas exploration is allowed. The public needs to be informed by various unbiased organizations, independent regulators, the government, and the industry. A single and unified regulatory framework brings stability and reduces

³The permits were granted to Schuepbach Energy and Total (a US and a French company respectively). Their duration was from 3 to 5 years and was covering a territory of 9672 km². Canceling, in less than a year, all permits that use hydraulic fracturing and the subsequent moratorium put the industry at a disadvantage creating thereby the well-known holdup problem.

⁴This was the law No 2011-835 (13 July 2011) by which the exploration and production of hydrocarbons by hydraulic fracturing was banned. By virtue of this law, all permits which were planning to use this technique were canceled.

⁵Total SA has spent €37 million in order to obtain the license for exploration in Montélimar.

the risks to the industry and the public. Fragmented regulations (Table 29.2) do not contribute to a harmonious development of the shale gas industry.

Wilson (2011), in his report on the shale gas industry around the world, and particularly in Europe, concludes that [...the shale gas industry must accept and involve the public as a legitimate “partner” and “environmental regulation is crucial to shale gas in EU” (Wilson 2011, *The Petroleum Economist*). Sustainable development must be the priority of all stakeholders. The shale gas industry can benefit from the experience of other industries which have witnessed disruptive technological changes, such as nanotechnology and the finance and brokerage industries. The lessons drawn from these industries are useful to the development of the shale gas industry, as it is analyzed in Sect. 29.4.

29.3 Disruptive Technologies and the Role of Regulation: Theoretical Perspectives

Regulation has costs and benefits. When it is applied appropriately, it may contribute to improve market performance and enhance social welfare. Many indices, quantitative and qualitative, have been used to measure performance like productivity gains, higher levels of innovation and technological improvements, lower prices, and better institutional capacity to deal with existing and arising issues in regulated industries.

Recent studies (SQW 2006, 2007) have shown that environmental regulations may, under certain circumstances, improve performance (accelerate and even stimulate technological changes and innovations). When productivity and competitiveness increase because of regulation, the latter contributes to a country’s economic growth. But other evidence (Conway and Nicoletti 2006) has shown that regulation, particularly its stringency, has the opposite effects. It may dampen incentives for technological changes and innovation and slow down the process of adjustment, imposing thereby undue costs to firms and contributing to the reduction of their competitive position.

These results are modulated by the findings of other studies according to which the effects of regulation on a country’s performance depend on the stringency of regulation. Thus Oulton and Srinivasan (2005) and OECD (2004a, b) show that different regulatory regimes may have different effects. For instance, it is argued that regulation of the ICT sector has a greater impact (increases productivity gains) in the USA than in Europe. This is attributed to differences in the regulatory regimes in these countries.

In the context of the shale gas industry, it is admittedly relevant and equally interesting to ask the same question. Can regulation create a “win-win” outcome? If it is the case, how can be done? What are the particular conditions for such an outcome? If regulation does create a “win-win outcome,” it would contribute to the creation of value for the industry and the whole economy (despite the direct and indirect costs of regulation).

Table 29.2 The regulatory frameworks in France and Quebec and their harmonization

France	Shale gas regulatory framework and its harmonization		Quebec	Shale gas regulatory framework and its harmonization
	Country-specific regulations	EU-specific regulations		
Ministry of the environment	Penalties	The groundwater directive (2006/118/EC)	Ministry of sustainable development, and parks	Permits and licenses for shale gas exploration
Ministry of the environment	Moratorium	The drinking water directive (98/83/EC)	Ministry of sustainable development, and parks	Moratorium
		The priority substance directive (2008/105/EC)	BAPE	No power to regulate/consultative role only
		The reach chemicals regulation (1907/2006)		
		The groundwater directive (2006/118/EC)		
		The environmental liability directive (2004/35/EC)		
		The waste framework directive (2006/12/EC)		
				No harmonization with other North American regulations

Porter (1991) and Porter and van der Linde (1995a, b) have set the debate by arguing that “stringent environmental regulation (under the condition that it is efficient) can lead to win-win situations in which social welfare as well as the private benefits of firms operating under such regulation can be increased” (Wagner 2003). Porter and Porter and van der Linde do not adopt a holistic approach to regulation, but they consider its impact solely on producers. They assume that if stringent regulatory regimes create benefits to producers which are higher than the costs they impose on consumers, the net effect is positive, and therefore regulation is welfare enhancing. In this paper, we consider explicitly the effects of regulation on both the industry and consumers.

Further, Porter’s results are based on another assumption, namely, that stringent environmental regulation is, a priori, efficient. But this hypothesis has been vehemently criticized. First, regulation is not necessarily efficient from the outset. Even with the passage of time, regulation does not necessarily become more efficient. There is always interplay of many forces, and various stakeholders have divergent interests. Regulators, either inadvertently or because they want to provide incentives to one group or another, may adopt regulations which are at the interest of a particular group. This regulation (particular interest group regulation) may not be inefficient as such, but it is not necessarily welfare enhancing. Second, by assuming that regulation provides incentives for innovation, Porter implicitly assumes that firms systematically fail to notice the business opportunities that technologies provide till regulators awake them with appropriate incentives. Although this argument may be right, it is also true that, in some occasions, firms would be reluctant or even unwilling to introduce innovations unless important incentives are provided which would reduce the cost of adoption of new technologies. Thus, in industries where competition is slow to develop (non-lucrative suburban or rural areas), incumbents would not innovate and new entrants would not enter.

Further, Porter’s arguments make reference to technological changes that are either minor or they evolve slowly creating thereby more risks as far as the establishment of a future technological standard is concerned. In the case of shale gas, technological changes are drastic and disruptive. They change the established business models and create great opportunities for incumbents and new entrants. Considering the importance of this source of energy for a nation’s security and reliability, industry participants expect a favorable regulatory environment from governments and regulators and therefore a greater support from them. This expectation combined with the promise of realizing supranormal profits from deploying the new technology, the shale gas industry, has exploded in recent years.

In the field of shale gas, the current outcome in Quebec and France is far from being the ideal one. In both countries, regulation or its absence, has created an uncertain business environment which has increased risks and the latter impinge negatively and add more costs to the shale gas industry and to consumers. Instead of creating value, regulation “destroys” value. In Quebec and in France, regulators and policymakers have not intervened in time to study, understand, and master the disruptive shale gas technologies, so they did not have the time to make legislations and create regulatory environments that would allow the orderly development of

this industry. Facing such an uncertain environment and without any valid scientific knowledge, worried citizens became more risk averse and start mistrusting the authorities which to their eyes they have already taken stance to protect the gas industry. Citizens' groups have considered that regulators and politicians are pro-industry, and there is nothing to protect them but street demonstrations and active lobbying. Obviously, this is not a "win-win" policy, and the question that is asked here is under what circumstances and what form of regulation governments and regulators can use to bring more favorable outcomes and enhance social welfare?

Since the shale gas industry is characterized by disruptive technological changes, it is advisable to examine other industries that have witnessed this type of major technological developments and the way regulators and governments have reacted to create a "win-win" environment. Best practices are a valuable analytical tool that may provide guidance in the current context. The examples from nanotechnologies and finance and brokerage industries are few illustrative cases that pinpoint to the necessity of regulation to be proactive and develop means to enhance its regulatory capacities to handle situations of emerging technologies. These lessons from other industries are thus useful to regulators, policymakers, and the shale gas industry alike.

29.4 Best Practices from Other Industries: Lessons for the Shale Gas Industry

Marchant et al. (2009) analyze the latest developments in nanotechnology, an array of complex technologies in areas such as genetics, reproductive biology, robotics and information technologies, neuroscience, and nuclear technologies, and the type of regulation that is appropriate for its smooth and orderly development. The authors take for granted that this technology needs to be regulated, and the plausible question is then how and at what stage of its development it should be regulated.

Nanotechnology is much more complicated than shale gas fracture technology. In the case of shale gas, the new technology is limited to the gas industry although the commercial implications go beyond this industry. The (over) supply of shale gas will necessarily affect the price of other sources of energy and the habits of users in the long run. New technologies not only affect the elasticity of supply but also the elasticity of demand in the long run. But in the case of nanotechnology, the situation is more complex since it encompasses a great number of sectors and jurisdictions and each one is at a different level or speed of adjustment. Nanotechnology is developing quite rapidly, perhaps faster than the capacity of adaptation of the regulatory agencies creating thereby a gap between the level of advancement of new technology and the level of knowledge of this technology by the governments and regulators. This "*adaptability lag*" between the industry and the regulators creates a business environment which is uncertain and risky. Risk and uncertainty are compounded by the risks that the new technologies create, particularly at the earlier

stages of their development when no technical or technological standards exist and when competition among important players to set the standard in the industry is at its highest level. First movers or second movers may find it advantageous particularly when their standard precludes others from entering the market. Competition is thus limited and pioneering firms can reap the benefits of their investments in new technologies for years to come.

In that context, the question concerning the design of the most appropriate regulatory mechanism capable of exercising an adequate monitoring of the actors in place is appropriate. Marchant et al. (2009, 725) by examining the history of technology regulation derive five important lessons. These lessons are useful in the current context of shale gas technologies and regulation. They are analyzed with the objective to get some insights for the shale gas industry. The five lessons are:

1. Regulators should be credible and inspire public confidence.
2. Regulators should adopt policies that make the playing field level.
3. Regulators should adopt a regulatory framework that is flexible and able to be adaptive as the industry evolves.
4. Regulators should address environmental, social, and moral concerns.
5. Regulators should harmonize their policies with the international ones (regional in the case of shale gas).

A short examination of each lesson in the context of shale gas will provide some explanations to the question why the current situation of inertia prevails in Quebec and France. Further, it will illustrate that in dynamic contexts regulators cannot allow an “adaptation gap” to exist if they want to enhance economic growth and broader social welfare.

Regulatory credibility is important because it contributes to reducing risks and creating a viable and dynamic business environment. It takes years of hard work and careful planning to build regulatory credibility. Regulatory schemes are credible only if the regulators are committed and have a long history of commitment. The Three Mile Island accident and the recent one in Fukushima are illustrative examples that may compromise the credibility of regulators and policymakers. If an incident or major accident reveals important flaws and major breakdowns in the regulatory framework, this compromises confidence and the credibility of the entire regulatory system. Consumers, industrials, and other stakeholders will mistrust regulators and the institutions, and, therefore, it becomes difficult to reverse this tendency in the future. In the case of shale gas, regulators and policymakers have not designed a detailed regulatory scheme that would have avoided the misunderstanding among the industry, the environmentalists, and the simple citizens who are scared about the deterioration of the environment, their health, and quality of life. Regulators in France and in Quebec have imposed a moratorium, but the trust in regulators and institutions is breached. It will not take long to encounter the same “climate” of mistrust and objection on every new scheme aiming at the future development of this industry.

Regulation aiming at the creation of a leveled-playing field: new disruptive technologies create opportunities and challenges for incumbents and new entrants.

Shumpeter's (1942) "creative destruction" creates a competitive environment which most often is leveled by favoring firms which are vertically integrated and/or already having important market shares. This creative destruction may favor the creation of larger firms with important market power. Competition *for* the market and *in* the market becomes less important as the number of firms diminishes and barriers to entry become insurmountable. Notwithstanding of these results, regulators and policymakers should not adopt regulations which discriminate against these new technologies, despite the fact that they have the tendency to disrupt the status quo and create potential for market power by few firms. Regulators should resist doing so even if public sentiment is in favor of such discriminatory regulation. This is the lesson learned from nanotechnology. Marchant et al. (2009) argue that regulators should not selectively target products or technologies, but they should address the whole issue in its entirety. Predicting and preventing risks that emanated from the widespread use of new technologies is a risky activity as such and regulators must be careful in not imposing stricter regulations on new technologies than on existing ones.

Marchant et al. (2009) draw these conclusions from the analysis they have done in nanotechnology and the examination of the differences in European and US regulation concerning the GM food. In Europe, GM is more severely regulated than conventional food although there is no scientific proof that GM is riskier than conventional food. In the case of shale gas, the authorities in Quebec and France have adopted the right policies. In conformity with the lesson learned from other industries, they have not discriminated against the shale technology. The authorities preferred not to regulate the shale technology because it was believed that by doing so firms can deploy faster this technology and extract more gas providing thereby a higher level of security and reliability. The problem with the current regulatory stance is that regulators have underestimated the public sentiment concerning the harmful effects of shale gas extraction. As the GM food example makes clear, discriminatory regulation of new technologies helps "buying" social peace at the expense of sustainable economic development. Applying such a nonoptimal approach to the shale gas industry jeopardizes a country's long-run growth. Regulators should adopt a balanced approach which will favor the development of the new technologies while protecting the interests of consumers. When a moderate or "producer-consumer interest regulation" is adopted, social peace and economic growth are not incompatible objectives. The inclusion of environmental, health, social, and ethical concerns in the regulatory framework is so important that it is classified as the fourth lesson learned from technology regulation.

Flexible and adaptive regulatory mechanisms play an important role in contributing to the realization of dynamic efficiencies by reducing risks and creating the appropriate conditions for a viable and dynamic business environment. More often than not, regulation is lagging behind new developments in technology, and regulators and other government authorities become slower as new technologies are progressing fast. The difficulties of the regulatory agencies to keep up-to-date with technologies and adjust their regulations to take into account these changes have already been underlined by the US OTA (Office of Technology Assessment

1986a, b). In 1986, it stated that “[o]nce a relatively slow and ponderous process, technological change is now outpacing the legal structure that governs the system, and is creating pressures on Congress to adjust the law to accommodate these changes” (p. 3). Marchant et al. (2009, p. 726) describe the complicated and lengthy political process to revise existing laws and regulations and the tardiness and delays of regulatory agencies to act when important technological changes disrupt the status quo in sensitive industries like energy, telecommunications, and finance. Gentzoglanis (2010) also argues that the recent financial crisis in the USA and elsewhere is mainly due to the tardiness of regulatory authorities to properly oversight the rapidly evolving financial sector due to product (and technology) innovations brought about in the financial sector. The existing model of regulation of the financial industry supposes that industry participants are disciplined by the increasing competition which emerges from overseas and the globalization of the markets. So, minimal regulation is required because competition is holding back the capacity of incumbents to exercise any monopoly power. The experience with the financial industry has shown that even in rather competitive markets, the short-run profit motive may lead some industry participants to “invent” ways to go around regulation even if the latter is at the minimum. In a context where financial innovation is little understood by regulators and government officials, the regulatory agencies may sit back and hope that the results from the introduction of innovations will be positive. Regulators are notoriously known worldwide about their tardiness to introduce new models of regulation which reflect better the changing economic and business realities. The only exception may be Ofgem, the British regulator, who is a world leader in introducing “timely” new regulatory models (price cap regulation in the 1980s and its hybrids thereafter and the RIIO model in the 2010s (Ofgem 2010)).

The complexities and bureaucratic procedures to revise laws and regulations are also due to a number of reasons, the most important of them being interest group politics, threat of judicial reversal, a great number of requirements and constraints imposed on the regulatory agencies, etc. Inertia in the process of changing laws and regulations results in situations where the existing regulation (law) does not correspond to the current state of affairs. These obsolete regulations are in effect no regulations at all, and an industry may be free of regulation although there are solid economic reasons which justify effective regulation. If the existing regulatory frameworks do not possess mechanisms that can make them more modern and up-to-date, then these frameworks soon become ineffective.

As suggested by Marchant et al. (2009, p. 727), effective regulation must incorporate a “procedural timing mechanism” that will require a mandatory and independent periodical revision of the existing regulatory frameworks. Another approach may be a “combined broad and firm-specific regulatory framework” like the environmental regulation used in the Netherlands. Under the Dutch environmental regulatory framework, the government sets broad environmental goals and then there is the possibility for each firm to negotiate a “covenant” with various regulatory agencies and government organizations and “construct a custom-made regulatory framework” for each company. It is easier then to revise the covenants than the whole regulatory framework. Principles-based regulation is

another regulatory mechanism which provides for more flexibility in the oversight and monitoring of regulated industries.

Principles-based regulation is a broad regulatory framework which serves a general guide to the regulated firms without explicit detailed rules and regulations. This type of regulation is typically accompanied by a second-tier regulatory framework which is industry made or self-regulation, i.e., a regulatory framework developed by the firms themselves whose core activities fall into the regulators oversight. Sanctions and penalties to firms with deviant behavior are self-imposed, and the regulatory agency intervenes in rare cases where an apparent injustice exists in this “self-correctional” procedure. Although this type of regulatory frameworks work well in principle, in practice, their functioning may underperform particularly in a dynamic and changing environment beset by technological change and innovations. In this case, the whole industry believes that the evolving industry structure and the type of competition that emanates from innovations is the right one for both the industry and therefore for society. Self-regulation becomes thus ineffective at the very moment where effective regulation is needed by the industry. Self-regulation has been severely criticized as an ineffective means to foresee and/or thwart the crisis that occurred in the financial industry (Gentzoglanis 2010).

Environmental, health, moral, and social concerns should be part of any regulatory framework, particularly in industries witnessing a tendency to major innovations and technological changes. Important breakthroughs in technologies may disrupt the social and economic life of a society and change dramatically its distribution of wealth and create major inequalities. Firms, particularly the dominant ones, may take advantage of their leading position and take unilateral decisions about the new technologies which may affect fundamentally the other players and the society in general. In the shale gas industry, major corporations from Canada, the USA, and abroad have invested important amounts of money to be the first in the exploration and exploitation of this source of energy. Not only the activities of these firms have negative effects on the environment (at least this is the perception of ordinary citizens), they get still this resource at a very low cost since royalties and rents are notoriously lower in Quebec than in the rest of Canada. The perception (and reality) is that firms will be able to get high profits at the expense of consumers. Not surprising, various citizens’ coalitions ask the governments to raise the royalties gas shale firms will pay (Government of Alberta and Energy 2011). Further, given that shale gas in Canada is of provincial jurisdiction, desperate citizens have deposited complaints asking the federal regulator to intervene in the exploration of shale gas and control more tightly or even stop shale gas exploration.

The current regulatory framework in Canada (Quebec), but not in France, precludes environmental and/or social and moral concerns. So, when environmental, health, and moral and social considerations are out of the realm of regulators and courts, citizens feel like abandoned by the government, and they desperately seek for protection using either street demonstrations or lengthy legal procedures as an effort to make up for the deficiencies of the regulatory and legal frameworks. This is no different from what has happened in the nanotechnology industry where various special interest groups (religious, environmental, and animal rights) have filed

“amicus briefs objecting to the patenting of living organisms on ethical grounds” (Marchant et al., p. 728), although the US Supreme Court refused to consider their arguments. Such a refusal was justified on the grounds that the arguments are “a matter of high policy” and surpasses their (judges’) competencies. The same is true with the FDA (Food and Drug Administration) which refused to deal with ethical concerns of worried citizens when FDA was about to approve the marketing of dairy products from cloned animals.

It is generally rare for the regulatory agencies to include in their regulatory frameworks objectives of social and moral consideration as they normally do with safety and reliability issues. This is because the latter are less controversial and much easier to set standards and reach unanimity. The former are subjective and influenced not only by scientific but also personal and religious beliefs. Further, the regulatory agencies are specialized agencies chiefly comprised by economists, lawyers, accountants, and engineers who are not qualified for taking decisions on ethical and philosophical issues. Nonetheless, moral and social concerns may be taken into account by setting up a special advisory committee on ethics and social issues within each regulatory agency. This is the European practice with the European Group on Ethics in Science and New Technologies (EGE). This group provides advice on ethical and social issues related to the ethical aspects of sciences and new technologies to the European Commission and other European bodies.

International/interregional harmonization of regulation makes trade among regions and nations easier and contributes to enhance economic well-being of the countries involved. For instance, in the nanotechnology case and particularly in the case of GM food, the different regulatory regimes in the USA and Europe have created important and long-lasting disputes and trade disruptions. Likewise, in shale gas industry, it is important, at least in North America, to have a consistent and more uniform regulatory framework that will further enhance trade and contribute to economic value. A harmonized regulatory framework reduces the regulatory risks and provides more incentives to firms to invest and make long-term commitments. It has already occurred that a province adopts an open investment policy, and under social pressure there is a drastic change in its policies, creating thereby a two- or even a multiple-tier regulatory policy within the same country (Canada, for instance), and this creates more uncertainties. It is not easy to harmonize the regulatory policies in sensitive areas such as energy, given the differences in endowments in natural resources and the objectives for energy security and reliability. But the same is true in the financial sector where talks have sparked on the harmonization of regulation in Canada, but there are strong objections from provincial governments, particularly Quebec and Alberta. For the European Union, the creation of a common energy market has streamlined the gas market, and the problems of harmonization of the regulatory framework are not as urgent as in North America. As the markets for shale gas become more regionalized (one in Western Canada and another in Eastern Canada), harmonization of these markets and those in the USA is becoming imperative. Differences in regulations may be justified on the grounds that less stringent regulation would attract foreign and national investment in the shale gas industry. This was the approach taken by the Quebec government,

but this has worked in the opposite way than it was originally expected. Scared citizens managed to change the government's approach to regulation of this industry and finally a moratorium has been imposed (levied) on further exploration of shale gas. This was also the outcome in France where the government has adopted a similar to Quebec policy ("race to the bottom" or "risk havens"). Investors having invested millions of dollars have found themselves in a holdup position.

Creating a national regulation first and try to harmonize it afterwards with international or regional regulations is much harder and time consuming than adopting a global approach to regulation in the first place. This is the case with the differences in regulations between the EU and the USA with respect to GM food. International/interregional regulation is extremely challenging given the divergence in national interests (economic, political, social, etc.). For all these reasons, it is not surprising to observe countries adopting a piece-meal approach to regulation than a holistic one from the outset.

The European national regulatory regimes with respect to licensing and permitting exploration of shale gas are practically similar, with no significant differences, at least for four EU members (France, Germany, Poland, and Sweden). This is the result of a study realized by Philippe & Partners on behalf of the European Union (EU 2011). Thus, harmonization is more advanced in Europe than in North America. Nonetheless, this study finds that public participation in the authorization process may be considerably improved since currently it is rather limited. The study emphasizes also that the Environmental Impact Assessment Directive (EIAD) should have a broader applicability and not limited to the gas production thresholds alone. It is also underlined in the report that the regulatory frameworks should aim at providing "legal certainty for investors" should European nations want to attract foreign and local investment in the shale gas industry. It can be said then that some of the conclusions of this study confirm the ones that were drawn from the analysis of best practice in nanotechnology and the financial industries.

All in all, harmonization is as important as the other four lessons learned from the analysis of regulating technologies (nanotechnology and financial industry). Quebec and France have missed the opportunity to develop a flexible and dynamic regulatory framework that evolves at the pace of evolution of the shale gas industry (lesson three). They also failed in making their regulation credible (lesson one) by addressing social and environmental concerns (lesson four). As far as the lesson two is concerned, both constituencies have performed rather well, while France scores better on the fifth lesson compared to Quebec. If countries desire to develop their shale gas industry on sound bases, they have to perform well on all the five lessons learned from past experience with the regulation of new technologies.

This is also the conclusion of the ETIPC (the White House Emerging Technologies Interagency Policy Coordination Committee) in the USA which developed its "Principles for Regulation and Oversight of Emerging Technologies." These principles are consistent with Executive Order 13563 which aims at guiding "the development and implementation of policies for oversight of emerging technologies at the agency level." These broad principles of regulation may be summarized as follows. They are, in a sense, similar to the ones enumerated above derived from

the analysis with respect to the experience we got with the regulation of emerging technologies. The summary of the five principles for “Regulation and Oversight of Emerging Technologies” as stated in the memorandum for the heads of executive departments and agencies in the USA are:

1. Regulation should be based “on the best reasonably obtainable scientific, technical, economic, and other information.” If regulatory decisions are taken based on this principle, regulation becomes more credible and inspires public confidence.
2. Regulation should bring more benefits than costs to market participants and to the whole society. Regulators by adopting policies that make the playing field level eliminate undue costs to market players.
3. Regulation should be “performance-based and provide predictability and flexibility in the face of fresh evidence and evolving information.” Regulators should adopt a regulatory framework that is flexible and able to be adaptive as the industry evolves.
4. Regulations should be developed with a firm commitment to fair notice and to public participation. Regulation should promote innovation while also advancing regulatory objectives, such as protection of health, the environment, and safety. Regulators, by addressing environmental, social, and moral concerns, increase public participation and reduce opposition to the projects with significant environmental or other negative effects.
5. The US government should participate in the development of international standards and regulations consistent with the US law and guidance. When appropriate, international regulatory approaches “should be coordinated as far in advance as possible, to help ensure that such approaches are consistent with these principles [of regulation].” Harmonization of the US shale gas industry regulation with the international/regional one would create a “win-win” situation.

As stated, these principles are inexorably similar to the five lessons learned above from the analysis of regulation of innovations in industries like finance and nanotechnologies. Given the current experience with the regulation of the shale gas industry and the lessons learned from the above analysis, further improvements in regulation may be done by taking into account these lessons.

29.5 Conclusions and Policy Recommendations

The shale gas industry is currently at the crossroads. Recent experience in Europe (France) and North America (Quebec) shows that the patterns of regulation and the approaches used in both continents were in some respects similar while still some important differences do exist. For one, both experiences demonstrate that both countries have not developed a regulatory framework that is flexible and capable of taking into account the rapid pace of technological change occurring in this industry. Second, both countries were unsuccessful in making their regulation credible essentially because they have not taken into serious consideration the

environmental and equity issues. Nonetheless, France performs better than Quebec in the harmonization of its regulation with the rest of its trading partners, although France needs to make further advances in that area too. Unless regulators develop new regulatory frameworks that take into account the five lessons learned from the analysis of other dynamic industries with emerging technologies, they will not be able to appease the opposing interest groups, and this may negatively affect the shale gas industry and their country's growth and development.

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Chapter 30

Trinities in Political Economy: More Than Just a Way of Observation

Thomas Siskou

Abstract In the recent economic discussion we observe more and more the use of so-called triangles or trinities of mutual exclusive options which at list pose trilemmas. The start was made with very famous impossible trinity, which nurtured generation of economists. After that came the so-called blessed and unblessed trinities, the peso and the dollarization trinity. With the appearance of the crises occurred diverse financial trinities, new trilemmas, monetary union trilemmas, and last but not least political economic and international trilemmas. Trinities have been used in the field of the monetary policy and exchange rate arrangements, in the international financial sector, in the Euro zone crisis, in the European banking union discussion, and in the field of the political economy. There are many trinities which entail many important trilemmas which make our life difficult. We believe, it is time to look at those triangles or trinities as a single unity, as a single methodology. We would like to understand their meaning, to investigate them systematically, to see if they are related together, last but not least we would like to discover the real message they are trying to convey. In order to do that, we classified the trilemmas in four groups, the first, second, and third generation trilemmas and as fourth group the political economy trilemmas. Our classification is not based on econometrics or other statistical methods. It is based on intuition and simple experience on how the financial sector was developed in the last decades. We must note that we will not consider all the possible trinities which have appeared occasionally but the most important. Therefore, after the introduction, in the first part of the paper we discuss the “first generation” of the trinities, those from the field of the international monetary and exchange rate theory, where we start with the classical impossible trinity, which seems to be the first one used in this kind of “methodology” and we continue with the “blessed and unblessed,” peso and dollarization trinities. In the second part we discuss the “second generation” of the trinities, those of the field of the international financial market, where we discuss the international financial trinity and holy trinity. In the third part of the paper, we investigate the “third generation” trinities, those that have been used to discuss the situation in the Euro

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zone after the crisis and we start with triangle with a new impossible trinity, the financial/fiscal trinity and the monetary trinity for EMU. In the fourth part of our paper, we discuss the triangles which are used in the field of the political economy and the international relation where we discuss a number of political trinities. Using this simple “methodology” we do not discover a “hidden” theory. No they don’t carry a “new theory” but they carry some strong message. From the theoretical point of view all the trinities are not very dissimilar to each other and nearly every one carry the same message, i.e., the importance of the monetary and financial sector and the problem the trilemmas express always has to do with the way the monetary and financial sector is combined with the others sectors in the economy. From the praxis point of view we discovered that the trinities should not be interpreted strictly because politicians and the authorities use the degree of freedom they have to choose the degree of capital transactions openness, the degree of exchange rate flexibility and that of the monetary independence?

Keywords Macroeconomic trilemma • Impossible trinity • Currency regime • Emerging markets • monetary policy • Monetary union • Financial crisis

JEL Classification F30, F31, F33, G20, G28

30.1 Introduction

Triangles, trinities, triples¹ of alternatives, which pose a difficult problem of choice because one cannot choose all three but only two of them, which are used very often to state how difficult it is to make a choice, to solve a problem, to handle a situation. Because such triples state mutually exclusive alternatives, they are called trilemmas,² originated from the Greek word dilemma.

The Governor of Reserve Bank of India Subbarao (2012) mentions that Epicurus, who lived about 300 BC, used the concept of trilemma to reject the idea of an omnipotent God. Such trilemmas are used in many aspects of life. It is used in religion, for example, the Apologetic Trilemma, for the proof of the divinity of Jesus, while in philosophy the well-known Munchausen Trilemma, which stresses the impossibility to prove any certain truth. In law it is the Cruel Trilemma. In the environmental field it is the 3E Trilemma, which confronts the three E’s: Economy–Environment–Energy, in management the well-known Project-Management-Trilemma of Quick, Fast, and Good.

Trilemmas are used in the economy as well. The oldest known trilemma is the trilemma of Uneasy Triangle, which was coined by the Economist in 1952, which states the three mutually incompatible alternatives of a stable price level,

¹In the following these three terms would be used interchangeably with same meaning if nothing else is mentioned.

²Trilemmas are not to mix with the trixotomes, which are triples as well, but they do not need to pose mutually exclusive alternatives.

full employment, and free collective bargaining. Other known trilemmas are the Pinker's Social Trilemma and the Wage Policy Trilemma. The Pinker's Trilemma is named after Steven Pinker, who claimed that a society cannot be simultaneously "fair," "free," and "equal." The Wage Policy Trilemma states the impossibility to reach simultaneously three egalitarian goals.

In the last time period, triangles, trinities, and trilemmas seem to be used much more often. It seems to be a kind of arisen fashion in expression, which entails trinities. The starting point was made by the very famous "impossible trinity," which was created on the basis of the theories of Mundell and Fleming, and it was for years the main «weapon» in discussing the international capital mobility in an open economy.

After some years, in the time period, when many of the emerging market economies were experiencing crises, other kinds of triangles appeared with strange religious names, like that of the "blessed and unblessed" trinities. Soon after, the triangles were transformed in lines with bipolar corners and to trinities, named after the currency units like peso and dollar, the so-called peso and dollarization trinities. The above mentioned trinities were used in times of relatively calm waters, in times, when the main problems with the capital mobility were narrowed to the problems of the emerging and developing countries, while the developed and industrialized world were stable and reluctant to the capital transfer problems.

With the emergence of the 2007–2008 financial crises, the developed world became suddenly very unsecure and discovered the problems of financial instability and sovereign debt sustainability, that's when the trinities of financial stability and the "holy" trinities came on the ground to the international discussion.

The problems of financial stability and sovereign debt sustainability came especially forcefully in Europe because they were associated with the survivability of the Euro and the Euro zone. The discussion was and is still intensive and emotional, and is largely conducive as well with the use of triangle, to which are given names like the "new impossible trinity of Euro," the trinity of a monetary union, and the financial/fiscal trinity.

All the above mentioned trinities point on the trade-offs, which have to be solved by a single country, while they do not deal with the problems and the trade-offs they have to face in a globalized world. This deficit cancels the political economy triangles, which state the mutually exclusive alternatives in the field of governance of the states in a globalized word.

Triangles, trinities, and trilemmas³ have been used all the time since the World War II and have been accompanied all the time with the economic discussion, the economic analysis, and the economic research. Every triangle with its dilemmas and trilemmas is unique. Every triangle poses difficult problems and interest questions, for example: how the goals in the triangle reinforce each other, how the goals and the objectives conflict with each other; what are the solution to the trilemmas; how

³In the following reference, when we use the simple words of triangle or trinity without stating something else, we mean a triangle or a trinity, which pose trilemmas.

can these mutually exclusive solutions be implemented; which one is responsible for the implementation of the solution; how the trinity and therefore the goals evolve over the time; do the trilemmas remain the same during the time or do they change?

Triangles, trinities, and trilemmas have attracted a considerable attention and were often the subject of empirical research: as in the works of Obstfeld et al. (2004) and Obstfeld and Taylor (2005), who tested the validity of the impossible trinity throughout history, or in the works of Aizenman and Ito (2012, 2013, 2015), who tested the validity of the impossible trinity on the developing countries and the impact of the trinity policies on the volatility of growth in the same group of countries.

Last but not least, triangles, trinities, and trilemmas are not universally accepted. At some times, they triggered forceful and emotional debates in theory as well as in the praxis. They incorporate the old and still actual debate about the neutrality of money, the debate about the separation of monetary economy and the real economy, the neutrality and independence of the central banks, the effectiveness of exchange rates, etc.

All these issues are very important, and they are factual for every single triangle. What is more important is that we can neither discuss them in every detail and for every triangle separately, nor do we want to discuss all the related debates. Our ambitions go not so far. We simply want to investigate all these triangles in one paper in order to see how these triangles are related to each other, if they are related to each other, what is the message they deliver, how far all these triangles are parts of a big figure, and what is this figure in fact.

We believe that the above mentioned economic triangles show us a similar pattern of “evolution” as that of the development of the financial market. Therefore, in the first part we look at the trinities of the “first generation,” and we start with the “star” of the trinities—the Impossible Trinity, which was based on the theories of Mundell and Fleming. Their model was developed at the time of the Bretton Woods era, when the main problems and dilemmas were identified between the interplay of exchange rate arrangement, capital mobility, and independence of the national monetary policy. After discussion of the main characteristics of the impossible trinity, we investigate the cases of the blessed and unblessed trinities, which were developed by Augusto de la Torre, Eduardo Levy Yeyati, and Sergio L. Schmukler, the cases of the Bipolar View, which were first mentioned by Ficher, and the solutions of Peso and Dollarization Trinities, which were developed by the same Augusto de la Torre, Eduardo Levy Yeyati, and Sergio L. Schmukler, concerning the emerging and developing countries.

In the second part, we discuss the “second generations” trinities, which were used to describe the dilemmas and trilemmas of the integrated financial market, resulted after the collapse of the Bretton Wood system and the deregulation of the capital market in the 1980s. Here we start with the trinity by Dirk Schoenmaker, which states the trilemma between a stable financial system, an integrated financial system, and a national financial policy, and continues with the newly developed trilemma of the Holy Trinity by Duvvuri Subbarao.

The international financial crisis hit Europe and the EMU very hard. A few years after the crisis, EMU continues to fight for their survival. The crisis has revealed many drawbacks for the EMU. A discussion about the new architecture of the EMU is inflated and is mostly done by using triangles with trilemmas. Even though these triangles could be included in the second generation triangles related to the integrated financial market, we prefer to discuss them separately in the third part of our paper, and we name them as triangles of the “third generation” because we give the EMU and its problems special attention: we think that these triangles entail issues, which are different from the previous triangles, especially as those of the single currency. Firstly we present the New Impossible Trinity by Jean Pisany Ferry, and then we continue with the Financial/Fiscal Trinity by Maurice Obstfeld and the Trilemma of a Monetary Union by Beck and Aloys Prinz.

The fourth part is devoted to a completely other family of triangles, the political economy triangles, which poses trilemmas about the integration of the countries in a globalized world. In this part, we introduce the well-known Fundamental Political Economy trinity by Denis Rodrik and follow with trinities by Michael Bord and Harold James. Though these political economy trinities have a much wider scope, they “incorporate” in the same way the trinities of the previous sections, thus we investigate how it happens, and what it really means for our research.

30.2 First Generation Trinities

The first and most recognized trinity, which trained generations of economists for more than 50 years, is the impossible trinity, which asserts that a country cannot simultaneously maintain all three political goals of fixed exchange rates, free capital flows, and independent monetary policy (controlling the interest rate), but only two of them (see Fig. A.1 in the appendix). The argumentation goes like this: if a country chooses fixed exchange rate and uses the interest rate (as a tool for an independent monetary policy), it needs capital control in order to block international

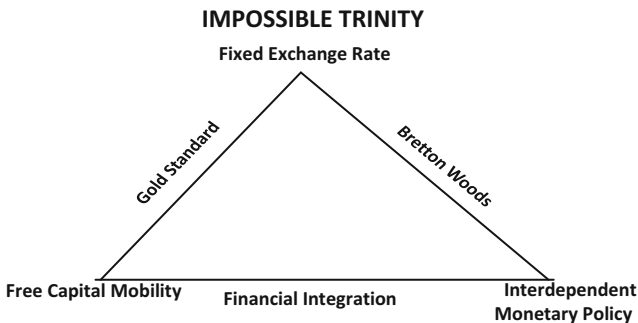


Fig. A.1 The classical impossible trinity (Reproduced from Obstfeld, M and Krugman, P. 2004)

arbitrage flows that would undermine the exchange and interest rate. If it fixes the exchange rate and has free capital flows, then it loses control over the interest rate since the monetary policy must be directed to control the exchange rate. If control interest rate has free capital flow, then it loses the control of the exchange rate, which is determined by the capital flows (Krugman 1999; Obstfeld and Taylor 2005; Subbarao 2010; Palley 2009).⁴

We will not exaggerate if we say that the impossible trinity is a kind of a “heritage” of Mundell and Fleming theories and their free capital open economy model, which expresses completely the free capital orthodoxy (Krugman 1999; Obstfeld and Taylor 2005; Palley 2009; Obstfeld and Krugman 2011; O’Rourke 2011; Subbarao 2012; Klein Schambaugh 2013; Obstfeld 2015). The impossible trinity is not universally accepted and is often questioned. This is done, for example, in the praxis of the Bretton Woods era,⁵ when many countries used fixed but adjustable exchange rates, free current account mobility and prohibited only the capital account transfers and, therefore, they could use an independent monetary policy without the fear of floating.

Without diving into very deep theoretical waters in order to question his validity,⁶ we can say that this impossible trinity opens many questions. First of all, why does a country need free capital mobility? Second, what kind of monetary policy does a country need and, third, what kind of exchange rate regime should a country choose.

Thomas Palley (2009, p. 17), for example, thinks that the impossible trinity is a logical correct construction but one, which “*engages in intellectual sleight of hand*” because, in his opinion, it compares different things. On the one side, the very importance of countries issues of exchange rate and interest rate, while on the other side, the inequivalent issue of capital mobility. The today orthodoxy claims that capital mobility improves the efficiency of the economy and considers the capital mobility to be of equal importance, like the other two variables. This is the reason why these apologists will assert that the impossible trinity will always hold. On the other side, if one thinks that capital mobility serves to reach some goals, like

⁴It is interesting to know who used first the construction of the impossible trinity. We conclude from the paper by Thomas Palley with a title “Rethinking the economics of capital mobility and capital controls” that the person, who used first the construction of the impossible trinity was Paul Krugman (Palley 2009, p. 16). Obstfeld and Taylor in their book “Global Capital Markets: Intergration, Crisis, and Growth” say that they use the construction of the impossible trinity after an idea of Padoa-Schioppa, who used a square to discuss the situation of the European Community (Obstfeld and Taylor 2005 p. 29).

⁵The impossible trinity, as it is well known, is very often used to explain the different monetary systems in the history of the world, asserting that the gold standard is a combination of fixed exchange rate and free capital movement without the using of an independent monetary policy, while the Bretton Woods system is a combination of a fixed exchange rate with an independent monetary policy and capital controls, where the today “non system” is a combination of free capital movement, independent monetary policy and flexible instead fixed exchange rates (see Fig. A.1).

⁶The New Open Macroeconomic Models, which consider price rigidities and monopolistic competition, show policy dynamics quite different from those built in the Mundell-Fleming tradition (Subbarao 2012).

employment, etc., then one is inclined to use capital controls and therefore do not “seriously” take the impossible trinity.

Doubts also appear on the side of the independent monetary policy. Today, when we think about a monetary policy, we usually think, in theory, from a monetary policy of one goal (Price, Inflation target) and one instrument (interest rate), while in the praxis, the central banks usually deviate from this “directive” in order to support other goals, thus it happens more in the developing or emerging market economies. Very often the authorities of these countries consider as well the exchange rates in their actions, for example, in order to foster the exports and international trade.

Equally complicated is the node of the exchange rate. The opinion here deviates from one extreme position of the monetarist side, which claims that the exchange rate is a simple monetary phoneme, thus cannot influence the real economy, to the other extreme evaluation by the Keynesians and post-Keynesians, who see in the exchange rate a very useful tool which can and should be used (De Grauwe 2003).

Much more complicated seems to be the node of the capital mobility and evaluation of the free capital mobility. From the neoclassical point of view, the case is clear (Palley 2009, p. 17): capital mobility leads to efficient allocation through portfolio investment, diversification, higher savings and higher investment and, last but not least, through the market competitiveness and efficient governance. From the praxis point of view, the situation is completely different, as it shows the cases of fear of floating, sudden stops, capital flights and the Dutch disease (Calvo 1991, 2001, 2003, 2005)⁷, etc.

Which one combination of exchange rate regime, a monetary policy and degree of capital mobility a country has to choose, is a matter of the concrete situation of the country in that time. Therefore, we have to give it right to Jeffrey Frankel, who argues “*that no single exchange rate regime is appropriate for all the countries or at all time.*” Countries choose their own “trinity,” depending on the economic environment in particular time. In the praxis countries don’t choose and realize the very extremes cases of the nodes of the trinity, but they prefer solutions that lie in the middle of the impossible trinity.

This fact exactly expresses two developments in theory, the Bipolar View and the developments of the “blessed and unblessed” trinities and, thereafter, the peso and dollarization trinities.

The bipolar view or the theory of excluding the exchange rate regimes of the middle was coined by Fisher (2001), as he recognized that in the 1990’s many countries abandoned soft peg arrangements (soft pegs, crawling regimes) and chose hard pegs or free floating systems and named this “regularity” theory of the bipolar view claiming that in the modern world of free capital movement countries do not have other choices but to choose either very hard pegs or floating exchange rate regimes.

⁷The empirical evidence is not very supportive to the case of the capital mobility because there was not found clear evidence to the thesis that the capital mobility increases growth. Most of the empirical works do not find a direct effect of the free capital mobility on growth, but an indirect effect is actualized, as far as capital mobility has collateral effects fostering technology transfer, trade, and Foreign Direct Investment (Palley 2009, p. 20, Kose et al. 2006).

Augusto de la Torre, Eduardo Levy Yeyati, and Sergio L. Schmukler (2002), having investigated the situation in Latin America and the many problems the countries suffered, such as high inflation, many devaluations of their currencies, and the different attempts with exchange rate regimes, have recognized that the constellation of the impossible trinity depends among others on the money as store of value, the exchange rate regime, and the contractual and regulatory financial environment of the country. They observed that countries, which do not have an international recognized currency, a solid contractual and regulatory environment in the financial sector and don't use a flexible exchange rate mechanism, have many difficulties when trying to participate in the international globalized world, thus such countries are asserted that they are in an unblessed trinity situation, while the countries that fulfill all the three characteristics are in a situation of the blessed trinity.

A blessed situation is a situation (see Fig. A.2 in the appendix), where a country can use their own currency in the international market and, above all, can issue debt at the international market denominated in their own currency. The people and the enterprises will not be concerned about the denomination of the credits. The service sector will be able to borrow in terms of the own currency and not in terms of the foreign currency. The country will be able to follow their own independent monetary policy without a need of "taking" into account the policies of the other countries. The country will be able to use a flexible exchange rate without usage of big amounts of international reserves. All these will be backed with sound contractual and regulatory environment in the financial market, so that the problems, like information asymmetries, moral hazard, adverse selection, and others, will be minimized.

On the other side, the authors define an unblessed trinity as a trinity (see Fig. A.3 in the appendix), where a country does not have an international recognized currency and cannot issue a debt in their own currency, has difficulties to issue long term debt at home as well. The service sector borrows money in term of the foreign currency. The country depends very strong on the development of the international market and the exchange rate. The country is not able to use their own independent monetary policy because it has to care about the policies in the international financial markets. Neither can use a free exchange rate. This difficult and unblessed situation contributes to the not very sound contractual and regulatory environment,

Fig. A.2 The blessed trinity
(Reproduced from Augusto de la Torre, Eduard Levy Yeyati and Sergio Schmukler 2002)

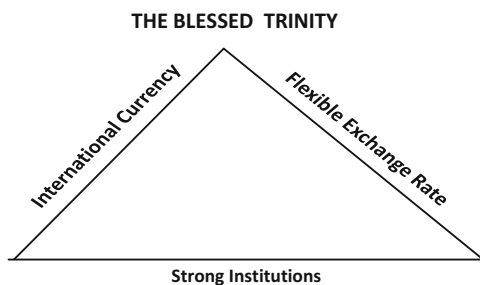


Fig. A.3 The unblessed trinity (Reproduced from Augusto de la Torre, Eduard Levy Yeyati and Sergio Schmukler 2002)

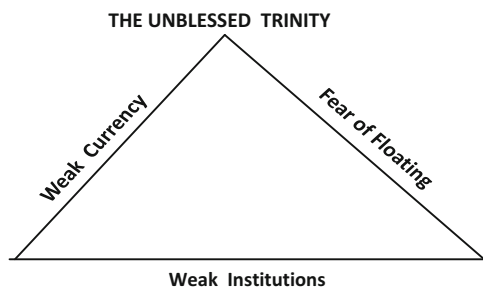
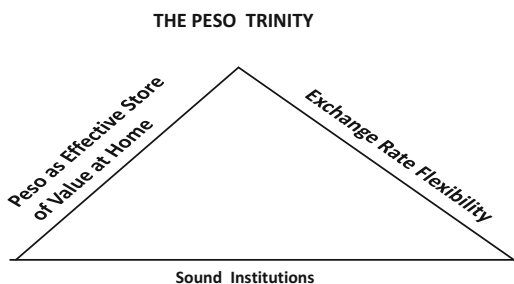


Fig. A.4 The peso trinity (Reproduced from Augusto de la Torre, Eduard Levy Yeyati and Sergio Schmukler 2002)



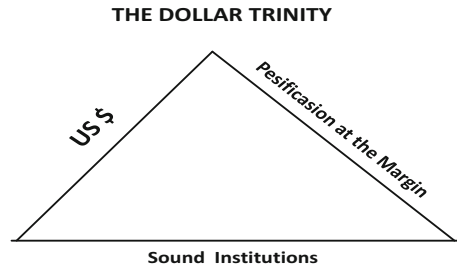
which enforces the problems of the financial market, like those of information asymmetries, the contract enforcement, the adverse selection and many others, which influence the risk-taking behavior of the market participants, especially the behavior of the investors, and leads them to overtake risk in the economy (de la Torre et al. 2002, p. 6).

In order to overcome the difficult situation of the unblessed trinities, the authors recommend two special solutions: the peso trinity and the dollarization trinity. The peso trinity (see Fig. A.4 in the appendix) is a situation where the country peg, per law, its own non international recognized currency with a another international recognized currency mostly a hard currency (dollar, euro or pound) and at the sometime uses a sound inflation targeting monetary policy with special measures in the financial sector in order to develop and regulate the financial market. In this way, the authors believe that the country will be able to stabilize the economy and their own currency will start to restore the lost confidence and in this way will the country be able to overcome the problem of original sin⁸ and the currency mix⁹ and

⁸Original sin is a term which was used by Eichengreen et al. (2005a, b) in order to describe a situation where a country cannot issue debt in the international financial market denominated in their own currency and therefore uses debt denominated in an international recognized currency with the result to end up in a currency mix situation. Under the original sin suffer usually the emerging markets, the developing, and the poor countries. According to the authors this unfavorable situation can be only overcome through the international help and the development of the special bond market.

⁹M Goldstein and P. Turner (Goldstein 2002, Goldstein and Turner 2004) differentiate between the original sin and currency mix. In their opinion the currency mix situation is a situation where

Fig. A.5 The dollar trinity
(Reproduced from Augusto de la Torre, Edurard Levy Yeyati and Sergio Schmukler 2002)



in this way to use their own currency internationally and contact an independent monetary policy (de la Torre et al., 2002, p. 10).

The dollarization trinity (see Fig. A.5 in the appendix) is a situation, where the country, instead of keeping their own currency, replaces the currency with an international currency, mostly with the dollar. Again, the starting situation is the same as of an unblest trinity. The country does not have an internationally recognized currency, borrows in the foreign currency, has a lot of currency mix, has the problem named as the original sin, the regulatory environment is weak, and the authorities, in order to overcome this difficulties, replace their own currency with the international one. In this way, the countries will use a foreign currency at home, borrow in the foreign currency and there will not be a possibility to conduct currency mix, if such a constellation is to be seen (de la Torre et al. 2002, p. 12).

Concluding, we can say that the first generation of trinities describes the situation in the Bretton Woods era, when the capital market was not properly developed and was mostly regulated by national rules. The impossible trinity gives a general form of the trilemmas we have to solve in an open economy. In this respect, capital mobility plays a very crucial role. The way, in which the (international) capital mobility is incorporated in the trinity, is in some kind twofold and it seems to break the law of Tinberger, who stated that two goals cannot be reached using only one instrument. If one understands capital mobility as an equal goal, like those of the exchange rate and independent monetary policy, then he/she is inclined to see the dilemmas between the three goals. If one sees in the capital mobility the tool to achieve some goals, then he/she will not see the dilemmas and the trilemmas of the trinity. The other's trinities cover the situation in the developing countries. They are not based to the large extent on the international capital mobility itself, but more on the development stage of the financial market of these countries. A developed local financial market, a recognized currency, and strong regulatory financial environment will not pose any difficulties to the monetary policy and to the country.

countries use different currencies because of original sin and others reasons but a situation which the countries by themselves can solve and do not need the help of the international community.

30.3 Second Generations Trinities

After the collapse of Bretton Woods, the world changed dramatically. Most of the developed countries chose flexible exchange rates and at the beginning many developing countries chose to peg their currencies to the dollar and to the others hard currencies, like German mark, yen, and sterling. At the same time, the world started to learn to appreciate the advantages of free movement of capital, and all developed countries removed the barriers of the free movement of capital. After the 1980s, the world experienced a second but much bigger wave of financial globalizations than that of the end of the eighteenth century. Huge amounts of money started to change the place, “to fly,” from one country to another.¹⁰ The world started to experience serious crises, like the one in 1994 in Mexico and the subsequent tequila crisis, the 1997 East Asian crisis, the 1998 Russian ruble crisis, the 2000 Brazilian, and Argentinean crisis. Crises were not confined to the developing countries, but they struck the developed world, as well as the dot com crisis, the British sterling crisis in 1992, the Sweden krona crisis and, of course, the 1992 European Exchange Rate Mechanism (ERM I) crisis.¹¹ This figure has completed the great financial crisis 2007–2008, which started in the developed world and transmitted on to the rest.

The world is not anymore the same. The economists could not anymore argue and separate the world in a “safe” developed and an “unsafe” developing world. The financial capital does not make exceptions and down through drifts of the developed world as well. The international economic community started to think about the financial capital, the speed with which the financial capital moves around the world, the amounts of transfers, the big financial players, their interconnectivity. They noticed that banks are not only simple intermediary instruments, which reallocate the capital wisely, but also as well organizations, which often take big risk. Similarly, they discovered that financial engineering can cause a lot of “pain.”

Now central banks or the authorities have not only to consider monetary issues, but also as well to deal with financial stability issues. They have to think how to define financial stability or instability, how to define macroprudential policy, how to implement financial stability.

Under this light of developments, some economist formulated triangles that are worth to be considered. The first person, who formulated such a triangle, was Dirk Schoenmaker, who formulated the Financial Trilemma (see Fig. A.6 in the appendix), which states that financial stability, financial integration, and national financial policies are not compatible. In order to show the incompatibility of the trinity, Schoenmaker draws very heavily on the banking sector in Europe. He developed a mathematical model and showed the dilemmas, which occur in the countries in case they are going to save international banks. Specifically,

¹⁰The Bank for International Settlement estimated that in the year 1998 on average 1, 2 billion dollar per day were exchanged in the international capital market (Casper 2002, p.).

¹¹Laeven and Valencia (2008) accounted 124 banking, 208 currency, and 63 sovereign debt crisis for the period 1970–2007.

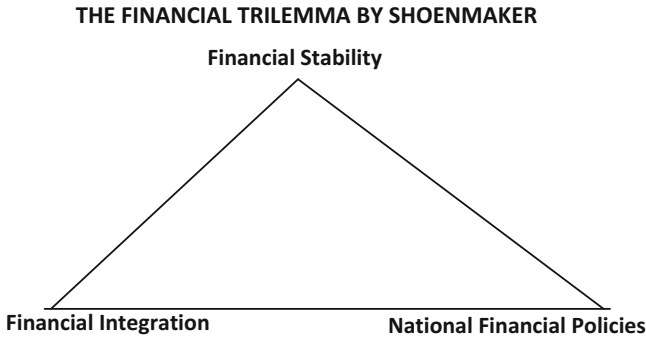


Fig. A.6 The financial trilemma (Reproduced from Schoenmaker Dirk 2011)

he discussed the case of banks, which have branches in different countries and investigated what will happen if these banks face problems, and the country is called up to save them. In such cases, the countries have to negotiate about the cost of their actions. The more the banks are split over the world, the more difficult the negotiation will be, the more problematic the solution will be, and the more severe the survival of the bank will be. In a situation, where the bank is active only in one country then the decision depends solely on the authorities of this country.

Unlike Schoenmaker, who focused solely on the banking sector, Duvvuri Subbarao put the whole economy in the figure. As a governor of the Reserve Bank of India, he was concerned about the task of the Bank in the new world after the global financial crisis, thus he understood that the central bank of India, like all others central banks in the world, should, apart from the price stability, care about the financial stability, and about the sovereign debt sustainability, and, therefore, he formulated a trinity of task, which have to pursue a central bank to maintain the price stability, the financial stability, and sovereign debt sustainability. Experienced as he was, he saw the trinity in the right dimension, not as an everywhere and always valid and inviolable law, but as an issue, which has to be taken, depending on the conditions of the environment. He knew that there is neither a theory, nor a reason why a bank cannot fulfill all three objectives. In such case, the price stability, financial stability, and sovereign debt sustainability will enforce the growth in the economy, and, therefore, he named the trinity as a Holy trinity.

Unlike the Schoenmaker, who focused only on the banking sector, Duvvuri Subbarao (2010), as governor of Reserve Bank of India, cared much about how the bank, which was chaired by him, could meet the new requirements. He formulated a new triangle that encompasses the price stability, financial stability, and sovereign debt sustainability, and, as it was mentioned above, named it holy, instead of impossible trinity (see Fig. A.7 in the appendix). From the start, he asked himself how far the trinity is a holy one or an impossible one. He gave two related answers: first, that the trinity could be a holy trinity because there is no reason and no theory, which states that a central bank cannot meet all three goals simultaneously. On the

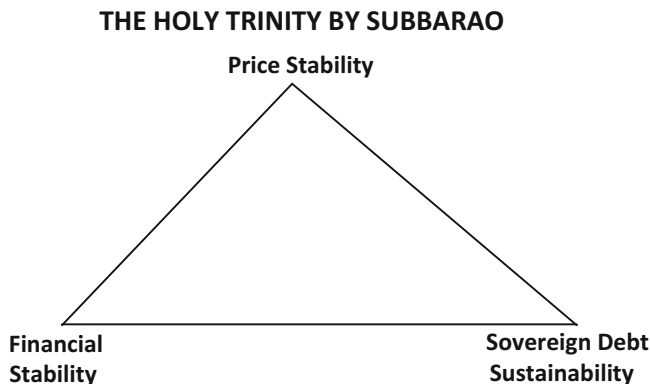


Fig. A.7 The holy trilemma (Reproduced from Subbarao Duvvuri 2012)

other side, he suspected that, in the praxis, the central bank will not be “able to determine, with any degree of exactitude, what inter se priority must be accorded to each of the three objectives under different sets of circumstances” (Subbarao, 2010, p. 4). He understood that the materialization of the trilemma depends on:

- How the objectives reinforce each other;
- How the objectives hinder each other;
- The policy measures, which sometimes are supportive to some objectives, while other times, hinder the realization of the objectives.

He knew that there would be tensions and trade-offs, especially in the short-term. In particular, the tensions materialize with brutal force in a state of disequilibrium—when inflation is off its target, the financial system is fragile and public debt is ballooning. To some extent, the bank has to manage these tensions and to solve all these problems the trinity qualifies as a trilemma.

In others words he saw and interpreted the trilemma not in an passive way, as in law, which applies always and all the time, but something in his fancy, therefore he gave emphasis on how (Subbarao 2010, p. 8):

- The price stability influences financial stability;
- The financial stability is related to the price stability;
- The financial stability is related to sovereign debt sustainability;
- The sovereign debt sustainability influences financial stability;
- The prices stability is related with the sovereign debt sustainability;
- The sovereign debt sustainability is related to the price stability.

The new holy trinity raises many important questions, i.e., how should fiscal policy be implemented? How to implement sovereign debt sustainability? Will fiscal policy not outweigh monetary policy? What is about the interdependence of the central bank? How will the holy trinity and, specially, the financial stability influence the growth?

These questions are of special relevance after the global financial crises. The financial crisis, which has exposed the deep connection of the public financial sector with the private banking sector, particularly evident in the case of the Euro zone, seems like calling into question the traditional separation between fiscal and monetary policies, reconsidering again the interrelation of public finance, sovereign sustainability, monetary policy, and price policy.

Without discussions of all these important issues, we can ask ourselves about the classical impossible trinity in the new “financialized” environment. How far the flexible exchange rates shield the country from abroad and allow them to pursue an independent monetary policy?

In a number of papers Helene Rey (2013, 2015) tested empirically the influence of the global financial cycle, a financial cycle of the center country to the periphery countries. At first, Rey tested empirically the existence of a global financial cycle. She identified it in the financial cycle of the center country, the USA, with their special currency, the dollar. After identifying the financial cycle, she tested how far this cycle was transmitted to countries, which used flexible exchange rate. She founded strong evidence that the policy actions of the center country, as of that of USA, were transmitted to the periphery countries (New Zealand, Canada, UK, and Sweden, the countries she investigated) through the credit and risk-taking channel. Thus, she concluded that in the modern “financialized” world flexible exchange and interest rates are not enough to shield the periphery countries from the global financial cycles, so the monetary policy needs many more instruments, like macroprudential measures or capital controls in order to fulfill their mandate. Therefore, as far as the impossible trinity concerns, she concluded that *“the global financial cycle transforms the trilemma into a “dilemma” or an “irreconcilable duo”: independent monetary policies are possible if and only if the capital account is managed.”*¹²

Reviewing the cases of the emerging and non-emerging developing countries, in a series of papers Aizenman and Ito (2012); Aitzenman and Chinn (2012, 2015); Aitzenman et al., (2010, 2011, 2013) came to the result that, in the praxis, the countries do not choose the polar choices in the vertex of the trinity, but they work with some kind of the middle level of the trinity, where the country usually intervenes somehow in the exchange rate (fixed or flexible), chooses the openness of the capital market, and realizes their own monetary policy. Using different indexes to measure the degree and the intension of the trinity choices, the authors conclude that in the last decades the emerging countries tend to prefer more flexible exchange rate

¹²This thesis is “challenged” again by Georgiadis and Mehl (2015), who assert that a part of the financial accelerator channel, which expresses the influence of global cycle, one has to consider the exchange rate channel, the valuation’s effects of the exchange rates change on the net long position of the countries. Measuring the effectiveness of the monetary policy in a number of developed countries, they found that the exchange rate channel had significant effects on the input of these countries and therefore they concluded that even though flexible exchange rate doesn’t isolate the country from abroad, they still play a role as far as they effect the monetary policy through the exchange rate channel.

regimes and independent monetary policies, as opposed to the developing emerging countries, which seem to prefer more stable solutions. Looking carefully at the behavior of these countries, they found that most of the countries tend to keep much bigger amounts of international reserves than the developed and industrial countries. Therefore, they hypothesize that it was done as a kind of financial insurance against financial crises, sudden stops, capital movements, etc. They concluded that this kind of behavior is a kind of strategic behavior for these countries in order to overcome the difficulties with the worldwide financial integration, a kind of fourth leg in the trinity and, therefore, Aizenman (2010) speaks about a Quatrilemma instead of trilemma.

In conclusion, we notice that the classical questions of the impossible trinity are still crucial in the “new financialized world.” Today’s, special attention is given to the flexible exchange rate node and the belief that this regime will be able to implement an independent monetary policy. The verdict is still open. There are many signs of a high degree of interconnectedness in the financial world, which will not allow so easily the implementation of the independent monetary policies. The most obvious was the financial crisis in itself. In such an interconnected world, it is not enough to think about monetary issues, but we have to consider at the least financial stability issues. A new way to think in such a “financialized” word is to consider the new holy trinity: the combination of price stability, financial stability, and the sovereign debt stability. The crisis showed that price stability is a necessary but not sufficient condition for the financial stability. On the other side, financial stability cannot be implemented, when there are concerns about the sustainability of sovereigns, as well as of “too big to fail” issues, and too much interconnected private organizations. The realization of all three goals will not be easy. It will remind us that the holy trinity, in the praxis, can be very easily metamorphosed into the impossible trilemma. The first and far the most important challenge that lies in front of us is to construct an operative financial trinity, which is especially difficult in EU and Euro zone.

30.4 Third Generations Trinities: Trinities of the EMU

We turn now to the trinities of the third generation, which are related to the situation of the EMU.

Looking at first sight at the EMU, we immediately recognize that EMU is a direct application of the most famous trinity, the impossible trinity, the trilemma of a single currency (the irrevocable fix of the currencies of the single countries with the new currency, the Euro), the free capital movement (one of the four freedoms of the European single market), and the independent monetary policy (through the most independent central bank of the world, the European Central Bank and the European System of Central Banks).

Despite many doubts, which were expressed from many sides,¹³ the first ten countries adopted the Euro in 1999. During the first decade, EMU was relatively successful. It was the time of the benign developments, the time of dynamic convergence, the time of great expectation of a very promising Europa, where many new countries had joined EU and EMU, and many others expressed the willingness to participate with the EU.

Things, however, changed for the worst in the second decade, as the international financial crisis hits Europe very heavily. During the crisis, the very existence of EMU and Euro, and even that of the EU, was at stake. Even though Europe has managed to avoid a breakup of the Euro zone and the Euro, still it faces many problems.

After the crisis, Europe, and especially EMU, was no longer a promising land of great expectations. Many discussions are held in north–south perspective of EU subdivision. Many versions of Euro were put on the table, like that of the Euro of the north countries and of the Euro of the south countries.

Many commentators characterize EMU as kind of gold standard system, which aims only to reach the stabilization of the prices and the value of the currency. Others identify EMU and the Euro as a kind of dollarization regime, where the countries have a kind of international currency, but they do not have the right to print this money. Apart from that, other researchers, relying on the differences of the countries, like Greece, i.e., countries that experienced and still experiences a deep recession in times of high level borrowing, characterize EMU as a currency board system, a system, which, needs to back every home currency with a foreign currency (Goldstein 2002).

Many things contributed to this difficult situation: the crisis of 2007–2008, the behavior of the banks, the bubble in house sector, the most debatable architectural configurations of the Maastricht treaty, the very same impossible trinity.

Looking at the configuration of the impossible trinity and the very same manifestation in the Maastricht treaty, one can find the following participating criteria:

- Stability and the convergence of the prices and the interest rates of the countries a year before the participation in the EMU;
- Stability of the exchange rates two years before the participation in the EMU;
- The limit of the public deficit and the public debt to the limits of 30 and 60 % of the GDP of the countries;
- The independent European Central Bank with their mandate to price stability;
- The No Bailout clause for the countries, according to which sovereigns are not allowed to take over or finance credit of others sovereigns;
- The No Financial clause, according to which the central banks inside are not allowed to finance governmental and public organization.

¹³See the First Generation Trinities part of this essay.

We can recognize that EMU put great emphasis on the price stability and the stability of the public finance, though it did not care about the financial flows. The architects of the Maastricht treaty thought that the price stability was a necessary and sufficient condition for the functioning of the EMU and that the price stability in conjunctions with the no financial and no bailout clauses will be a necessary and sufficient condition for the financial stability in EMU as well.

In this very architectonical situation many analysts and academics saw the main reasons as to why the crisis hit Europe so heavily and, therefore, many of them made suggestions about what would be the right configuration, which is to aim Europe and EMU in the direction that would avoid crisis in the future.

In this respect, we will consider three new configuration trinities, even though they show some similarities with each other, they must be treated differently as far as they propagate different proposals and measurements. These are the New Impossible Trinity of Pisani Ferry, the Financial/Fiscal Trinity of Maurice Obstfeld, and the Impossible Trinity of a Monetary Union of Hanno Beck and Aloys Prinz.

30.4.1 The New Impossible Trinity of Pisani Ferry

Explaining the debt crisis in Europe, Pisani Ferry thinks that the fiscal discipline, which the European bodies once tried to impose on the single countries after the Euro zone crisis, was a desirable policy as long as some countries did not follow prudent fiscal policies, but not enough to lead Europe and the Euro zone to safe waters, because he asserted that the true problems of EMU lie in the configuration of the no co-responsibility clause of Art. 125 of the treaty^{14,15} the no financial clause of Art. 123 of the treaty,¹⁶ and the bank sovereign interdependence,¹⁷ which was the

¹⁴The article states following: “The Union shall not be liable for or assume the commitments of central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of any Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project. A Member State shall not be liable for or assume the commitments of central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of another Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project” (Pisani Ferry, 2012, p. 4).

¹⁵This clause is called as well the no bailout clause (Pisani Ferry, 2012, p. 12).

¹⁶The article states “Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States (hereinafter referred to as ‘national central banks’) in favor of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments” (Pisani Ferry 2012, p. 5).

¹⁷With the expression “bank sovereign interdependence” the author means that time existent situation in the banking sector, where the single state was responsible for the regulation, supervision and survival, or recapitalization in case of bankruptcies, thus the banks were relatively

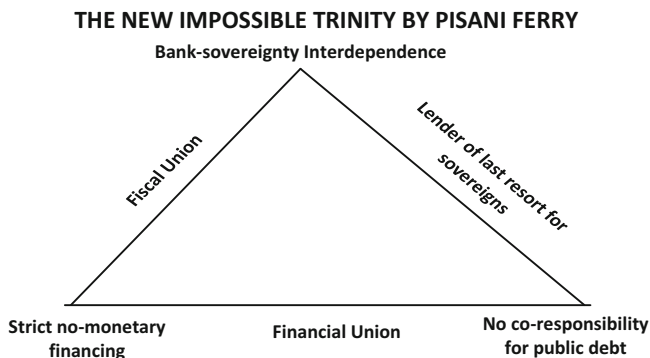


Fig. A.8 The new impossible trilemma (Reproduced from Pisani Ferry Jean 2012)

reality of the Euro area (see Fig. A.8 in the appendix). He realized that the crisis in Europe led to a very strange situation, a kind of “doom loop” (Obstfeld 2013, p. 7), where the bank exposure influenced the government and the government exposure influenced the banks.

When the crisis started and many banks in Europe were exposed to financial difficulties, the home governments of these banks helped them to take over the liabilities. These actions led to high budget deficits and, in some cases, to financial difficulties. The market started to realize that some countries are not in very good shape and started to demand higher risk premiums for these countries, thus, in many cases, to negatively upgrade the creditworthiness of the countries. On the other side, this led to problems of the banks because most of the banks in Europe have significant amounts of government bonds in their portfolio. In order to break this strange situation, Pisani Ferry saw three mutually exclusive alternatives, either to realize a truly fiscal union and to give up the no co-responsibility clause, so that countries could help the banks with problems or to give the no financial clause and to give the ECB the possibility to act as Lender of Last Resort in order to help to rescue the banks, or at least to realize a truly financial union¹⁸ (see Fig. A.8 in the appendix).

active overall in Europe, and they had relative big amounts of governments bonds (Pisani Ferry 2012, p. 6).

¹⁸As it is already known, Europe is in a phase of strong procedural changes. There is a variety of proposals. A large number have been included in the proposals of the five presidents of EU. Taking into account the proposals of the presidents, one can express the view that the EMU is directed towards the solution of the banking union as far as the clauses of no co-responsibility and no financing remain in power.

30.4.2 *The Financial/Fiscal Trinity of Maurice Obstfeld*

Obstfeld moves in the same direction like Pisani Ferry. He concentrates his attention as well on the financial and banking sector. He asserts that when economy like that of the monetary union has reached a certain level of development, it cannot simultaneously maintain cross-border financial integration, financial stability, and national fiscal independence it has to choose two of them. By explaining the trilemma, he says that (Obstfeld 2013, p. 7) “*if countries forgo the options of financial repression and capital controls, they simply cannot credibly backstop their financial systems without the certainty of external fiscal support, either directly (from partner-country treasuries) or indirectly (through monetary financing from the union-wide central bank)*” (see Fig. A.9 in the appendix).

We see in this point that even though Obstfeld does not refer directly to the no co-responsibility and to the no financing clauses of the treaty, he includes them in his concept of the trinity. Obstfeld, like Pisani Ferry, does not stay only in the explanation of the crisis and the trilemmas, but he made a special proposal to the solution of the crisis and to the solution of the trilemma. How far these proposals coincide with that of Pisani Ferry and which of them are implemented is a matter which we will not investigate further.

30.4.3 *The Impossible Trinity of a Monetary Union of Hanno Beck and Aloys Prinz*

The impossible trinity of Beck and Prinz (2012) differs somehow of those of Schoenmaker, Pisani Ferry, and Obstfeld, as these authors do not include in their trinity the financial and banking sectors. Beck and Prinz define their trinity as

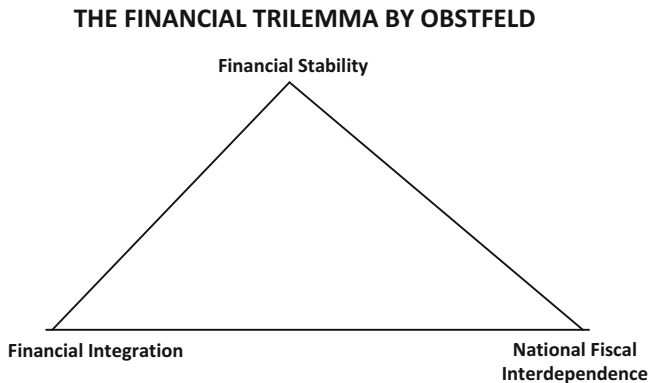


Fig. A.9 The financial/fiscal trilemma (Reproduced from Obstfeld Maurice 2013)

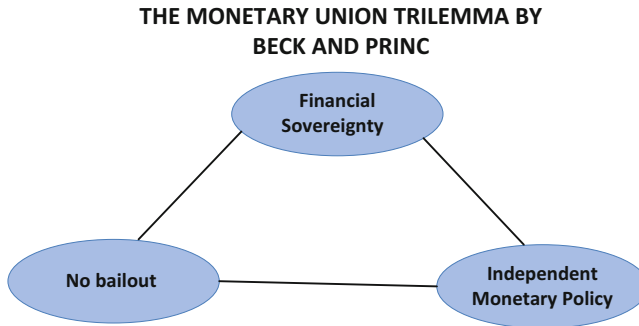


Fig. A.10 The monetary union trilemma (Reproduced from Beck, H and Prinz, A 2015)

a trinity, which entails an independent fiscal sovereign, an independent monetary policy and, the third, the no bail out clause (see Fig. A.10 in the appendix). They define (Beck and Prinz 2012, p. 40):

- The independent fiscal sovereignty, as a country which can choose their own deficit on national consideration and without any restrictions;
- The independent monetary policy in the classic way, as it is defined in the case of the ECB, the case, when the national bank is independent and follows their own policy of price stability without restriction;
- The no bailout clause of article 125 of the treaty.

Assuming that default is not allowed in EMU to any country, the authors proceed with the three solution of the trinity as follows (Beck and Prinz 2012, p. 41):

- Scenario #1: fiscal sovereignty combined with independent monetary policy. That is the case, where the country retains their sovereignty and does not have direct influence on monetary policy. In this case, the country can freely choose the level of their deficit and this can be “dangerous,” as far as the central bank is independent and does not finance the deficits. In this case, if the monetary union does not want to let the country fall in default, the only one thing it has to do is not to enforce the no bailout clause.
- Scenario #2: fiscal sovereignty and no bailout clause. If a country retains its fiscal sovereignty, and the no bail out clause is enforced strictly, then the central bank will be in charge of saving the monetary union by rescuing the respective over-indebted country.
- Scenario #3: independent monetary policy plus the no bailout clause. With independent monetary policy and strict appliace of no bailout clause, union members will have to be forced to limit their sovereign debts to sustainable limits.

The authors made as well some suggestions about a possible configuration of the monetary trilemma in union, which will be, as it was the case for the two above mentioned trinities, not considered further.

Looking again on the trinity of Beck and Prinz, we can figure out two remarkable points. First, the efforts of the authors were concentrated only on macroeconomics variables. Second, the last scenario, which fits very well with the consensus of Berlin and the strict austerity policy, this consensus, is propagated with.

In general, we see that trinities are used to describe and analyze the viability of the EMU. At the start, the impossible trinity with the strong support of the Optimal Area Currency (OCA) theory¹⁹ was used to theoretically “justify” the project of the EMU. Even though many scholars and analyst mainly from the Anglo-Saxon predicted that EMU will not be successful, the monetary union of Europe started in the year 1999, and for the first years it was up to contradict all the false prediction because of the convergence dynamics of the Euro zone and the endogeneity of the OCA theory.²⁰ But the first serious trouble shocked the edifice of EMU and showed the main weaknesses. Once again, the problem was the “devil” of the financial flows, the financial sector, and the financial integration. Again, the situation was stated using the trilemmas between the financial integration, financial stability, (Euro survival) and the national financial or national fiscal, last resort funding regulation. Which one of the alternatives Europe will choose is only a matter of time.²¹

30.5 Political Economy Trinities

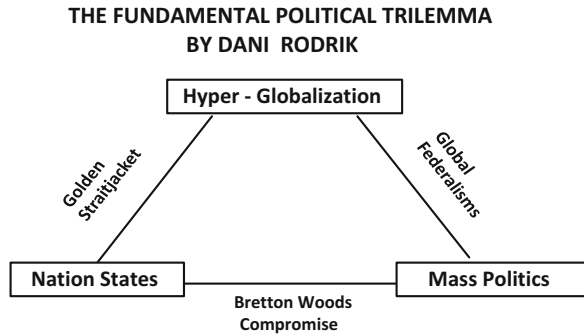
The logic of the trilemmas is exposed to the political economy and international relations area. The most known political trilemma is that of Rodrik (2012a, b, 2010) who investigated the feasibility of globalization, the national states, and the democracy. In his famous fundamental political trilemma, Rodrik asserts that it is

¹⁹Optimal Currency Theory is developed by Mundell, McKinnon, Kenen, and others and examines whether a geographical area is an optimal area for a single currency. In other words, it is a theory, which investigates how far countries could or should participate to monetary union, how far countries could or should choose a fixed exchange rate system. Unlike the others traditional theories, which focus on the exchange rate as an adjustment mechanism, OCA concentrates on alternatives to exchange rate mechanism, like the geographical mobility of workers, size of the area, concentration, diversification, etc (Mongelli 2002, 2008).

²⁰The endogeneity of OCA states that even a geographical area has not the right criteria to be an optimal currency at the start, but by adopting a common currency, it might become an optimal currency area in the future (Mongelli 2002, 2008).

²¹Many analysts do not believe that solving the monetary union trilemma will be enough. For example, Bibow (2013a, b, 2014, 2015a, b) asserts that EMU must proceed much farther than solving simply the monetary union trilemma and implement a real fiscal union by establishing a union treasury, which will back the lender of last resort function of the European Central Bank and give the Euro the legitimate power to become a currency of “European Nation,” the power of sovereign state. As he put it “*the current regime (in the EMU added) leaves all players vulnerable. Lacking a central bank partner, the national treasuries are subject to default and, hence, runs. Lacking a Euro Treasury partner and Euro Treasury debt, the ECB is subject to legal challenges of its quasi-fiscal policies as applied to national debts.*”

Fig. A.11 The fundamental political trilemma
 (Reproduced from Rodrik
 Dani 2012)



not possible to achieve a hyper-globalization having at the same time independent national states and mass politics, which he identifies as democratic politics (see Fig. A.11 in the appendix).

Under hyper-globalization Rodrik (2012a, b., p.285) understands a globalization, which is not only characterized through the abolishing of tariffs, controls on capitals, and other obstacles, which prevent the free movement of products, service capital and people, but also a system, which completely harmonizes and works as one country. With mass politics Rodrik (2012a, b., p. 285) understands the policies which are legitimated by the mass of the people and are implemented on the behalf of them in order to follow their own interests.

Under these conditions Rodrik (2012a, b., p. 285) asserted that the globalization can be achieved either by the nation states imposing very strange rules (the famous straitjackets) with an aim to abandon independent mass policies, or globalization can be achieved by using a kind of international democratic regulation (federal government), which allows to use some mass policies and to abandon the notion states. Lastly, the globalization will be not realized if the international community chooses a combination of nation states, which follow their own mass policies (see Fig. A.11 in the appendix).

Rodrik (2012a, b) gave some examples and propose the following statements (see Fig. A.11 in the appendix):

- The combination of nation states and globalization, which abandon the mass policies, is very similar to the gold standard system, which was implemented during the globalization era (the international medium of exchange, the Gold) of that time by imposing the rules of the game, the rules of the free capital, and free exchange of gold;
- the combination of the realization of globalization through the democratic mass politics, using international roles in the kind of a federal state, is very similar to the European Monetary Union a “federal state of Europe”;
- the possibility of free nation states, which follow democratic mass policies, point on the compromise of Bretton Wood, the monetary system, which gave space to the state to follow their own policies, but which “abandoned” the globalization by imposing strict rules to capital movements.

Having in mind all the above mentioned, it is logical to ask ourselves how to fit all the trinities, which have been introduced and discussed in the previous parts of the paper, with the fundamental political trinity? After all, all the trinities, discussed in the previous parts, have something to do with the free capital movement and the free capital movement, and it is a direct expression of globalization. How can we combine the trinities with the notion of fundamental political trinities to make a suggestion in the international context?

We think that the fundamental political trinity is a trinity with a high level of abstraction over the other trinities. The political trinity deals with the globalization itself, while the previous trinities deal with single entities, single countries, and they touch the problem of globalization only partly. We can notice if we compare previously discussed trinities with political trinity:

- Taking into consideration the Mundell impossible trinity, we can see that it fits very well with the political trinity, if one takes the free capital movements or the fixed exchange rate as expressions of the globalization. So, for example, if we interpret free capital movement as expression of globalization, if we put the free capital movement in the vertices of hyper-globalization and on the vertices of the nationally fixed exchange rate, we receive again the impossible trinity (see Fig. A.12 in the appendix);
- The same can be done with the two financial trinities by Shoenmeker and the financial trinity by Obstfeld, which are not anything else rather than a direct expression of financial and banking globalization (see Fig. A.13 in the appendix).

No matter, which one of the triangles we use, we arrive at same conclusion. If a country or the “global entity” accepts the international capital movement, it has no other choice as to curtail the democracy and the mass policies (realized through independent monetary policy).

The Trinity by Rodrik and the Impossible Trinity

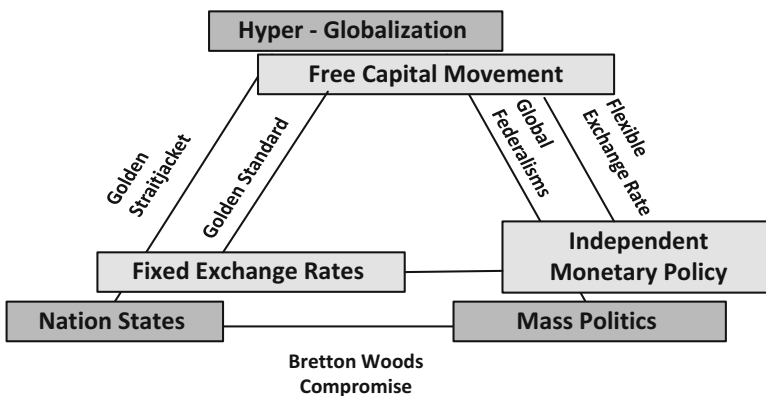


Fig. A.12 The trinity by Rodrik and the classical impossible trinity

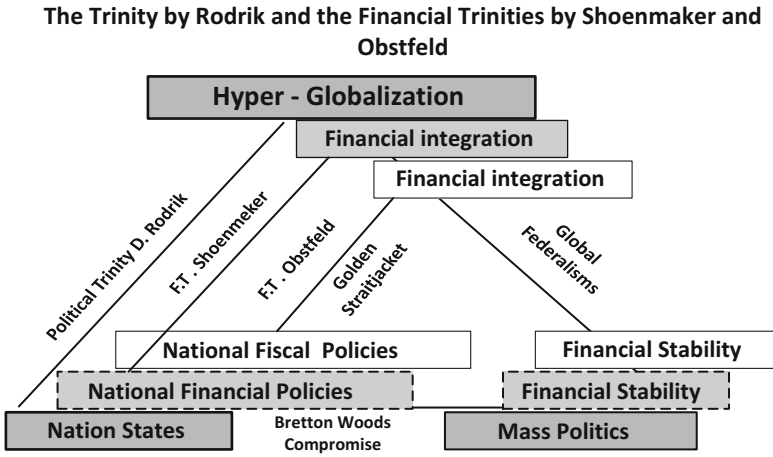


Fig. A.13 The trinity by Rodrik and the financial trinitities by Schoenmaker and Onstfeld

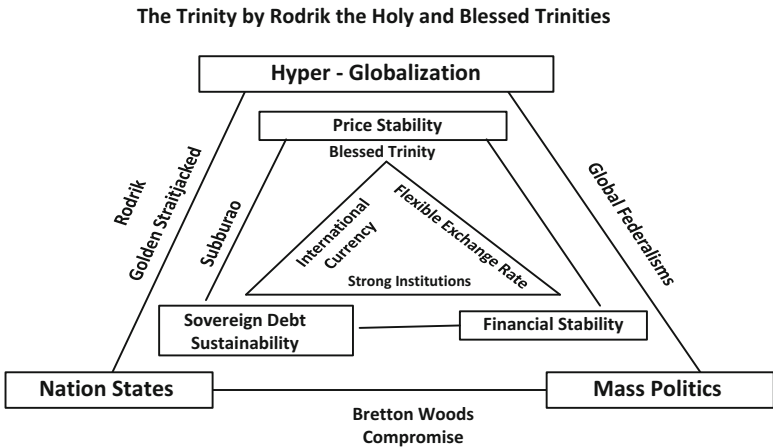


Fig. A.14 The trinity by Rodrik the holy and the blessed trinitities

Things are not much different with the other three triangles that of the blessed, the holy trinity and the monetary union trinity of Pisani Ferry. At the first glance they look completely different, than the political trinity, but, by looking closer, we can recognize that these trinities fit very well somewhere in the middle and inside of the political trinity (see Fig. A.14 in the appendix). The first two trinities look solely on the working financial condition without referring to political condition, regardless to, for example, how far mass politics (democratic policies) would be implemented or not. We know that countries can choose their suitable degree of exchange rate stability or flexibility; equally, they can choose the degree of capital openness and, of course, the stance of the independent monetary policy. Choosing

the degree of capital openness, the degree of the exchange rate fixedness, and the stance of the independent monetary policy, the countries choose, at the same time, the degree of the mass politic. In this realm, both trinities fit somewhere inside the political trinity: either in the near of mass policies or in the near of the globalization side (see Fig. A.14 in the appendix).

This is very clear and to be observed in the case of the Pisani Ferry monetary union trilemma, the trilemma between the sovereign financial markets, the no co-responsibility, and no bailout clause. The Pisani Ferry trilemma fits very well inside the political trilemma, but the question here is if it will be more on the side of democracy, accountability, and responsibility or in the direction of imposing a straitjacket. In effort to tackle the EU crisis, one has to take a series of measures like the six pack, the two pack, the European Semester, the Fiscal Plus, the European Stability Mechanism, and many others with no need to be listed. By observing these changes, somewhat superficially we could say that they tend towards the side of straitjacket, as far as we, in the new measures, “recognize” something called as enforcement²² (see Fig. A.15 in the appendix).

Different approaches were chosen by the two scholars Bordo and James (2015). They don’t base their theory on the Rodrik fundamental trilemma and developed their own four political trilemmas. The first two are the classical macroeconomic (see Fig. A.16 in the appendix) and the financial stability trilemma (see Fig. A.17 in the appendix) are identical with two classical impossibility trilemmas and the financial trilemma, which are presented and discussed in the first and second part of the paper. They make exactly the same conclusion, but it is very interesting to see how those two scholars do not put the examples they use on the arcs or the

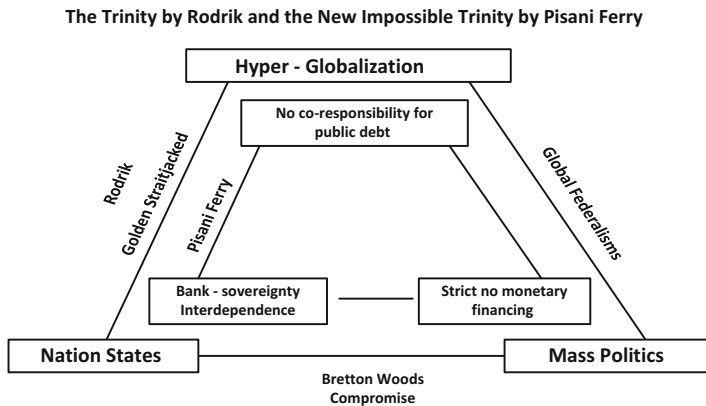


Fig. A.15 The trinity by Rodrik and the new impossible trinity

²²This must, of course, not be truth, but we cannot deal with such issues in the present work. Issues of democratic legitimacy, for example, of the European Semester or the European Stability Mechanism are beyond our subject, and for this reason they are no further examined.

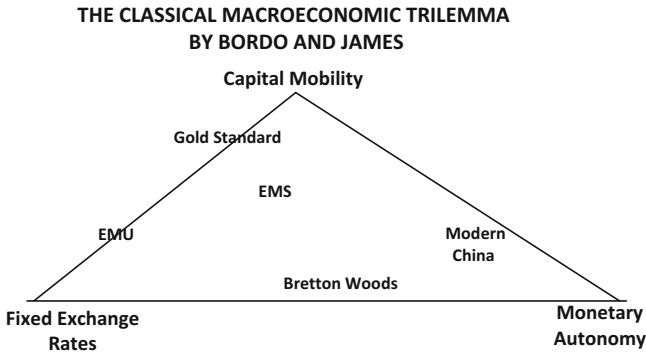


Fig. A.16 The classical macroeconomic trilemma by Bordo and James (Reproduced from Bordo, M and James, H. 2015)

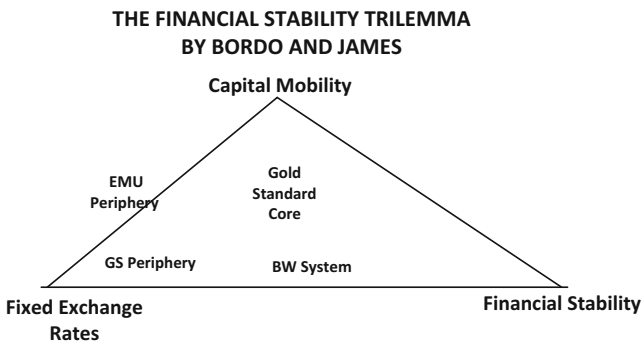


Fig. A.17 The financial stability trilemma by Bordo and James (Reproduced from Bordo, M and James, H. 2015)

vertices of the triangles, but somehow put it in inside of the triangle in order to show that the politicians and the different authorities do not choose polar and extremes alternatives, but rather more moderate ones, as far as they can choose the degree of capital market openness, the exchange rate stability/flexibility, and the monetary autonomy.

The third one triangle they developed is the triangle which they named political economy trilemma, a trilemma between the capital mobility, democracy and monetary autonomy (see Fig. A.18 in the appendix). They interpret democracy in a classical way, as the condition, in which individuals or politicians decide freely and follow their own interests. Politicians look to exploit every opportunity, like that of the free capital movement, but if they are short sided, they cannot make any long term commitment and they are subjected to the time inconsistency, so they cannot fulfill the long term commitments (Bordo and James 2015).

The fourth triangle is the International Relation Trilemma, which is a trilemma between the capital mobility, democracy, and international order (see Fig. A.19 in

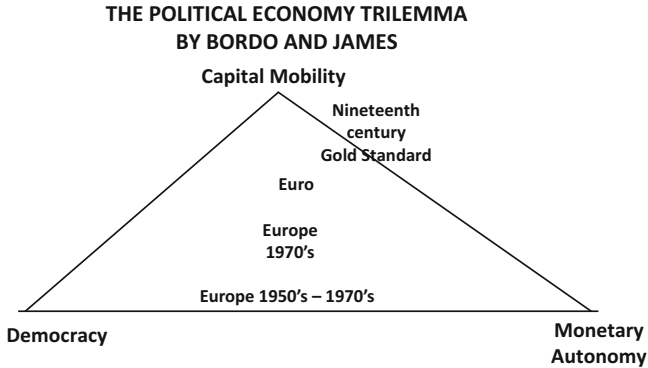


Fig. A.18 The political economy trilemma by Bordo and James (Reproduced from Bordo, M and James, H. 2015)

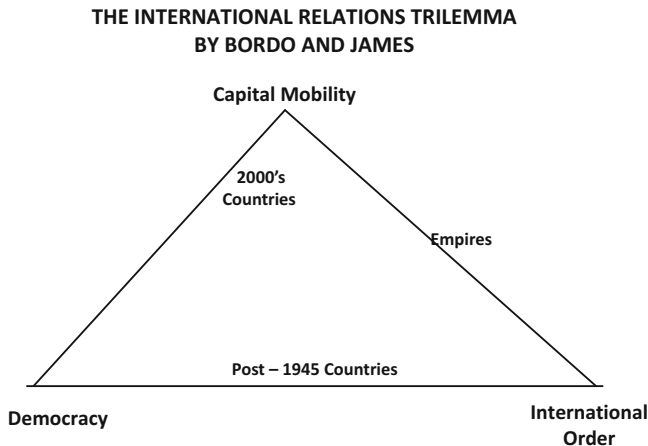


Fig. A.19 The international relation trilemma by Bordo and James (Reproduced from Bordo, M and James, H. 2015)

the appendix). The international order in form of international treaties, regional treaties, like that of EU or EMU, international authorities and institutions that help to overcome the problem of time inconsistency and the redistributions problem that are inherent to every democracy, firstly have to make long term commitments and, secondly, to solve the problems, which are related with redistribution of wealth and power (Bordo and James 2015).

Restating, we can note that the political trinities break the “straitjacket” of the narrow economy and put the issues in a much wider context, in the political and international context. The issues are not anymore investigated only in the area of exchange rate regimes, currencies, financial flows, sudden stops, etc. Now dilemmas and trilemmas are investigated considering issues, like the political pressure groups,

the legitimacy, the accountability, governance, etc. This sharpens and broadens our understanding, as far as we put the dilemmas and trilemmas in the social context. Eventually, the economy is not an end in itself but a mean for social better off effects. In this realm, the fundamental political economy trinity of Denis Rodrik seems to be a very useful tool. As a high abstraction triangle “entails” all the others as well and puts so the whole problematic in the “right” dimension, in the dimension of the contradiction between the globalization, the nation states and the democracy (mass politics).

30.6 Conclusion

After a “small historical chronology,” we can conclude, in general, that triangles, trinities, and trilemmas are used very often in different times and for different reasons.

Even though, as Bordo and James put in their article, “*trilemmas may not pose the apparently impossible policy straitjackets which they seem to represent*” because policymakers usually choose the degree of capital transactions openness, the degree of banking regulation, the degree of exchange rate flexibility, and the stance of monetary policy, thus they must not be interpreted and understood strictly. Trinities are still very useful tools, as far as they help to analyze the dilemmas, they are put on the map not only to the very practical policymakers.

From the theoretical and analytical point of view, as we saw in the paper, they can be very useful because they allow us to see the polar cases, the mutually exclusive alternatives, the contradictions in the solutions. We will not exaggerate if we say that they sharpen, broad, and deepen our understanding.

The first trilemmas, those of the first generation, put emphasis on the dilemmas between the exchange rate and the monetary autonomy. In those times the problem was a contradiction between the exchange rate and the monetary policy. The authorities were looking to find when, how, and under what conditions they can use the exchange rate, or the monetary policy, or how to combine them. The solutions put in a question the validity of the uncovered arbitrage, the purchasing power parity, and the monetary transmission mechanisms. Capital mobility was very seldom questioned, particularly because this was the time, where the world was not so much financially integrated and the world community was standing for the positive effects of the free capital movement. When the free capital movement was questioned, it was for the case of the emerging markets economies, where the financial markets and the financial conditions were not so much developed.

In the 1980s and in the 1990s, the emerging markets countries and many developing countries, in times of regional crisis experienced in these years, started to put a fourth element in this trinity that of the financial deepening. Many of them “survived” the difficult times of sudden movements of financial flows by using the safety pillow of the international reserves. Very soon, the problems of sudden changes of financial flows were transposed to the developed world as well.

The developed world suffered this through the severe global financial crisis. Now the trilemma has changed its configuration and has been put in its “new” clothes, those of the international financial trinity, the trilemma between the financial stability, financial integration, and national financial policies. However, in reality, the problem was and still is how international banks, others institutions, and even financial flows, which “travel” over the world, can be “managed”; if they can be managed by national authorities or by international authorities, by national measures or by international measures. Again the financial “world,” the financial flows are seldom questioned.

The issue does not change too much in the case of Europe and EMU. In EMU, where the abolishment of the exchange rate and the free movement of capital are imposed in treaty and accepted “per se,” the trilemma took again the form of a contradiction between the financial integration, which is imposed per treaty and not questioned, the no co-responsibility of the debt by the sovereignties, and the no monetary financing by the ECB. How Europe and EMU are going to solve this difficult puzzle is a question which puzzles many researchers.

Things differ somehow in the case of the political and international relations trilemmas. Using the configuration of the fundamental political trinity, we can clearly recognize the trilemma between financial globalization, the nation states, and the democratic policies. Using the fundamental political trinity by Rodrik, we can clearly see the alternatives between the straitjacket of the similar rules, the solution of a kind of federalisms, or the big compromise to incorporate mass politics.

Now we are again at the start and we ask ourselves whether we should accept the capital mobility unquestioned, or we should accept the “financialization” unquestioned, whether we should simply put emphasis only on the capital and financial intermediation and not to look on the vagaries it causes? As it was put by Joshua Aizenman (2010, p. 10) *“By force of history and by virtue of learning by doing, the pendulum is shifting towards a more nuanced view, recognizing central banks and Treasuries’ responsibility in implementing prudential regulations and policies aimed at reducing volatility and susceptibility of economies to crises.”*

Appendix

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Chapter 31

Evolution of Trade Globalization from 2003 to 2014: Weakening Dynamics of World Trade Confirms Globalization Postulates

Bruno G. Rüttimann

Abstract This paper measures the globalization degree of physical trade flows based on WTO figures from 2003 to 2014. The paper is an annual update of former presented papers representing a long-term study analyzing the evolution of the globalization phenomenon. The entropy-based metrics used to compute the interweavement of trade flows is based on a Boltzmann derived concept of entropy, i.e., the higher the order (high inequality) the lower the entropy, leading to a new defined statistical entropy. Translated to economy: the higher the inequality (high concentration of flows) the lower the entropy, i.e., the lower the globalization degree resulting in a higher risk of the economic system. Former papers have shown that economic world trade, as a whole, has been globalizing during recent years but with different patterns: de-globalizing for advanced economic regions, such as North America and Europe, and globalizing for emerging economic regions. Furthermore, it shows that globalization or de-globalization, intended as interweavement of flows, is not a result of the absolute trade volume but of the growth rate of trade volume. The Globalization Trade Model with globalization type 1a of commodities, globalization type 1b of specialties, and opportunistic low-cost globalization type 1c gives an explanation for the different regional evolutions. At the beginning of economic development, globalization is governed by the H-O resource endowment trade logic complying with complementary needs of economic regions, spreading trade flows to new destinations, whereas advanced economies are concentrating on preferential destinations, following Linder's trade model based on similar consumption patterns. However, after the financial crisis of 2008, during the last years, the evolution of world trade has been stagnating. Is the globalization of trade coming to an end? The aggregated result seems to confirm inverse Kuznets evolution of globalization, explainable with the Central Theorem of Globalization and the Maximizing-Value-Net-of-Risk globalization logic.

Keywords Globalization • World trade

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31.1 Introduction

Decade-long, world trade has been increasing; but has also globalization, i.e., the interweavement of trade flows been increasing? Globalization is a natural phenomenon of an open economic system. Liberalization and deregulation of trade barriers as well as bilateral economic development agreement have been leading to an increase in trade and therefore in wealth generation but bears also the danger of exploitation of disadvantaged regions. The emerging economies, namely the BRICS countries (Brazil, Russia, India, China, and South Africa) are, or will be, the major drivers and stakeholders in the future importance of economic development, although they show presently some stumbling. But also within the emerging economies substantial differences within action scope or preferential trade partners are observable. The development of economic globalization is a mix of increase in physical trade, sustained foreign direct investments, financial market repercussions, and an increase in human mobility, all supported by telecommunication and increase in transparency of efficient market places via the world wide web.

Different types of indicators have been developed to measure the multiple dimensions of globalization. For a non-exhaustive comparison see, e.g., Caselli (2006), Dreher et al. (2010), Ghemawat and Altman (2013), and Fagiolo (2012). The evolution of world economic development is monitored by the World Trade Organization (WTO) as well as, e.g., the yearly published KOF ETH Zurich globalization indicator (Swiss Economic Institute of Swiss Federal Institute of Technology). KOF uses a multidimensional index to capture economic, social, and political dimension of globalization (Dreher 2006). All these types of indicators have a rather descriptive character measuring merely the evolution of globalization. Other research is rather focused on measuring the intrinsic nature of globalization, i.e., how globalization originates and its effects. Such research aiming to understand trade patterns, evolution of value chains, destination of investments, behavior of networks, as well as AB models (Agent Based) are described, e.g., in Gallegati et al. (2008), Battiston et al. (2006), Gabrielli (2012), Karunaratne (2012), Pietronero et al. (2013), and Stiglitz (2004). It is not intended here to perform a comparative analysis of existing research work but based on a new defined globalization metric (Rüttimann 2007) to update an ongoing study presented first in 2009 at the occasion of a globalization congress at University of Ostrava and published by the University of Stettin in *Europa Regionum* (Rüttimann 2010a), and institutionalized finally from 2011 onwards (Rüttimann 2011b), based on the theory developed in Rüttimann (2007). The hereafter used indicator is a specific developed globalization indicator having normative character, i.e., bearing the intrinsic globalization law (Rüttimann 2007; Rüttimann 2010a; Ruettimann 2011a).

The present paper is a yearly updated study of previous papers (Rüttimann 2010a; Ruettimann 2011b; Ruettimann 2012; Rüttimann 2013; Rüttimann 2014a; Rüttimann 2015). It will concentrate the analysis first on the evolution of physical trade flows within the major world economic areas given by the WTO table i04, namely North America NA, South Central America SCA, Europe EU, Russia

with Commonwealth of Independent States CIS, Africa, Middle East ME, and Asia. We will apply a new inequality indicator based on statistical entropy which incorporates also the intrinsic reason of minimizing risk by even distribution of portfolio, formalizing a built-in rational explanation of globalization (Rüttimann 2007; Rüttimann 2010a; Ruettimann 2011b). Within the main economic globalization types, namely type 1 (physical flow globalization), type 2 (financial and capital globalization), type 3 (human factor globalization, i.e., migration and services), each is characterized by subtypes (Rüttimann 2007; Ruettimann 2009; Ruettimann 2011a) of this comprehensive globalization model. We will use the type 1 globalization to explain the different evolution of globalization in each geographical region.

Second we will apply the Central Theorem of Globalization (CTG) and its corollary (Rüttimann 2007; Rüttimann 2010a; Ruettimann 2011b) to understand the underlying logic of evolution of trade. The paper will investigate questions such as: How are different globalization patterns linked to the trade flows? Why should different regions perform differently? Is it a consequence of different resource endowment or the maturity of the economy? Which are the possible economic driving causes for the different trade patterns? And finally, is globalization of economy coming to an end?

31.2 Theoretical Background

In the following, we will apply the globalization measure according to (Rüttimann 2007; Rüttimann 2010a; Ruettimann 2011b) to foreign trade flows as well as the Globalization Types Model (Rüttimann 2007; Ruettimann 2009; Rüttimann 2011a). From the paradigmatic interpretation of thermodynamic entropy we can define risk as a dualistic view of order in an economic system, therefore the more order (i.e., inequality) that exists in an economic system the more risky the economic system (or vice versa, the more equality a system shows the less risk it presents). The greater the inequality compared to the riskless state with equality $\psi_{XY} = 1$, the larger the risk of an atomic element. Whereas in the here presented context inequality refers rather to a single element of a system, the concept of risk can be aggregated to the entire system.

31.2.1 *Measuring Globalization: Entropy-Based Inequality Risk Metric*

According to the Pigou–Dalton Transfer Principle and the interpretation of entropy law, we will apply the Minimum Risk Principle (Rüttimann 2007; Rüttimann 2010a; Ruettimann 2011b) to analyze the foreign trade, i.e., the material globalization

type 1 (Rüttimann 2007; Ruettimann 2009; Rüttimann 2011a) dealing with physical flows of a product α , by applying it to which country X exports to which countries Y , and which country imports from which countries represented by the trade matrix $T^\alpha = [t^\alpha_{XY}]$. For a trade system we can build the market share vector of an economy and calculate the inequality measure ψ_{XY} as the market share of X in Y compared to the overall market share of X . For economy X we can calculate the risk $r_X(\psi_{XY})$ of its portfolio of activities in the countries Y . The lower the inequalities in each country Y the lower the risk value and therefore the higher the globalization degree of the country X . If the inequality is $\psi_{XY} = 1$ for all Y , then country X has the same market share in all countries Y and its portfolio of trade flows is proportional to the market composition according to its competitiveness. We can consider the CTG and its corollary as the basics to explain that our economy will globalize naturally with the existing deregulation tendency. This risk metric is a genotypic measure, bearing the intrinsic law of economic globalization.

31.2.2 Globalization Logic: Maximizing Value Net of Risk

But entropy is not the sole governing physical law of thermodynamics. Indeed, if a transformation happens is determined by free enthalpy. The same is also applicable to economics (Rüttimann 2007). By adding the concept of thermodynamic enthalpy to the economic system, we can also explain the presence of an eventual de-globalization trend (i.e., an increased order of the economic system corresponding to an increased inherent economic risk of the system). This matches the fundamental economic law that a higher risk corresponds generally to a higher return.

Minimizing risk is only one cardinal law (this law models the globalization extension), maximizing profit is the other cardinal one (this law models the supposed rational acting). Globalization is extending the business scope to new geographic areas, and the aim is

- To increase the profit generation (explicit strategy of profit maximization), and at the same time
- It reduces the risk of the portfolio (implicit law of risk minimization).

The final governing principle of economic globalization is therefore risk deducted value maximization (Rüttimann 2007; Rüttimann 2010a; Ruettimann 2011b), i.e., Maximizing Value Net of Risk (MVNR). With this principle we can explain the rationale of any economic actor not only limited to perfect competition models but also including oligopolistic markets comprising Multi National Enterprises (MNE) and extended to world trade responding to why globalization happens.

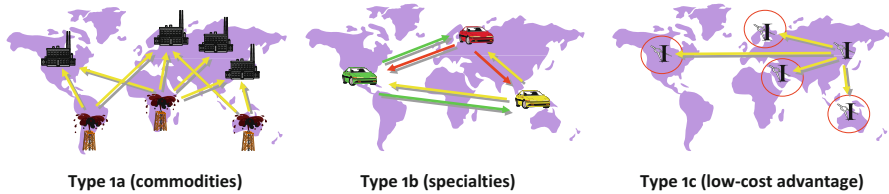


Fig. 31.1 The three subtypes of trade globalization (type 1 globalization)

31.2.3 Types of Globalization: The Trade Globalization Model

But globalization is not always the same globalization; according to different business types also different globalization types exist. Indeed, the product characteristics determine the business type (commodities, standards, specialties, and convenience) and the related globalization types with its specific logic (Rüttimann 2007; Ruettimann 2009; Ruettimann 2011a). We will concentrate on the three subtypes of type 1 trade globalization: type 1a the globalization of commodities, type 1b the globalization of specialties, and type 1c the opportunistic low-cost globalization. Figure 31.1 shows synoptically the difference between the three subtypes of trade globalization. We have to be aware that globalization types may overlap, e.g., capital globalization type 2a with trade type 1b or type 1c; these globalization types, each with different logics, give a rough classification to facilitate understanding of globalization (Rüttimann 2007). Let us give in the following a brief overview; for detailed information we refer to (Rüttimann 2007; Ruettimann 2009; Ruettimann 2011a) entering into all three main types of economic globalization as well as their seven subtypes.

Type 1a is the globalization of commodities with unidirectional flows t_{od} from the country of origin O to the industry countries of destination D. The main drivers for this type of globalization are shown in Eq. (31.1); these are the demand V_d for a certain commodity in the industrial country and the price p_r of the commodity which is determined by the demand/offer at efficient commodity exchanges, as well as the substitute materials and their prices p_s and the production cost P_o in the country of origin.

$$t_{od,r} = f \left(V_d \left(a_i, \frac{p_s}{p_r} \right), P_o(p_r), p_r \left(\frac{V_d}{P_o} \right) \right) \tag{31.1}$$

Type 1b is the globalization of specialties characterized by bidirectional trade flows t_{AB} between countries A and B modeled with Eq. (31.2). The main drivers for that type of globalization are: the volume demand V_A and V_B for the product in the producing country A and the demanding countries B, as well as market growth rates g_A and g_B , their prices p_A and p_B for the products produced in A and B, as well as the comparative product characteristics $\pi_{\alpha\beta}$ and prices between similar products; for detailed explanation see (Rüttimann 2007; Ruettimann 2011a).

Due to the differentiation possibilities of the products, the price fixing is made from the view of the value for the customer and competitive marketing decisions.

$$t_{AB} = f \left(V_B, \frac{1}{V_A}, g_B, \frac{1}{g_A}, \frac{p_{\alpha B}}{p_{\alpha A}}, \frac{p_{\beta B}}{p_{\alpha B}}, \pi_{\alpha\beta} \right) \quad (31.2)$$

Type 1c is a transient globalization type with unidirectional trade flows t_{ZK} from the low-cost country Z to the high-price countries K and is based on exploiting the structural advantage of production cost Δp_{ZK} , as shown in Eq. (31.3). The trade flows depend also on the capacity filling situation in the low-cost country (P_Z/V_Z) and how attractive the price differences (p_K/p_Z) are. This type of globalization is a transient type, existing as long as the opportunities are intact. Low-cost countries are, e.g., the BRIC countries. Due to the different stages of maturity of the BRIC economies, this type will last for long (Rüttimann 2007; Rüttimann 2011c).

$$t_{ZK} = t \left(V_K, \Delta p_{ZK}, s_{ZK}, \frac{p_K}{p_Z}, \frac{P_Z}{V_Z} \right) \quad (31.3)$$

These functional relations (31.1), (31.2), and (31.3) are based on empirical as well as theoretical considerations; they are derived from proven basic economic laws. The three different equations show that globalization is not equal to globalization; different driving logics govern the triggering and evolution of globalization leading to different trade globalization patterns. Giving insights to the transaction mechanism, they allow, together with the globalization types 2 and 3, to explain on macro-economic level the transaction evolution, in order to model competitive behavior and potential evolution of value chains (Rüttimann 2008a; Rüttimann 2008b; Rüttimann 2010a) and macro-economic implications (Rüttimann 2014b; Rüttimann 2016). It has to be mentioned that Eqs. (31.1), (31.2), and (31.3) are not state equations as generally used in neo-classic economy for modeling equilibrium, but they are functional relations modeling the triggering and transition from one state to the other, i.e., the dynamic aspect of evolution.

31.2.4 *Phenotypic Manifestation: Enunciating the Globalization Postulates*

The results of previous research published in Ruettimann (2012); Rüttimann (2013); Rüttimann (2014a); and Rüttimann (2015) can be summarized with the following empiric conclusions about trade globalization, globalization seen as interweavement of trade flows, giving increased insights into this phenomenon. We can enunciate them as the following Trade Globalization Postulates (Rüttimann 2015).

- Postulate 1: At the first stage of globalization, economic globalization at aggregate level of all economies is correlated to trade volume (L-curve): increased trade will reduce risk level (i.e., indicating increased globalization).
- Postulate 2: The economic world as a whole is globalizing but with different evolution for the different economic regions: globalizing for the emerging economies, de-globalizing for the mature economies.
- Postulate 3: This means that for each economic region, as the maturity degree of an economic region evolves, we can see the transformation from an L-shaped curve to a U-shaped curve for the risk level, i.e., inverse Kuznets pattern.
- Postulate 4: Further, graphical correlation shows that on a long-term basis not the trade volume but the growth rate determines the evolution of globalization: i.e., the structural segregation of long-term de-globalizing advanced economies from globalizing emerging economies is not given by absolute trade volume but correlated to reduced trade growth, i.e., de-globalization is accompanied by reduced growth rate of production (for the time being, no causalization has been proved).
- Postulate 5: Emerging economies, mainly focused on commodities following type 1a globalization logic, are more sensitive to volatility and therefore to temporal (short-term or economic cycle) de-globalization as they respond to economic cycle contraction than advanced economies, advanced economies which maintain their risk level, i.e., their globalization degree.
- Postulate 6: A strong globalization tendency is initially seen by economies following commodity type 1a globalization and subsequently low-cost opportunistic type 1c globalization following Heckscher–Ohlin factors endowment theory. Specialty type 1b globalization, observable more in advanced economies, favors de-globalization, due to preferential destinations according to Linder's similar demand pattern theory.
- Postulate 7: The evolution of globalization (measured as interweavement) given by the CTG can be explained by the universal ultimate economic rational Maximizing-Value-Net-of-Risk logic, corresponding to the efficient frontier of a portfolio of activities, which allows to explain also a de-globalization evolution.

These seven postulates give an increased understanding of the trade globalization phenomenon. The evolution has to be monitored during the next years to verify these findings. We will now use the trade figures of 2014, and if when they will become available, to confirm or reject these postulates.

31.3 Methodological Approach

To measure the globalization degree of a set of geographical regions, which have been defined at the beginning, regarding the economic dimension of trade, as well as the evolution of globalization, we will use the inequality risk metric (Rüttimann 2007; Ruettimann 2011b) applied to yearly physical trade flow, statistics published

yearly by WTO. Despite physical trade flows, today, are not reflecting any more perfectly the performance of an economic region (Maurer and Degain 2010), we will continue to use these data due to availability reasons of long-term time series. We will not enter here into a detailed explanation of the applied metric for which we refer to Rüttimann (2007); Rüttimann (2010a); and Rüttimann (2011b), giving only a brief introduction. In brief: this new metric represents a paradigmatic approach of Boltzmann entropy of a thermodynamic system leading to statistical entropy. Instead of talking about entropy in economics, in the following we prefer to talk about risk of an economic system, which is more appropriate, i.e., the higher the entropy, the lower the risk of the economic system, i.e., the higher the globalization degree.

Let us define the trade matrix $T^\alpha = [t^\alpha_{XY}]$ showing the trade flows from economic region X to economic region Y for a product α or, in this case, for the whole trade volume. We can now build the market share array of an economic region and calculate the inequality measure $\psi_{XY} = p_{XY}/p_X$ as the market share of X in Y compared to the overall market share of X obtaining the inequality matrix for the whole economic system $\psi^\alpha = [\psi^\alpha_{XY}]_\infty$. For economy X we can calculate the risk $r_X(\psi_{XY})$ of its portfolio of activities in the countries Y as the 2nd momentum of the elements belonging to the inequality array ψ_X relative to the attractor 1

$$r_X(\psi^\alpha_{XY}) = \frac{\sum_{y=A}^Z (\psi_{Xy} - 1)^2}{\text{card}(Z)} \quad (31.4)$$

The lower the inequalities in each country Y of supplying country X , i.e., the more even is the repartition of trade portfolio and therefore the interweavement with other economies, the lower the aggregated risk value and therefore the higher the globalization degree of the country X ; this concept leads to the CTG and its corollary (Rüttimann 2007; Rüttimann 2010a; Rüttimann 2011b; Rüttimann 2012) which we will apply. If the inequality is $\psi_{XY} = 1$ for all Y , then country X has the same market share in all countries Y and its portfolio of trade flows is proportional to the market composition and marginal matrix distribution according to its competitiveness and the inequality risk $r_X(\psi_{XY})$ will become 0, i.e., attain maximum globalization. The array $r_X(\psi_{XY})$, containing the single risk of each economy (Eq. (31.4)), can be aggregated to the risk of the entire system of economies $r(\psi_{XY})$ representing the world globalization degree in terms of interweavement. Inequality measure can be applied to supply or demand; we will analyze in the following for the pattern analysis rather the supply side, i.e., the exports marginal distribution of the trade matrix. The aggregated world risk value, of course, is the same for both marginal distributions. We will interpret empirically the resulting patterns based on theoretical considerations.

The upper part of Table A1 in the annex shows the world trade flow matrix of the year 2014 (source WTO Table i04), as well as in the middle part, derived

trade shares measures of the geographic regions, and in the lower part relative inequalities calculated according to Rüttimann (2007); Rüttimann (2010a); and Rüttimann (2011b). The single inequalities are then aggregated to a risk measure of each economic region according to the two dimensions of supply portfolio (exports) and demand structure (imports); the matrix also contains geographic intra-trade t_{XX} . These individual “geographic” risk figures $rX(\psi_{XY})$ for exports, and $rY(\psi_{XY})$ for imports, are finally aggregated to the world risk index $r(\psi_{XY})$ measuring the economic globalization degree, i.e., the extension of the world economic trade system.

With this paper we want to confirm or reject the findings of previous publications (Rüttimann 2011b; Rüttimann 2010a; Rüttimann 2011a; Rüttimann 2012; Rüttimann 2013; Rüttimann 2014a; Rüttimann 2015), findings which we have called Trade Globalization Postulates.

31.4 Analyzing Trade Patterns Between 2003 and 2014

The world trade flows on an aggregated level have increased according to WTO source from 7290 b\$ in 2003 to 18,146 b\$ in 2014 showing a stagnation during the last years after the unrelenting growth of the world economy with a deep throwback to 11,978 b\$ during the world financial crisis in 2009, as shown in Fig. 31.2 and the data in the upper part of Table A2 in the annex.

The associated geographical areas and world risks, calculated according to Eq. (31.4), are shown in the lower part of the same Table A2 in the annex; it emerges that economic world risk metric diminished from 4.43 in 2003 to 1.62 in 2012

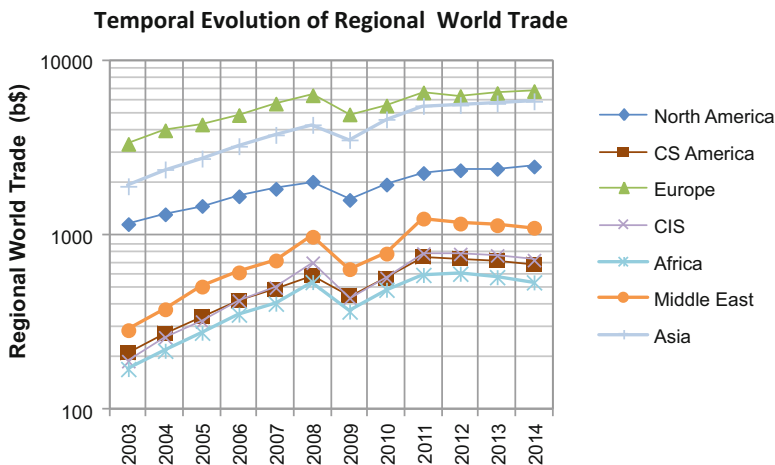


Fig. 31.2 Regional Evolution of World Trade of different macro-economic regions according to Table A2

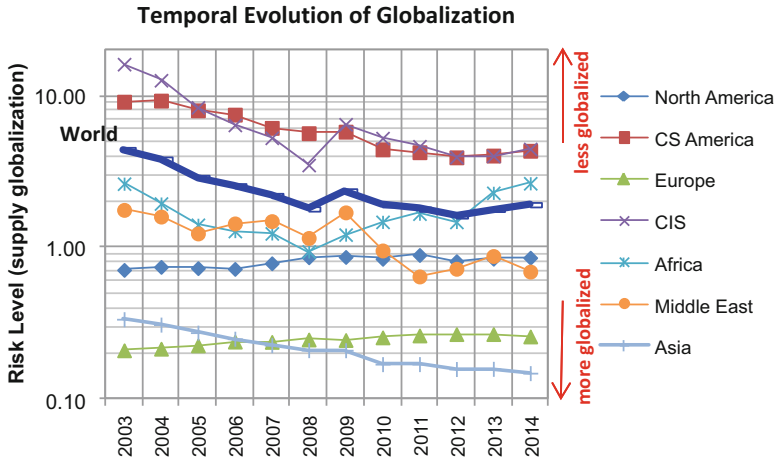


Fig. 31.3 Regional risk of different macro-economic regions according to Table A2 revealing heterogeneous evolution

demonstrating increased interweavement of economies, hence a more globalized world of trade flows but increasing again to 1.92 in 2014. The graphical evolution of regional risks is presented also in Fig. 31.3 and reveals a heterogeneous evolution, according to postulate 2.

Building the correlation between world trade and world supply risk we obtain the regression model shown in Fig. 31.4. The applied model is the model calculated using figures from 2003 to 2009 presented in Ruettimann (2012) but with the figures from 2010, 2011, 2012, 2013, and 2014 added to test the model. The present results including the five recent years generally confirm the validity of the regression model and already emerged results from the 2003–2009 analysis (Ruettimann 2012), giving evidence on a regression base for postulate 1. It shows that the risk level diminishes, i.e., the interweavement of globalization generally increases with the growth of trade volume. On the contrary, the risk increases with shrinking trade volume; that means, that during an economic downswing exports are concentrated on specific preferential areas less affected by the downswing, increasing portfolio inequality, and therefore increasing risk level. Nevertheless we observe that for the trade volume of 2013 and 2014, as already in 2011, the model overestimates the globalization level, revealing in reality a higher risk than the model shows. The increasing risk metric in 2013 and 2014, despite only little growth in trade volume, might be an indication for postulate 3. This fact would have resulted clearer if the commodity prices were not down, prices influencing on the trade volume expressed in monetary units. Although this fact becomes evident, it is too early to transpose postulate 3 on aggregate level. We will wait for the figures of 2015 to recalculate the L-model with a U-model.

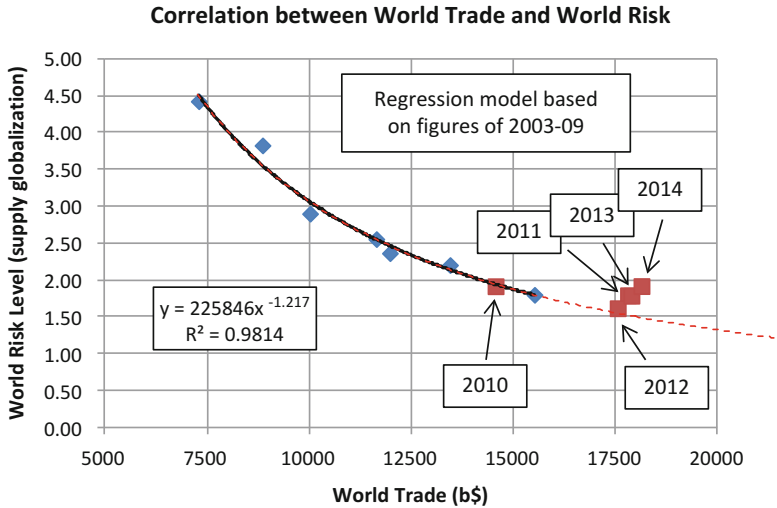


Fig. 31.4 Modeling globalization on aggregate level with an L-model

If we look at disaggregated data, i.e., at the evolution of regional risk shown in the lower part of Table A2 or Fig. 31.3, we notice that Asia and SCA have shown a continuous reduction in risk, also during 2009, i.e., a clear globalization trend, whereas NA, and especially EU, have shown a continuous de-globalization trend during the period 2003–2013 (Fig. 31.3) but NA with a significant throwback in 2012. In 2014 EU diminished for the first time the risk level, i.e., increasing the globalization level, after confirming several times the de-globalization tendency, whereas Asia, i.e., mainly China, confirmed further the globalization trend. The regions CIS and ME show also a globalization tendency but suffered a throwback in 2009 due to the world economic crisis, which aligns with postulate 5. This might be given by their heavy commodity orientation: commodities being very sensitive to economic cycles, standing at the beginning of the value chain. Also Africa showed the same throwback as CIS and ME but after 2009 has continued to increase its risk level; this is an indication that the trade flows were redirected and concentrated. Indeed, shipments from Africa to Europe and North America have decreased over-proportionally (this data has not been annexed to the paper) whereas the shipments to Asia have been maintained; this effect is also influenced by weakening commodity prices. After increasing trade in 2012, Africa did not increase further trade in 2013, and neither in 2014, but increased the risk level. On a long-term basis (2003–2014) we believe to see the U-shaped form of postulate 3 for the African risk evolution, but this volatility might be influenced from the relative reduced quantity of trade (less than 600b\$). If the reduced supplies to NA and EU are more due to reluctant economy than to priority shipments to Asia has not been investigated.

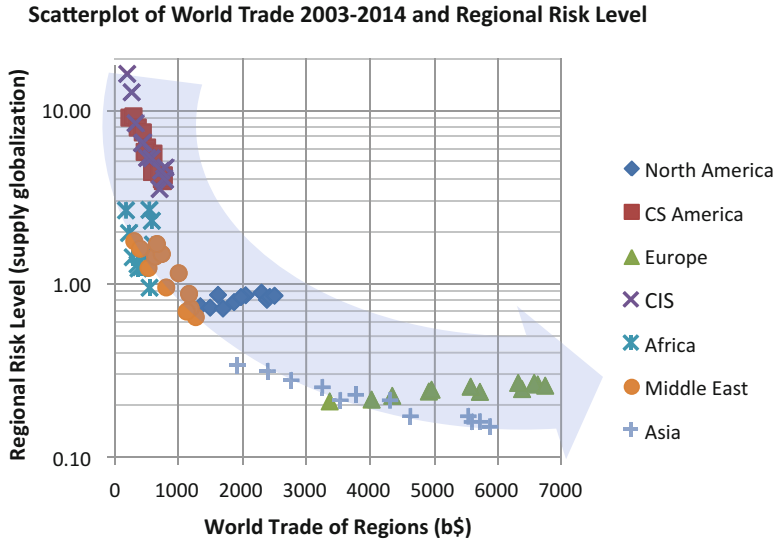
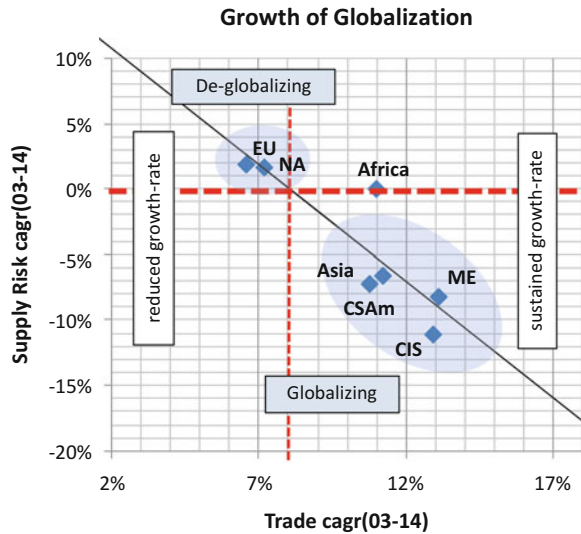


Fig. 31.5 Regional pattern on disaggregated level

Plotting the data from Table A2 regarding the different macro-economic geographical regions on a scatterplot, we obtain Fig. 31.5 revealing the comparative evolution of globalization in the different geographic areas with increasing trade flows. The enveloping curve shows a similar pattern as the aggregated data in Fig. 31.4, i.e., diminishing risk with growing trade volume. Nevertheless, whereas most regions are increasing global interweavement (diminishing their risk level) with growing trade volumes (such as SCA, CIS, ME, and Asia), it is observable that Europe has steadily increased its risk level with growing trade volume from 0.21 in 2003 to 0.26 in 2014 and North America even more, from 0.71 to 0.90 in 2011 (leaving apart for the moment the value 0.86 of 2014), i.e., an antithetic evolution confirming postulate 3. We can therefore not generally state that increased trade volume is increasing global interweavement but as soon as economies are reaching a certain maturity (or let us say a temporal local maxima), there will install preferential trade destinations according to postulate 6. Have we to expect the same evolution on an aggregated level with further increasing trade flows, i.e., substituting the L-shaped curve with a U-shaped curve with polynomial modeling to comply with Kuznets? As Fig. 31.4 shows we have first indications to have reached the bottom-line of aggregated risk level (globalization) but it is too early to be confirmed.

Analyzing the difference in globalization evolution in different geographical regions, comparing CAGR of trade and CAGR of supply risk according to Fig. 31.6, we notice that there emerge two clusters: one with the advanced economies EU and NA and another with the emerging economies. The clusters of globalizing countries (SCA, CIS, ME, and Asia) are characterized by high growth rates of trade whereas the de-globalizing countries (EU and NA) are characterized by reduced growth rates of trade; i.e., the segregation of pattern is not given by the absolute volume of trade

Fig. 31.6 Emerging clusters of macro-economic regions



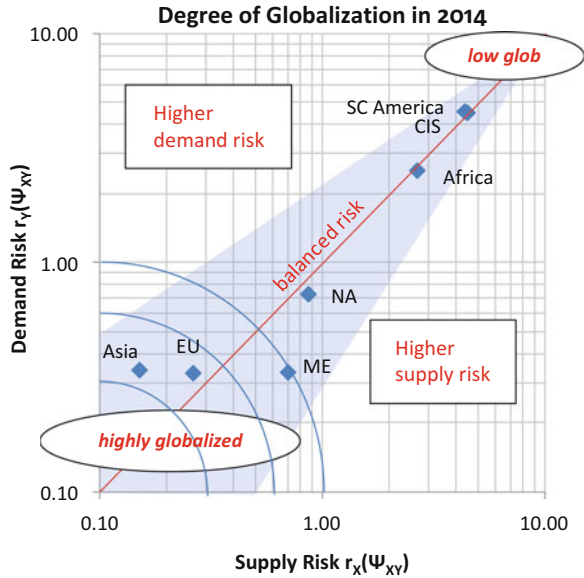
but by the growth rate of trade, leading to postulate 4. Africa is presently positioned in between within the long-term view; a mid-term view would have placed it even higher.

If we consider also the demand risk of an economical region, i.e., inequality in imports, we obtain the overall globalization evolution shown in Fig. 31.7. From Fig. 31.7 and Table A1 it emerges that EU and ME occupy the first position as the most globalized region from a sourcing view point with a demand risk $rY(\psi XY)$ of 0.33 and followed by Asia with 0.34. This shows that Asia is not only exporting worldwide but also sourcing with increased interweavement. The overall most globalized region, according to Pareto iso-risk curves, is Asia, followed by EU and then ME and NA, i.e., reflecting mainly supply risk; we will continue therefore to concentrate on this dimension.

High risk level, i.e., high inequality, usually originates from predominant autarchic economy orientation with limited foreign trade. This is typical for emerging economies as well as for geographically isolated economies, such as SCA, or politically isolated economies, such as CIS, which focus on the home market. Low risk level, i.e., high globalization of trade, is seen in economies such as Asia, EU, ME, and NA with low trade barriers.

Figure 31.8 shows the behavior of globalization during the recession of an economic cycle. It shows that risk level is increasing during a contraction of trade also on a disaggregated level as the model in Fig. 31.4 shows. In addition, Fig. 31.8 shows that there are different sensitivities in risk change of the different economic regions. Economic regions well endowed with commodities such as CIS, ME, and Africa show a coherent behavior of high sensitivity, whereas mature economies such as NA and EU show no relevant change in globalization levels during economic cycles; this reflects postulate 5. Only SCA behaved differently with low sensitivity;

Fig. 31.7 Most globalized regions



Sensitivity of Regional Risk vs Regional Trade Growth 2004-2014

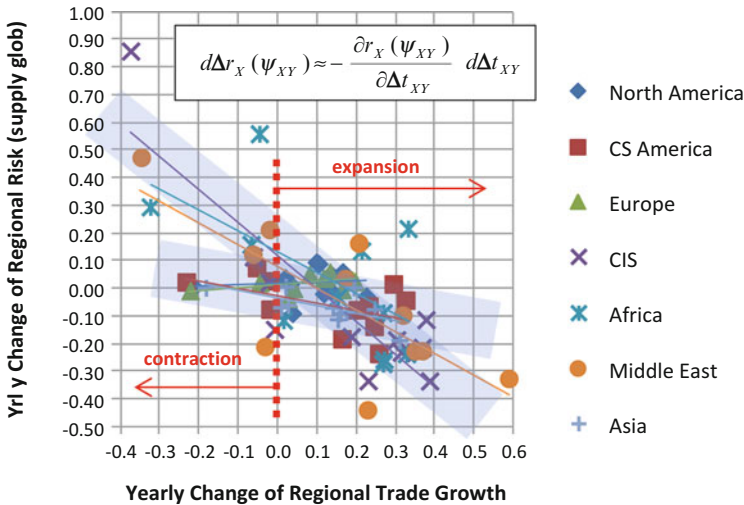


Fig. 31.8 Sensitivity of regional risk during economic cycle

this shows that there are also other driving factors influencing risk change than merely change in economic cycle, such as a well-balanced portfolio composition of destination countries for export giving more robust solutions.

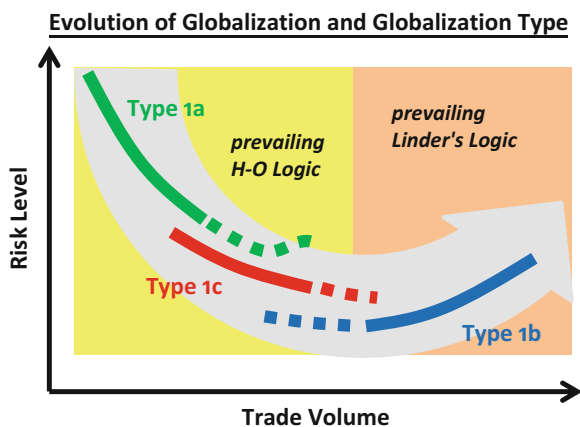
31.5 Interpretation and Findings: Confirmation of Postulates

The question arises what are the causes of this different evolution in globalization leading finally to the Trade Globalization Postulates? From empirical interpretation there are possibly two main causes which drive the different evolutions of trade globalization (Rüttimann 2013):

- The maturity degree of economic region (advanced or emerging)
- The characteristics of product/goods (commodities or specialties, as well as low-cost products).

Indeed, if we compare the information of the globalization evolution of different world regions in Fig. 31.5 and if we consider postulate 5, we can derive empirically postulate 6, drawing the chart of Fig. 31.9 (adapted from Rüttimann (2013)), where we put the type of globalization on the evolution of globalization. This shows inverse Kuznets evolution, i.e., with decreasing inequality at the beginning and then, in mature advanced economic status, again with increasing inequality due to concentrated preferential trades. It shows that type 1a stands at the beginning of globalization evolution, followed by absolute cost-advantage and differentiated products in the evolution of an emerging economy. The rationale of interpretation makes sense; indeed, emerging economies do not yet have developed technology to sell, but are often endowed with raw material to be extracted and shipped all over the world, increasing with that their globalization with sinking risk indicator according to type 1a globalization logic (Heckscher–Ohlin’s endowment pattern model). Preferential export destinations may increase risk indicator again, as is the case with African exports (see Fig. 31.3, period 2009–2014). Emerging economies can also benefit from low wages and have therefore an advantageous cost-structure to produce intermediates or low-technology products for export

Fig. 31.9 Resulting empiric model of globalization evolution



increasing globalization following the opportunistic low-cost type 1c globalization logic. Low-cost products are appealing for every economy and fuel therefore opportunistic type 1c globalization. Production of differentiated specialty products allow the development of further exports and are further fuelling globalization governed by the type 1b globalization logic. After the initial 360° export orientation approach, mature economies will also install preferential destinations. This is given by the fact that similar (advanced) economies are more likely to have trade together than complementary economies (Linder's demand pattern model). Another deriving reason is that trade partners are selected on economic return considerations and ethical business practices, which will invert the globalization tendency in terms of trade interweavement, concentrating commerce to selected destinations with bilateral trade agreements. Therefore, postulate 6, represented by Fig. 31.9, can be interpreted as a unifying trade model covering two dimensions: different types of business as well as the temporal evolution.

Nevertheless, the globalization type model explains the phenotypic dimension of trade, based on different business types such as commodities, specialties, standards, and convenience goods and their pertinent forms of globalization with its underlying rational (Rüttimann 2011b, 2012, Rüttimann 2013, Rüttimann 2011a, Rüttimann 2011c). It does not fully explain why we observe at the same time globalization (decrease of risk level) and de-globalization (increase of risk level) within the same economic area. Indeed, NA, e.g., experienced in 2012 a significant increase in globalization reducing its risk level from 0.90 in 2011 to 0.81 in 2012, against the trend observed since 2003 (see Fig. 31.3). On the other hand, EU reduced further its globalization level increasing its risk indicator from 0.26 in 2011 to 0.27 in 2012, continuing its steady de-globalization trend (N.B. risk value is still on a very low level documenting a very high trade interweavement with other regions, i.e., globalization, compared to other economic regions). This is partly due to the increase of trade for NA and the decrease in trade for EU (according to the aggregate modeling, see Fig. 31.4) but also for a more balanced export pattern for NA, finding new opportunities. The question arises, why certain countries or economic regions, i.e., the aggregation of economic actors, concentrate their trade on preferential destinations taking, deliberately or unintentionally, de-globalization, i.e., a higher risk, into account? Apart from Linder's demand pattern model and the inverse Kuznets type globalization evolution combined with the globalizations types model (Fig. 31.9) there is a dualistic explanation.

Indeed, globalization can also be explained by the Minimum Risk Principle, derived from portfolio theory and the CTG (Rüttimann 2007; Rüttimann 2011b). Apart from conjuncture-influenced structural change of the marginal distribution of the trade matrix, changing also inequality measures, economic policies are driven by maximizing profit. Maximizing profit means exploiting competitive advantages in areas where the products show a demand. This leads to abandon the Minimum Risk Principle exporting to all over the world and to concentrate flows, according to Linder's demand pattern model, to preferential destinations, following

the Maximizing-Value-Net-of-Risk MVNR-Principle (Rüttimann 2007; Ruettimann 2011b), which can be assimilated to free enthalpy of a thermodynamic system. The paradigm to assimilate an economic system, composed of many economic actors, to a thermodynamic system, composed of many physics molecules, might be only approximate right; indeed molecules follow exact physics law whereas economic actors, even if they should behave like the “homo oeconomicus,” they only can be considered in the average to be rational. Nevertheless, the average rational acting of economic actors leads to have trade with preferential economic partners in defined geographic regions, leading finally to de-globalization, measured as interweavement of trade flows, despite trade volume is increasing confirming postulate 7. This is why EU since 2003, and perhaps even before, shows a steady de-globalization trend coming only in 2014 to a stop.

31.6 Conclusions

Now, is globalization of economy coming to an end? Despite reduced trade growth—absolute figures not only influenced by reduced physical volumes but also given by lower commodity prices compared to the commodity boom period—without doubt, signs are emerging that globalization, i.e., interweavement of trade, is slowing down and has even decreased during 2013 as well as 2014, given by an increased level of the inequality risk metric. Indeed, we have first signs that also on aggregate level, globalization, i.e., the interweavement of trade, follows an inverse Kuznets curve. To say that globalization has coming to an end, having reached presently a clear slow—down in trade growth, is for sure too early. The next couple of years will bring clarity about this phenomenon. Nevertheless, evidence emerges that the globalization logic will be governed by the CTG and the MVNR principle.

N.B.: This paper is presently the latest version available for this long-term research on economic globalization comprising the most recent update of insights gained, leading to this new normative globalization theory.

A.1 Appendix

Table A.1 World trade matrix (in b\$) with inequalities and risk measures for the year 2014

Network of world merchandise trade by region (source: WTO International Trade Statistics, Table i04)												
2014	North Am	SC Am	Europe	CIS	Africa	Middle E	Asia					
t_{xy}	A	B	C	D	E	F	G	Supply	p_x	Coverage		
A	1251.00	214.00	379.00	17.00	43.00	79.00	504.00	2487.00	0.14	0.78		
B	173.00	179.00	114.00	9.00	18.00	17.00	170.00	680.00	0.04	0.91		
C	540.00	119.00	4665.00	218.00	221.00	229.00	738.00	6730.00	0.37	0.99		
D	28.00	7.00	385.00	131.00	16.00	22.00	134.00	723.00	0.04	1.41		
E	39.00	29.00	201.00	2.00	98.00	18.00	152.00	539.00	0.03	0.84		
F	99.00	11.00	148.00	7.00	36.00	113.00	694.00	1108.00	0.06	1.42		
G	1065.00	185.00	900.00	127.00	207.00	302.00	3093.00	5879.00	0.32	1.07		
Demand	3195.00	744.00	6792.00	511.00	639.00	780.00	5485.00	18146.00	1.00			
p_y	0.18	0.04	0.37	0.03	0.04	0.04	0.30	1.00	18301	reported		
$p_{xy?}$	A	B	C	D	E	F	G		p_x			
A	0.39	0.29	0.06	0.03	0.07	0.10	0.09		0.14			
B	0.05	0.24	0.02	0.02	0.03	0.02	0.03		0.04			
C	0.17	0.16	0.69	0.43	0.35	0.29	0.13		0.37			
D	0.01	0.01	0.06	0.26	0.03	0.03	0.02		0.04			
E	0.01	0.04	0.03	0.00	0.15	0.02	0.03		0.03			
F	0.03	0.01	0.02	0.01	0.06	0.14	0.13		0.06			
G	0.33	0.25	0.13	0.25	0.32	0.39	0.56		0.32			

Ψ_{XY}	A	B	C	D	E	F	G	$r_X(\Psi_{XY})$	r_X/r_Y
A	2.86	2.10	0.41	0.24	0.49	0.74	0.67	0.86	1.17
B	1.44	6.42	0.45	0.47	0.75	0.58	0.83	4.35	0.94
C	0.46	0.43	1.85	1.15	0.93	0.79	0.36	0.26	0.78
D	0.22	0.24	1.42	6.43	0.63	0.71	0.61	4.47	0.98
E	0.41	1.31	1.00	0.13	5.16	0.78	0.93	2.65	1.04
F	0.51	0.24	0.36	0.22	0.92	2.37	2.07	0.70	2.08
G	1.03	0.77	0.41	0.77	1.00	1.20	1.74	0.15	0.44
$r_Y(\Psi_{XY})$	0.73	4.60	0.33	4.55	2.54	0.33	0.34	1.92	

Table A.2 Evolution of supplies and risks during 2003–2014 for different macro-economic regions

ϵ_{xy}	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	cagr(03-14)
North America	1163	1323	1477	1678	1852	2034	1600	1960	2282	2367	2411	2487	7%
CS America	212	274	341	420	488	587	450	566	750	735	719	680	11%
Europe	3351	4008	4332	4906	5706	6367	4948	5561	6612	6306	6557	6730	7%
CIS	191	261	321	423	503	699	439	572	789	784	769	723	13%
Africa	172	218	277	352	407	541	367	489	594	604	577	539	11%
Middle East	287	378	510	615	720	984	642	788	1251	1171	1146	1108	13%
Asia	1916	2391	2761	3251	3775	4311	3532	4632	5538	5596	5720	5879	11%
World trade (b\$)	7290	8854	10020	11645	13451	15523	11978	14568	17816	17563	17899	18146	9%

$r_X(\Psi_{XY})$	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	cagr(03-14)
North America	0.71	0.75	0.73	0.72	0.79	0.86	0.87	0.84	0.90	0.81	0.85	0.86	2%
CS America	9.15	9.30	8.02	7.52	6.15	5.67	5.81	4.44	4.25	3.93	4.04	4.35	-7%
Europe	0.21	0.22	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.26	2%
CIS	16.16	12.66	8.39	6.43	5.29	3.50	6.49	5.27	4.65	3.95	4.02	4.47	-11%
Africa	2.64	1.95	1.42	1.29	1.24	0.94	1.22	1.48	1.68	1.48	2.30	2.65	0%
Middle East	1.77	1.60	1.24	1.44	1.50	1.16	1.71	0.96	0.65	0.73	0.88	0.70	-8%
Asia	0.34	0.31	0.28	0.25	0.23	0.21	0.21	0.17	0.17	0.16	0.16	0.15	-7%
World risk $r(\Psi_{XY})$	4.43	3.83	2.90	2.56	2.20	1.80	2.37	1.92	1.79	1.62	1.79	1.92	-7%

Source: Rüttimann

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Chapter 32

High Education, Professional Insertion and Economic Development in Romania

Raluca Ioana Horea Serban and Marinela Istrate

Abstract Education and professional training play a major part in the progress of the individual and society on the whole, as well as in supplying the qualified human capital each country needs in order to secure its economic growth and prosperity. Although Romania has made significant progress in respect of higher education in the last 25 years in the direction of increasing its number of students and academic majors, the competences and skills acquired by graduates are not always correlated to the market demand, not only at the national level but especially at the European one. Starting from these hypotheses and using an appropriate methodology to identify regional disparities, the authors intend to investigate, reconstitute and forecast the quantitative and qualitative evolution of the tertiary education in the post-communist Romanian system, in the context of a general dynamics disturbed by the continuously decreasing number of the population, by the effects of the selective international labour migration and the recent enforcement of some employment policies in full compliance with the European standards. Based on a set of indicators meant to highlight the degree of integration of graduates on the labour market, our study tries to emphasize not only the segregation level in the labour force market but also the mechanisms that can reduce this discrepancy, as well as the necessity of rethinking the human resource policies in order to adapt them to the new European reality.

Keywords Tertiary education • Post-communist countries • Indicators' education • Unemployment • Economic growth

32.1 Introduction and Background

The human capital consists of the educational and biological capital. The former concept includes both the skills acquired by individuals during the schooling process, being certified by diplomas, and the skills acquired during their lives

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through their own efforts or through contacts with experts in various fields, this informal education producing educational capital stocks which are difficult to estimate (Voicu 2004). The latter refers to the physical abilities of the individuals, most often expressed by their state of health. The concept of human capital is developed within the economic field, which regards it as an assessment of a person's ability to generate income through work (Di Bartolo 1999). Education and professional training, in general, have gained an increasing importance in all European countries, this statement being supported by the extended duration of compulsory schooling, by the increased spending on education, permanent adjustment of the educational offer to the economy demands and promotion of concepts such as *lifelong learning* and *one hour a day* (Becker 1997). The main explanation resides in the fact that the authorities have become aware of the strong relationship between sustainable economic development and substantial investments in labour force, between improved wealth and investments in human capital (Becker et al. 1990; Hawkes and Ugur 2012). Enlarged schooling and training periods lead to higher qualification degrees, which further on bring about larger wages, statistical data supporting the differentiation of incomes based on the investments in education, regardless of the degree of development of the economic system. Therefore, within recent decades, we have faced a strengthening of the university-industry collaboration, which gives new opportunities to academic institutions and industries, lab researchers, corporate managers and venture capitalists (Teller and Validova 2015). This hypothesis is in keeping with the fundamental objective of the Lisbon Process, that of changing the European space into "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, with more and better jobs and greater social cohesion". The world has been facing the transition from industrial society to a new company "information" or "knowledge", marked by complex changes in all activity fields, with major implications in the economic process (Achim 2015; Ianoş et al. 2009). More than ever, human development performances depend on the production and assimilation of knowledge in the process of creating subsistence, man's capacity to make a step forward through innovation (Mursa 2006), quantitative approaches of labour force leaving room to a qualitative perspective expressed by the attained level of education and professional training. The intellectual capital can be regarded as a measure of the intelligence of a country/region, functioning as a source of new knowledge, ideas and information, which brings about a more competitive economy and higher social prosperity (Kotenkova and Korablev 2014).

The connection between education and labour has also been perfectly grasped by the European Commission, whose 2020 strategy is clearly focussed on education and knowledge, starting from the premises that the employment problem in EU can be solved out not only by providing more educational opportunities but also by shaping demand for those skills (Diaconu 2014). When not enough resources are available to satisfy job demands, job strain occurs (Tarvid 2015). The relationship between education and labour market goes even further (Fig. 32.1), the former helping alleviate some of the dysfunctionalities of the latter, such as unemployment,

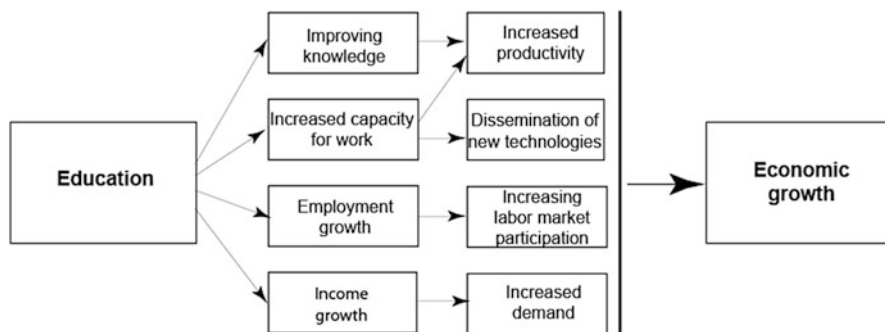


Fig. 32.1 Conceptual model of the impact of education on economic growth (adapted after Pribac and Anghelina 2015)

since it has been proved that the lack of educational qualifications is the main factor that explains unemployment and insecurity (Alves et al. 2012). Moreover, education may also function as a solution to unemployment indirectly, through regional mobility, more educated people being more susceptible of leaving their towns in order to move to another one within their country (Weiss 2015), since migration is one of the main forms of adapting to a negative regional demand shock (Blanchard and Katz 1992).

Undoubtedly, education is one of the priorities of the EU authorities and organisms, the common strategic objectives for the EU member countries being synthesized in the so-called Education and Training 2020, a strategic framework for European cooperation in education and training. It stipulates some benchmarks which are to be accomplished by 2020, starting from the important role that education plays in economic growth, materialized in increased employment, enlarged productivity and formation of skills: an average of at least 15 % of adults should participate in lifelong learning; the share of 30–34-year-olds with tertiary educational attainment should be of at least 40 %; the share of early leavers from education and training should be of less than 10 %; an EU average employment rate of at least 75 % for the population aged 20–64 (ET 2016).

The question is how far is present-day Romania from the above-mentioned objectives? Statistical data (Table 32.1) clearly reveal the fact that the only chapter at which it performs better than the targeted value is that of the share of early leavers from education and training, Romania having made significant progress from this point of view, while in the other cases, the gaps require sustained efforts for harmonization with the European norms (especially when it comes to the share of adults which should participate in lifelong learning, a rather new concept in post-communist Romania).

Table 32.1 Objectives of Europe 2020 strategy

Europe 2020 objectives	Objectives for Romania (%)	Present situation in Romania, 2014 (%)
An EU average employment rate of at least 75 % for the population aged 20–64	70	65.4
The share of early leavers from education and training should be less than 10 %	11.3	18.5
The share of 30–34-year-olds with tertiary educational attainment should be at least 40 %	26.7	23.8
An average of at least 15 % of adults should participate in lifelong learning	10	1.8

Source: National Strategy for Tertiary Education 2015–2020 (Ministerul Educatiei Nationale si Cercetarii Stiintifice 2015–2020)

32.2 Objectives and Methodology

The statistical and cartographic analyses were the main research tools to highlight the convergences/discrepancies between the Romanian university system and the European one and their impact on economic growth. To this end, a database was created, the most important data sources being provided by the National Institute of Statistics (INS), Eurostat and European Commission (EACEA—Education, Audiovisual and Culture Executive Agency).

On this basis, a series of indicators were calculated, mapped (by using PhilCarto software) and then analysed comparatively in order to investigate the dynamics of tertiary education attainment in post-communist Romania and to oppose it to the EU context:

- The number of students during the period 1990–2014 and their share by activity fields, gender and average age (both in Romania and EU), it represents the total number of persons who are enrolled in the tertiary education system and who, after graduation, will contribute to the rise of the population's educational attainment level, provided they do not choose to make their living abroad after completing their studies. For this reason, they are the main population segment higher education policies are targeted at.
- The share of the population aged 30–34 having a tertiary educational attainment (both in Romania and EU), an indicator which takes into account the share of the persons aged 30–34 who have successfully completed their tertiary education (either in a university, in a higher technical institution, etc.).

In order to extract patterns of educational structure of the Romanian LAU 2 administrative units, we drew a hierarchical ascendant classification starting from the highest level of education attainment of persons, at the same time investigating their causes and forecasting their effects. Another objective was to prove that the skills acquired in higher education bring about more employment opportunities on the labour market, and for this reason, we analysed the following three indicators:

- Employment rate by educational level (it represents the ratio between the number of employed persons and the total number of the population in an age group)
- Transition from the status of student to that of employed person (expressed in months as the time gap between the moment of graduation and that of having started the first job for at least 3 months)
- Education-unemployment correlation (established on the basis of the investigation of the unemployment rates for the 25–64 age group by educational attainment and by gender, as well as of the differences in the levels of unemployment between women and men with the same level of qualification)

The final outcomes are intended to support a comparative evaluation of the tertiary educational stock in Romania and the EU, at the same time investigating the causes and impact on the labour market.

32.3 Comparative Analysis of the Romanian and EU University Systems

Economic growth is based on the participation of all the citizens in a country, and the transition towards an economy based on research and development can only be achieved by increasing the population's educational attainment level. Romanians have quickly adapted the present European pattern of success in the context in which the studies in the field reveal the fact that education is the most certain path that leads to social success. The fall of communism in 1989 represented a turning point in the Romanian education system, which has faced an ample restructuring process, even though the implementation of the reforms in this area has not always been a coherent one (Popescu 2015). The number of students and university graduates has significantly risen—in 2003, more than 63 % of high school graduates completed an undergraduate degree, as opposed to 37 % in 1997. Unfortunately, despite the improvement in the tuition and graduation rate, the quality of the Romanian higher education system has remained relatively low. After 1990, numerous private universities have been set up, but many of them are just diploma factories, without providing an adequate education, although Law no. 88/1993 introduced a system of evaluation and accreditation for the new specializations and institutions. In 2008, the tertiary education system in Romania was reorganized into three cycles: bachelor's, master's and doctoral studies (according to Law no. 288/2004), in keeping with the European Qualification Framework and Bologna Process. Moreover, in 2005 they set up the Romanian Agency for Quality Assurance in Higher Education, whose main features are coercion, centralization and orientation towards control and input and process indicators.

32.3.1 *Dynamics of the Number of Students and Territorial Distribution of the Educational Capital*

In the 1990s and early and mid-2000s, Romania experienced a consistent growth of the number of students (Fig. 32.2), in this respect recording the highest growth rate of all EU member states, in 2010 placing Romania on the seventh position in the EU top of the total number of enrolled students (after Germany, UK, France, Poland, Italy and Spain—Pavelescu and Vasile 2014). This positive dynamics overlaps a favourable economic period, in the 2000s Romania recording one of the highest rates of economic growth in Europe (over 6.5 % between 2003 and 2008), which brought about an increase in the number of employed persons, as well as in wages and social protection transfers (from 51 % of tax revenues in 2005 to nearly 75 % in 2009).

But the global financial crisis that started in 2008 has severely affected the country's economy, causing the number of students to decrease. However, the quantitative regress of the number of students must necessarily also be correlated to the demographic evolution of Romania, its population continuously declining in the last 25 years, the two main reasons for this evolution being the negative natural balance and the massive emigration process.

In order to extract pattern of population's educational structure at the national level, we drew a hierarchical ascendant classification (Fig. 32.3) which grouped localities in five classes that stand out through a coherent logic of their distribution, being influenced by the presence of primary and secondary education institutions, by the accessibility to high school educational services, by the demographic dimension of settlements, as well as by the distance to a town/city with a polarizing role.

- Class 1—comprises 177 localities evenly spread across the country, being characterized by a high share of persons with tertiary and high school studies. They are medium and large town, which will always have better indicators than rural settlements, even though some of them enjoy a better position in relation to university centres. This situation can be explained through higher indices of accessibility to secondary educational services, from this point of view having secured some positive stocks.

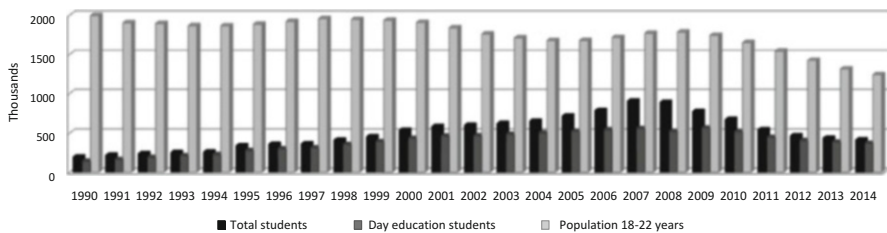


Fig. 32.2 Dynamics of the number of students enrolled in tertiary undergraduate studies in Romania, 1990–2014. Data source: National Institute of Statistics

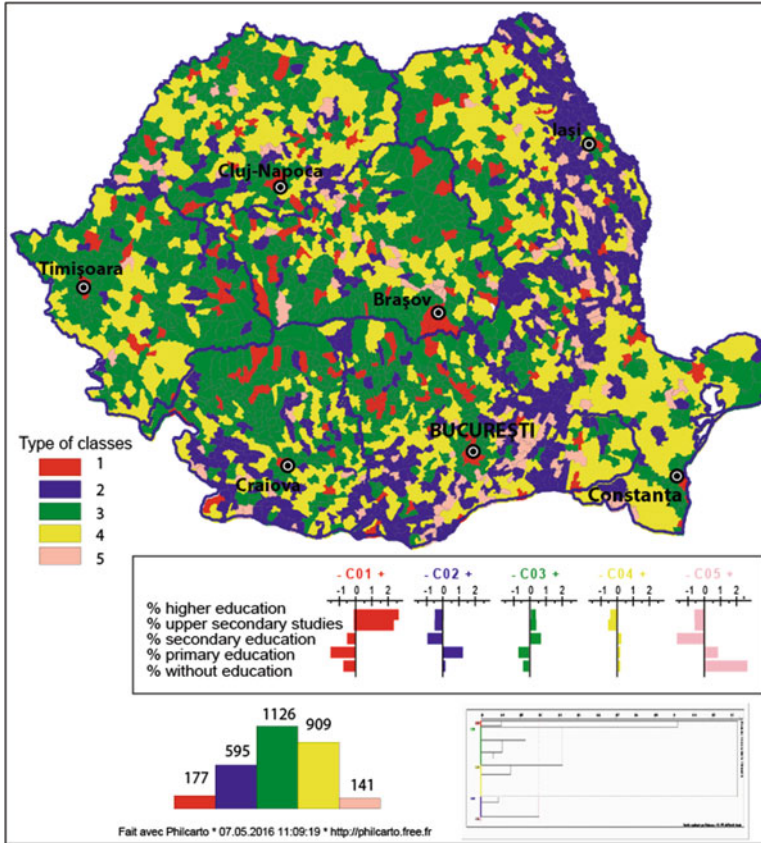


Fig. 32.3 Typology of LAU 2 units by population’s educational level. Data source: National Institute of Statistics

- Class 2—includes 595 localities, differing from class 1 through the overrepresentation of primary educational studies. They are primarily concentrated in the east and south of Romania, in the poorest rural areas, which were affected by early processes of depopulation, especially at the level of the fertile quotas; we also include here those settlements which have faced a slower depopulation process but which experience extremely serious forms of school abandon and hereditary behaviour towards educational values (the educational level of the adult population is below the regional average).
- Class 3—is the most numerous one (1126 localities). They stand out through an overrepresentation especially of secondary studies, but also of high school and university studies, generally lying in the proximity of some medium and large towns (which allow them to import skilled human resources) or along major communication routes, thus enjoying good accessibility. Most of them are

endowed with high schools and, in addition, due to their mixed functional profile, they can attract/preserve labour force with an average educational level.

- Class 4—comprises 909 localities, ubiquitously distributed across the country, but forming compact areas in the southeast and north. It is the class that best overlaps the average national profile, revealing a slight underrepresentation of high school and university studies, but also a low share of illiteracy. Many of them are settlements with an old educational tradition induced by historical conditions, perpetuating generations of youth better anchored in the schooling process (Bukovina, Banat).
- Class 5—includes 141 localities, its profile resembling that of class 2, but with an obvious overrepresentation of the population with no education. It can be regarded as a relict, being the least spatially distributed, mainly referring to areas poorly served by primary and secondary services, at the same time affected by the presence of a weakly qualified educational stock at the level of the adult population; many of them are located in profoundly rural regions in the east and south of Romania (many times facing demographic problems, such as a most serious ageing process), while others comprise significant Roma communities (especially in Transylvania).

In conclusion, we can say that the mapped territorial realities point out that the propensity of a community towards education is many times an inherited behaviour, both negative and positive contexts tending to perpetuate. Around large cities, we can spot areas endowed with a human capital with an average and superior educational education, areas which date back to the communist period and work as relay points for their rural areas. The rural population has the lowest rate of participation in education and training at various levels. According to the National Institute of Statistics, only 24 % of the Romanian students originate in the rural environment. Early school leaving is a phenomenon especially encountered in Romanian rural areas, the abandon rate being about 1.5 times higher in rural secondary institutions as opposed to urban ones. As young people advance within the education system, the underrepresentation of rural youth gets more obvious, recording the largest gap at the level of the tertiary education system.

32.3.2 Structural Configuration of Students by Fields and Gender

In 2012, at the European level, the students in social sciences, business and law accounted for the highest share, of nearly 33 % of the total number. By comparison, only 15 % of them studied science, mathematics and computing and about 15 % health and welfare (Table 32.2). As regards the structure by gender, according to the latest trend, females clearly outnumber males in almost all study fields, but primarily in health and welfare, humanities and arts, social sciences, business and law. Technical domains (such as engineering, math and computing, etc.) are still

Table 32.2 Students in tertiary education in EU and Romania (2012)

Total number of students (thousands)	Of which, studying (%)						
	Humanities and arts	Social sciences, business and law	Science, math and computing	Engineering, manufacturing and construction	Agriculture and veterinary	Health and welfare	Services
EU 20245.9	12.23	32.85	10.43	15.01	1.76	14.35	4.22
RO 705.3	8.52	42.95	5.84	22.78	2.62	10.79	4.49

Data source: Key Data on Education in Europe (2012)

dominated by men, although, from this point of view, Romania stands out through a better representation of female students in comparison to the European average (32.8 % vs. 26.2 %, according to Key Data on Education in Europe 2012).

At the European level, the average age of students is of 22.1 years old, the highest value (over 24) being recorded in Finland, Sweden, Denmark and Austria (where they have the tradition to work after graduating high school in order to support themselves, which causes them to delay the beginning of their university life), while the lowest is under 21, as it is the case in Belgium, France and Ireland. In this context, Romania's place is slightly below the European average, the mean value being of 21.8 years old.

32.3.3 *Share of the Population Aged 30–34 Having a Tertiary Educational Attainment, 2014*

But how educated is the young active population as compared to the European target of 40 %? In 2014, the European average was under this value, only 34 % of the men aged 30–34 having university studies, with a percentage of 42 % the women in the same category outnumbering them (Fig. 32.4).

Lithuania (with 44 % for men and 63 % for women), Luxembourg, Cyprus and Ireland are some of the countries that rank first, while at the bottom of the list, we can find many East-European countries (such as Slovakia, the Czech Republic, Bulgaria and Romania—where only 23 % of men and 27 % of women aged 30–34 have tertiary education), as well as certain Mediterranean states (as it is the case of Malta and Italy). Naturally, the share of people holding a university degree decreases with age.

This statement is very obvious in the case of Romania, but less obvious when we refer to the European Union, whose 30–34-year-old group (and not the 24–29 one) records the highest value (Fig. 32.5), considering the graduation gap between the

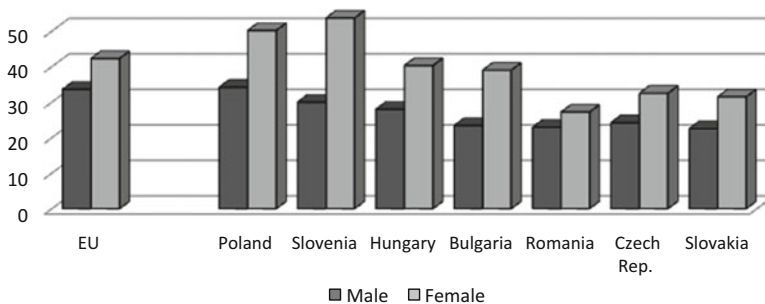


Fig. 32.4 Proportion of the population aged 30–34 having a tertiary educational attainment, 2014. Source: Key Data on Education in Europe (2012)

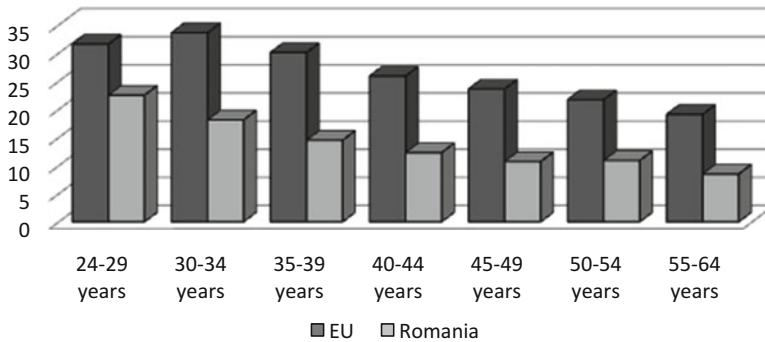


Fig. 32.5 Share of the population with tertiary education qualifications in the population aged 24–64, by age group, 2010. Data source: Key Data on Education in Europe (2012)

different European countries. However, for all age groups (except for, perhaps, the 24–29 one), the difference between the European percentage of the population with higher education and the Romanian one is preoccupying, revealing the long way Romania still has to walk from now on, since it is only in an early stage of market economy implementation.

32.3.4 Skills Acquired Through Tertiary Education Lead to Increased Employment Opportunities

Higher education provides, most of the time, easier access to the labour market. A sustainable economy, based on knowledge, involves highly skilled jobs, thus improving the capacity of human resources, which means that the modernization and consolidation of the tertiary education system represents a priority for all European countries. The present development stage Romania is in, 25 years after the fall of communism, assumes an increase in labour productivity and efficiency, as well as in the quality of finished products. The achievement of these goals requires the existence of an adequate workforce, both from the quantitative and especially from the qualitative point of view (university graduates who hold the necessary skills and competences). To this end, additional characteristics of human capital were analysed, starting from the insertion of graduates on the labour market.

32.3.4.1 Proportion of People in Employment by Age Group (25–39, 40–64) and Highest Level of Education Attained

At the European level, on average, 86% of university graduates aged 25–39 are employed, as opposed to 78% of those with secondary education and only 60%

Table 32.3 Proportion of people in employment by age group (25–39, 40–64) and highest level of education attained, 2010

Level of education	Age group	UE (%)	Romania (%)
Low	25–39	59.9	60.6
	40–64	51.4	51.5
Medium	25–39	77.5	75.6
	40–64	70.3	63.5
High	25–39	85.6	88.1
	40–64	82.4	81.5

Data source: Key Data on Education in Europe (2012)

of those with primary education. This is especially obvious for the 40–64 age group, where university graduates have 37 % more opportunities to be employed in comparison to those with low and medium studies (Key Data on Education in Europe 2012). When analysing the employment rates of the two age categories, regardless of their educational level, we can notice that younger persons (aged 25–39) have a higher employment rate both at the European and national levels (Table 32.3).

When taking into consideration the educational level, the greatest gaps in employment rates are recorded in the case of the category of individuals with secondary studies (a 12.1 % difference for Romania) and of those with a low educational level (in the case of the EU—the difference between the two age groups is of 8.1 %).

32.3.4.2 Transition from Education to Work (from the Status of Pupil/Student to That of Employee) Is Significantly Shorter for University Graduates

The youth in East Europe, formerly part of the communist bloc, face longer transition periods in comparison to the European average in the case of all low and medium educational levels (Fig. 32.6).

This is especially the case of Bulgaria (21.5 months), Slovakia (24.3 months) and Poland (17 months). Romania records slightly higher values than Hungary and the Czech Republic, being also above the European average: 12.5 months for those with a low educational level, 12 months for those with a medium educational level and 7.3 months for those with a high educational level. Once more we have the confirmation of the fact that tertiary education helps people easier find their place on the labour market.

32.3.4.3 Tertiary Education and Its Role in Preventing Unemployment

Generally, there is a strong correlation between unemployment rate and educational attainment, in the direction of a decreasing unemployment incidence when the educational level is high. The analysis of unemployment statistics for the year 2010

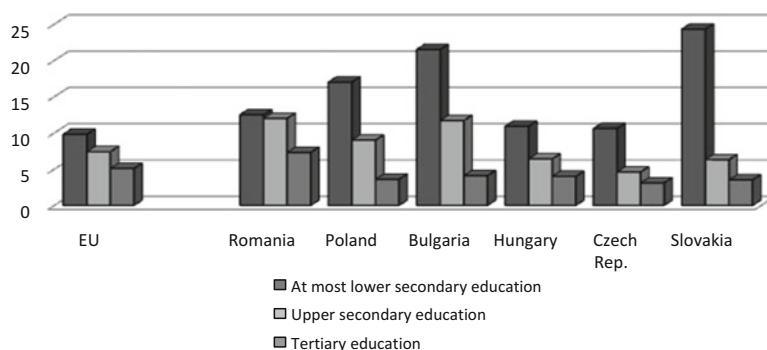


Fig. 32.6 Average length of transition from education to work by educational attainment level, 2009 (in months). Data source: Key Data on Education in Europe (2012)

Table 32.4 Unemployment rates for the 25–64 age group by educational attainment and by gender, 2010

Level of education	Population	EU unemployment rate (%)	Romania unemployment rate (%)
Low	Males	14.1	7.5
	Females	14.4	3.8
	Total	14.2	5.7
Medium	Males	7.6	6.8
	Females	8.1	6.5
	Total	7.8	6.7
High	Males	4.7	4.3
	Females	5.2	3.9
	Total	4.9	4.1

Data source: Key Data on Education in Europe (2012)

reveals significant gaps between Romania and EU (Table 32.4): in EU, on average, the female unemployment rate is higher than in Romania, a country in which men are more likely to be affected by this negative phenomenon, regardless of their educational level. The biggest difference by gender takes place in the case of the persons with low education (for Romania, the gap is of 3.7%). Overall, individuals with a higher educational attainment are less susceptible of being unemployed than those with low and medium studies.

The recent evolution (2011–2015) shows that, in Romania, the persons with a medium educational level represent the highest share of the total number of unemployed people, while all the other categories are grouped at the bottom of the chart, the gap between these two distinct groups being increasingly larger. The fact that one in four young persons who completed a form of secondary education does not have a job raises a serious question mark on the efficacy of the Romanian education system (Fig. 32.7).

The graphical representation of the same statistical data shows that nearly half of the unemployed people with tertiary education are between 25 and 34 years old;

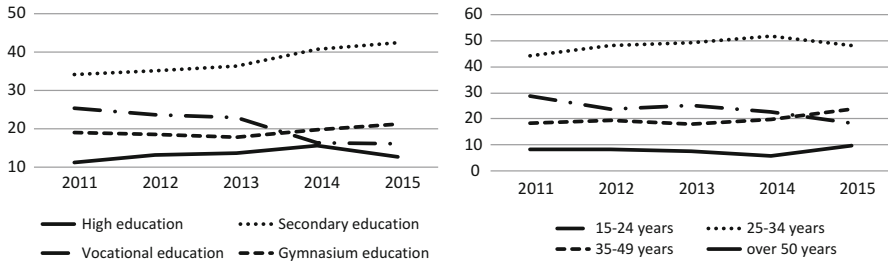


Fig. 32.7 *Left*: Structure of unemployed persons by educational level (%). *Right*: Structure of unemployed persons with tertiary education by age groups (%). Data source: National Institute of Statistics

there also exists a rise in the 35–49-year-old category, which means that the young and mature active population is most exposed to the unemployment risk. Young graduates find jobs easier (but not for a long time, as the chart reveals), while those over the age of 50 enjoy the highest job stability.

32.4 Conclusions

The issue of educational attainment and misuse of labour force is of extremely present uttermost importance, especially under the circumstances in which Romania is facing a strong pressure induced by the unfavourable ratio between the employed and inactive population, as a consequence of the mismanagement of human resources during the last 25 years of transition.

The long-term attractiveness of higher education should focus precisely on the role that education plays in finding a job. Therefore, it requires continuous quality improvement in this field, but also its better harmonization with the existing demands on the labour market. It is necessary for universities to be more flexible in terms of the needs and expectations of both students and employers, to adapt to the necessities of a dynamic labour force market and to provide skills and qualifications appropriate to these demands. Many times there is a gap between the theoretical knowledge of graduates and their practical skills. It is essential to facilitate the transition from education to professional life, including by increasing the number of quality traineeships. Also, there should be funded and developed programmes which encourage the fast insertion of young people on the labour market (such as the initiative entitled *Jobs for Youth*).

In Romania, the main problems are related to the poor relationships between companies and the academic environment, as well as to the fact that many university graduates find a job in a field that does not meet their training or are below their skill level. Graduates who fail to find a job according to their educational level induce pressure on those who do not have a university degree by occupying workplaces

which are inferior to their educational training. Ensuring an increased quality of the vocational and technical education, academic system and lifelong learning, as well as an easier access to them, could improve people's adaptation to the current needs of the labour market.

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Chapter 33

Strategic IT Alignment: Business Performance During Financial Crisis

Fotis Kitsios and Maria Kamariotou

Abstract Information Technology has become a significant tool for businesses who act in an unsustainable environment. The need for the strategic use of Information Technology in order to add value to businesses is more urgent for Small-Medium Enterprises (SMEs) which have been negatively affected from financial crisis. The strategic use will be achieved by aligning business strategy, objectives, and planning with Information Systems. Strategic alignment has an impact not only on firm's profitability, but on the increase of sales, on the customer's satisfaction, and on the competitive advantage as well. Strategic use of information management increases the knowledge about customers' and market's needs, as well as about the environmental circumstances, and gives the opportunity to businesses to produce new products and services which meet market's needs and increase firm's profitability and competitiveness. A major factor which affects the strategic alignment, except information handling, is the support of information technology by managers and the creation of a related business culture. This paper aims to provide a holistic approach for issues about strategic alignment and ending up to proposes for SMEs in order to implement the alignment process and increase their firm's performance. The analysis of strategic alignment starts with its necessity and importance, as well as the presentation of steps and factors which influence the success of the process, the link with firm performance follows, and it concludes to the presentation of the need to be implemented by SMEs in order to increase their competitive advantage in the current turbulent financial environment.

Keywords Business strategy • Information technology • Alignment • Performance • SMEs

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33.1 Introduction

Achieving alignment between business and Information Technology has been a fundamental issue for many years, and many researchers, businesses, Information Technology executives, and consultants have sternly investigated and focused on this field since 1970 (Benbya and McKelvey 2006; Rahrovani et al. 2014; Ullah and Lai 2013). Researchers have thoroughly investigated this research area in order to understand the relationship between strategic alignment and the business value of using Information Technology.

Businesses frequently face changes in the environment. In this environment of innovation and strong market competition, businesses need Information Systems which meet the needs of the business according to its goals, which affects the process of business by using Information Technology alignment. The development of successful Information Systems needs understanding both the system requirements and the business activities. Achieving alignment from the development of Information Systems includes supporting the organizational stakeholders to effectively meet business goals (Ullah and Lai 2013).

Researchers argue that the alignment between organizational aspects such as strategy, structure, management processes, individual roles, and skills with technology can lead to increase the value for businesses and Information Systems effectiveness and business performance (Rahrovani et al. 2014; Suh et al. 2013).

Alignment has been defined as the degree to which the Information Technology mission, goals, and plans are maintained and supported by the business mission, goals, and plans (Kwanroengjai et al. 2014; Oh and Pinsonneault 2007; Reich and Benbasat 2000; Suh et al. 2013).

The most prevalent model includes the following elements to measure alignment: organizational strategy, structure, and technology. This framework examines the relationship between different strategy components, such as business strategy, organization infrastructure and process, Information Technology strategy, and Information Technology infrastructure and process (Bergeron et al. 2004; Chatzoglou et al. 2011; Henderson and Venkatraman 1999).

Previous researchers show that little empirical surveys have been implemented in order to highlight the factors which affect the success of the alignment process (Chan et al. 2006). The results of these papers conclude to the following major factors, the handling of information and the support of managers to use Information Technology.

The alignment of Information Technology and business strategy leads to the increase in profitability, competitive advantage, sales, and the reduction of business costs (Andersen 2001; Bergeron et al. 2004; Chatzoglou et al. 2011; Croteau and Bergeron 2001; King and Teo 2000; Oh and Pinsonneault 2007).

SMEs act in the current complex financial environment, and they require information in order to produce innovative products and services because they aim to survive and to be more competitive. Alignment between business strategy and Information Technology will support this effort, so it is proposed for SMEs to investigate the current model of alignment and the factors which affect the process and to combine them in order to achieve their goals. Managers from SMEs should be

informed both about business issues and Information Technology in order to make more effective decisions on account of their profitability.

In this view, the purpose of this paper is to analyze the current framework of the alignment process and to highlight the link with firm performance and especially the need for SMEs to implement this process in order to respond to the current environmental situations.

The structure of this paper is as following: after a brief introduction to alignment, the effects on firm performance and the success factors are discussed and the need for an approach based on this link for SMEs is presented. Next section includes the description and the implementation of the literature review methodology which was followed in order to highlight the issues which are discussed in this paper. Then a theoretical framework is analyzed based on the literature review about strategic alignment, the influence on firm performance, the success factors, and the impact and necessary of strategic alignment for SMEs. Next the final section which concludes the paper proposes many important observations for the implementation of the alignment process in SMEs.

33.2 Literature Review Methodology

Literature review is very important and the initial idea is a compilation of summaries and literature of previous studies. The quality of the literature review is important since it determines the way in which researchers combine the different parts of the studies and how they have been analyzed. Finally, it highlights areas that require further research.

Three steps are suggested by this methodology of literature review to achieve effective implementation of the above. These are the search, in which the definition of keywords and databases, and the selection of individual topics, is analyzed, then the “backward search,” and, finally, the “forward search.” At the end, the analysis and synthesis of the central ideas of articles follow (Webster and Watson 2002).

This methodology was used by plenty of researchers in the field of Information Systems and business management. So, this methodology was selected by the authors of this paper because it refers to Information Systems and to the concept of this paper in terms of strategic alignment and Information Systems Planning.

As primary and decisive stage of the search of articles seemed appropriate, an initial and general search on the issue of Strategic Information Systems Planning and alignment has been conducted concerning and corresponding literature reviews that have been implemented by previous researchers to create a basic idea of the concepts resulting. Databases and keywords are selected from these literature reviews on the field. Databases are Scopus, Science Direct, Web of Science, and ABI/INFORM, and searching was done with keywords: “information strategy and business strategy alignment,” “information systems strategy and business strategy and innovation,” “information systems strategy,” “business strategy and firm performance,” “strategic information systems and planning,” “strategic information systems planning and competitive advantage,” “strategic information systems planning and firm performance,” “strategic information systems planning and innovation,” “strategic

information systems planning phases,” and “strategic information systems planning success.” Articles are only in English and are published in scientific journals or conferences, not in books. Articles should have 15 citations, except for articles which have been published in peer-reviewed journals.

Having searched all databases, titles and abstracts of the relevant publications were scanned, and the citations and references of the residual articles were then reviewed. A total of 88 article results consist the final sample.

Search was completed when it resulted in common articles from all databases and different combinations of keywords. It was then that the critical mass of relevant literature sources was considered as having been collected.

Articles were classified in three categories according to their concept. These categories were alignment, firm performance, e-business/Internet, Information Systems (IS) resources, Strategic Information Systems Planning (SISP), Strategic Information Systems Planning (SISP) phases, Strategic Information Systems Planning (SISP) success, Information Systems (IS) planning and success, innovation, and management commitment.

Table 33.1 shows only the papers which are based on alignment and firm performance concepts and the other concepts which are related with them. The basic concepts related with alignment are firm performance and Strategic Information Systems Planning. Alignment has been investigated since 1991. This result confirms that alignment is a concept which has been investigated since previous decades.

The results of the articles show that in the current rapidly changing environment, businesses need resources and capabilities in order to be competitive and to increase their competitive advantage. Businesses compete in the digital economy, and they aim to transform themselves in e-businesses, so the Internet and Information Systems are very significant tools that contribute to this effort. Businesses have the opportunity to develop new products and services according to customer needs, to personalize their services, to collaborate with them in order to develop successful new products and services, and to reduce the introductory time of new products and services in the market. The results of these activities are the increase in competitive advantage, firm performance, profitability, customers' satisfaction, and market share. Customers perceive the value of new products and services, and they are satisfied and thus prefer to buy products and services which were developed with their contribution. So this customers' behavior leads to the increase in firm performance. Another precious opportunity of businesses is that they can collect data for customers and competitors with the use of Information Technology. Collecting these information businesses are able to learn about customers' needs and their competitors' offers, and they can not only develop new products and services according to their needs but also differentiate from competitors.

In order to achieve the above, businesses need resources and capabilities, not only technological but strategic, as well. Information Technology and business strategy should be aligned because Information Systems support business's goals and strategy in order to increase firm performance. Organization structure should be aligned with Information Systems architecture in order to design new products and services and to integrate business processes according to the vision and mission. In order to support their strategy and goals by the use of Information Systems,

Table 33.1 The number of selected articles and their concept matrix analysis with related concepts

		Concepts										
	Author	Method	Alignment	Firm performance	E-business/ Internet	IS resources	SISP	SISP phases	SISP success	IS planning and IS success	Innovation	Management commitment
1.	Coltman et al. (2015)	Literature review	x								x	
2.	Maharaj and Brown (2015)	Survey	x				x					
3.	Kwanroengjai et al. (2014)	Case studies	x									
4.	Yang and Pita (2014)	Survey	x						x			
5.	Rahrovani et al. (2014)	Survey	x									
6.	Hovelja et al. (2013)	Survey		x			x		x			
7.	Suh et al. (2013)	Survey	x	x								
8.	Yang et al. (2013)	Survey					x		x			
9.	Ullah and Lai (2013)	Literature review	x	x							x	
10.	Merali et al. (2012)	Literature review		x		x	x					
11.	Mirchandani and Lederer (2012)	Survey	x					x				

(continued)

22.	Oh and Pisonneau (2007)	Survey	x	x															
23.	Benbya and McKelvey (2006)	Literature review	x																
24.	Chan et al. (2006)	Survey	x	x															
25.	Fairbank et al. (2006)	Survey	x									x							
26.	Newkirk and Lederer (2006)	Survey	x							x									x
27.	Pai (2006)	Survey	x							x									
28.	Piccoli and Ives (2005)	Literature review		x							x								
29.	Bergeron et al. (2004)	Survey	x	x															
30.	Cao and Schmeiderjans (2004)	Survey	x								x								
31.	Nathan et al. (2004)	Survey	x	x															x
32.	Peppard and Ward (2004)	Literature review	x								x								x
33.	Ratfinam et al. (2004)	Case studies	x																

(continued)

Table 33.1 (continued)

		Concepts										
	Author	Method	Alignment	Firm performance	E-business/ Internet	IS resources	SISP phases	SISP success	IS planning and IS success	Innovation	Management commitment	
34.	Keams and Lederer (2003)	Survey	x	x							x	
35.	Sambamurthy et al. (2003)	Literature review	x	x		x						
36.	Croteau and Bergeron (2001)	Survey	x	x								
37.	Andersen (2001)	Survey		x	x		x					
38.	Bergeron et al. (2001)	Survey	x	x								
39.	King and Teo (2000)	Survey	x	x			x					
40.	Keams and Lederer (2000)	Survey	x	x		x						
41.	Reich and Benbasat (2000)	Survey	x									
42.	Teo and Teo (2000)	Survey	x		x							

businesses follow the process of Strategic Information Systems Planning, which has specific phases in order to select the appropriate Information Systems and plan their use, according to their strategy. One dimension of the measurement of Strategic Information Systems Planning success is the degree of alignment. The result of this measurement will conclude by noting to what degree businesses support their goals with the use of Information Systems in order to increase firm performance.

SMEs are important for national economy, because they constitute the entire business of a country and they have been negatively influenced by financial crisis. Although gathering information is a difficult process especially for SMEs, it is necessary in order to face financial crisis. The process of gathering information should be strategic. SMEs try to survive in the current turbulent environment. In order to be innovative and to achieve rapid growth, it needs to align business and Information Technology strategy.

In the following sections, alignment and its impact on firm performance are examined and conclusions for SMEs are presented in order to increase their competitive advantage through alignment in the current unsustainable financial environment.

33.3 Theoretical Framework

33.3.1 An Overview of Alignment

Achieving alignment between business and Information Technology has been a fundamental issue for many years, and many researchers, businesses, and Information Technology executives and consultants have sternly investigated and focused on this field since 1970 (Benbya and McKelvey 2006; Rahrovani et al. 2014; Ullah and Lai 2013). Aligning business goals with Information Technology is still one of the most important research issues in management of technology (Croteau and Bergeron 2001). Nowadays, the alignment is one of the most often researched concepts for both businesses and academic.

Researchers have thoroughly investigated this research area in order to understand the relationship between strategic alignment and the business value of using Information Technology. In this light of these investigations, researchers have identified the following types of alignment between business and Information Systems strategy and structure. The first type concerns business alignment and specifically the alignment between business strategy and structure. The second type regards Information Systems alignment and includes issues such as alignment between Information Systems strategy and structure. Last, the third type presents a cross-dimension alignment which comprises alignment between business structure and Information Systems strategy or business strategy and Information Systems structure. Researchers argue that the alignment between organizational aspects such as strategy, structure, management processes, individual roles, and skills with technology can lead to increase value in businesses and Information Systems effectiveness and business performance (Rahrovani et al. 2014; Suh et al. 2013).

The achievement of a high-degree alignment between Information Technology and organizational goals has been referred to as one of the key issues for Information Systems managers (Reich and Benbasat 2000). In this context both the business and Information Technology are combined, providing services with the support of Information Technology at all levels of the business in order to effectively achieve its goals. A definition of alignment mentions that this concept regards on the degree of fit and integration between business strategy, Information Technology strategy, business infrastructure, and Information Technology infrastructure (Ullah and Lai 2013). Other researchers have defined alignment as the degree to which the Information Technology mission, goals, and plans support and are maintained by the business mission, goals, and plans (Kwanroengjai et al. 2014; Oh and Pinsonneault 2007; Reich and Benbasat 2000; Suh et al. 2013). Chan and Reich (2007) add to the previous definition the completion among business strategy, Information Technology strategy, business infrastructure, and Information Technology architecture.

Alignment includes the following basic concepts. Firstly, concerning on the business side are business planning, business strategy, and the tactical and business operational level. Second, the Information Technology side comprises Information Technology planning, Information Technology strategy, and the tactical and Information Technology operational level (Henderson and Venkatraman 1999; Luftman and Brier 1999; Luftman et al. 1993; Ullah and Lai 2013). Strategic Information Technology alignment is unique for each business because it combines business and Information Technology knowledge in order to support business objectives, which are singular resources for each business (Kearns and Lederer 2002).

Since alignment can be defined as the degree of completion between business strategic orientation and Information Systems strategic orientation and since it specifically focuses on how that linkage can be achieved, both business strategy and Information Systems strategy should be developed side by side. Alignment between business and Information Systems should be considered as a continuing process rather than as an occurrence. Senior business managers and Information Systems managers should collaborate in order to design and evaluate Information Systems plans. This effort contributes to the successful implementation of the alignment process in order to support the need of an ongoing process (Booth and Philip 2007). Another critical factor which strengthens this partnership is the business culture. Major components are shared values, beliefs, and behavioral norms which are required in order to maintain organizational culture.

Researchers widely admit that the process of alignment is significant for businesses for several reasons. The initial benefit is to effectively determine the role of Information Technology which efficiently supports the business to achieve its goals. Second, another advantage is that alignment motivates businesses to meliorate both their business scope and their infrastructure by improving the relationship between business components and Information Technology. Researchers point out that the existing alignment models are mostly business driven rather than Information Technology driven. Consequently, more attention should be paid to Information Technology in order to define the better way in which it can support the organization.

Businesses should not only know but also should make their business strategy clear so as this support to be achieved by means of Information Technology (Ullah and Lai 2013).

The most prevalent model includes the following elements to measure alignment: organizational strategy, structure, and technology. This framework examines the relationship between different strategy components, such as business strategy, organization infrastructure and process, Information Technology strategy, and Information Technology infrastructure and process. Information Technology strategy can be presented as a dimension, which includes competencies, role of Information Technology, systems design and development, and Information Technology infrastructure. Strategic orientation of Information Systems focuses on presenting an application portfolio which includes the dimensions of aggressiveness, analysis, defensiveness, futurity, proactiveness, risk aversion, and innovativeness. Strategic orientation, Information Technology, and organizational structure have an impact on performance when aligned rather than when each of them is regarded independently. Strategic orientation: Aggressiveness concerns with the allocation of business resources and business's improved position, in order to increase market share faster than competitors. Analysis refers to a business's capability to secure advantage in a competitive market. Defensiveness reflects on supporting a business to tight marketplace alliances with its customers, suppliers, and distributors. Futurity aims at the degree of the business preparation for positioning in future environmental situations. Proactiveness refers to the introduction of new technologies, which allows the realization of pioneer advantages. Finally, riskiness aims in present how decisions are made and how action is taken. Business structure can be measured by five dimensions, which are specialization, vertical differentiation, professionalization, formalization, and centralization (Bergeron et al. 2004; Chatzoglou et al. 2011). Business structure refers to a method in which organizations, departments, functions, and people are combined and interact with each other in order to succeed in common business objectives. According to business performance, businesses should select the right structure because not all types of structures are suited to all businesses or people (Ullah and Lai 2013). The Information Technology strategy component contains two dimensions. The first is Information Technology environment scanning which represents the degree of the business having the capability of discerning and reacting to technological changes differentially from its competitors. The second is strategic use of Information Technology which displays the degree of the use of Information Technology to increase quality, competitiveness, and performance. The Information Technology structure component has one dimension relating to Information Technology planning and control and another dimension which is Information Technology acquisition and implementation. This dimension relates to the effective selection and introduction of new IT applications by managers (Bergeron et al. 2004; Chatzoglou et al. 2011).

It is known that businesses frequently face changes in the environment, especially in terms of changes in consumer services, technologies, and product lifecycles. In this environment of innovation and strong market competition, businesses need Information Systems which meet the needs of the business according to the

business's goals, which affects the process of business with Information Technology alignment. The development of successful Information Systems needs both understanding of system requirements and business activities. Achieving alignment from the development of Information Systems supports the organizational stakeholders to effectively meet business goals. Nevertheless, Information System developers face challenges in implementing systems that meet business goals which act in an ongoing changing environment, because businesses are misaligned. Despite the contribution of alignment methodologies, some businesses fail to align business with Information Technology due to the following challenges. First, many decisions which concern about Information Technology are driven by business executives who are not informed about Information Technology. This barrier leads to the company being misaligned. Another challenge refers to Information Technology executives who are not informed about the business goals, and often they cannot understand the needs of business decisions. Finally, business and Information Technology executives contravene and they do not trust each other, which influences their relationship and consequently the business survival (Ullah and Lai 2013).

Previous researches state that alignment between business and Information Systems strategy increases firm performance. Nevertheless, factors influencing alignment have received relatively little attention. Information Systems alignment is identified as the degree to which the mission, goals, and plans included in the business strategy are distributed and contended by the Information Systems strategy to affect firm performance. Information Systems strategy cannot be aligned to the business strategy when the business fails in formal planning, and the business strategy is not clearly identified (Chan et al. 2006).

Other factors related to the successful implementation of alignment refer to shared domain knowledge, Information Technology implementation, communication between business executives and Information Technology stakeholders, and link between business and Strategic Information Systems Planning, in order to improve the business's culture. In this view the following should be put into perspective so as to increase alignment in any business. The business strategy must be cleared by both business stakeholders and Information Technology, a strong cultural relationship between business and Information Technology needs to be established, successful communication between both business and Information Technology executives needs to be sustained, business and Information Technology strategies must be associated, Information Technology has to support the business strategy and Information Technology must be supported by business strategy, and, finally, business and Information Technology executives must trust each other (Ullah and Lai 2013). Teo and Ang (1999) add management commitment to the strategic use of Information Technology and clear or stable business mission, goals, and priorities to the previous factors. Reich and Benbasat (2000) propose a model which contains four factors that would potentially affect alignment. The first one is shared domain knowledge between business and Information Technology executives, the second refers to Information Technology implementation success, the third is about communication between business and Information Technology executives, and the last is related to connections between business and Information Technology planning processes.

The alignment between business strategy and Information Technology strategy has been highlighted as a major issue for businesses. On the other hand, alignment between business strategy and Information Technology strategy gap exists due to lack of communication, leadership, education, and participation in business strategy planning and development. Rathnam et al. (2004) investigate the factors that affect the decrease of gap in alignment. Chan and Reich (2007) conclude to the following critical success factors which affect the alignment of business and Information Technology planning in fifty stakeholders. The first major factor is the clear definition of business goals and vision. Other factors concern management commitment, confidence and knowledge about business planning, strategic use of Information Technology, and the collaboration and communication in the department of Information Technology in order to be efficient and reliable and responsive to user needs (Luftman and Brier 1999).

It has already been mentioned that the participation of the Chief Executive Officer (CEO) and other top managers is a major factor for successful alignment. This participation is significant because it contributes to the competitive use of Information Technology and the successful implementation of Information Technology strategies. The Chief Information Officer (CIO) should devote to understanding business needs, and the CEO should devote to investigating Information Technology opportunities. CIOs who participate in formulating business goals are more possible to understand business goals and to closely connect Information Technology strategies closely with organizational strategies. CEOs' participation contributes to the ability of CIOs to provide information about competitors' uses of Information Technology and to share knowledge about emerging opportunities. This collaboration aims to strengthen both types of alignment (Kearns and Lederer 2002).

When it comes to the effectiveness of the alignment, CIOs are responsible for educating business managers according to strategic implications of Information Technology investment, forwarding the strategic vision of Information Systems to the whole business, making critical strategic decisions in resource dispensation, and communicating with other stakeholders to generate new ideas for business progress and innovation (Chen et al. 2015).

There is variety of other factors which negatively influence the process of alignment. These factors concern with the limited involvement of the CEO and CIO in strategic planning, the frail relationship between business and Information Technology, the communication problems between business and Information Technology, the short-term planning between business and Information Technology, the lack of business and Information Technology capabilities, the turbulent organizational structure, the organizational culture which does not promote the use of Information Technology, the use of Information Technology not as an organizational tool, the informal business planning, and the lack of Information Technology faith (Ullah and Lai 2013). Except for factors which negatively affect the process of alignment, there are inhibitors which hamper the process. These inhibitors are referred to be the facts that Information Technology does not prioritize well or fails to meet its obligations, does not understand business objectives, fails to succeed in strategic objectives, and

does not communicate effectively the business goals and vision. Also, Information Technology management does not provide leadership in the alignment process, and managers do not support the use of Information Technology and resist. Last major factor is that Information Technology and business plans are not linked (Luftman and Brier 1999).

Managers want to know the steps which are needed so that alignment can be successful and the way to increase business performance and effectiveness through Information Technology in order to avoid previous challenges which negatively affect the process of alignment. According to Luftman and Brier (1999) the process of alignment consists of six steps which are the definition of goals and the selection of the team which will contribute to the alignment process, the understanding of the business and Information Technology linkage, the analysis and the identification of prioritized gaps, the specification of actions which will take place in the process, the choice and evaluation of success criteria, and the support of the alignment process.

33.3.2 Alignment and Firm Performance

There have been only few researchers who have actually developed alignment and those who have investigated its effect in firm performance have been few. The result for businesses which have aligned strategy and structure is that they are less defenseless to external change and internal inadequacies, and consequently they are able to perform more competitively (Bergeron et al. 2004). Researches support that alignment must have a positive combination with firm performance. Previous surveys concluded that businesses with high strategic alignment of Information Systems were performing better (Cao and Schniederjans 2004). Also, effective alignment of the Information Technology plan with the business plan can impact on competitive advantage (Chan and Reich 2007). Despite the fact that more attention is given to strategic Information Technology alignment, it cannot influence the firm performance without the simultaneous implementation of both strategic and structural alignment (Chan and Reich 2007). If the business delays according to its competitors, strategic advantage and competitive advantage can quickly become strategic and competitive need. New technologies offer new opportunities for competitive advantage and strategic advantage (Luftman et al. 1993). Researches have been implemented to demonstrate alignment between Information Systems and organizational objectives, and several alignment levels have been suggested to impact organizational outcomes which refer to performance and competitive advantage (Benbya and McKelvey 2006). The fact is that the strategic importance of Information Technology in organizations is increasing; most studies have focused on the alignment of Information Technology strategy with business strategy and examined the performance effects of the strategic alignment (Yayla and Hu 2012).

An important view of Information Technology planning is the alignment of Information Technology plans with business plans through the linkage between business and Information Technology planning processes and activities. This kind

of alignment is necessary to secure that the Information Systems processes support business goals and activities at every level to achieve business value from Information Technology and take advantage of Information Technology to achieve strategic advantage (Haki 2011).

Consequently, according to information processing theory, the most effective organizational strategies are those that identify a suitable combination between business's ability to manage both information and the amount and kind of information that is disposable or demanded. This conclusion has three meanings. Firstly, managing the environment means for businesses to use Information Technology so as to support cooperative associations, partnerships, or acquaintance with other businesses.

Secondly, the use of Information Technology increases the productiveness of internal processes to a competitive response enabling the company to ensure approach to rare resources and to operate as a modulator against changes. This would demand an information processing focus on limiting coordination costs, raising inner control, meliorating the productiveness of internal methods, limiting costs of functions, and limiting the costs of handling data. Finally, the use of Information Technology brings the business more closely to the customer by strictly learning more about his needs. Through the use of Information Technology, the business can reduce uncertainty as it is able to understand more quickly changing consumer demands and abridge response times, resulting in improving firm performance. Customers are satisfied and contribute to the increase of firm performance. It also permits the business to plan into differential products that consumers require or to supply more efficient service on existing products (Fairbank et al. 2006).

Information Technology can influence firm performance only by the alignment between the strategic, structural, and environmental elements which are special to each business. Researchers are interested in the following important questions, how can a business translate its Information Technology investments into growing firm performance? The second question concerns the way that a business meliorates its productivity and the last question refers to the way that a business grows the market share it holds.

Businesses are constantly looking out for rapid changes in the business environment, especially changes related in consumer services, technologies, and product lifecycles. Innovation and market competition has pressed businesses to improve their business strategies in a rapid way. The huge business investment in Information Technology and the speedy upgrading of business strategies have forced top management to pay more attention to Information Systems and combine Information Systems Planning at the strategic level of the business (Chatzoglou et al. 2011).

Some researches have successfully noticed the outcome of the alignment of Information Technology with organizational variables on firm performance. These dimensions concern the strategic management of Information Systems, the organizational structure, or the business strategy.

Successful strategic alignment of Information Technology with the business strategy should include elements such as business strategy, Information Technology

strategy, business infrastructure, and technological infrastructure, as it is mentioned above. Firstly, the strategic use of Information Technology is related to the Information Technology applications used to contribute to the business to gain a competitive advantage. Next, Information Technology management makes awareness of the processes of the Information Technology department such as the use of current and new technologies, the growth of especial Information Technology applications, and the rate of Information Technology use experienced by the employees. Next, the role of the Information Systems department regards the business significance of Information Systems Planning, the quality of the Information Technology alignment with business structure, the productiveness of software development, and the manipulation of communicational networks. Then, the technological infrastructure includes the Information Technology architecture and the formal procedures used to guide and manage the business's Information Technology resources. Finally, the business infrastructure concerns the internal processes of the Information Systems department such as formal structure, relationships, support groups, and capabilities.

A few papers have ended up with the significance of the alignment among business strategy, Information Technology, and firm performance. The usage of Information Technology for competitive advantage is a variable performance and it can be measured (Kearns and Lederer 2002).

Researchers have measured firm performance with variables such as sales growth and profitability (Bergeron et al. 2004; Croteau and Bergeron 2001); sales growth, profitability, and innovation (Andersen 2001), cost reduction, quality improvement, and revenue growth (Oh and Pinsonneault 2007); improvement of internal efficiency of operations, growth of customer satisfaction, growth of ROI, growth of market share of products and services, and growth of annual sales revenue (King and Teo 2000); and ROA, sales, growth, and profitability (Chatzoglou et al. 2011).

33.3.3 Alignment and SMEs

Managers in current and complex environments are expected to investigate the field of the alignment of Information Technology and business strategies more (Chan et al. 2006). Nowadays, that environmental uncertainty is higher than ever before, businesses need information and Information Systems. It is expected that businesses will thoroughly investigate Information Technology alignment within the environmental uncertainty and may be able to collect greater advantages from Information Technology. As a consequence, environmental turbulence influences the significance of Information Technology alignment, the convenience with which it is achieved, and the models required to manage it (Chan and Reich 2007).

The business functions have changed over the last years, and business environment is getting more and more complicated and troublous due to the growth of e-business, globalization, virtualization, and collaboration. To deal with the environments, businesses identify that Information Technology and Information Systems are requisite to meliorate firm performance and sustain competitive advantage by

developing productive business operations, contributing on global contacts, and contending interactions between business components and resources.

Businesses change becoming more sophisticated and integrated, which is more cost-effective, bendable, performance oriented, competitive, profitable, and sustainable to adapt to the demands of constant change by strategic use of Information Systems (Yang et al. 2013).

In particular, innovative small firms which are those which introduce new products, processes, or business models are most likely to create new markets, achieve rapid growth, and help the economy recover (Lee et al. 2015).

In Europe almost the amount of 75 % of all businesses are family ones. Family businesses incline to pay attention on the business's long-term sustainability than perceiving short-term profitability (Siakas et al. 2014). Family firms are significant, both because they make a substantial contribution to the national economy and also because of the long-term consistency they achieve, the liability they display, and the values they represent. Greece is a country which has an enormous number of SME businesses comparatively with other countries of the European Union, and most of them are family businesses (Bourletidis 2013; Vassiliadis and Vassiliadis 2014).

There are few factors which influence SMEs success and help to limit the challenge of failure and raise opportunities for success. These factors came from a survey of 143 SMEs in Thailand and include SMEs characteristic, management and know-how, products and services, customer and market, cooperation with other businesses, resources and finance, strategy, and external environment. It is observed that these factors are related with the factors which affect the alignment process (Chittithaworn et al. 2011). A major conclusion results from the fact that if SMEs are to produce new innovative products and services and meet customers' and market's needs, they require information. In order to handle these information, they need both technological and strategic resources. They have to analyze the environment and to define their business strategy and objectives which have to be aligned with those of Information Technology. This alignment will help SMEs to increase their cooperation with customers and other businesses and to enhance their competitive advantage.

This competitive advantage came from SMEs' investigation in market research, Research and Development (R&D), and innovation in order to raise their productivity. Launching on market intelligence, they will be able to understand the needs of customers' and market's needs (Chittithaworn et al. 2011).

The current financial crisis has negatively affected a huge number of activities, and the majority of family businesses found themselves in a new complex financial environment where uncertainty prevails and the market characteristics are radically inverted. Except for difficulties in their financial aspect, their relative lack of technological, managerial, and human capabilities may limit their ability to bowl over the financial crisis.

Information handling plays a very significant role in the relationship between innovation and SMEs return. Some businesses have the gathering and the processing of the information handling as a separate part of their activity, and it seems to show up better perspectives. This information comes from all individuals who cooperate

with the business. These individuals are customers, suppliers, and competitors. Raising the frequency of information handling and managing supports businesses to behave more quickly and flexibly to new conditions and occasions caused by financial crisis (Bourletidis and Triantafyllopoulos 2014).

The handling of the information is a strategic resource which faces SMEs in the period of crisis. The degree of businesses that has been highly influenced by the financial crisis predominates the 80 %. Above all, more attention requires to be paid to SMEs and how they realize and reply to the crisis. SMEs play a major role both in Greek and European competitive financial growth and also in the world's economy because they constitute 97 % of businesses all over the world.

It seems that formal processes in SMEs which are related to strategic management and information handling expedited checking and coordination and supported managers to pay attention to strategies, structures, and processes that were likely to increase firm performance.

In unsettled environments, businesses incline to formalize processes using standardized rules and procedures which help the reduction of environmental uncertainty and to be prepared for stability. It seems that formalization supports the development of constant frameworks that accommodate communication among the individuals and sharing of new information and provides through the inflicted structures the transformation of new ideas into real plans accordingly, raising innovation. The more of a turbulent an environment may be, the higher the need for innovation is so as to continue being competitive and to survive (Giannacourou et al. 2015).

To conclude, strategy, resources, and finance are the main factors which SMEs have to deal with in order to develop and sustain technological advantage through Information Technology (Ensari and Karabay 2014). The alignment of these components will increase the profitability of the business, and it will be able to compete in the current turbulent financial environment.

33.4 Conclusions

So far academic studies have focused on the effect of strategic alignment between business strategy and Information Technology strategy or strategic planning and Information Systems Planning on firm performance and especially for SMEs. This paper contributes to the existing literature review because it summarizes the existing knowledge about the significance of alignment, factors that affect alignment, the influence of alignment on firm performance, and a framework for SMEs. There are some conclusions which concern SMEs in order to maximize competitive advantage in the current complex environment. SMEs have been influenced negatively from the financial crisis. They make efforts to survive and to increase their profitability. In this view, SMEs need information about their customers, their competitors, and their environment in order to produce new innovative products and services according to customers' needs and to increase customers' satisfaction. If customers are satisfied,

they prefer to buy the products or services of the business which satisfies their needs, and they contribute to firm's profitability. In order to handle the information they need, they require technological and strategic resources. Information Systems are a tool which helps SMEs to reduce their costs, to reduce product lifecycles, to produce products according to customer needs, and to make internal processes more effective. However, Information Technology without strategic direction does not add value to SMEs. SMEs should define and communicate their vision, mission, business strategy, and objectives in order to align them with strategy and objectives of Information Systems. Executives of SMEs should be informed about Information Technology issues in order to make better decisions for their businesses. This is difficult to be achieved when executives are not young and educated about Information Technology. Otherwise they make decisions without considering the objectives of Information Systems department, and this can be a barrier in SMEs' profitability and competitiveness because it may increase cost of new products or it may not make internal processes more effective and rapid. So a culture for innovation and supporting Information Technology is necessary so that SMEs' benefits from the process of strategic alignment could be gained.

By identifying the factors that affect the alignment process and the model which has been investigated by previous researchers (Bergeron et al. 2004; Chatzoglou et al. 2011; Henderson and Venkatraman 1999), it is proposed for SMEs to be based on the components of this model and combine the factors which affect the process of strategic alignment in order to design the process of alignment and pay attention to these components in order to maximize performance. Furthermore, it is proposed academics and SMEs test this model and the factors which affect the process of alignment in order to confirm their influence on firm performance and to highlight the components to which SMEs have to pay more attention. The result of these investigations may conclude to a new model or a formal process which will combine both the elements of the alignment process and the factors which affect the process and will be followed by SMEs in order to maximize their profitability in the current complex environment. A limitation of this paper stems from the fact that the model which has already been investigated is combined with the factors that have not been tested yet. Nevertheless, the results of an exploratory study will be summarized in an improved conceptual model for further research.

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Chapter 34

On the Examination of Value-Based Performance Measures: Evidence from Indian Firms

Imlak Shaikh

Abstract There is a shift in focus from traditional accounting-based performance measures to the new value-based performance measures. With the rising focus on value-based performance measures which are derived from the long-term goal of wealth maximization as opposed to the short-term approach of profit maximization, EVA and FCF are promising indicators. Many past researches have shown that value-based performance indicators (especially EVA) are superior to traditional indicators like EPS, ROE, ROA, etc. Traditional indicators do not capture value creation and since they are accounting based, they can be manipulated by the managers. Therefore using them as firms' performance measure is not in the best interest of the shareholders. The purpose of this study is to understand the various value-based performance measures and empirically verify the conceptual equivalence of free cash flow (FCF) and economic value added (EVA). For this, a sample of 30 firms listed in BSE SENSEX is taken and their FCF and EVA are calculated for the period of 5 years, from 2011 to 2015. The results of this calculation are analyzed using correlation and regression analysis. The descriptive analysis shows that there is a strong correlation between FCF and EVA. The regression analysis also shows that EVA and FCF are positively related which means that both EVA and FCF give similar results regarding firms' performance. The discounting of appropriately defined cash flows (FCF) is conceptually equivalent to discounting economic profits (EVA) for performance and decision-making process. This study has empirically tested the conceptual equivalence of the two measures.

Keywords Economic value added (EVA) • Free cash flow (FCF) • BSE • Performance • NOPAT

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34.1 Introduction

The paper discusses about value-based concepts: free cash flows (FCF) and economic value added (EVA) and their mathematical equivalence. The FCF is calculated by discounting cash flows and EVA is calculated by discounting appropriately defined economic profits. The central idea of both approaches is that operating profit after tax (NOPAT), derived by adding after-tax interest payments to net profit after taxes. The FCF approach focuses on the intermittent total cash flows calculated by deducing total net investment and adding net debt issuance to net operating cash flow, whereas the EVA mechanism requires defining the intermittent total investment in the firm. In a project valuation context, both FCF and EVA are conceptually equivalent to net present value. The FCF is important, the reason it enables the company to practice opportunities that enhance stakeholders' value. The free cash flow reports the cash that a company is able to generate after laying out the money required to maintain or expand its asset base. Without cash, it's difficult to develop new products, make acquisitions and takeovers, pay dividends, and reduce the liabilities.

The economic value added determines profit performance by taking into account direct cost, such as interest and cost of capital. Therefore, a company can formulate the profitable corporate strategy, business operations, and cost of capital. The EVA holds great potential; it does not show measurements by percentage term, unlike return on equity and return on assets, but with the monetary value that investors are well-known with. Investors get an insight on the corporate value at a glance and are able to compare how their profit surrounds the expected investors return.

The purpose of this article is to examine how FCF and EVA are actually calculated and empirically check whether both the approaches are actually mathematically equivalent or not. So data has been taken for the 30 firms listed on the Bombay Stock Exchange BSE SENSEX, and FCF and EVA values are calculated for the last 5 years.

34.2 Literature Review

The corporate finance has evolved over time shifting its focus from the traditional short-term approach of profit maximization to the modern long-term approach of wealth maximization, i.e., maximizing shareholder's wealth. Shareholders aim to maximize the returns on their investments and for that they use financial data of firms to assess its current performance and predict future performance.

Chen and Dodd (1997) highlighted that there is no single accounting measure that accounts for the variability of shareholder's wealth. They suggested that information from economic value added (EVA) helps in explaining stock returns (as a good accounting measures used to assess firm performance should). Traditionally performance was measured using net operating profit after tax (NOPAT), earnings per share (EPS), return on equity (ROE), return on assets (ROA), etc.

Using these measures to assess the firm's performance is not in the best interest of shareholders because these measures do not capture value creation. EVA and other value-based financial management have been preferred as performance indicators since then. Some of the important studies on value based performance measures are Burksaitiene (2015); Kaplan and Zingales (1997); Parvaei and Farhadi (2013); Ibendahl and Fleming (2003); Stewart III (1994); Unnisa and Janakiramudu (2014); Wells et al. (1995) and provides some intuitions to further investigate its relevance in the emerging corporate world.

Stewart (1991) demonstrated that "Earnings, EPS and earnings growth are misleading measures of corporate performance," "The best realistic intermittent performance measure is economic value added," and "EVA stands well out from the crowd as the single best measures of value creation on continuous basis." Lovata and Costigan (2002) claim EVA reduces agency cost. Maditinos et al. (2006) suggested EVA is strongly associated with stock returns. Ferguson et al. (2005) concluded that EVA improves stock performance. Lefkowitz (1999) and Finegan et al. (1991) concluded that there is a high correlation between EVA and market value added (MVA) as compared to other performance measures like cash flows, EPS, capital growth, and ROE. Mann and Sicherman (1991) studied announcement of seasoned issues of common equity during years 1982, 1983, and 1984. The equities were selected from the Investment Dealer's Digest of Corporate Financing. The equity of banks, bank holding companies, insurance companies, public utilities, limited partnerships, real estate investment trusts (REIT), and foreign-based firm industries and organizational forms was excluded from the sample. The study concluded that equity issues result in increase in free cash flow (FCF) available to managers and that these nonbonded funds carry agency costs and present evidence that shareholders do expect misuse of this FCF and condition their response to the firm's acquisition history.

Shrieves and Wachowicz (2001) explored the relationship among EVA, free cash flow (FCF), and traditional net present value (NPV) methods from a valuation perspective. Beginning with cash budget identity, they showed that for valuation and decision-making purposes, with some accounting adjustments, discounting clearly defined cash flows with FCF approach is theoretically and rationally equivalent to discounting clearly defined economic profits under EVA approach. The difference among the two approaches is computational, that is, the FCF approach focuses on intermittent total cash flow, whereas EVA requires clearly defined intermittent total investment. Subatnieks (2005) empirically studied and calculated FCF of Latvian firms and also concluded the theoretical similarity of EVA, FCF, and NPV. Kaviani (2013) analyzed ten companies representing the automotive industry of Iran Stock Exchange for a period of 5 years from 2005 to 2009 to test the hypothesis that there is significant relationship between EVA and created value from FCF to firm and equity (i.e., FCFF and FCFE). The research concludes that EVA can serve investors and managers well to interpret and predict FCF.

There has not been a conformity on a single best performance measure in the literature. For example, O'Byrne (1996) suggested that earning measures have stronger involvement with share returns compared to EVA. Goetzmann and Garstka

(1999) reported long-term performance of a firm is related to earnings and that earning per share (EPS) does a better job at explaining differences across firms and for predicting future performance. Turvey et al. (2000) examined a sample of 17 publicly traded food companies in Canada and could not find any correlation between EVA and MVA. Gunther et al. (1999) studied the German stock market and could not prove that value-based measures outperform traditional accounting-based measures. Worthington and West (2004) that showed using pooled time series and cross-sectional data on 110 Australian companies over the period 1992–1998 proved that earnings are more strongly connected to returns than FCF and EVA. Sharma and Kumar (2010) argue that EVA is not a better indicator of firm performance as compared to traditional performance measurement tools based on the sample taken from developed countries. Hence, it is essential to verify this notion for the emerging market like India. To explain the corporate performance, some more longitudinal studies are needed to validate the current status of EVA.

34.3 Data Sources and Empirical Model

The present study is based on the data collected from the financial statement of 30 firms. The data has been collected from Capitaline Databases maintained by Centre for Monitoring Indian Economy (CMIE). It provides data from firms' financial reports and stock exchanges. The financial data is updated annually, whereas the shareholding details and share price data are updated quarterly and daily, respectively.

The data of 30 companies listed in BSE SENSEX (Sensitive Index) for the period of 5 years, from 2011 to 2015, has been used for the study. The BSE SENSEX, also called BSE30 or just SENSEX, is based on free-float market-weighted stock market index of 30 blue-chip Indian firms and financially sound firms across key sectors listed on Bombay Stock Exchange. The data collected includes profit before tax (PBT), tax, interest, depreciation, total net investment, total debt, total shareholder funds, and capital employed.

For the analysis and comparison of FCF and EVA, statistical tools like descriptive statistics and regression analysis have been used. Descriptive analysis is done for annual net operating profit after tax (NOPAT), FCF, and EVA. To evaluate the effect of FCF on EVA, we develop a regression model with EVA as dependent variable and FCF as independent variable. The regression is done separately for individual years from 2011 to 2015 (see Table 34.3) for the 30 companies listed in BSE SENSEX. The data collected is used to calculate required variables using the following relationships:

$$\text{NOPAT} = \text{NPAT} + \text{interest} (1 - t) \quad (34.1)$$

where

NOPAT: net operating profit after tax

NPAT: net profit after tax

t : tax rate, calculated as the fraction of PBT (profit before tax) paid as tax:

$$\text{EVA} = \text{NOPAT} - \text{Capital employed (WACC)}$$

WACC is the weighted average cost of capital and is calculated as follows:

$$\text{WACC} = k_d w_d + k_e w_e \quad (34.2)$$

where

k_d : cost of debt

k_e : cost of equity

w_d : weight of debt, calculated as debt capital/capital invested

w_e : weight of equity, calculated as equity share capital/capital invested and finally,

$$\text{FCF} = \text{NOPAT} + \text{depreciation} - \text{total net investment}$$

The following regression model is used:

$$\text{EVA} = \beta_0 + \beta_1 \text{FCF} + \varepsilon \quad (34.3)$$

where

β_0 : intercept

β_1 : coefficient of FCF

ε : classical error term

34.4 Empirical Results and Discussion

In this section we present the empirical relevance between free cash flow and the economic value added. The results are presented in the form of summary statistics, covariances, and regression for sections of years. First, we summarize descriptive statistics of FCF and EVA for the previous 5 years (see Table 34.1). The mean, median, standard deviation, standard error, and maximum-minimum values for 30 companies from BSE SENSEX have been calculated for each year from 2011 to 2015. The data presented is in ten million rupees. Graphical representations of FCF and EVA are also shown for better understanding of the readers (see Fig. 34.1). We can see that minimum mean FCF and EVA are in the year 2015 and the maximum in the year 2011.

This section discusses how the two variables, FCF and EVA, are correlated. Correlation has been calculated for every year from 2011 to 2015 for 30 companies included in BSE SENSEX. It is found that FCF and EVA exhibit strong positive correlation with each other (as can be seen in Table 34.2). The strong correlation between EVA and FCF suggests that with increase in one of the factor increases

Table 34.1 Descriptive statistics

Year		2011	2012	2013	2014	2015
FCF	Mean	-17390.85	-19216.40	-22078.89	-24523.54	-32718.81
	Median	-1654.05	-888.08	-1631.00	-1870.93	-1699.57
	Std. deviation	50734.47	53964.02	59257.08	65409.92	82131.61
	Std. error	9262.80	9852.44	10818.81	11942.16	14995.11
	Maximum	23721.52	34832.05	28035.88	26332.11	19078.86
	Minimum	-245550.68	-246143.28	-271812.71	-310067.46	-402561.87
EVA	Mean	-3636.18	-4250.26	-4373.61	-4781.08	-5056.15
	Median	-1461.51	-1978.48	-1771.87	-2931.63	-2236.86
	Std. deviation	5443.47	6042.84	6216.41	6088.73	8189.21
	Std. error	993.84	1103.27	1134.96	1111.65	1495.14
	Maximum	-36.46	-65.66	18.47	2343.07	1801.35
	Minimum	-26259.60	-28440.37	-30018.27	-27799.31	-40770.77

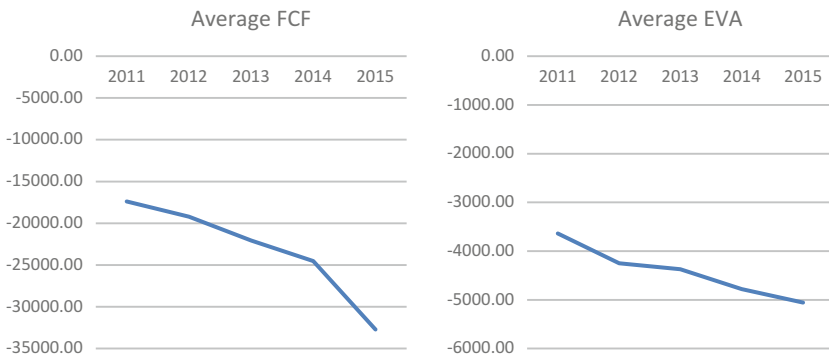


Fig. 34.1 Change in average FCF and EVA with time

Table 34.2 Correlation between EVA and FCF

Year	Covariance	Correlation
2011	583625400.5	0.8976
2012	317558158.9	0.8249
2013	283906051.6	0.7973
2014	227474684	0.7216
2015	199847319.9	0.7486

the other and vice versa. The correlation is strongest in the year 2011 and weakest in 2014 with given covariances. The average correlation over the 5 years is 0.798. The significant correlation measures imply that over a period of time, the free cash flow and economics value added remain similar; this happen due to theoretical mathematical equivalence of EVA and FCF. To test this equivalence, we developed the regression model as mentions in the previous sections, and the results are presented in Table 34.3.

Table 34.3 OLS result on the relation between EVA and FCF

	Coefficients	Standard error	t-Stat	P-value
Year 2015				
Intercept	2127.7273	723.5507	-2.9407	0.0065
FCF	0.0895	0.0083	10.7777	0.0000
Year 2014				
Intercept	-2898.1174	684.5167	-4.2338	0.0002
FCF	0.0768	0.0099	7.7204	0.0000
Year 2013				
Intercept	-2526.9133	745.5598	-3.3893	0.0021
FCF	0.0836	0.0120	6.9896	0.0000
Year 2012				
Intercept	-2697.4447	826.7050	-3.2629	0.0029
FCF	0.0808	0.0147	5.5158	0.0000
Year 2011				
Intercept	-2239.3773	710.2009	-3.1532	0.0038
FCF	0.0803	0.0134	5.9743	0.0000

This section discusses the relationship between the FCF and EVA of the 30 companies included in BSE SENSEX from year 2011 to 2015. The following model has been used for linear regression between the two variables: the equation $EVA = \beta_0 + \beta_1 FCF + \varepsilon$ and the hypothesis $H_0 : \beta_1 \neq 0$ $H_A : \beta_1 = 0$. Regression has been carried out independently for each year for 30 data points pertaining to the 30 companies of the sample. Regression results for the 5 years show that EVA and FCF are positively related to one another, and these results are highly significant as null hypothesis is not rejected even at 99.5 % confidence interval. This positive relationship comes from the fact that both are positively related to NOPAT. Table 34.3 shows the empirical output for years through 2015–2011; the slope of each year’s FCF appears to be positive and statistically significant. The accounting profit reported annually based on the fiscal year and the estimated slope of the FCF indicate that in all the period, the intermittent free cash flow explains the current years’ economic value additions.

34.5 Conclusion

With the rising focus on value-based performance measures which are derived from the long-term goal of wealth maximization as opposed to the short-term approach of profit maximization, EVA and FCF are promising indicators. Many past researches have shown that value-based performance indicators (especially EVA) are superior to traditional indicators like EPS, ROE, ROA, etc. Traditional indicators do not capture value creation and since they are accounting based, they can be manipulated by the managers. Therefore, using them as firms’ performance measure is not in the best interest of the shareholders. The discounting of appropriately defined cash

flows (FCF) is conceptually equivalent to discounting economic profits (EVA) for performance and decision-making process. This study has empirically tested the conceptual equivalence of the two measures. The high correlation and the regression analysis suggest that both EVA and FCF give similar results. The regression analysis also shows that EVA and FCF are positively related which means that both EVA and FCF give similar results regarding firms' performance. This positive relationship comes from the fact that both are positively related to net operating profit after tax.

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Chapter 35

The Procyclicality of African Sovereign Credit Ratings

Marinda Pretorius and Ilse Botha

Abstract Credit rating agencies are supposed to have a long-term outlook when assigning credit ratings to sovereign states. It is unwarranted to assign high (low) ratings to sovereigns that are experiencing momentary successes (impediments). Ratings should therefore be assigned without taking the business cycle into account. If the business cycle is taken into account in the process of rating assignments, ratings are assigned procyclically. This paper empirically investigates the behaviour of rating agencies when assigning sovereign ratings for African countries. It makes use of ordered probit models which control for macroeconomic factors to determine if Standard and Poor's, Fitch, Moody's and a South African based research entity, NKC African Economics take the business cycle into account in their rating processes. The results show that three of the four agencies act in a procyclical manner to a certain extent when assigning ratings to African countries.

Keywords Credit rating • Africa

JEL Codes F340, C330, C350

35.1 Introduction

Credit rating agencies are caught between a rock and a hard place. On the one side they have to ensure rating stability and on the other side rating accuracy. Considering past trends it seems that it is nearly impossible to attain both these qualities in the rating assignment process at the same time. Rating stability is normally a by-product of independent ratings or ratings that are formulated without taking the business cycle into account. Ratings that are formulated without taking the business cycle into account are known in literature as rating through-the-cycle. Point-in-time ratings are the opposite of rating through-the-cycle. These ratings are procyclical because it takes the business cycle into account. Point-in-time ratings tend to be more accurate

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than through-the-cycle ratings because it takes current economic conditions into account.

Credit rating agencies have been criticized for downgrading (upgrading) sovereigns during bad times (good times) in excess of what was really necessary. This trend can be ascribed to the existence of possible asymmetries in the sovereign credit ratings market. This asymmetry refers specifically to the divergent behaviour between upgrade and downgrade phases. Asymmetry in return can be attributed to procyclicality in the ratings market. According to Dimitrakopoulos and Kolossiatis (2015) ratings are procyclical when credit rating agencies allocate higher ratings than deserved before crises periods and create misleading expectations and thereafter downgrade sovereigns more than what macroeconomic fundamentals prescribe.

The aim of this article is to investigate the influence of the business cycle on the sovereign credit rating levels of several African economies in order to see if ratings are determined through-the-cycle or point-in-time ratings. The African of NKC African Economics, Standard and Poor's, Fitch and Moody's will be used for 27 African sovereigns and the main determinants identified from literature will be included in addition to the business cycle to accommodate for any other factors that could influence sovereign credit ratings. The article is organized as follows: Sect. 35.2 covers the literature review of the procyclicality of credit ratings. Section 35.3 discusses the data and methods used in this study. In Sect. 35.4 the estimation results are presented and discussed and Sect. 35.5 concludes the article.

35.2 Literature Review

According to Topp and Perl (2010) there exist two “philosophies” when determining the rating of an issuer—one that takes cyclical effects into account (procyclical) and one that does not (independent). When ratings are procyclical it is also known as point-in-time ratings seeing that the current situation of an issuer is taken into account—therefore cyclical and permanent influences are taken into account (Topp and Perl 2010). In theory credit ratings agencies are supposed to have a long-term outlook and should not vary in a procyclical manner and should rather be independent (Freitag 2015). When ratings are independent of the business cycle it is known as rating through-the-cycle. These ratings are based on issuer specific characteristics (Freitag 2015). The focus of the rating through-the-cycle philosophy is on permanent influences and therefore these ratings are not as volatile as point-in-time ratings (Topp and Perl 2010).

According to Kiff et al. (2013) rating agencies are caught between attaining rating stability and rating accuracy. Ratings through-the-cycle are typically more stable whereas point-in-time ratings are more accurate. Users of credit ratings abidingly prefer rating stability mainly due to the trading transaction costs that accompany frequent rating changes (Kiff et al. 2013). In their research they made use of a structural credit risk model to compare the stability and accuracy characteristics

of through-the-cycle and point-in-time ratings. Their results proved that through-the-cycle ratings are indeed more stable, however they are also predisposed to “cliff effects” and a decreased capacity to forecast defaults in the future. Cliff effects refer to the situation when a specific rating is initially stable but are later exposed to several impulsive downgrades (Kiff et al. 2013).

Ferri et al. (1999) emphasize that actual ratings are a weighted average of fundamental factors as well as ad hoc information that represent agencies’ qualitative judgements and these weights are generally unknown to the public. According to Ferri et al. (1999) if the ratings that are estimated from a model that takes economic fundamentals into account are constantly higher than the actual ratings of a sovereign, it could be an indication that the qualitative judgement portion of rating determination might understate the ratings estimated by using economic fundamentals (the reverse is also true). Therefore credit agencies are using their “idiosyncratic judgement” to adapt ratings estimated by using economic fundamentals (Ferri et al. 1999). This behaviour could lead to procyclical sovereign ratings. This procyclicality occurs especially during economic crisis. If credit rating agencies allocate ratings above what economic fundamentals indicate and they do not warn investors regarding specific risks before a crisis, agencies would try to excessively downgrade ratings in order to protect their “reputation capital” (Ferri et al. 1999). Rating agencies effectively worsens an already dire situation by accelerating capital outflows and diminishing further capital inflows in the future (Ferri et al. 1999)

Ferri et al. (1999) found evidence of this trend during and after the East Asian crisis. Higher weights were assigned to qualitative judgements than to economic fundamentals before and after the crisis and this leads to a pattern where economic fundamentals were ignored when the economy was booming and deteriorating (Ferri et al. 1999). Ferri et al. (1999) ascribe this procyclical behaviour to “reputation incentives” that rating agencies face. There is an incentive to rating agencies to become more conservative during economic crises especially, so that they can compensate for the damage that they caused for not being able to predict crises before the event and to reconstruct their own reputational capital (Ferri et al. 1999).

The majority of research on procyclicality in the credit rating markets focus on corporate ratings. Topp and Perl (2010) investigated 7355 firms rated by Standard and Poor’s between 1986 and 2006. They concluded that although ratings are through-the-cycle, they still adjust in relation to the business cycle when rating classes and specific industries of firms are taken into account. This means that issuers with the same rating class have the same probability of default (Topp and Perl 2010). In another corporate rating study Amato and Furfine (2003) argue that there is no sense in assigning ratings procyclically, i.e. assigning high ratings to an issuer that is experiencing temporary success. In their research, corporate ratings of Standard and Poor’s were taken into account from the period 1981 to 2001. Ordered probit models were used in this study to show if the business cycle, macroeconomic and financial variables have an influence on credit ratings. It was concluded that there is very little evidence that credit ratings are influenced by the business cycle.

Freitag (2015) investigated procyclicality and path dependence of European sovereign credit ratings. According to Freitag (2015:309) ratings are procyclical if they are “positively correlated with economic or credit cycle fluctuations.” Path dependence refers to the situation where prior ratings influence current ratings (Freitag 2015). Probit models (where either rating changes in terms of upgrades or downgrades or actual rating levels were used as dependent variables) were utilized while controlling for typical macroeconomic variables that are normally taken into account when determining credit ratings (Freitag 2015). The ratings of Standard and Poor’s, Moody’s as well as Fitch were used in the study. It was concluded that there are certain circumstances where rating agencies act procyclical, however there was no clear pattern visible under these circumstances (Freitag 2015). It was also shown that there is clear evidence of dynamic elements in rating changes—if a rating change occurs at present, there is an increased probability of a rating change in the future.

According to Freitag (2015) this could lead to a vicious cycle where economies in trouble are downgraded further which leads to increased financial suffering due to increased costs of borrowing, affirming asymmetry in the market. It was proved that credit rating agencies take rating histories into account and ratings are therefore path dependent (Freitag 2015).

Recent research by Dimitrakopoulos and Kolossiatis (2015) investigated whether ratings were procyclical or sticky during the period before the East Asian crises and the European debt crises and the period during the crisis. Their research shows that ratings were not procyclical during the crisis mentioned but rather sticky. According to Norden (2008) ratings are sticky when rating changes only occur a certain period after the market expects a rating change to occur, they are thus slow to react.

This study will make use of models similar to that of Freitag (2015).

35.3 Data and Methods

35.3.1 Data

A panel of 27 African countries will be utilized for the time period between 2007 and 2014 on an annual basis. The countries included in the study are Algeria, Angola, Benin, Botswana, Cameroon, DRC, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Rwanda, Senegal, South Africa, Swaziland, Tanzania, Tunisia, Uganda, Zambia and Zimbabwe.

The ratings of the three major credit rating agencies (Standard and Poor’s, Moody’s and Fitch) will be used in conjunction with a South African based political and economic unit (NKC African Economics) to test the effect of the business cycle on rating levels while controlling for typical factors that normally influence sovereign credit ratings. The choice of variables was based on literature by Cantor and Packer (1996), Mulder and Perrelli (2001), Rowland and Torres (2004), Mellios and Paget-Blanc (2006) and Afonso et al. (2011). The variables are summarized in Table 35.1

Table 35.1 Explanatory variables included in models

Variable name	Definition
<i>Macroeconomic indicators</i>	
GDP growth	Annual real growth, year-on-year (%)
Investment	Foreign direct investment to GDP (%)
Inflation	Annual consumer price inflation (%)
<i>Government performance</i>	
Fiscal balance	Budget balance to GDP (%)
External debt	External debt to GDP (%)
<i>External balance</i>	
External balance	Current account to GDP (%)
Foreign reserves	Foreign reserves to GDP (%)
<i>Developmental explanatory variables</i>	
Per capita income	GDP per capita (US\$)
Corruption	Transparency international—corruption perceptions index
Regulatory quality	Ability of government to form and implement sound policies and regulations that promote private sector development
Internet users	Individuals who have made use of the internet via computer, mobile phone or any other electronic device in the past 12 months (per 100 people)
<i>Business cycle indicator</i>	
Business cycle	Cycle component of GDP

The business cycle indicator is created by making use of logged GDP data for the respective countries and extracting the cycle component by making use of the Hodrick-Prescott (HP) filter. This method was used by Freitag (2015). The business cycle indicator is given a value of 1 during boom phases and a value of -1 during recessions (Freitag 2015).

In order to test the robustness of the results, another business cycle indicator was used as proposed by Nickell et al. (2000) as well as Amato and Furfine (2003). A histogram is constructed of real GDP growth rates for each sovereign in the sample period and divided into thirds. All the observations that fall into the lower third of the distribution are allocated the value of -1 (classified as trough periods), and observations that fall into the upper third of the distribution are allocated the value of +1 (classified as peak times) (Nickell et al. 2000). Observations in the middle third are allocated the value of 0 (classified as normal times). This business cycle indicator will be labelled as “Business Cycle 2”.

The data for the NKC qualitative ratings and other explanatory variables used in the models were sourced from the NKC and Worldbank databases, whereas the ratings from Fitch, Standard and Poor’s and Moody’s were sourced from Bloomberg. The sample and frequency of the data were selected for countries where adequate data were available.

In order to quantify the respective rating categories, a linear transformation was used. A linear transformation assumes that the distance between rating categories

is identical (Eliasson 2002). For Standard and Poor's, Fitch and NKC the rating category of D was assigned a one, through to AAA which was assigned a value of 26. For Moody's the rating category for a default (D) was assigned the value of 1 through to Aaa which was assigned the value of 26. The end-of-year ratings were used in the analysis.

35.3.2 *Econometric Framework*

Due to the ordinal nature of sovereign credit ratings, ordered probit models are technically the best suited to sovereign credit rating data (Bissoondoyal-Bheenick 2005). The econometric framework used in this study will be similar to the ordinal framework used by Teker et al. (2013). It will include four models (one for each of the respective rating agencies) specified as follows:

$$y_{it}^* = x_{it}\beta + \varepsilon_{it} \quad (35.1)$$

where y_{it}^* is an unobservable latent variable that represents the sovereign credit rating of country i in period t ; x_{it} is a vector of time-varying explanatory variables; β is a vector of unknown parameters; and ε_{it} is a random disturbance term. According to Teker et al. (2013) if ε_{it} is normally distributed, Eq. (35.1) delivers an ordered probit model. It is assumed that y_i^* is related to the observed variable y_i , the sovereign credit rating, in the following way (Long and Freese 2006):

$$y_i = \begin{cases} 1 & \text{if } y_i^* < \tau_1 \\ 2 & \text{if } \tau_1 \leq y_i^* < \tau_2 \\ 3 & \text{if } \tau_2 \leq y_i^* < \tau_3 \\ 4 & \text{if } \tau_3 \leq y_i^* < \tau_4 \\ \vdots & \\ 26 & \text{if } y_i^* > \tau_{26} \end{cases} \quad (35.2)$$

where τ_m are known as cutpoints or threshold parameters and are estimated through maximum likelihood estimation (MLE).

35.4 Results

The results from Eq. (35.1) with the Eq. (35.2) specification will be investigated in Tables 35.2, 35.3, 35.4, and 35.5. In these models the actual rating levels of NKC, Standard and Poor's, Fitch and Moody's will each be used as dependent variable in the respective models. Two models were estimated for each credit rating agency—one for each of the business cycle indicators. The models for NKC are presented in Table 35.2.

Table 35.2 NKC ordered probit models

Variable	NKC	
	Coef	Coef
GDP growth	0.0018	0.0151
Fiscal balance	-0.0304	-0.0294
External balance	0.0613***	0.0611***
External debt	-0.0013	-0.0014
Investment	0.0652***	0.0656***
Inflation	0.0059	0.0041
Foreign reserves	0.0336***	0.0339***
Per capita income	0.0003***	0.0003***
Corruption	-0.0331**	-0.0344**
Regulatory quality	2.2371***	2.2725***
Internet users	0.0279***	0.0279***
Business cycle	0.0252	
Business cycle 2		-0.0632
Total panel observations	206	206
Log likelihood	-325.35	-325.22

*10 % level of significance

*5 % level of significance

**1 % level of significance

Table 35.3 Standard and poor's ordered probit models

Variable	Standard and poor's	
	Coef	Coef
GDP growth	-0.0315	-0.1962***
Fiscal balance	-0.0828**	-0.0622
External balance	-0.0060	-0.0059
External debt	-0.0053**	-0.0068***
Investment	0.0033	0.0289
Inflation	0.0459	0.0594**
Foreign reserves	0.1113***	0.1159***
Per capita income	0.0007***	0.0006***
Corruption	-0.0238	-0.0268
Regulatory quality	2.5767***	3.1475***
Internet users	0.0530***	0.0579***
Business cycle	0.1940	
Business cycle 2		0.5758***
Total panel observations	111	111
Log likelihood	-113.67	-109.43

*10 % level of significance

*5 % level of significance

**1 % level of significance

Table 35.4 Fitch ordered probit models

Variable	Fitch	
	Coef	Coef
GDP growth	-0.1433**	-0.3431***
Fiscal balance	-0.1009***	-0.0971**
External balance	0.0097	0.016
External debt	-0.0142***	-0.0160***
Investment	-0.0286	-0.0174
Inflation	0.0781**	0.0822**
Foreign reserves	0.0944***	0.0903***
Per capita income	0.0008***	0.0007***
Corruption	0.0116	0.0153
Regulatory quality	3.9036***	4.3622***
Internet users	0.1055***	0.1111***
Business cycle	0.2300*	
Business cycle 2		0.7562***
Total panel observations	114	114
Log likelihood	-92.54	-86.68

Source: Model estimations
 10 % level of significance
 *5 % level of significance
 **1 % level of significance

Table 35.5 Moody's ordered probit models

Variable	Moody's	
	Coef	Coef
GDP growth	-0.1801*	-0.3643**
Fiscal balance	-0.1459*	-0.1427*
External balance	0.2026***	0.1938**
External debt	-0.0052	-0.0060
Investment	0.26852***	0.2620**
Inflation	0.0474	0.0295
Foreign reserves	0.0187	0.0327
Per capita income	0.0017***	0.0015***
Corruption	0.0942	0.0753
Regulatory quality	-1.6267	-0.8031
Internet users	0.0425**	0.0383**
Business cycle	0.7442***	
Business cycle 2		0.7856**
Total panel observations	55	55
Log likelihood	-39.62	-42.61

Source: Model estimations
 10 % level of significance
 *5 % level of significance
 **1 % level of significance

It can be seen from Table 35.2 that the results from the respective models are very similar to each other and that the external balance, investment, foreign reserves, per capita income, corruption, regulatory quality and internet users are statistically significant with the expected relationship with sovereign ratings.

The business cycle indicator for both models are not statistically significant. This could indicate that NKC rate African sovereigns independent of the business cycle and therefore through-the-cycle. The models for Standard and Poor's are presented in Table 35.3.

The results from Table 35.3 show that although the results from the two models with the respective business cycle indicators are similar, there are a few differences that stand out. The GDP growth variable is statistically significant for the model with the second business cycle indicator but not for the first. The negative sign of the GDP growth model is highly questionable. The fiscal balance and inflation variables are significant in the model with the first business cycle indicator but not the second. Furthermore the external debt, foreign reserves, per capita income, regulatory quality and internet users variables are significant in both models with the expected relationship with sovereign ratings.

The first business cycle indicator in the Standard and Poor's model is statistically insignificant; however, the second indicator is highly significant. The sign indicates that Standard and Poor's could be procyclical in its determination of sovereign credit ratings. This means that during boom phases there is a higher probability of getting a higher rating assigned to a sovereign than which would normally be the case. The reverse is also true. The robustness of the significance of the business cycle indicator is questioned because only one of the indicators is statistically significant. The results for the Fitch models are shown in Table 35.4.

It can be seen from Table 35.4 that the results from the respective models are very similar to each other with GDP growth, fiscal balance, external debt, inflation, foreign reserves, per capita income, regulatory quality and internet users variables statistically significant with expected signs (except for the GDP growth variable again).

In the Fitch models the first and second business cycle indicators are both statistically significant (the first at the 10% level of significance and the second at the one percent level of significance). As was the case with the Standard and Poor's model the positive sign of the indicators could indicate the procyclicality of Fitch in assigning credit ratings. Therefore during recessions there is an increased probability of getting downgraded. The reverse is also true. The results for the Moody's models are shown in Table 35.5.

The results in Table 35.5 exhibit very similar results between the two models—the same variables are statistically significant (albeit at different levels of significance) and have the same signs. The GDP growth, fiscal balance, external balance, investment, per capita income and internet users variables are statistically significant. Once more the negative sign for GDP growth is unexpected.

Again both the business cycle indicators are statistically significant in the model for Moody's. The positive sign of the business cycle indicators exhibits possible

procyclicality of Moody's in assigning ratings to African sovereigns. Therefore during boom phases there is an increased probability of getting upgraded and during recessions there is an increased probability of getting downgraded.

35.5 Conclusion

The purpose of this study was to investigate the effect of the business cycle on sovereign credit ratings in Africa in order to analyse procyclicality trends of the three major credit rating agencies (Standard and Poor's, Fitch and Moody's) and NKC African Economics (a South African based research and political entity). The annual rating levels were used as dependent variable and two business cycle indicators and other determinants as identified in literature were used as independent variables for the four rating agencies for 27 African countries from 2007 to 2014. Two different measures for the business cycle were used to ensure the robustness of the results. Due to the ordinal nature of sovereign credit ratings ordered probit models were used.

The evidence from the rating level models supports the research by Freitag (2015) that there are cases where rating agencies take the business cycle into account. NKC rate sovereigns independent of the business cycle. Standard and Poor's take the business cycle into account to a certain extent. The results could not be confirmed for both business cycle indicators in the Standard and Poor's model. However both indicators proved to be statistically significant for the Fitch and Moody's models. Procyclicality is therefore confirmed for Fitch and Moody's in their rating assignment of credit ratings for African sovereigns. This means that there is an increased probability to African sovereigns of getting upgraded during boom phases and downgraded during recession phases by the mentioned rating agencies.

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Chapter 36

The Determinants of Sovereign Credit Ratings in Africa: A Regional Perspective

Marinda Pretorius and Ilse Botha

Abstract Often there is underinvestment by rating agencies for developing countries with detrimental consequences. Investors will both be totally unaware of this underinvestment and base their decisions on inefficient credit ratings or they will have to supplement the credit ratings with additional information (Ferri, *J Appl Econ* 7:77–98, 2004). The importance of obtaining a sovereign credit rating from an agency is still underrated in some developing economies and even more so in Africa. Less than half of the African countries have a formal sovereign credit rating even though Africa has been identified as an emerging investment destination. Africa is a very unique continent and African countries are at various development stages and are classified by the World Bank according to income groups. Literature on the determinants of sovereign credit ratings in Africa is scarce. Therefore, the purpose of this research is to determine what the determinants are for sovereign credit ratings in Africa and whether these determinants differ between regions and income groups. A sample of 27 countries' determinants of sovereign credit ratings is compared between 2007 and 2014. Sovereign credit rating variables are classified as categorical variables, and conventional econometric methods used in identifying the determinants are not always appropriate for a model with a categorical-dependent variable. The ordered response panel data model which allows for a categorical-dependent variable and a panel framework that accounts for unobserved country heterogeneity will be employed in addition to the standard panel models. The results indicated that the determinants of sovereign credit ratings differ between African regions and income groups. The Southern African region's determinants were mostly in line with findings in literature. The developmental indicators, including variables such as regulation and corruption, as determinants of sovereign credit ratings were the most significant determinants across most income groups.

Keywords Sovereign credit ratings • Panel-ordered response model • Categorical variables • Determinants • Africa

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36.1 Introduction

Sovereign credit ratings play an imperative role in the decision-making process of where and when to invest and determine the interest that is paid to investors for sovereign debt borrowings.

Literature shows that most research on this topic identifies the determinants of sovereign credit ratings of developed and developing countries around the world. However, the research in developing countries excludes the African continent at large. Africa is a continent characterised by a very volatile economic environment, plagued by conditions like political and labour unrest as well as civil wars almost on a daily basis. The economic environment in Africa is different from most developing countries, and thus this paper aims to investigate whether the determinants identified in literature are also relevant for countries on this unique continent.

The importance of obtaining a credit rating from an agency is still underrated in some developing economies and even more so in Africa (African Development Bank 2011). Various African countries are rated by the three major rating agencies, but a South African-based research entity, known as NKC African Economics, issues credit ratings to more African countries than the major three rating agencies.

The advantage that NKC has is that it is based in Africa and has a competitive advantage over the international rating agencies due to first-hand experience of African business and economic environments. NKC rates more African countries than any of the other international agencies which only rate a limited selection of African countries, and NKC also focus on regional aspects of the African continent. In our previous research, the ratings between NKC, S&P, Fitch and Moody's were compared for a selection of African countries (Pretorius and Botha 2014). Contrary to findings from Cantor and Packer (1996), it seems as if these rating agencies do not follow each other when ratings in Africa are concerned. Far less determinants identified in literature were significant for African ratings for the three major rating agencies. The determinants for the NKC ratings however were in line with literature. This research is a follow-up on the previous research by focusing on the differences in the degree of development of these African countries in order to see if it has an influence on the significant determinants and their weights. Therefore, the countries will be divided into geographical regions and their levels of income classification according to the World Bank to test whether there is a difference in the significant determinants for these regions and group of countries.

The paper is organised as follows: firstly, literature on the African continent will be discussed followed by the literature on the determinants of sovereign ratings. Thereafter, the discussion on the data and method will follow after which the results and conclusion will be represented.

36.2 Literature Review

36.2.1 *Sovereign Credit Ratings in Africa*

According to the African Development Bank (2011), some African countries do not realise the benefits of obtaining a credit rating from a formal credit rating agency. The cost of obtaining a credit rating and a lack of knowledge of the benefits of obtaining a rating seem to be the main deterrents why African countries are not pursuing formal credit ratings (African Development Bank 2011). Furthermore, the African Development Bank (2011) holds that it is sometimes difficult for these countries to first of all provide the necessary financial and economic data that is required to obtain a credit rating, and secondly, they may not be ready for the required discipline that accompanies a formal credit rating. These countries could also be apprehensive of an unfavourable rating which could further discourage investors (African Development Bank 2011). The scepticism over credit ratings has contributed to the slow development of credit ratings within the African region.

Some African countries have entered the highly indebted poor countries (HIPC) debt relief programme and have started structural reform programmes that aim to transform their economic performance (African Development Bank 2011). Gueye and Sy (2010, p. 3), state that many low-income African countries have benefited from debt relief initiatives, to such an extent that such countries are now able to tap sources of financing that have not been opened to them in the past. More African countries are trying to enter international debt capital markets with the aim to finance their developmental expenditures.

The benefits to African countries specifically to obtaining a formal credit rating are endless. Sovereign credit ratings can aid in the development of financial markets in a country (Kim and Wu 2008). The authors found that long-term foreign currency ratings have a strong link to international capital flows. Furthermore, according to Dahou et al. (2009), the deepening of financial markets in Africa could optimise the use of Africa's resources and unlock Africa's growth potential through the resourceful channelling of savings and investments into productive activities.

Sovereign credit ratings enhance the transparency of many developing countries by attending to the information asymmetry in the market by adding new information and thereby improving the countries' ability to attract private capital flows (Kaminsky and Schmukler 2002; Özatay et al. 2009). Acquiring a credit rating will not only open up funding from international markets, but it will also allow these countries to obtain a suitable interest rate for borrowed funds compared to a situation where a country does not have a formal rating (Kahn 2005, p. 77).

According to the African Development Bank (2011), other benefits to African countries getting a credit rating include attracting FDI and giving support to the private sector so that they can access global markets too, it will provide better public sector transparency and it will foster deeper regional capital markets. In addition, ratings could also add to the credibility of the reforms that African countries have started, and subsequently, it could generate funds which can be used to meet debt obligations (African Development Bank 2011).

The African continent can be divided into five different geographical regions, namely, North Africa, West Africa, East Africa, Central Africa and finally Southern Africa. The African continent is the most fragmented region globally with 54 countries of which almost 50 % have populations of less than 10 million people and more than 33 % are landlocked (World Economic Forum 2013). The possible gains for Africa from increased regional integration are therefore significant.

Over the years, there have been various initiatives to help promote the development of the African continent. Very few of these initiatives targeted investment in Africa explicitly—increased investment was usually a by-product of development initiatives.

In 2002 the United Nations Development Plan (UNDP) launched an initiative to promote the attainment of sovereign credit ratings to sub-Saharan Africa and other developing countries (Standard and Poor's 2003). The aim of the project was to give support to countries in order to gather funds from private capital markets (Standard and Poor's 2003). The initiative did not only explain the potential benefits to sovereigns but also provided technical and financial support to countries who requested ratings (African Development Bank 2011). Before this initiative, only six African countries have been rated by Standard and Poor's, namely, Botswana, South Africa, Tunisia, Egypt, Morocco and Senegal (Panapress 2004).

A similar initiative was also launched in 2002 by the U.S. Department of State, Bureau of African Affairs (U.S. Department of State 2009). Fitch was awarded the contract to conduct the ratings for 12 sub-Saharan countries over the period 2002–2006 (U.S. Department of State 2009). Before the project was launched, only four sub-Saharan African countries had a formal sovereign credit rating. At the end of 2006, there were 19 sub-Saharan African countries with a formal rating (U.S. Department of State 2009).

Data collected from the respective credit rating agencies indicate that by 2015, 23 African sovereign states have obtained at least one formal foreign currency credit rating from the three major rating agencies. This indicates that just over 43 % of African countries have sovereign credit ratings provided by at least one of the big three rating agencies. In 2015, Fitch Ratings was responsible for issuing credit ratings to 17 sovereigns in the African region (NKC 2015). Moody's Investor Services was responsible for 18 sovereign ratings and Standard and Poor's for 17 in the African region (NKC 2015).

NKC is a political and economic research unit based in South Africa and in operation from 2002 (NKC 2015). In 2015, NKC was responsible for the rating of 27 African sovereigns. It is majority owned by Oxford Economics, a UK-based economic advisory firm, since May 2015 (Reuters 2015). The entity analyses the political and macroeconomic environment of the African continent. NKC has developed a sovereign risk rating model and is able to assess countries not rated by the major credit rating agencies. In cases where those ratings are available from other credit rating agencies, NKC gives its own comparative rating (NKC 2015). NKC makes use of the same letter grading system that Standard and Poor's and Fitch make use of.

36.2.2 *Determinants of Credit Ratings*

One of the first studies that identified the determinants of country risk ratings by making use of a direct measure of creditworthiness was that of Feder and Uy (1985). Earlier research on the topic made use of proxy variables related to creditworthiness like risk premiums or credit volumes (see, e.g. Sargen 1977; Kapur 1977; Eaton and Gersovitz 1981). Brewer and Rivoli (1990) and Lee (1993) concluded that both political instability and economic indicators are taken into account in the determination of credit ratings, although bankers place a greater emphasis on economic indicators. Cosset and Roy (1991) extended the study by Feder and Uy (1985).

In a seminal paper, Cantor and Packer (1996) presented the first systematic investigation of the determinants of sovereign credit ratings by making use of two leading U.S. rating agencies, Moody's and Standard and Poor's. They identified several significant variables (per capita income, GDP growth, inflation, fiscal balance, external balance, external debt, economic development and default history) that determine credit ratings by making use of sample correlation statistics of the broad letter category as well as an OLS multiple regression with credit ratings as dependent variable. Mulder and Perrelli (2001) focused on Moody's and Standard and Poor's and made use of pooled ordinary least squares (POLS) regressions and feasible generalised least squares (FGLS) panel data regressions to show that significant determinants are different from those identified by Cantor and Packer (1996). Their results show that the ratio of investment to GDP has the most significant impact on rating changes across countries (Mulder and Perrelli 2001). Other important determinants identified include the ratio of debt to exports and rescheduling history.

Eliasson (2002) made use of Standard and Poor's credit ratings for emerging markets in both a static and dynamic context and used only macroeconomic indicators as explanatory variables due to the unavailability of objective sociopolitical variables. Afonso (2003) identified GDP per capita, external debt, level of economic development, default history, real growth rate and the inflation rate as the most relevant in determining country credit ratings. Rowland (2004) tested for significant differences between his results and those of Cantor and Packer (1996) focusing only on developing countries.

Bissoondoyal-Bheenick (2005) was one of the first researchers who changed the modelling framework in this field of study by incorporating an ordered response model (specifically a panel-ordered probit model). Other studies that incorporated similar ordered response models included Afonso et al. (2009) and Teker et al. (2013).

Bissoondoyal-Bheenick et al. (2006) made use of a completely different type of model to identify the determinants of credit ratings, namely, case-based reasoning. In addition, Bissoondoyal-Bheenick et al. (2006) also made use of an ordered probit model in their study. They found very similar results in the two different approaches

in terms of significant determinants and forecast precision. This study emphasises the importance of including a proxy for technological development.

All research conducted in this field focuses on either developed or developing countries or a combination of the two with none focusing exclusively on African countries. The lack of the availability of reliable data for African countries might play a significant role in this shortcoming. Ferri (2004) found evidence of absolute underinvestment of most rating agencies in less developed countries. When there is underinvestment by rating agencies, the information content of the ratings is inefficient (Ferri 2004). The consequences of underinvestment for developing countries could be very detrimental to their economies. Investors will both be totally unaware of this underinvestment and base their decisions on inefficient credit ratings, or they will have to supplement the credit ratings with additional information (Ferri 2004).

The lack of research on sovereign credit ratings in Africa and the fact that only 43 % of the countries on the continent have a formal rating are testament to the purpose of this research.

36.3 Data and Method

36.3.1 Data

This study examines what the determinants are of sovereign credit ratings in Africa classified according to regions and income groups. A panel of 27 African countries has been constructed for the time period between 2007 and 2014 on an annual basis. The sample was selected for countries where adequate data were available. The study will make use of qualitative ratings due to the availability of symbol grades for African countries. The data for the ratings and other explanatory variables were sourced from the NKC database as well as the World Bank.

African countries were divided into their geographical regions (North, South, West, East and Central). In addition, the African countries were also categorised into their level of income as classified according to the World Bank. The 27 countries included in this study fall into three categories, namely, low income (Benin, DRC, Ethiopia, Malawi, Mozambique, Rwanda, Tanzania, Uganda and Zimbabwe, GNI per capita of \$1035 or less), lower middle income (Cameroon, Egypt, Ghana, Kenya, Lesotho, Morocco, Nigeria, Senegal, Swaziland and Zambia, GNI per capita between \$1036 and \$4085) and upper middle income (Algeria, Angola, Botswana, Gabon, Mauritius, Namibia, South Africa and Tunisia, GNI per capita between \$4086 and \$12,615) (World Bank 2013). This geographical and income division is done in order to identify if there are any differences in the significant determinants of African countries in specific regions and income levels of countries. This is done since the countries on the African continent are at different stages of development.

The dependent variable is the sovereign credit rating. Only the ratings of NKC African Economics were used since they rate the most African countries. Dummy variables were created for each of the regions and income classes. Interactive dummies were also created by multiplying each dummy with the identified explanatory variables. The interactive dummies will highlight the differences in significant determinants between regions and income levels in the model.

To quantify the rating categories, there is a choice between a linear or non-linear transformation. Some researchers do not find significant differences between the two transformations (see, e.g. Beers and Cavanaugh 2004; Ferri et al. 1999). For the purpose of this study, the linear transformation will be used. The credit ratings were transformed into a linear scale (Cantor and Packer 1996) with D assigned a one, through to AAA assigned a value of 26.

The study includes a selection of explanatory variables as possible determinants of ratings in Africa. The choice of variables was based on literature by Cantor and Packer (1996), Mulder and Perrelli (2001), Rowland and Torres (2004), Mellios and Paget-Blanc (2006) and Afonso et al. (2011). The choice of variables was categorised in the broad groupings as specified by Afonso et al. (2007).

The categories were macroeconomic variables (GDP, inflation and FDI to GDP), government performance (budget balance to GDP, external debt to GDP), external balance (current account to GDP, foreign reserves to GDP) and developmental indicators (GDP per capita, corruption perceptions index, regulatory quality, number of Internet users).

36.3.2 Method

The explanatory variables identified in literature that determine sovereign credit ratings will be tested on African regions and income groups by using various panel data methods. Panel data methods are preferred since it will increase the number of observations, and the nature of the data used in this study is a combination of cross-sectional and time series data.

Due to the ordinal nature of sovereign credit ratings, an ordered probit model is technically better suited for the sovereign credit rating data. Therefore, this study will make use of the ordered probit model as well. The ordered panel probit model is specified as follows (Tekker et al. 2013):

$$y_{it}^* = x_{it}\beta + \varepsilon_{it} \quad (36.1)$$

where y_{it}^* is an unobservable latent variable that represents the sovereign credit rating of country i in period t ; x_{it} is a vector of time-varying explanatory variables; β is a vector of unknown parameters; and ε_{it} is a random disturbance term. According to Tekker et al. (2013), if ε_{it} is normally distributed, Eq. (36.1) delivers an ordered probit model. It is assumed that y_{it}^* is related to the observed variable y_{it} , the sovereign credit rating, in the following way (Long and Freese 2006):

$$y_i = \begin{cases} 1 & \text{if } y_i^* < \tau_1 \\ 2 & \text{if } \tau_1 \leq y_i^* < \tau_2 \\ 3 & \text{if } \tau_2 \leq y_i^* < \tau_3 \\ 4 & \text{if } \tau_3 \leq y_i^* < \tau_4 \\ \vdots & \\ 26 & \text{if } y_i^* > \tau_{26} \end{cases} \quad (36.2)$$

where τ_m are known as cutpoints or threshold parameters and are estimated through maximum likelihood estimation (MLE).

36.4 Results

The results are represented in the tables below.

The included countries for North Africa were Algeria, Egypt, Morocco and Tunisia and for West Africa Benin, Ghana, Nigeria and Senegal. Cameroon, DRC, Gabon and Rwanda were included for Central Africa and Ethiopia, Kenya and Uganda for East Africa. The Southern Africa region encompasses the most countries—Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

From Table 36.1, it is clear that none of the explanatory variables are statistically significant for East and West Africa. For Central Africa, three explanatory variables turned out to be statistically significant—economic growth, GDP per capita and the regulatory quality of their respective governments. The economic growth variable is significant and it has a negative sign. For the North Africa region, the significant variables are the external debt, foreign reserves as well as the regulatory quality variable.

When looking at the results for Southern Africa, it can be deduced that this model is best geared towards this region. A total of eight of the eleven included variables are significant for this region. The fiscal balance, external balance, investment, foreign reserves, GDP per capita, corruption, regulatory quality and Internet users are all significant in this model.

Interestingly enough, the sign for the Internet variable for Southern Africa is puzzling. A positive relationship is expected of this proxy for the technological advancement of countries—therefore, the more Internet users there are in a country, the higher the credit rating is expected to be. The reason for this might be that the technological development is unevenly spread between the different countries.

If the results for the regional model are considered in addition to Table 36.2 which shows which countries fall into the mentioned income categories, it can be seen that the regional model is more geared towards the countries that fall under the lower-middle and upper-middle income classes. These are also the emerging African countries.

Table 36.2 shows that the countries of West and East Africa fall in the low- and lower-middle income categories with no countries in the upper-middle income

Table 36.1 Results of the regional panel data model (NKC rating, dependent variable)

Variable	Region	NKC
		Coefficient
Dummy variable (benchmark, East Africa)	North Africa	5.8783
	Southern Africa	0.2831
	Central Africa	3.9115
	West Africa	-2.1048
GDP growth	North Africa	-0.1045
	Southern Africa	0.0092
	Central Africa	-0.1994**
	West Africa	0.0522
	East Africa	-0.0613
Fiscal balance	North Africa	-0.0346
	Southern Africa	-0.0676*
	Central Africa	-0.1464
	West Africa	-0.0299
	East Africa	0.0930
External balance	North Africa	-0.0508
	Southern Africa	0.0945***
	Central Africa	-0.0302
	West Africa	0.0437
	East Africa	-0.0191
External debt	North Africa	-0.0146**
	Southern Africa	-0.0010
	Central Africa	-0.0019
	West Africa	-0.0047
	East Africa	-0.0041
Investment	North Africa	-0.1560
	Southern Africa	0.1248***
	Central Africa	-0.1257
	West Africa	-0.2220
	East Africa	0.4354
Inflation	North Africa	0.0452
	Southern Africa	0.0543
	Central Africa	0.1007
	West Africa	0.0112
	East Africa	-0.0245
Foreign reserves	North Africa	0.0746***
	Southern Africa	0.0349***
	Central Africa	-0.0947
	West Africa	-0.0583
	East Africa	-0.1677

(continued)

Table 36.1 (continued)

Variable	Region	NKC
		Coefficient
Per capita income	North Africa	0.0005
	Southern Africa	0.0012***
	Central Africa	0.0006**
	West Africa	0.0051
	East Africa	0.0031
Corruption	North Africa	-0.0567
	Southern Africa	-0.0640**
	Central Africa	-0.0759
	West Africa	0.0080
	East Africa	-0.0389
Regulatory quality	North Africa	8.7385***
	Southern Africa	2.3505***
	Central Africa	4.6316***
	West Africa	0.5002
	East Africa	1.2889
Internet users	North Africa	0.0150
	Southern Africa	-0.0935***
	Central Africa	0.1503
	West Africa	-0.0503
	East Africa	0.0674
Total panel observations		206
Log likelihood		-250.7632

*, **, *** 10 %, 5 %, 1 % level of significance, respectively

Source: Model estimations

Table 36.2 Country classification according to region and income class

	North	Southern	Central	West	East
Low		Malawi Mozambique Tanzania Zimbabwe	DRC Rwanda	Benin	Ethiopia Uganda
Lower middle	Egypt Morocco	Lesotho Swaziland Zambia	Cameroon	Ghana Nigeria Senegal	Kenya
Upper middle	Algeria Tunisia	Angola Botswana Mauritius Namibia South Africa	Gabon		

category. North Africa only has countries in the lower-middle and upper-middle income categories. Central and Southern Africa have countries spread over all the income categories. Southern Africa has the most countries in the upper-middle income category. The model performs better in the lower-middle and upper-middle categories (it is also confirmed in Table 36.3 where the ordered probit model was conducted again with the income classification groups). This could be the reason

Table 36.3 Results of the income classification panel data model (NKC rating, dependent variable)

Variable	Income category	NKC
		Coefficient
Dummy variable (benchmark, low)	Lower middle	0.7865
	Upper middle	0.8749
GDP growth	Low	0.0141
	Lower middle	0.0720
	Upper middle	-0.0570
Fiscal balance	Low	0.0307
	Lower middle	-0.0147
	Upper middle	-0.0927*
External balance	Low	0.0145
	Lower middle	0.0736***
	Upper middle	0.0604
External debt	Low	0.0024
	Lower middle	-0.0029
	Upper middle	-0.0188***
Investment	Low	0.0982***
	Lower middle	0.0609
	Upper middle	0.0532
Inflation	Low	0.0181
	Lower middle	-0.0658**
	Upper middle	0.0928
Foreign reserves	Low	0.0023
	Lower middle	0.0682***
	Upper middle	0.0009
Per capita income	Low	0.0010
	Lower middle	-0.0010***
	Upper middle	-0.0003*
Corruption	Low	-0.0790***
	Lower middle	-0.0777**
	Upper middle	0.0631*
Regulatory quality	Low	5.3736***
	Lower middle	2.9671***
	Upper middle	2.2271***
Internet users	Low	-0.0131
	Lower middle	0.0862***
	Upper middle	0.0241
Total panel observations		206
Log likelihood		-262.4033

*, **, *** 10 %, 5 %, 1 % level of significance, respectively

Source: Model estimations

why none of the included explanatory variables are significant for the West and East Africa regions. This could also explain why so many variables are statistically significant for the Southern Africa region.

Table 36.3 shows that the investment, corruption and regulatory quality variables are significant for the low-income countries. The lower-middle income countries have the most significant variables—the external balance, inflation, foreign reserves, per capita income, corruption, regulatory quality and Internet users are all significant. Lastly, the fiscal balance, external debt, per capita income, corruption and regulatory quality variables are significant for the upper-middle income countries. These determinants are in line with the findings in literature (Cantor and Packer 1996; Eliasson 2002; Afonso 2003; Afonso et al. 2011; Mellios and Paget-Blanc 2006; Rowland and Torres 2004; Rowland 2004).

The importance of the developmental indicators (corruption and regulatory quality) for African countries is emphasised in this model through the statistical significance throughout all three categories. The African continent is a volatile environment politically, and the proxies for governance, i.e. regulatory quality and corruption, are both significant. The regulatory quality variable captures the capability of government to formulate and implement sound policies and regulations in the economy (World Bank 2013). The better the regulatory quality in a country, the higher the credit rating of that country and therefore the positive sign in the model makes economic sense. The corruption indicator has a negative sign (except for upper middle) and indicates that the more corrupt a country appears, the lower the credit rating of that country. The support for political or governance variables as determinants of sovereign credit ratings is very substantial (see, e.g. Feder and Uy 1985; Lee 1993; Alexe et al. 2003; Borio and Packer 2004).

Internet users were used as a proxy for the technological advancement of the country. This variable measures the amount of people per 100 people who have made use of the Internet via electronic devices in the past 12 months. The variable was found to be highly statistical significant with a positive sign (lower middle) that reflects that the more Internet users a country has, the higher that country's credit rating will be. This finding is in line with research conducted by Bissoondoyal-Bheenick et al. (2006) who identified a proxy for technological development (in their case mobile phone use) as the most significant determinant of sovereign credit ratings in their case-based reasoning and ordered probit models.

36.5 Conclusion

The purpose of this paper was to investigate the determinants of sovereign credit ratings in Africa focusing on the difference between regions and income groups. A static panel model (with pooled OLS, fixed effects, random effects and ordered probit estimation) was used to identify the explanatory variables that influence the sovereign credit ratings in Africa.

The continent is characterised by different levels of development, and this trend was captured by dividing the continent into different regions and different income classifications. The results showed that there are a difference in the importance of certain determinants between regions and income groups. None of the identified explanatory variables are significant for East and West African countries, whereas most of the variables are significant for the Southern African region. This could be due to the fact that East and West Africa do not have any countries that fall into the upper-middle income class, and most of the Southern Africa countries lie in the upper-middle income category. The determinants for this region confirmed the determinants identified in literature.

The significance of the variables in the developmental indicator group such as GDP per capita, corruption, regulatory quality and Internet users was found to be statistically significant for lower-middle and upper-middle income groups. Most of these countries are in the Southern African region. The lower-middle and upper-middle income groups are identified as the emerging markets in Africa and therefore should all obtain a formal sovereign credit rating in order to attract investment.

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Chapter 37

CFIs for Sustainable Risk Proofing in Value Chain Financing: Instances from the Asia Pacific Region

C. S. Sundaresan

Abstract Agriculture is prone to high levels of risk emanating from natural, operational, financing, and market sources. These risks get transmitted to the agribusiness value chains to establish operational efficiency, in turn to make value chain financing risky and unsustainable. At a theoretical level it relates to the returns to scale trade framework (Krugman, Increasing returns and the theory of international trade, 1985) and the sustainability imperatives of businesses. This paper therefore suggests that there remains a close relation between sustainability environment and financing risks in a trickle down and trickle up frames. The format of organizations at the farm and value chain levels determines the financing risks. Community empowerment and integration of value chain partners proves to be much risk easing in financing the value chains. The community financial institutions (CFIs) potentially can be the ideal organizational format to sustain value chain financing in a risk free ambience through peer pressure and local networking across chain partners. The paper establishes that social, economic, and environmental sustainability will add to social development and therefore the risk levels in financing the farm economies and the value chains will reduce.

Keywords Risk proofing • Value chain • Asia Pacific region

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37.1 Introduction

Financing of agribusiness value chains continue to be risky for lenders and borrowers simultaneously. The reasons obviously are the uncertainty emanating from various internal and external sources for the farmers and the transmission of the same towards failing their repayment commitments to the lenders. The intensity of this risk, however, varies across the internal and external players within the value chain. This is essentially because of the fact that the dynamics of financial flows to the actors from within the value chain and from the outside as a result of their being linked within a value chain are different. This paper at an analytical level attempts to conceptualize the dynamics of the risks in value chain financing from internal and external sources and conceptualize the scope and extent of its proofing in a sustainability framework.

From a logical and pragmatic angle, the variables of risk indicators vary vertically and spatially. In mathematical terms it expresses that

$$FR = f(s)$$

where

FR = Financial risks,

s = sustainability at the farms and value chains from different sources.

It is true that investment decisions are mainly determined based on the sustainability factors and hence it is rational that financing are guided by such variables. Having said that, it is prudent to argue that adherence to sustainability criteria will establish risk free long run value chain financing for the agriculture and agribusinesses.

Accordingly this paper investigates into the dynamics of financing the farms and farm value chains from the point of view of the farmers, farm entrepreneurs as well as the financiers. Higher emphasis is attached to the financiers as they shoulder the risk of such financing arising out of the low ability of the chain partners to repay in the event of a collapse of the operations. Further it seeks to draw the real life examples and experiences of farmers and value chain partners and stakeholders across crops and locations to identify the various finance risk indicators and its interaction with other chain network constituents to mitigate the risk of operational sustainability. One of the main determinants of risk in the value chain financing has been the nature of farmer organizations which avail credit and the financing organizations which lend to the value chain partners. The prevailing farmer organizations (cooperatives, producer companies, or producer organizations) are not capable enough to mobilize the finance for the value chain operations. This is essentially because they cannot access external investment which makes the businesses viable and hence make the financing easier for the lending agencies. However, these organizations can mobilize finances only either through share capital or through borrowing. Both are not feasible in the uncertain scenario of the farming operations and hence the value chains remain hidden and it needs to be pulled up.

This includes the mapping of social, economic, and environmental sustainability variables of the value chains for its suitable financing options and servicing patterns. It is therefore to identify the nature and structure of risks in financing the agriculture value chains at various stages of value addition and the sustainability factors in respective levels to make the financing less risky or more precision oriented. This study therefore attempts to propose feasible value chain financing linkages and its options for establishing such systems and innovations whereby the rural and agriculture based businesses will flourish for an increased demand for value chain finance.

37.2 Value Chain Financing Risks: Concepts and Realism

There remains a vicious cycle of low capital flow leading to low output and the resultant low growth in the farm enterprises in much of Asia Pacific region. This essentially emanates from the constant or decreasing returns to scale (Cobb-Douglas production function) in the farm economies. It not only retards the national economic growth but also implicates negatively on the global trade in agriculture commodities. Krugman (1985), for instance, observed that increasing returns are as fundamental a cause of international trade as competitive advantage, but its role has until recently been neglected because of the problem of modeling market structures. This constraint, however, has been overcome with the theories of comparative and competitive advantages to drive the growth in the farm economies and thereby gain a substantial economic stimulation and thereby create growth engines. The risks involved in financing the value chains and enterprises make the cost and competitive advantage unsustainable.

Mitigating the multiple risks that farmers and farm value chain financing agencies shoulder in their respective operations stands beyond the scope of prevailing systems, policies, and programs. Yet they continue to cultivate risks. Farmers do not have systematic and sustainable means to overcome uncertainties in their farm adventures, but can't give up farming as they do not have alternate livelihood/engagement avenues. The value chain financiers do not have the systems in place to coordinate the technical and operational aspects of farm enterprises which makes it difficult to finance the value chains. Hence the financiers seek nonfarm value chains which are relatively more stable and sustainable. This further establishes a vicious cycle in the agribusiness and value chain space viz, the risky farms make the farm value chains less amenable to enterprising and thereby the linkages become less effective to realize the potential in terms of establishing businesses, investments, and returns. Often it happens that the value chain partners find it difficult to find finance for value adding operations due to the lack of credit supports and the financiers face the dearth of viable guarantees.

Having said the above, the pertinent question in the risk front of farms and farm enterprises has been that do policy and business environment prevail for farm value chains to go forward in a sustainable frame of objectives? Farmers

in the less developed regions are often constrained by system inefficiency and policy lags. There are observations in this context that risk reduction strategies stabilize farm incomes, but at a lower level (World Bank 2007). This conveys the likely impact of varying levels of farm risks on standard of living of farmers and farming communities. In rain-fed regions, income from agriculture is uncertain due to the monsoon failures as well as market imperfections. In the irrigated areas, the monsoon risks are not as severe as that of the market risks. The fact of the matter is that risk surrounds farming communities and farm enterprise financiers in either of its manifestations, for sure.

Given the above elements of realism, it is imperative to understand the concept in a cohesive and holistic frame towards ascertaining the nature and structure of risks held by various take holders in the farm value chains. It is true that risk emerges from the interaction of physically defined hazards with the properties of exposed systems such as sensitivity or vulnerability. Risk can also arise from the combination of an event, its likelihood of occurrence and consequences. In risk assessment the focus is always on individuals, social groups, or economic sectors. This focus is meant to understand the probability of triggering the event. These interactions further mean that different people are exposed to stress and threats in different ways. Risk equals the probability of (natural and physical) climate hazard multiplied by a given system vulnerability. However all risks are not quantifiable. Kirilenko et.al (2004) mathematically established the risk assessment by the relationship between risk (R), vulnerability (V), and hazard (H).

$$R = f(V, H)$$

where

R —Likelihood of negative outcomes

H —Likelihood of exposure to hazard

V —Likelihood that people fail to cope up with the defined hazard.

Theoretical base of sustainable risk proofing and its practical applications therefore commands a more serious approach towards establishing the scope and options from the operational as well as policy angles towards a sustainable and reliable solution to value chain financing.

37.3 Risk Scenarios and Drivers

Assuming that the farmers are rationale on their own to determine the economic options of farming vs. the scope of doing nonfarm activities to sustain their livelihood, the price volatility leaves them uncertain irrespective of their receiving a high price or a low price at the time of harvest/sales. The problem is, however, not limited to how much cash a farmer receives for his harvest. Every investment

decision a farmer makes during the crop cycle is a difficult task because he is not sure whether he will be able to get back the investment (often borrowed for labor, fertilizer, equipment, and repairs). The expected commodity price, prices of competing crops, and government programs play significant roles in determining the farmers' decision of a crop and accordingly the area under a particular crop.

Once the value chain become active and interlinked, the risk and uncertainty in one sector will get extended to other facilitating sectors. For instance, uncertain prices influence borrowers' ability to repay. This potentially will make agriculture financing a risky proposition for lenders—both formal and informal ones. In the absence of appropriate risk proofing instruments, financiers will be reluctant to finance traders also given the cash-flow uncertainty. This will get infected to all the chain partners in the value chain creating a constraint in value chain finances. Often, they will raise interest rates to cover uncertain risks, or just refuse to provide credit (Kang and Mahajan 2006). As a result, it is not surprising that the absence of proofing price risks is one of the major reasons that poor farmers stay poor (World Business Council for Sustainable Development 2004). Farmer organizations/associations can also face similar risks if they advance their members' credits. For example, if such advances are reimbursed through future deliveries of crops, they run the risk that the prices have fallen to levels too low to enable loan reimbursement. The risks in the value chains further hinder the establishment and growth of farm enterprises or markets in the long run given the threat of uncertainties and mistrust across partners (see Chap. 4).

The nature and extent of price volatility do have a significant bearing on the economic well-being of agricultural producers. Prices mainly constitute one of the two central dimensions (the other is production) of revenues (or incomes). Producers therefore are concerned about low prices may result in lower revenues even while improvements in yields and production—to erode the fruits of their labor and other favorable production factors. Revenue uncertainties, needless to mention, will not only threaten the livelihoods of agriculturists, but also limit farm credit and consequently trap the farmers into a vicious cycle of low investment, low productivity, and low income. From a medium-term perspective, lower household incomes are likely to compromise the economic security and living standards of the families. It is for sure that this will rule out investments to improve the efficiency of their human capital and accordingly the productive capacities of their resources in the long run.

Sustainable risk proofing in the farms and value chain financing needs to identify the risk dimensions and returns to scale. Secondly it has to establish the “trickle down” and the trickle up elements in the financing patterns. The former is to be categorized in terms of the cost of financing, its returns and accordingly the identification of risks for a calculated risk taking by the value chain financiers. For instance, there are four scenarios in this risk verification in terms of the returns viz (Table 37.1).

Table 37.1 Returns to scale and the sustainability of value chain financing—scenarios

<ul style="list-style-type: none"> • Low investment—Low risk (Where the investment required for mitigating the risk is low and the feasibility of it among the small agribusiness enterprises are high—increasing returns)	<ul style="list-style-type: none"> • High investment—Low risk (Where the investment required for mitigating the risk is high but the scope of averting the risk is low. This become unsustainable for financiers to go for—decreasing returns)
<ul style="list-style-type: none"> • Low Investment—High risk (Where the investment required for mitigating the risk is relatively low and the scope of risk mitigation is high. This will become feasible among the smaller chain partners— increasing returns)	<ul style="list-style-type: none"> • High Investment—High risk (Where the investment required for mitigating the risk is high while its scope also is high. But the feasibility of it among the smaller ones is low—decreasing returns)

37.4 Making Value Chain Financing Sustainable: A Trickle Approach

There remains no alternative to sustainable value chain financing to create rural wealth and multiple it in a competitive framework in the long run. Financing of every sort currently is determined essentially by the sustainability of the operational domains. Questions therefore remain on the ways and means to make the sustainability of the enterprises and thereby the financing risk free. Voluntary actions and initiatives are found to be inadequate to make such a sustainable and risk free value chain financing framework. Hence the requirement is a “trickle down” of enabling policy frameworks and a “trickle up” of newer and enlarged farm business systems for the financial institutions to sustain their operations in a low risk ambience.

Based on the experiences and experiments in risk free and sustainable value chain financing in the Asia pacific region, the following trickle down policies and the subsequent trickle up innovations are identified for its wider applications and thereby bring in the required dynamism in the rural and value chain financing domains through interventions, handholding, and establishment of institutions and organizations in a participatory frame of operations. One of the main features of this approach has been the stakeholder linkages in a joint stake ambience to reduce the risk of financing as well as to crate strong inter-linkages across value chain partners to sustain the businesses and the finances (Table 37.2).

37.5 Community Finance Institutions for Sustainable Value Chain Financing

Having said the above pointers for the development of market and price management options, the focus has been on famer and community empowered value chains and its financing options in mitigating the market based risk and its management

Table 37.2 Two way trickle effects

Trickle down policies	Trickle up responses
<ul style="list-style-type: none"> • Establish clear and proactive land polices and credit policies • Formalize markets—land and capital • Create policies for crop diversification • Align farm produce prices with the global market trends • Establish credit and insurance markets • Eliminate information asymmetry 	<ul style="list-style-type: none"> • Vertical diversification • Horizontal diversification • Trade preference in diversification • Market concentration and value chains • Include price and volume risk in sustainability calculations • Promotion of FPOs • Sustainability labels—like fair trade

instruments. It seeks a more comprehensive treatment of farmer organizations and value chain partners by adopting a value chain and market perspective wherein each stage or process has a significant bearing on the final outcome in an integrated strategic framework. Value chain specific in-depth knowledge creation is sought by the financiers in the successive phase for pragmatic risk proofing systems.

Mainstream financial and capital markets do have least interest and enthusiasm to finance the farm value chains essentially because of the high levels of risk associated with the weak links in the VC networks as well as the socio-political dynamics associated with such funding. Most of the farmer organizations (cooperative, partnerships, or producer companies) cannot get external investments as it is stipulated that the financing of such organizations needs to be either through member equity contribution or through borrowing. Often the shareholders are small farmers and they are not capable of investing in high end value chain development. On the other hand, the borrowing is not feasible as it will become difficult to establish the sustainability of the agribusinesses.

Given the above constraint in value chain financing, the recent experiences of agriculture financing in the Asia pacific countries suggest that community financial institutions can potentially make a sustainable financing channel for the farm value chains. This paper draws the instances of CFIs in effectively financing the rural and farm value chains. Given the small and marginal farmers dominating the supply side of the value chain, the financing risks are spread across the stakeholders and it varies with the levels and strength of the networks with the back end supply chains. The factors that make the CFIs more effective in mitigating the back end risks are the following:

- Build capacity of small farmer-producers to participate in the value chain.
- Base interventions on a solid assessment of actual smallholder [small farmers] needs.
- Familiarize small farmers and other stakeholders with the structure and the dynamics of the value chain.
- In considering financial interventions, consider non-financial alternatives such as: (1) ensuring contact with financial institutions; (2) bringing together in workshops various stakeholders to see whether solutions can be found within ordinary business relationships; (3) providing technical assistance to producer

organizations or lead actors in the chain, allowing them to meet the requirements of viable and sustainable chain operations; (4) facilitating linkages offering finance providers the comfort of well-established market outlets, and providing sufficient value added potential at the local level.

- Identify an effective lead partner in value chain finance.
- Provide the necessary infrastructure in rural areas.

The CFI experience (of Thailand) has been that it is community oriented and evolves a holistic welfare approach to its members and value chain partners. It is democratically managed and community participation is established in the management processes. It acts as a contingency source of finance for the members and caters to the exigencies of the local communities. It provides a wide range of financial products which enable the members to make investments in new activities, meet the working capital requirements as well as refinancing the business loans. Further it provides services like input supplies (backward linkage) for effective farm operations. It also engages in debt resolution through negotiation with other lenders with whom the members have affiliations. It works on the principles like cooperation, collaboration, and commitment.

Similarly the CFIs support the heterogeneous groups in the operational space like the flood prone and the drought prone for farming operations. It promotes agriculture and agribusinesses through sustainable and flexible financial products to the farmers and the small agribusiness entrepreneurs. It evolved new financial products which repair the old debts as well as to take forward the farm processing activities and value adding activities. For instance, to meet the requirements of the value chain partners it has regular loans, special loans, and quick cash to ensure the liquidity of the activity groups across the value chain.

Accordingly the CFI has activity groups to take advantage of scale operations and also to establish market and trade linkage—to gain competitiveness of the businesses. Some of these specialized value chain groups include the rice mills group, beef-cow group, trade group, etc. It promotes small savings among the youth and provides them equity based financial service participation. It provides training and exposure to the different activity groups towards enabling their enhanced efficiency levels along with the financial supports. Given the high levels of networking of the CFI, it is low cost financing and fast realizing for the users to be benefited.

The experience (of Indonesia) also reveals that Agribusiness Microfinance Institution (LKMA) is one of the innovative approaches in rural value chain financing. It is a combination between community based organization and government initiative. Ministry of Agriculture promotes the establishment of LKMA through the establishment of farmer group association. With the support of Agricultural regional offices of Province Sumatera Barat, some LKMAs in this province show innovations in their operations to reach the rural value chain systems and make it sustainable. The LKMAs are registered as cooperative for their legal businesses. To improve the sense of belonging of the LKMA members, besides obligation to have principal and compulsory saving for being cooperative member, the members should also

be shareholders. The sense of belonging creates a common understanding among members to be together in developing their LKMA. Similarly the BRI village banking approach is another sustainable value chain financing route delivered by government agricultural development bank (Apraca 2007). The feature of BRI village banking is that the units operate as profit centers with deposit and loan services. It provides retail (value chain) lending innovative with flexible loan term adapted to local social, economic, and cultural circumstances. The BRI targets low-income clients. Outstanding elements of the BRI village banking are high outreach on saving mobilization and high deposit to loan ratio. The BRI lending model is a success in Indonesia and the best practices for retail banking targeting the low-income clients.

37.6 Financing Risk: Triggers and Enablers

The above examples are just isolated local experiences, but it is indicative of the emerging trends in sustainable value chain financing to reduce the risks of financing in a participatory framework. This financing system identifies opportunities across the value chain for improving price realization of a commodity without getting bogged down by structural constraints or policy hurdles (*ceterus paribus*). Considering that the ultimate goal of risk management is to contribute towards increase in returns, the purpose is served equally well, if not better, by concentrating on improving the price realization than on managing price volatility. The following triggers and enablers are identified for the CFIs to enhance the returns and hence to improve the efficiency of value chain financing (Table 37.3).

37.7 Proofing the Risks in Value Chain Financing

Value chain financing in the current context carries higher levels of risk for reasons assigned to information asymmetry, missing linkages in the value chain, and the traditional operational structures. This brings in the lack of trust between the lenders and borrowers towards maintaining a large demand-supply gap and low lending options available for potential value chains to take off and to pull up the hidden ones. To minimize the risks, the financiers therefore seek collaterals, which is the main road block for agriculture enterprising and agribusinesses. The main constraints identified in the credit guarantee front have been the lack of technical assistance to gain operational competencies and the business support providers who can create the value chain linkages which potentially can reduce the risks. Creating an effective credit guarantee system therefore calls for the filling of the above gaps and creating an effective stakeholder partnership through providing technical and business support services. Experiences with the CFIs and other financiers in the value chain suggest that the following system approach can ease the risks and improve the returns to scale (Table 37.4).

Table 37.3 Triggers and enablers for the CFIs

Secular prices	Secular relative decline in agricultural commodity prices is expected as technological progress reduces costs and induces supply expansion at a faster rate than population and income growth expands demand. However, unanticipated shifts in supply and demand lead to variability around commodity price trends. The effects of these shifts are made more pronounced by the inherent economic and physical characteristics of agricultural commodities such as low demand and supply elasticity and perennial production. At a general level, all commodity prices are affected by the same basic factors, namely the market fundamentals of demand and supply. But these can change through time as a result of changes in technology, consumer preferences, market structures, policies, and/or institutions.
Natural hedging	Production and prices are negatively correlated. This creates the scope of a “natural hedge.” It means that a mechanism through which the negative consequences of a low harvest are partly transferred to the buyers at a higher price. It is therefore prudent to have decisions on the quantity to be sold immediately and the volumes to be stored for a future date and/or the time of sales. The producer can directly hedge the price variability. This becomes more effective if the producer organizations can collectively regulate the volumes of supplies and the timings. The smaller the market, higher will be the possibility that natural hedge becomes effective.
Price signals	Spot and futures prices are signals that farmer can use for future realizations, given the close linkages between the two. For instance, futures price is a function of the spot price and at the same time futures price is an unbiased predictor of the future spot price. If demand in 1 year is known with certainty, to be above the average, then the prices will rise in spot in anticipation of it. The future prices also will rise because it is a function of the spot price. For example, investigated the relation between spot and futures price and showed that the impact of supply and demand shocks on spot and spot futures price relation essentially depends on the level of inventories when the shock actually occurs. If inventories are high, then the demand and supply shocks are tend to impact the spot price and futures price in as much the same way.
Market integration and prices	FAO experience suggests that although market integration and complete price transmission can be formally tested in the long run, the extent to which price signals are transmitted from one market to another is an ambiguous concept. To do this the concept of price transmission needs to be decomposed into notional components. Agriculture policies may or may not hinder market integration, depending on the nature of the policy instruments deployed. This will require in-depth investigation and analysis to be applied in countries like India.
Attitude and risk aversion	There exist two ways to measure the attitude to risk and its aversion options. One is the graphical and other is the mathematical. In the graphical approach the slope of the lines connecting the alternatives determine the attitude. From a choice theory framework does utility functions in terms of wealth. It is possible to relate the devices of the game to the theory via the concept of partial risk aversion (P), introduced by (who calls it size of risk aversion). Partial risk aversion is defined as—let $u(W)$ be the utility function of wealth W and u^I and u^{II} be its first and second derivatives. Let M be the income or the certainty equivalent of any uncertain prospect.

Table 37.4 System approach to ease the risks and improve the returns to scale

Financiers	Technical assistance agencies	Business support providers
Commercial banks FIs MFIs Financial service providers Nabard	<ul style="list-style-type: none"> • Development and evaluation of the business proposal—identifying the methods and systems • Enlisting the nature of technologies and supports • Identify the right implementing agency/contractor • Enabling access to warehouse credit • Rating of the borrower • Usage of the finance—end use criteria—early warning systems/alerts • Identify/develop the insurance products 	<ul style="list-style-type: none"> • Help in availing the schemes and supports available. • Research on value chain involved • Procurement and aggregation systems • Setting up of organizational systems • Market and price intelligence • Market/business development support • Capacity development • Collateral managers • Profiling of the borrowers • MIS and IT based enterprise management systems

37.8 Conclusions

The main driver to mitigate the risks in value chain financing has been the type of organizations and enterprises which drive the chains. None of the organization formats prevailing as of now have the scope of establishing scale operations without availing external funds and there is no guarantee that their operations will be successful. From a business angle it is imperative that the increasing returns to scale needs to be established for the sustainability of the business operations as well as to enable the investment decisions. Given this uncertainty of outcome, the financiers will find it risky to finance the value chains which are not sustainable. It seeks a more comprehensive treatment of organizations and value chain partners by adopting a value chain and market perspective wherein each stage or process has a significant bearing on the final outcome in an integrated strategic framework. Value chain specific in-depth knowledge creation is sought by the financiers in the successive phase for pragmatic risk proofing systems.

Hence the risk proofing in the value chain financing makes it imperative to have a trickle approach in the sustainability framework. This will have a two way effect—tickle down and trickle up. In the trickle down channel the government and other stakeholders make the policies, infrastructure, and programs that will make the organizations viable and sustainable for the financers to get aligned with. In the trickle up channel the value chain players respond to the enabling environment in which they will diversify their activity levels and establish the scale operations for the financers to proof the risks. Recent experiences in this context suggest that the community finance institutions (CFIs) could be potential value chain financiers in a sustainable frame of linkages and controls.

Community financial institutions do have the stake holding pattern in such a way that the risks in financing are less due to the peer pressure. However, there are

issues in establishing the returns to scale and the trickle down areas. It perhaps calls for an advocacy to enable suitable policy interventions at the state level which will trigger the trickle up. Simultaneously by establishing the integration of stakeholders—financiers, technical assistance agencies, and the business support providers can create the viability and sustainability of value chains for risk free financing environment.

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Chapter 38

Cointegration Between Energy Commodities and the South African Financial Market

Corlise L. Le Roux

Abstract The long run relationship between the three energy commodities, namely crude oil, jet kerosene and natural gas, and the FTSE/JSE Top 40 Index will be examined. A second relationship between the three commodities and the FTSE/JSE Top 40 Index against the South African Rand (versus the US Dollar) will also be explored to determine the impact of the variables on the ZAR. The analysis of the variables will include correlation, regression, vector autoregression and the Johansen cointegration test to determine linear interdependencies among the variables. The results indicate that there is a cointegrating relationship between the both relationships investigated.

Keywords Energy commodities • FTSE/JSE Top 40 Index • South African Rand • Cointegration

38.1 Introduction

Relationships are important in the financial market context as the relationships guide investment related decisions. These relationships cause investors to buy, sell or hold investments. The relationships can be linked to economic variables, financial statement variables or between other financial or real assets to name a few. By understanding relationships investments are better understood in how they react to outside factors. Understanding which factors affect the investment is very important in the investment process.

This paper explores the initial relationships between energy commodities, the FTSE/JSE Top 40 Index and the South African Rand (versus the US Dollar), denoted as ZAR which will be used for a further study.

The historical time-series datasets examined in the study are three energy commodities, crude oil, jet kerosene and natural gas, the FTSE/JSE Top 40 Index

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and the ZAR. These commodities formed part of the study as they are part of the international benchmarks for energy commodities.

The objective of the study is to determine the following significant relationships:

- Three energy commodities against the FTSE/JSE Top 40 Index
- Three energy commodities and the FTSE/JSE Top 40 Index against the ZAR.

The empirical data analysis of the study will include correlation, single and multiple regressions, vector autoregression and the Johansen cointegration test to determine significant relationships that will be used for a study to identify causality in the five datasets included in this paper.

The remainder of the paper is structured as follows: Sect. 38.2 provides a brief review of current literature. Sections 38.3 and 38.4 discussed the methodology and explanation of the data. Section 38.5 illustrates the results and interprets the findings. The final part, Sect. 38.6, discusses the conclusion and implication of the study.

38.2 Review of the Literature

Long run relationships between similar variables are not often studied. Prior studies which investigated the relationships that metal, agricultural and chemical commodities have with the FTSE/JSE Top 40 Index and ZAR have been explored by le Roux (2014, 2015a, b). Each set of commodity data tested had a long run relationship.

The agricultural commodities explored to test for a long run relationship between the FTSE/JSE Top 40 Index and the ZAR were cocoa, coffee, corn, cotton, soyabean, sugar and wheat. These commodities were compared firstly against the FTSE/JSE Top 40 Index and then the seven commodities and the FTSE/JSE Top 40 Index were compared against the ZAR, similar to methodology in this paper. Both datasets tested showed that a cointegrating relationship exists between the variables. Breaking the data down to investigate relationships between the variables showed that strong relationships exist between soyabean and cocoa, soyabean and corn, wheat and corn, and wheat and soyabean. The multiple regression included based on the methodology mentioned showed that cotton, as an independent variable caused the largest percentage change in the FTSE/JSE Top 40 Index and wheat, as an independent variable caused the largest percentage change in the ZAR (le Roux 2015a).

The metal commodities, copper, palladium, platinum and silver, were compared to the FTSE/JSE Top 40 Index and the ZAR in the same manner as the agricultural commodities. Both relationships investigated show that a long run relationship existed between the four commodities against FTSE/JSE Top 40 Index as well as between the four commodities and the FTSE/JSE Top 40 Index against the ZAR. The strongest relationships between the variables were between platinum and

copper, silver and copper, FTSE/JSE Top 40 Index and copper, silver and platinum, FTSE/JSE Top 40 Index and platinum, and FTSE/JSE Top 40 Index and silver. From the multiple regression, platinum caused the largest percentage change in the FTSE/JSE Top 40 Index and the FTSE/JSE Top 40 Index caused the largest percentage change in the ZAR, with copper and silver close behind it with the largest negative coefficient affecting the ZAR (le Roux 2014).

The chemical commodities were compared to the FTSE/JSE Top 40 Index and the ZAR following the same methodology. The chemical commodities included in the analysis were naphtha, paraffinic-xylene, poly vinyl chloride, polyethylene, styrene, terephthalic acid and vinyl chloride monomer. The empirical results showed that a cointegrating relationship exists between the seven commodities against FTSE/JSE Top 40 Index as well as between the seven commodities and the FTSE/JSE Top 40 Index and the ZAR. Naphtha and paraffinic-xylene, naphtha and polyethylene, naphtha and styrene, paraffinic-xylene and terephthalic acid, and polyethylene and styrene showed the strongest interrelationships. The multiple regression revealed that vinyl chloride monomer caused the largest percentage change in the FTSE/JSE Top 40 Index and the ZAR (le Roux 2015b).

Nazlioglu and Soytas (2011) applied panel cointegration and Granger causality to investigate the dynamic relationship presented between variables. The variables being the world oil price and twenty-four world agricultural commodity prices, some being maize, coffee, sugar and rice. The prices of oil and the agricultural commodities took into account the changes in the relative strength of the US Dollar. The study showed that oil prices have a strong effect on the agricultural commodity prices.

The relationship between the United Kingdom wholesale gas price and the Brent oil price was explored by Panagiotidis and Rutledge (2004). Empirical analysis included Johansen integration, Breitung nonparametric procedure, vector error correction models (VECM), McLeod-Li, Engle test for (G)ARCH effects and the BDS test statistic, with data from 1996 to 2003. The results indicated that a long run relationship exists through the period included.

Relationships between the energy commodities, the FTSE/JSE Top 40 Index and the ZAR have not yet been investigated and will be explored in the remainder of this paper.

38.3 Methodology

The data methodology applied in this study is based on historical time-series data which is used to explore the relationships that exist between the five datasets included. The presence of relationships between the datasets will be examined using econometric tests applied to the data, namely correlation, regression, vector autoregression and Johansen cointegration.

The initial movements between the datasets will be examined by the means of correlation and single regression. The relationships to be investigated are:

- Movements in each commodity price against movements in the FTSE/JSE Top 40 Index and vice-versa
- Movements in each commodity price against movements in the ZAR and vice-versa
- Movements in the FTSE/JSE Top 40 Index against movements in the ZAR and vice-versa.

Once the initial movement is examined, the relationships will be further investigated by the use of multiple regressions. The multiple regressions will be followed by the vector autoregression model and Johansen cointegration test. These tests are applied to determine if any long run relationships exist (Asteriou and Hall 2011; Johansen 1991; Luetkepohl 2011; Watson 1994). The analysis of this paper will be further applied in a paper which will follow that will investigate causality.

38.4 Data

There are three energy commodities included in the paper, namely crude oil, jet kerosene and natural gas. These commodities will be examined against the FTSE/JSE Top 40 Index initially, followed by the comparison of the three commodities and the FTSE/JSE Top 40 Index against the ZAR. The prices of the datasets are daily spot prices available from the commodity benchmarks from the Thomson Reuters Datastream database. The sample period runs from 7 January 2005 to 31 December 2014, which amounts to 2604 data points. The sample period was chosen as not all datasets had data available before 7 January 2005. The five datasets included in the paper were analysed using EViews.

The alternative hypotheses for the datasets are:

- Ha: There is a movement relationship between the commodity price and the FTSE/JSE Top 40 Index
- Ha: There is a movement relationship between the commodity price and the ZAR
- Ha: There is a movement relationship between the FTSE/JSE Top 40 Index and the ZAR
- Ha: There is a movement relationship between a combination of the nine datasets by means of single and multiple regressions
- Ha: There is a movement relationship between a combination of the nine datasets by means of VAR and Johansen cointegration test.

The empirical results are referenced as follows (first code represents the daily spot price and the second code represents the log differenced data):

- Crude oil: CRUDBFO and LCRUDBFO
- Jet kerosene: JETFSIN and LJETFSIN

- Natural gas: NATGHEN and LNATGHEN
- FTSE/JSE Top 40 Index: JSE40 and LJSE40
- South African Rand: COMRAN and LCOMRAN.

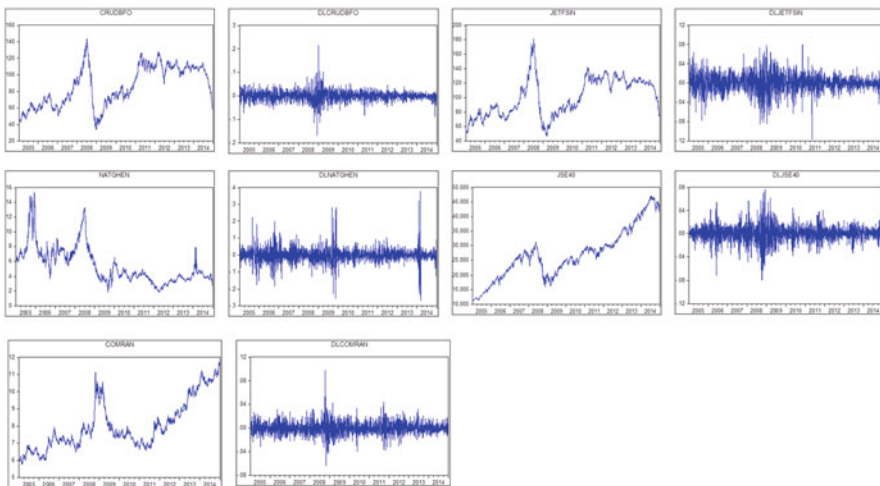
38.5 Empirical Results

The first view of the data is shown in a graphical form in Fig. 38.1, showing the movements of the datasets. Two graphs are shown for each datasets, the daily price on the line graph as well as on the log differenced graphs.

All three commodities were affected by the global financial crisis of 2008; however, the log differenced graphs show that crude oil and natural gas were highly affected. The natural gas log differenced graph shows a very volatile change in prices at the beginning of 2014. The FTSE/JSE Top 40 Index and the ZAR were affected by the global financial crisis for a short period before the volatility stabilized within a tighter range.

Strong positive correlations (bold values which are 0.74 and above) are shown in the correlation matrix in Table 38.1 between the following dataset combinations:

- FTSE/JSE Top 40 Index and crude oil
- FTSE/JSE Top 40 Index and jet kerosene
- Crude oil and jet kerosene.



Source: Researcher’s own data

Fig. 38.1 Graphical representation of movement in the five datasets. Source: Researcher’s own data

Table 38.1 Correlation matrix

	LJSE40	LCRUBFO	LJETFSIN	LNATGHEN	LCOMRAN
LJSE40	1	0.7709	0.7420	-0.4901	0.6891
LCRUBFO	0.7709	1	0.9812	-0.3647	0.2927
LJETFSIN	0.7420	0.9812	1	-0.2775	0.2883
LNATGHEN	-0.4901	-0.3647	-0.2775	1	-0.4240
LCOMRAN	0.6891	0.2927	0.2883	-0.4240	1

Source: Researcher's own data

Table 38.2 Descriptive statistics (7 January 2005–31 December 2014)

	LJSE40	LCRUBFO	LJETFSIN	LNATGHEN	LCOMRAN
Mean	10.1520	4.4124	4.5743	1.6079	2.0668
Median	10.1755	4.4372	4.5787	1.5019	2.0288
Maximum	10.7596	4.9695	5.2021	2.7337	2.4627
Minimum	9.3258	3.5184	3.8373	0.5988	1.7544
Std. dev	0.3325	0.3032	0.2737	0.4159	0.1715
Skewness	-0.3564	-0.4373	-0.2909	0.3228	0.5283
Kurtosis	2.8091	2.1509	2.2117	2.6550	2.2823
Jarque–Bera	59.0763	161.2360	104.1429	58.1372	176.9945
Probability	0	0	0	0	0
Sum	26435.79	11489.91	11911.39	4186.909	5381.927
Sum sq dev	287.8482	239.2634	194.9288	450.3215	76.5210
Observations	2604	2604	2604	2604	2604

Source: Researcher's own data

A relatively strong negative relationship exists between the FTSE/JSE Top 40 Index and natural gas.

The descriptive statistics of the five datasets are shown in Table 38.2.

The Augmented Dickey–Fuller (ADF) (Dickey and Fuller 1981) and Phillips–Perron (PP) (Perron 1989) tests need to be run in test for unit roots which is required to continue with the analysis. The results indicate if the data included in the study is stationary or not. The null hypotheses are:

- ADF test: variable has a unit root
- PP test: variable has a unit root.

The results of the test ADF and PP tests are shown in Table 38.3.

The results of the unit root tests in Table 38.3 show that all the variables are stationary at first difference at a 1 % significance level. This indicates that the single and multiple regressions need to be run using data that is logged. The single regression outputs of interest are shown in the following tables.

The *R*-squared as shown in the regression results shows the percentage of total variation in the dependent variable explained by variation in the independent variable (Cameron and Windmeijer 1995). The following relationships indicate a relatively strong and strong relationship as the *R*-squared results are above 0.55 as

Table 38.3 Unit roots test using the augmented Dickey–Fuller and Phillips–Perron method

	Level		1st difference	
	Intercept	Trend and intercept	Intercept	Trend and intercept
ADF				
JSE40	-1.8255	-2.7273	-50.6858***	-50.6849***
COMRAN	-1.1077	-2.2253	-49.9169***	-49.9095***
JETFSIN	-2.3828	-1.5008	-51.4365***	-51.5003***
NATGHEN	-2.1413	-3.4191	-40.5198***	-40.514***
CRUDBFO	-2.1243	-1.2816	-51.9105***	-51.9583***
PP				
	Level		1st difference	
	Intercept	Trend and intercept	Intercept	Trend and intercept
JSE40	-1.806	-2.4886	-51.4254***	-51.4497***
COMRAN	-1.0751	-2.2147	-49.9191***	-49.9115***
JETFSIN	-2.4498	-1.6819	-51.5397***	-51.5662***
NATGHEN	-2.1098	-3.4926***	-47.5567***	-47.5482***
CRUDBFO	-2.1222	-1.2859	-51.9025***	-51.9492***

Source: Researcher’s own data

**Statistically significant at a 1% level of significance

Table 38.4 Summary of single regression outputs above 0.55

Dependent	Independent	R-squared	F-stat	Prob	t-stat	Prob
LJETFSIN	LCRUDBFO	0.962811	67365.7	0	44.15176	0
LJETFSIN	LJSE40	0.550513	3186.821	0	56.45193	0
LCRUDBFO	LJSE40	0.594317	3811.875	0	61.74038	0

Source: Researcher’s own data

displayed in Table 38.4 which is in line with the three relationships which showed a high correlation shown in Table 38.1:

- FTSE/JSE Top 40 Index and crude oil
- FTSE/JSE Top 40 Index and jet kerosene
- Crude oil and jet kerosene.

The confirmation that the above relationships exist in the single regression analysis leads to the examination of the relationships between multiple datasets. Table 38.5 shows that there is a statistical significant relationship between both relationships investigated, however, the relationships are only relatively strong.

In Table 38.5, the adjusted R-squared shows that the model explains a relatively large portion of the total variation in the dependent variable for the FTSE/JSE Top 40 Index and the ZAR as the dependent variables.

The model with the FTSE/JSE Top 40 Index as the dependent variable, crude oil results in the largest percentage change with a coefficient of 0.5666. Crude oil also causes the largest percentage change with the ZAR as the dependent variable with a coefficient of -0.8127.

Table 38.5 Multiple regression outputs

Dependent	Independent	Adjusted R-squared	F-stat	Intercept	Intercept t-stat	Ind coeff	Ind t-stat
LJSE40	LJETFSIN	0.6451	1577.918***	7.0698	0.6451***	0.1993	2.4221**
	LNAIGHEN					-0.2048	-18.2705***
	LCRUBBFO					0.5666	7.3944***
LCOMRAN	LJETFSIN	0.64394	1177.889	-2.29355	-27.99459	0.5312	12.4882***
	LNAIGHEN					-0.0762	-12.3895***
	LCRUBBFO					-0.8127	-20.3268***
	LJSE40					0.5555	54.8468***

Source: Researcher's own data

Note: All variables were logged

**Statistically significant at 1 % level of significance

***Statistically significant at 5 % level of significance

The remainder of the analysis focuses on whether or not the datasets are cointegrated. In order to identify if the datasets are cointegrated a VAR model needs to be estimated, followed by the Johansen cointegration test. The empirical results for the VAR model and Johansen cointegration test will be explained in order to determine if the datasets are cointegrated.

The first VAR model and Johansen cointegration test examined below will be for the relationship between the FTSE/JSE Top 40 Index and the three commodities, with an optimal lag length of three lags. The optimal lag length was determined by the Schwarz information criterion and the Hannan–Quinn information criterion.

The results for the ZAR against the FTSE/JSE Top 40 Index and three commodities, with four lags as the optimal lag length, will be shown last. The optimal lag length was determined by the final prediction error and the Akaike information criterion.

The VAR model was estimated using three and four lags, respectively, for both relationships investigated. The VAR for the first relationship investigated indicates that there are 17 significant relationships. The following significant explanatory variables and related lag periods are:

- Crude oil: Crude oil (−1)
- Jet kerosene: FTSE/JSE Top 40 Index (−3), Crude oil (−1, −2, −3), Jet kerosene (−1, −2)
- Natural gas: Crude oil (−3), Jet kerosene (−1, −2, −3), Natural gas (−1, −2, −3)
- FTSE/JSE Top 40 Index: FTSE/JSE Top 40 Index (−1), Crude oil (−1), Jet kerosene (−1).

Table 38.6 shows that there is only one cointegrating relationships under all the assumptions of the Johansen cointegration test.

Table 38.7 shows the maximum eigenvalue test and trace statistics when a linear deterministic trend is assumed. The null hypothesis based on the maximum eigenvalue statistics and trace statistic of no cointegrating equations can be rejected.

The results for the relationship between the ZAR and the FTSE/JSE Top 40 Index and three commodities are illustrated below.

The VAR test indicates that there are 25 significant relationships. The following significant explanatory variables and related lag periods are:

Table 38.6 Summary of all assumptions of the Johansen cointegration test

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
	No trend	No trend	No trend	Trend	Trend
Trace	1	1	1	1	1
Max-eig	1	1	1	1	1

Source: Researcher’s own data

Selected 0.05 level number of cointegrating relations by model, the critical values are based on MacKinnon-Haug-Michelis (1999)

Table 38.7 Maximum eigenvalue statistics and trace statistics

Hypothesized number of cointegrating equations	Eigenvalue	Trace statistic	0.05 critical value	Prob.**
None*	0.022473	76.18059	47.85613	0
At most 1	0.00499	17.08482	29.79707	0.6338
At most 2	0.001566	4.078165	15.49471	0.8971
At most 3	0.000001	0.002524	3.841466	0.9576
Hypothesized number of cointegrating equations	Eigenvalue	Maximum eigenvalue statistic	0.05 critical value	Prob.**
None*	0.022473	59.09577	27.58434	0
At most 1	0.00499	13.00666	21.13162	0.4516
At most 2	0.001566	4.075642	14.2646	0.8513
At most 3	0.000001	0.002524	3.841466	0.9576

Source: Researcher's own data

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

*Denotes rejection of the hypothesis at the 0.05 level

**MacKinnon–Haug–Michelis (1999) *p*-values

Table 38.8 Summary of all assumptions of the Johansen cointegration test

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
	No trend	No trend	No trend	Trend	Trend
Trace	3	1	1	1	1
Max-eig	1	1	1	1	1

Source: Researcher's own data

Selected (0.05 level number of cointegrating relations by model, the critical values are based on MacKinnon-Haug-Michelis (1999)

- Crude oil: South African Rand (−4), Crude oil (−1)
- Jet kerosene: South African Rand (−1), Crude oil (−1, −2, −3, −4), Jet kerosene (−1, −2)
- Natural gas: Crude oil (−3), Jet kerosene (−1, −2), Natural gas (−1, −2, −3, −4)
- FTSE/JSE Top 40 Index: FTSE/JSE Top 40 Index (−1, −4), Crude oil (−1), Jet kerosene (−1, −2)
- South African Rand: South African Rand (−1), FTSE/JSE Top 40 Index (−4), Jet kerosene (−1, −4).

The Johansen cointegration test results in Table 38.8 shows that there is only one cointegrating relationship under all the assumptions of the Johansen cointegration test.

Table 38.9 shows the maximum eigenvalue test and trace statistics when a linear deterministic trend is assumed. The null hypothesis based on the maximum eigenvalue statistics and trace statistic of no cointegrating equations can be rejected.

38.6 Conclusion and Implications

The relationships between the three energy commodities, crude oil, jet kerosene and natural gas, and the FTSE/JSE Top 40 Index were investigated. The relationship between the three commodities and the FTSE/JSE Top 40 Index against the ZAR was also investigated to determine the impact of the variables on the ZAR.

The empirical results of the study indicate that there are significant relationships in the long run of the five financial datasets included. The first set of hypotheses related to the movement relationships present between the datasets according to the correlation and single regression results show the following relationships are present:

- FTSE/JSE Top 40 Index and crude oil
- FTSE/JSE Top 40 Index and jet kerosene
- Crude oil and jet kerosene.

In the multiple regression, the model with the FTSE/JSE Top 40 Index as the dependent variable, crude oil results in the largest percentage change with a coefficient of 0.5666. Crude oil also causes the largest percentage change with

Table 38.9 Maximum eigenvalue statistics and trace statistics

Hypothesized number of cointegrating equations	Eigenvalue	Trace statistic	0.05 critical value	Prob.**
None*	0.021332	97.40595	69.81889	0.0001
At most 1	0.008482	41.36451	47.85613	0.1773
At most 2	0.005402	19.22477	29.79707	0.4768
At most 3	0.001643	5.14584	15.49471	0.7931
Hypothesized number of cointegrating equations	Eigenvalue	Maximum eigenvalue statistic	0.05 critical value	Prob.**
None*	0.021332	56.04144	33.87687	0
At most 1	0.008482	22.13975	27.58434	0.2133
At most 2	0.005402	14.07893	21.13162	0.3586
At most 3	0.001643	4.274745	14.2646	0.8293

Source: Researcher's own data

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

*Denotes rejection of the hypothesis at the 0.05 level

**MacKinnon–Haug–Michelis (1999) *p*-values

the ZAR as the dependent variable with a coefficient of -0.8127 . The Johansen cointegration test results indicates that there is a cointegrating relationship between both models investigated.

Further opportunities for study include further analyses of energy commodities as well as similar study on other combinations of commodities. The results of the study are important to market participants as the movement in the commodity price does have an effect on the FTSE/JSE Top 40 Index and the ZAR which can influence the monetary policy in South Africa.

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Chapter 39

Do Dividend Payout Ratio Drive the Profitability of a Firm: A Case of Energy and Textile Sector of Pakistan?

Anikia Sattar, Gao Leifu, Muhammad Ishfaq Ahmad, Mudassar Hassan, and Rizwan Ali

Abstract This paper investigates the relationship between dividend payout ratio and profitability of a firm. For this, two main sectors of Pakistan are selected, energy and textile. We employed the date of 2004–2015. We employed the logarithmic regression analysis. The results of logarithmic regression show that there is a negative impact of dividend payout ratio on next year earnings of a firm.

Keywords Dividend payout • Firm's earnings • Textile sector

39.1 Introduction

There is one common thing among all the firms operating throughout the world which is earning the profit which is also known as the basic reason why a firm exists. Once firms earn profits they belong to the owners of the firms, which might be distributed among the owners as per their investment ratio which is normally in the form of dividends or it might be reinvested in the business called the retained earnings. This financial decision of either distributing among the investors or reinvesting in the business is a quite hot topic among the researchers. Investors invest their funds in any business to maximize their wealth and always expect some return from the firms. So dividend policy is one important financial policy not for the investors only but also for the firm, employees, and government (Uwuigbe et al. 2012).

Investors expect some reasonable return from their investment. At the same time, firm management wants to plough back enough profits to reinforce capital base for

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the future growth of the company. Investors do not want to accept any dividend less than their expectations until they did not convince that reinvestment pay them higher than any opportunity in the economy. Black (1976) documents that “The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don’t fit together”.

To resolve this many theories were proposed by the distinguished scholars, starting from Gordon’s (1962) Bird in Hand theory which explains that dividends are preferred by the outside shareholders. Shareholders prefer today profits (dividends) over the uncertain gain in the future. In contrast signaling theory proposed that dividends are the source of signaling to let ensure the loyalty of the investors with the firms. Due to wholly dependence upon the information, the agency conflict came into existence as the insider investors (managers) have more information about the firm future as compared to the outside investor. Sometimes firms pay the dividends even they do not have the free cash flows to just win the confidence of the investors. So this interesting puzzle still remains unsolved even a rich body of literature exist in this issue.

This study is an effort and contribution in the existing literature to examine how the dividend payout ratio influences the profitability of the energy and textile sectors of Pakistan economy. The following section is all about the literature review. The third section explains research methodology used in this study along with the data sources. The fourth section contains the results and detailed discussion, and the final section concludes the whole study.

39.2 Literature Review

A strand of literature is available on the dividend payout and firm performance, i.e. Zhou and Ruland (2006) document that higher paid dividend firms have strong future earnings. Arnott and Asness (2003) explain that there is strong association between future earnings and higher dividends rather than lower dividends. Explained that there is a negative relationship between the dividend payout ratio and firm growth. Higher dividend means less resources for the expansion and growth of the business while lower dividend payout ratio means higher resources for the expansion and growth of the business.

Nnamdi (2009) examined the relationship between the dividend and future earnings for the Nigerian corporations and concluded that there is a strong and significant relationship existing between the dividends and future earnings. Many researchers proposed empirically that firms with the higher free cash flows must pay the higher dividends to reduce the agency conflicts and use dividend as a tool to minimizing the agency issues (Jensen 1986; Mollah et al. 2002; Holder et al. 1998; La Porta et al. 2000). For the dividend payout decision the current level of the firms does matter a lot. A number of studies witness (Jensen et al. 1992; Fama and French 2001; Han et al. 1999; Al-Kuwari 2007 in Al-Kuwari 2009) that firm’s profitability is the significant explanatory variable for the dividends.

To test the signaling theory empirically announcement are considered to convey information on the future earnings of the firms. Supporting Lintners (1956), Bhattacharya (1979) and Miller and Rock (1985) suggested that dividends announcement conveys the information of the future of the business. If the company announces higher dividends, it contains the information that the firm is performing well and investors do have the same expectations in future which ultimately increases the price of the share (Zakaria et al. 2012). Similarly studied the impact of dividend payout on the price volatility of the Jordanian industrial firms and concluded empirically that there is a positive and significant association between the dividend payout and price volatility.

Brigham (1995) empirically documents that dividend payout policy is the strong determinant of the firm performance. Firm's dividends explained the financial stability of the firm's future cash flows argued. Studying the S&P 500 explained that 87 % of the dividend firms believed that paying dividend is an efficient tool for signaling the future performance of the firms. On the other hand, interestingly posed the negative association between the dividends and firm performance.

Ajanthan (2013) examined the Colombia Stock Exchange (CSE) to test the relationship between the dividends and firm's performance. By applying different econometric tools, he concluded that dividend is the critical factor for the firm's performance. Priya and Nimalathan (2013) examined the same hypothesis for the Sri Lanka hotel industry and argued that dividends have significant and great influence on the firm's performance. Examined the relationship between dividends and Ghana banks performance. By employing the data of 1999–2003 they concluded that dividends does matter significantly for the performance of the Ghana banking industry.

39.3 Methodology

The sample of this study consists of energy and textile firms operating in the Pakistan for the time span of 2004–2015, which are the sound sectors of the economy. The reason behind selecting these two sectors is not only the soundness of the two sectors but also the diverse dividend payout ratio over the last decade. It has been observed that the energy sector provides high dividends while the textile sector paid low dividends. Performance of the both sectors is measured by return on assets (ROA) and earnings per share (EPS) which are depended variables where dividend payout ratio is taken as the independent variable. During the sample time frame, Pakistan has enjoyed the high growth and after that it declines sharply. This study also shows this influence, there is no study regarding dividend payout ratio covering this period for the energy and textile sectors.

$$\text{LogEPS}_{\text{ES}(t+1)} = \alpha_1 + \beta_1 \text{Log DPR}_{\text{ES}(t)} + \epsilon_1 \quad (39.1)$$

$$\text{Log ROA}_{\text{ES}(t+1)} = \alpha_2 + \beta_2 \text{Log DPR}_{\text{ES}(t)} + \epsilon_2 \quad (39.2)$$

$$\text{Log EPS}_{\text{TS}(t+1)} = \alpha_2 + \beta_2 \text{Log DPR}_{\text{TS}(t)} + \epsilon_3 \quad (39.3)$$

$$\text{Log ROA}_{\text{TS}(t+1)} = \alpha_2 + \beta_2 \text{Log DPR}_{\text{TS}(t)} + \epsilon_4 \quad (39.4)$$

where $t = 1, 2, \dots, 11$.

39.3.1 Expected Signs

As literature gives the mixed results for the dividend payout ratio, we are expecting that there is a negative sign for the ROA and EPS for the energy sector and textile sector. We will apply the linear regression models by keeping an eye on the assumptions of the linear regression.

39.4 Results and Discussion

Descriptive and logarithmic regression has been employed for the analysis of the study. The results of the study show interesting facts, that there is a mixed trend in the dividend payout ratio of the both sectors. Over the last decade, the dividend payout ratio is inconsistent and along with the profitability of the both sectors. In comparison of the both sectors, energy sector seems consistent over the textile sector.

The descriptive statistics of the energy sector shows that return on assets is 28.52 % along with the standard deviation of 96.28 % which has quite big variation but interestingly in the comparison of the textile sector (32.78 mean and 200.53 std. dev.), it shows that energy sector is consistent with the textile sector. On the other hand, dividend payout ratio for the energy sector is 37.00 %, std. dev. 0.80 as compared to the textile sector which is 12 % and 0.46, see Tables 39.1 and 39.2.

Table 39.1 Descriptive statistics (energy sector)

	No. of obs	Mean	Std. dev	Std. error
ROA	252	28.52 %	96.28	6.06
EPS	252	11.72	24.17	1.52
DPR	252	37.00 %	0.80	0.05

Note: EPS is in Pak rupees

Table 39.2 Descriptive statistics (textile sector)

	No. of obs	Mean	Std. dev	Std. error
ROA	1980	32.78 %	200.53	4.51
EPS	1980	3.83	17.57	0.39
DPR	1980	12.00 %	0.46	0.01

Note: EPS is in Pak rupees

Table 39.3 Regression analysis for the Eqs. (39.1)–(39.4)

Model	R sq	A	β	<i>t</i> -stat	<i>p</i> -value	DW
1	0.45	0.429	−0.5	10.06 < <i>t</i> > −7.87	0.00*	1.64
2	0.55	0.352	−0.47	9.35 < <i>t</i> > −6.35	0.00*	0.92
3	0.35	0.58	−0.23	18.93 < <i>t</i> > −8	0.00*	1.23
4	0.54	0.55	−0.49	16.45 < <i>t</i> > −15.48	0.00*	1.5

Note: Significance level 5 %

The study objectives are twofold: one is the factors affecting the dividends of the firms and the other is the comparison of the textile sector and energy sector which have different characteristics. For the objective of study we run the two models for the both sectors, first model with the return on assets (ROA) and second model with the earning per share (EPS). The energy sector model for the EPS has an *r*-square equal to 45 % which means that the explanatory power of the model is quite acceptable. The *p*-value is 0.00 which indicates a very high statistical significance. The results showed that there is a significant negative relationship existing between the dividend payout ratio and earnings per share.

On the other hand, if we see the textile sector EPS influence on the dividend payout ratio, we observed that the *r*-square of the model is also in the acceptable range with good Durban Watson value but shows the negative influence on the dividend payout ratio which is consistent with the energy sector.

In the case of ROA influence on the dividend payout ratio for the energy sector we see that there is a significant and negative relationship existing between the ROA and dividend payout ratio with the good explanatory power of the model which is 0.55. On the other hand, the textile sector also empirically showed that there is a negative relationship existing between the return on assets and dividend payout ratio of the textile sector (see Table 39.3).

39.5 Conclusion

This study is a contribution in the literature of the dividend puzzle which has been studied by many scholars but still remains unsolved. Dividend payout has been studied from many perspectives but there are very few studies available with respect to comparison of different sectors performance. As the both sectors (textile sector and energy sector) are the quite sound sector of the economy. The results show

that either the energy sector or textile sector dividend has negative and significant influence on the return on assets meanwhile dividend also negatively affects the earning per share of the energy and textile sector of Pakistan. These are interesting findings which are the source of motivation for the new researchers to let check this relationship with the rest of the sector of the industry. This study also helps the practitioners to set up the dividend policies specifically for the energy and textile sector and for all the sectors generally.

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Chapter 40

Attitude of Customers to Socially Responsible Products

Katarína Moravčíková and Ľubica Gajanová

Abstract The issue of social responsibility in today's globalized market conditions becoming an increasingly important element of the strategic management of the company. Society's expectations regarding the performance of businesses continue to grow. Currently companies have competitive advantages that are able to actively respond to ever-changing customer expectations and implement socially responsible aspects to its business. The customer is one of the most important stakeholders of the company. He/she decides where and to whom he/she will allocate their resources. Customers often report positive approach to buying products from socially responsible business, even if higher costs. Article compares the willingness of customers to pay more for socially responsible product in the Czech Republic, Slovakia, and in the world. The methods used in the article are: analysis, synthesis, deduction, and comparison.

Keywords Consumer behavior • Socially responsible products

40.1 Corporate Social Responsibility

The modern history of corporate social responsibility began to develop in the 1950s of the twentieth century, when the idea of CSR fully penetrated the literature for managers. Howard R. Bowen, who in 1953 wrote a book *Social Responsibilities of the Businessman*, is considered the first theorist of the concept. Rapid development and considerably broad scope of this concept have resulted in very high terminological disunity, because currently there is no uniform global definition (Kuldova 2012). Bowen (2013) defines corporate social responsibility as “the commitment of entrepreneurs to seek such policies, make such decisions or carry out such activities that are needed to the objectives and values of our society.” According to the European Commission (2001) is corporate social responsibility “concept whereby companies integrate social and environmental concerns into everyday

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corporate operations and interactions with business stakeholders.” According to Kotler and Lee (2005) corporate social responsibility is “commitment to improve the welfare of society through voluntary corporate actions and contributions of corporate resources.”

Corporate social responsibility is a modern concept of business that leading to a broader view of the business and is based on three pillars, i.e., triple-bottom-line (3P):

- economic (profit)
- social (people),
- environmental (planet).

The company, that receives the concept of corporate social responsibility, tries in its business not only to make a profit, but also its approach is more comprehensive because it takes account of all the so-called 3P and applies on a voluntary basis beyond their legislative obligations some principles in three main areas, namely economic, social, and environmental area (Trnkova 2004; Prskavcova 2008).

The economic pillar of CSR is primarily devoted to corporate transparency, good relations with stakeholders that have an impact on the economic activity of the enterprise (Masarova and Krizanova 2013). There are investors, owners, customers, suppliers, business partners, and the subjects that are significant for the company in this area.

Social area can be divided into two areas: both internal and external. The internal area is also called social enterprise policy and external area is primarily devoted to philanthropy, altruism, cooperation with the local community.

Social policy of the company and its instruments must give a partnership with employee, about which the company considers as a co-worker, provides opportunities to utilize his active skills, expands his abilities and skills, and reaches business goals by achievings his satisfaction (Prskavcova 2008).

External social area is focused on philanthropy and cooperation with the local community. Philanthropy is understood as a set of activities and actions that lead to the conscious support of other persons (individuals, groups, and organizations). It differs from altruism, which is individual initiative and mostly focuses on the immediate surroundings (Parobek et al. 2016). Philanthropy is trying to solve the problems of disadvantaged or disabled in a wider context and tends to organize the whole system of care for these problematic groups.

Issues in the environmental field in recent years have been increasingly attracting attention. Corporate management should be aware that the responsibility of the company in this area must be applied within the company itself, as well as with the outside world, which company affects by its activity, whether it is about the landscape, noise, resource use, emissions, waste, and traffic flows (Prskavcova 2008).

40.2 Socially Responsible Customer

Stakeholder theory was an important impetus for the development of social responsibility, of which the development is credited in the 1980s of the twentieth century mainly to American professor R. Edward Freeman by creating of stakeholder approach (Freeman 1984). Stakeholders term in its broadest concept includes customers, shareholders, employees, business partners, suppliers, representatives of state and local governments, the media, trade unions, and international organizations (Trnkova 2004).

The customer is one of the most important stakeholders of the company. He or she decides where and to whom they will allocate his or her resources. Customers are very important factor, which determines whether the company will make a profit.

Socially conscious customer is a customer who is aware of the consequence of his/her public and private consumption and who through his/her own purchasing power trying to implement the change in the company (Mohr et al. 2001). This means that not only companies have certain obligations to customers in terms of customers, but also customers themselves, who care about CSR of companies, should behave socially responsible.

Devinney et al. (2010) suggest ways in which the customer can prove his responsibility:

- develop activity aimed at social issues both in terms of donations or willingness to participate in the protests, which express value preferences,
- expression of opinion in the market research,
- buying decision or refusal to purchase.

Based on customer segmentation into different groups (according to purchasing behavior as set by Peelers Paris, Natural Marketing Institute and Vysekalova et al. and Mohr et al.) it is possible to earmark the groups that are socially responsible:

Bio customers—people who are interested in all natural and organic and believe the technology can be useful for nature. It is necessary to respect nature because of the recurring crises in food. The new biotechnology of product must be more advanced, combine bio-ethical values with bio packaging.

Customers with imagination—people who want to make every product to tell stories and offer something out of life. The human values should show increasingly in the industrial world. Companies should give an original appearance and story to mass products and let them tell stories of past, present, or future. It's a new trend of mass individuality. The customer is not only a buyer, he/she wants to participate in the whole process (Nemecek 2002).

LOHAS—in addition to high quality, people in this group require still greater sensitivity of manufacturers and suppliers on issues of ethics, health, and ecology. There are passionate and active customers who are influential among friends and family, less price-sensitive and loyal to the brand.

Easy-nature oriented customers—they take care of their health and use a lot of natural products. They are active consumers of ethical consumer goods.

Conventional customers—these consumers are, in addition to health issues, often oriented on financial savings products such as energy-efficient electronics and appliances and green living.

Super parents of Generation X—the center of attention is the baby. They focus on organic products, fresh food, green, recycled, and local products.

Generation Y—people of this generation born in the 1980s and 1990s. It is the first global generation that grew up in relatively calm conditions. The question of ecology is more significant. People are more sensitive to environmental issues (Vysekalova 2011).

Maintainers—these people take into consideration the concept of CSR in most cases in their buying decision and it is important criterion for them. They improve understanding of social problems, behavior, and commitment of individual companies. People are willing to change the brand of a product or company or they are willing to pay extra money for socially responsible purchase (Mohr et al. 2001).

40.3 The Consumer Willingness in the Purchase of Socially Responsible Products

Socially responsible products have an ethical ideology or obligation to benefit society at large. Socially responsible products help support worth social causes and charitable organizations through socially responsible business models that raise donations, funding, and supplies to help solve today's most important social problems (Krizanova et al. 2013).

There is always a trade-off between economic development, in the material sense, and the welfare of the society and environment. Socially responsible products, like one for one shoes or socially responsible clothing means sustaining the equilibrium between the two (Tokarcikova and Ponisciakova 2014).

These socially responsible products are made from sustainable materials with socially responsible business practices that support charities and non-profit organizations.

Nielsen Company (2014) conducted research on corporate social responsibility entitled "Doing Well by Doing Good." The survey was conducted from 17 February to 7 March 2014 and was attended by 30,000 consumers from 60 countries in Asia Pacific, Europe, Latin America, Middle East, Africa, and North America. The survey shows that more than half of respondents are willing to pay for products and services from companies that are socially responsible. The greatest willingness to pay extra for a socially responsible product was expressed by respondents from Asia Pacific—64 %, followed Latin America and Middle East/Africa, where willingness was expressed by 63 % of respondents. Only 40 % of respondents in Europe are willing to pay higher prices for products that are socially responsible (Fig. 40.1).

Fig. 40.1 Willingness to pay extra for socially responsible products in the world. Source: authors according to (13)

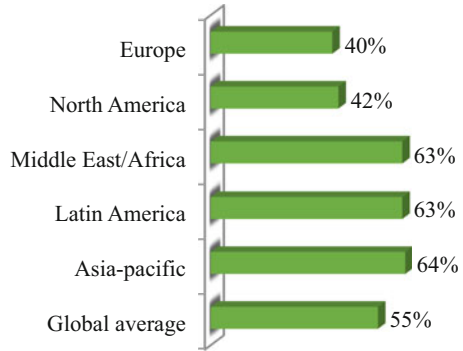
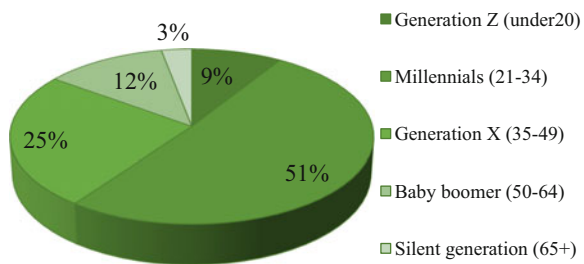


Fig. 40.2 Willingness to pay extra for socially responsible products in the world by age. Source: authors according to (13)



The largest group of respondents, who are willing to pay extra for a socially responsible product, is the generation Y in age group 21–34 with 51%. The second largest group is Generation X in age 35–49 years with 25%. The slightest willingness to pay extra for a socially responsible product consists of respondents aged 65 and over (Fig. 40.2).

Ipsos (2013) company carried out research on corporate social responsibility in terms of customers in the Czech Republic in November 2013. The research was conducted on a representative sample of the adult population. Size of the population of respondents was 1019. The survey shows that the greatest willingness to pay more for socially responsible products showed respondents in the age group 35–54 years with 72%. On the contrary, the unwillingness to pay higher prices for products from socially responsible companies was expressed by respondents aged 55 years and older with 34% (Fig. 40.3).

Department of Economics University of Žilina conducted a survey entitled Perceptions of corporate social responsibility in terms of customers in January 2015. The survey involved 396 respondents. The survey shows that the greatest willingness to pay more for socially responsible product was expressed by respondents in the age group 46 years and over, namely 47%. Answer “maybe,” if the willingness to pay higher prices for responsible products was expressed most frequently by respondents in the age group 18–25 with 58%. Up to 14% of respondents in the age group 36–45 years have expressed a reluctance to buy products from socially responsible company at a higher price (Fig. 40.4).

Fig. 40.3 Willingness to pay extra for socially responsible products in Czech Republic by age. Source: authors according to (5)

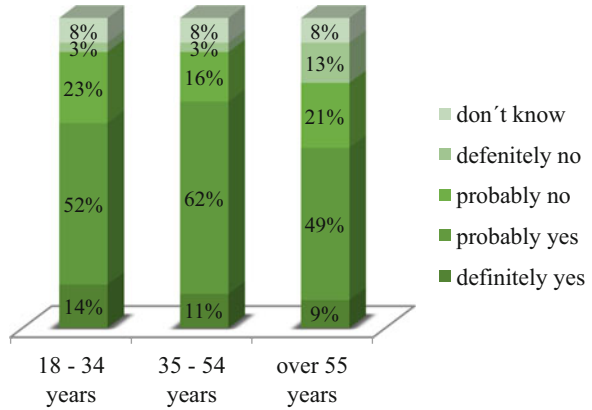
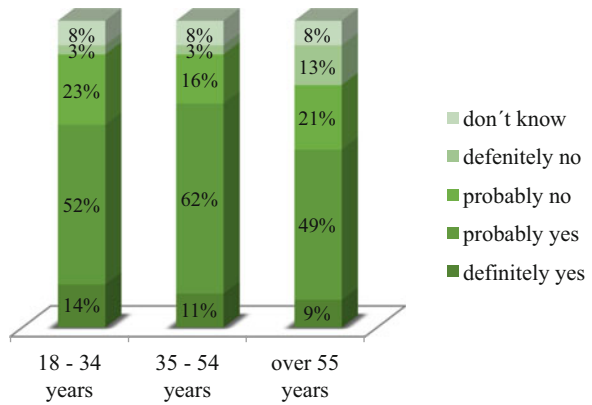


Fig. 40.4 Willingness to pay extra for socially responsible products in Slovakia by age. Source: authors



Comparing these surveys, there are significant differences. Global research of company Nielsen showed that the greatest willingness to pay more for socially responsible products expressed Generation Y respondents (21–34 years). Results of the research company Ipsos in the Czech Republic revealed the greatest willingness to pay for these products in the age group 35–54 years. The survey of Department of Economics shows that respondents aged 46 years and older are mostly willing to pay a higher price for the responsible product. It can be stated from these results that in the world has a positive relation to products from socially responsible enterprises, in particular the younger generation, while in the Czech Republic and Slovakia have such a relationship rather older respondents.

40.4 Interdependence Between Age and Willingness of Customers to Pay Extra for Socially Responsible Product

At the beginning we set the zero hypothesis (H0) and the alternative hypothesis (H1). Zero hypothesis expresses that there is no relation between these variables. On the other hand, alternative hypothesis supposes the relation of these variables.

1. H0 There is no relation between customer age and willingness of customers to pay higher prices for socially responsible product compared with traditional product.
2. H1 There is relation between customer age and willingness of customers to pay higher prices for socially responsible product compared with traditional product.

Next, we set the *P*-value of 5 % (0.05). *P*-value is the probability of mistakes that you make, if you reject zero hypothesis that actually is true. If the calculated value is less than the *P*-value, zero hypothesis is rejected, thus alternative hypothesis is accepted (Krizanova et al. 2013). Otherwise, zero hypothesis is accepted. We expressed the dependence between the selected variables through the Kendall Tau-b correlation coefficient, which is used if we want to express the relation between two ordinal variables (Table 40.1).

40.5 Conclusion

Corporate social responsibility is now becoming an increasingly important factor when purchasing a product. Socially responsible customers include bio customers, customers with imagination, LOHAS customers, easy to naturally oriented customers, conventional customers, super parents of Generation X, Generation Y, maintainers. According to the present surveys it can be concluded that customers are willing to pay extra for socially responsible products. This willingness of one

Table 40.1 Calculation of Kendall’s Tau-b, variables: customer age; willingness of customers

			Age	Willingness
Kendall’s Tau-b	Age	Correlation coefficient	1000	−0.140
		Sig. (2-tailed)		0.082
		<i>N</i>	123	123
	Willingness	Correlation coefficient	−0.140	1000
		Sig. (2-tailed)	0.082	
		<i>N</i>	123	123

country varies with age. We interested in whether there is an interdependence between the age of customers and their willingness to pay more for socially responsible product. Statistical analysis of this hypothesis refuted.

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Chapter 41

Dynamics of Lending Rates in the Baltic Countries: Influence of Funding Costs of Banks and Risk Factors

Vija Micune

Abstract In the Baltic countries, lending rates have been among the highest in the euro area mainly reflecting national differences in the market structure as well as relatively strict credit standards applied by banks in response to the changes in their perception of risk. In this context, the deeper econometric analysis could provide additional information about the common and diverging aspects of the dynamics of lending rates in the Baltic countries. Therefore, the aim of the paper to explore the pass-through of funding costs of banks to lending rates in different lending segments in the Baltic countries during the period of 2005–2015 taking in account risk considerations. To reach the set aim, appropriate comparisons are made between different specifications of the error correction model, first of all, relating specifications with 3-month EURIBOR rate and weighted average costs of short-term euro liabilities and, secondly, specifications with and without the measures of borrower credit risk and banking risk. As a result, the conclusion was reached about superiority of 3-month EURIBOR rate as a measure of funding costs of banks. The measures characterising creditworthiness of borrowers and banking risk are significant factors determining lending rates in the Baltic countries. Across the Baltic States, the pass-through from funding costs of banks to lending rates is high. Long-term pass-through from funding costs of banks to lending rates tends to be higher in Lithuania, but creditworthiness of borrowers appeared to have the highest influence on lending rates in Latvia.

Keywords Lending rates dynamics • Baltic countries

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41.1 Introduction

The level of and changes in lending rates are in the scope of interest of the European Central Bank (ECB), which bases its monetary policy on the interest rate channel. The ECB sets official interest rates and influences the level of liquidity in the money market to ensure the appropriate level of short-term money market rates, which, in turn, influence the path of development of longer-term market rates. Those market rates usually have a direct effect on lending rates, and, if changes in market rates are fully reflected in the lending rates, this phase of the monetary policy could be considered as effective. Low interest rates on loans newly granted to non-financial corporations implicitly stimulate country's investment and international competitiveness in the same way as low interest rates on loans newly granted to households encourage consumption. In addition, declining money market interest rates may transform into a smaller interest rate burden on borrowers. Finally, higher investment and consumption stimulate the overall growth of the economy and medium term inflation, which are in the primary focus of the ECB. In the Baltic countries, lending rates presently have been among the highest in the euro area mainly reflecting national differences in the market structure and relatively strict credit standards applied by banks in response to the changes in their perception of risk. In this context, a question arises about what common and diverging aspects explain the dynamics of lending rates in the Baltic countries in general and how they could be affected by the monetary policy of the ECB in particular.

The dynamics of lending rates is studied in depth in the empirical literature. An important strand of this literature concerns the pass-through from money market rates to lending rates. Many scientific papers (for example, Cottarelli and Kourelis 1994; Winker 1999; DeBondt 2002; Sander and Kleimeier 2004; Egert et al. 2007; DeGreave et al. 2007; Banerjee et al. 2013) show that lending rates adjust to the changes in funding costs of banks described by money market rates with a time lag; the level of pass-through from money market rates to lending rates and the speed of their adjustment differ across countries, financial institutions and various types of loans. Frequently, a faster and more complete adjustment is considered to characterise a more efficient monetary policy (Mojon 2000; Sander and Kleimeier 2004; Illes et al. 2015). Most recent research papers (Hansen and Welz 2011; Arnold and van Eivijk 2014; Paries et al. 2014; Illes et al. 2015; von Borstel et al. 2015) show that after the 2008 global financial crisis and successive European debt crisis, the dynamics of lending rates is affected not only by the policy or money market rate but also by credit risk of borrowers, sovereign risk and banking risk.

Hence the aim of the research is to explore the pass-through of funding costs of banks to lending rates in different lending segments in the Baltic countries during the period of 2005–2015 taking into account risk considerations. To reach the set aim, the paper addresses several research questions. First of all, it assesses whether the pass-through from funding costs of banks to lending rates and the speed of lending rate adjustment differ significantly for two alternative measures of funding cost of banks, namely the 3-month EURIBOR rate and the weighted average cost of

euro liabilities. Secondly, it addresses the question whether and how the credit risk of borrowers and the banking risk have affected previously observed relationships between lending rates and funding costs of banks. Finally, the work compares the pass-through from funding costs of banks to lending rates for different types of loans and across the Baltic States. The work is based on foreign and Latvian scientific publications as well as on statistical data published on websites of the national central banks of each Baltic country, the ECB and the European Commission. The dynamics of lending rates in the Baltic States is analysed with the error correction model.

In Europe, most research papers about the pass-through of policy rate or bank funding costs to lending rates are devoted to the largest euro area countries (Weth 2002; Banerjee et al. 2013; Paries et al. 2014; Avouyi-Dovi et al. 2015; Illes et al. 2015; von Borstel et al. 2015). However, the dynamics of lending rates in the Baltic countries is also analysed either for each country separately or as a part of the larger group of the Central and Eastern European countries (see, for example, the paper by Mannasoo 2013, Estonia, Lapinskas 2011, Lithuania, and Micune 2010, Latvia). The development of lending rates has not been analysed for the separate group of three Baltic countries yet. As concerns the analysis of pass-through from money market rates to lending rates in the Baltic countries, the standard form of the error correction model has been used for different lending segments, currencies and time periods only in Latvia. In those econometric estimations, lending rates have been related to the dynamics of the respective money market rates (Micune 2009). In this paper, the analysis of the dynamics of lending rates in the Baltic States involves not only the estimation of the standard error correction model between lending rates and money market reference rate, but also the estimation of other specifications of error correction model that include several risk factors and weighted average cost of short-term euro liabilities as an alternative measure of funding costs of banks. The findings of the research would contribute to the understanding about how lending interest rates are set in commercial banks; likewise, they would provide insight into the effectiveness of the ECB monetary policy in the Baltic countries.

41.2 Research Results and Discussion

41.2.1 *Statistical Data and Methodological Considerations*

In this paper, the analysis is based on monthly data of monetary financial institutions' lending rates for the time period from January 2005 to January 2016, which are published on the Statistical Data Warehouse on the website of the ECB. The lending interest rates used therein cover the largest part of lending products offered by banks in the Baltic countries: loans granted to resident households for house purchase, consumer loans, other purpose loans as well as loans granted to resident non-financial corporations (hereinafter in the text—enterprises) of small

and medium size (up to 1 million euro) and of large size (over 1 million euro). Due to data availability issues, the article considers only floating interest rates or interest rates with an initial rate fixation period of up to 1 year on newly granted euro loans.

In order to get better understanding about the factors affecting lending rates in the Baltic countries, their dynamics is analysed within five specifications of the selected econometric model. In three of the five model specifications, lending rates are analysed in connection with 3-month EURIBOR, which is the most popular interest rate for pricing euro loans in the Baltic countries. In two specifications, the article uses an alternative benchmark for bank funding costs proposed by Illes et al. (2015), namely the weighted average cost of short-term euro liabilities of banks in each of the Baltic countries. The measure is compiled using four types of liabilities: interbank deposit liabilities, private non-financial sector deposit liabilities, debt securities and funding from central bank operations. Each type of liabilities is linked to the corresponding interest rate. The weights are based on outstanding stock of liabilities from bank balance sheets (for details, see the paper by Illes et al. 2015).

In addition, several risk measures are tested in the specifications of the proposed model. Taking into consideration the article by Arnold and van Eivijk (2014), the Economic Sentiment Indicator, measuring the current business climate and its future outlook, is used as a variable describing the credit risk of borrowers. The time series for this indicator is taken from the webpage of the European Commission. Based on the work by Paries et al. (2014), the banking risk is also included in the last specification of the model. It is represented by the median of credit default swap rates on 1-year senior debt of European Union banks from the ECB Statistical Data Warehouse. Both risk measures are transformed in logs.

After the analysis of time series properties of the data, all proposed data on lending rates and their explanatory factors in the Baltic States appear to be integrated with order one. Therefore, the framework of the well-known error correction model could be the most appropriate one for deeper analysis of the dynamics of lending rates in the Baltic States. In this framework, the analysis procedure starts with estimating the long-run relationship between lending rates and their explanatory factors (see, for example, DeBondt 2002; Heffernan 1997; Paries et al. 2014). For different specifications of the model used in this paper, this relationship is expressed by the following equations:

Specification I

$$LR_{j,i,t} = \alpha_{j,i}^{S1} + \beta_{j,i}^{S1}MR_{i,t} + u_{j,i,t}^{S1}, \quad (41.1)$$

Specification II

$$LR_{j,i,t} = \alpha_{j,i}^{S2} + \beta_{j,i}^{S2}WACL_{i,t} + u_{j,i,t}^{S2}, \quad (41.2)$$

Specification III

$$LR_{j,i,t} = \alpha_{j,i}^{S3} + \beta_{j,i}^{S3}MR_{i,t} + \gamma_{j,i}^{S3}CR_{i,t} + u_{j,i,t}^{S3}, \quad (41.3)$$

Specification IV

$$LR_{j,i,t} = \alpha_{j,i}^{S4} + \beta_{j,i}^{S4}WACL_{i,t} + \gamma_{j,i}^{S4}CR_{i,t} + u_{j,i,t}^{S4}, \quad (41.4)$$

Specification V

$$LR_{j,i,t} = \alpha_{j,i}^{S5} + \beta_{j,i}^{S5}MR_{i,t} + \gamma_{j,i}^{S5}CR_{i,t} + \tau_{j,i}^{S5}BR_t + u_{j,i,t}^{S5}, \quad (41.5)$$

where $LR_{j,i,t}$ is lending rate in j th segment in i th Baltic country; denotations $MR_{i,t}$ and $WACL_{i,t}$ stand for two alternative measures of bank funding costs, i.e., for the 3-month EURIBOR rate and weighted average cost of bank short-term euro liabilities, respectively; $CR_{i,t}$ is the proxy for creditworthiness of borrowers in i th Baltic country; BR_t represents banking risk. Variables $u_{j,i,t}^{S1}$, $u_{j,i,t}^{S2}$, $u_{j,i,t}^{S3}$, $u_{j,i,t}^{S4}$ and $u_{j,i,t}^{S5}$ are the deviations of lending rates from their long-term equilibrium level for different specifications of the model in j th lending segment in i th Baltic country. Parameters $\alpha_{j,i}^{S1}$, $\alpha_{j,i}^{S2}$, $\alpha_{j,i}^{S3}$, $\alpha_{j,i}^{S4}$ and $\alpha_{j,i}^{S5}$ measure a mark-up over of bank funding costs for different specifications of the model in each lending segment and country. They show by how many percentage points the lending rate is set above the related measure of bank funding costs. Parameters $\beta_{j,i}^{S1}$, $\beta_{j,i}^{S2}$, $\beta_{j,i}^{S3}$, $\beta_{j,i}^{S4}$ and $\beta_{j,i}^{S5}$ reveal by how many percentage points lending rates in different segments in the Baltic States would change in the long-run, if the related measures of bank funding costs change by one percentage point. The expected value of those parameters is positive and, under perfect competition and complete information, close to one. Parameters $\gamma_{j,i}^{S3}$ and $\gamma_{j,i}^{S4}$ characterise the influence of creditworthiness of borrowers and parameter $\tau_{j,i}^{S5}$ —that of banking risk in each lending segment of the Baltic countries.

The next step of the analysis involves the estimation of short-run relationship between lending rates and explanatory variables. The short-run equations for five specifications of the model are generalised into one equation:

$$\begin{aligned} I\Delta LR_{j,i,t} = & \alpha_{j,i}^{n,SR} + \beta_{j,i,0}^{n,SR}\Delta RR_{i,t} + \lambda_{j,i}^n \widehat{u}_{j,i,t-1}^n + \sum_{k=1}^{K_1} \beta_{j,i,k}^{n,SR} \Delta RR_{i,t-k} \\ & + I_{CR} \sum_{k=0}^{K_2} \gamma_{j,i,k}^{n,SR} \Delta CR_{i,t-k} + I_{BR} \sum_{k=0}^{K_3} \tau_{j,i,k}^{n,SR} \Delta BR_{i,t-k} + \varepsilon_{j,i,t}^n, \end{aligned} \quad (41.6)$$

where $RR_{i,t}$ is the funding cost measure of i th Baltic country either based on the 3-month EURIBOR rate (the first, third and fifth specification) or the weighted average cost of short-term euro liabilities (the second and fourth specification); $\widehat{u}_{j,i,t-1}^n$ is an estimated long-term equilibrium error incurred in the previous period for n th specification in j th lending segment of i th country; all other variables correspond

to the definitions given above. Denotation Δ stands for a first order operator. Denotation $\alpha_{j,i}^{n,SR}$ stands for a constant, $\beta_{j,i,0}^{n,SR}$ is an immediate or short-term pass-through coefficient from funding costs of banks to lending rates and $\lambda_{j,i}^n$ expresses an error correction quotient or the adjustment speed of lending rates towards their long-term equilibrium value; $\beta_{j,i,k}^{n,SR}$, $\gamma_{j,i,k}^{n,SR}$ and $\tau_{j,i,k}^{n,SR}$ are coefficients corresponding to k th lag of funding costs, creditworthiness of borrowers and banking risk, respectively, for n th specification in j th lending segment of i th country. A number of lags determined arbitrarily by a criterion of the coefficient of determination. Instrumental variable I_{CR} takes the value of 1, if specifications with creditworthiness of borrowers are considered and the value of zero otherwise. Variable I_{BR} takes the value of one if the fifth specification with banking risk is estimated and its value is zero otherwise. An error term for n th specification and j th lending segment in i th country is denoted by $\varepsilon_{j,i,t}^n$. If the long-term equilibrium error is statistically significant, the parameter $\lambda_{j,i}^n$ shows what fraction of the long-term equilibrium error could be eliminated during the next period. The expected value of parameter $\lambda_{j,i}^n$ is negative. The following equation could be used to calculate the time necessary for complete adjustment of lending rates to their long-run equilibrium value $(1 - \beta_{j,i,0}^{n,SR})/\lambda_{j,i}^n$ for the corresponding specification of the model, lending segment and country.

41.2.2 *Interpretation of Estimated Long-Run Relationship of the Error Correction Model*

Tables 41.1 and 41.2 report the results from estimating the long-term relationship of the error correction model for loans to households and enterprises, respectively. Both tables show the estimated coefficients before the respective explanatory variable and their significance across the five model specifications for the three Baltic countries.

Across lending segments, the long-run pass-through coefficients in all the three Baltic countries are the highest in the lending segments where interest rates are usually linked to a variable money market reference rate (Tables 41.1 and 41.2). In Latvia and Lithuania, the money market rate or weighted average cost of liabilities affects the long-term level of lending rates most in the segment of large loans to enterprises, but in Estonia—in the segment of loans to households for house purchase. In the fifth specification of the long-run relationship for large loans to enterprises, the long-run pass-through coefficient is 0.80 and 0.82 for Latvia and Lithuania, respectively. Relatedly, the long-run pass-through coefficient is 0.76 in the respective specification for loans to households for house purchase in Estonia. The long-run pass-through coefficient of money market rate is the lowest for consumer loans in Estonia and Lithuania. In the same lending segment in Latvia, the money market rate has a theoretically wrong sign in the first four specifications and is insignificant in the fifth specification of the long-term relationship.

Table 41.1 Assessment of long-run relationship for loans to households

Specification	Latvia			Lithuania			Estonia					
	MR _t	WACL _t	CR _t	BR _t	MR _t	WACL _t	CR _t	BR _t	MR _t	WACL _t	CR _t	BR _t
<i>Loans to households for house purchase</i>												
I	0.7***				0.7***				0.7***			
II	0.8***	0.8***			0.9***	0.9***			0.8***	0.8***		
III	0.7***		-2.8***		0.8***		-3.1***		0.7***		-1.9***	
IV	0.8***	0.8***	-1.3**		0.9***	0.9***	-2.4***		0.8***	0.8***	-2.3***	
V	0.7***		-2.7***	0.0	0.9***		-2.6***	0.1***	0.8***		-1.5***	0.1***
<i>Consumption loans (accounting for euro introduction effect)</i>												
I	-0.7**				0.5***				0.4			
II		-0.7*			0.6***	0.6***			0.3			
III	-0.4		-12.5***		0.6***		-2.7***		0.5*		-4.6*	
IV		-0.5**	-13.2***		0.6***	0.6***	-2.1**		0.4	0.4	-4.5	
V	-0.3		-9.4***	0.5	0.6***		-2.1**	0.1	0.5*		6.8*	2.1***
<i>Loans for other purposes</i>												
I	0.4***				0.5***				0.6***			
II		0.6***			0.7***	0.7***			0.7***			
III	0.5***		-6.4***		0.6***		-3.8***		0.6***		-0.5	
IV		0.6***	-5.3***		0.7***	0.7***	-3.2***			0.7***	-0.8	
V	0.6***		-5.6***	0.2*	0.7***		-2.9***	0.2***	0.7***	1.0		0.3*

Note: Any *p*-value less than 0.001 is designated with three (***) asterisks, *p*-value over or equal to 0.001, but less than 0.01—with two (**) asterisks, *p*-value over or equal to 0.01, but less than 0.05—with one (*) asterisk
 Source: author's calculations based on the data from the ECB Statistical Data Warehouse and national banks of Latvia, Lithuania and Estonia

Table 41.2 Assessment of long-run relationship for loans to non-financial corporations

Specification	Latvia			Lithuania			Estonia					
	MR _{<i>i,t</i>}	WACL _{<i>i,t</i>}	CR _{<i>i,t</i>}	BR _{<i>t</i>}	MR _{<i>i,t</i>}	WACL _{<i>i,t</i>}	CR _{<i>i,t</i>}	BR _{<i>t</i>}	MR _{<i>i,t</i>}	WACL _{<i>i,t</i>}	CR _{<i>i,t</i>}	BR _{<i>t</i>}
<i>Small and medium loans</i>												
I	0.6***				0.7***				0.6***			
II		0.8***				0.8***				0.7***		
III	0.7***		-5.9***		0.7***		-2.8		0.6***		-4.1***	
IV		0.8***	-4.5***			0.8***	-2.1***			0.7***	-4.5***	
V	0.7***		-5.1***	0.2**	0.9***		-2.0***	0.2***	0.7***		-3.1***	0.2***
<i>Large loans</i>												
<i>Small and medium loans</i>												
<i>Large loans</i>												
I	0.7***				0.7***				0.8***			
II		0.9***				0.9***				0.9***		
III	0.8***		-3.4***		0.8***		-2.5***		0.7***		-2.0***	
IV		0.9***	-1.3**			0.9***	-1.8***			0.9***	-2.3***	
V	0.8***		-3.0***	0.1*	0.8***		-2.0***	0.1***	0.7***		-2.4***	0.5***

Note: Any *p*-value less than 0.001 is designated with three (***) asterisks, *p*-value over or equal to 0.001 but less than 0.01—with two (***) asterisks, *p*-value over or equal to 0.01 but less than 0.05—with one (*) asterisk
 Source: author's calculations based on the data from the ECB Statistical Data Warehouse and national banks of Latvia, Lithuania and Estonia

The influence of money market rates or weighted average cost of liabilities could be assessed as average for loans to households for other purposes as compared with loans in other lending segments in all Baltic countries. Across lending segments, the proxy of creditworthiness of borrowers influences the long-term level of lending rates to a smaller extent for large loans to enterprises and loans to households for house purchase (Tables 41.1 and 41.2). Large enterprises tend to be less affected by economic fluctuations than the smaller ones; banks in the Baltic States prefer the lending to large enterprises to lending to smaller and riskier enterprises after the 2008 financial crisis. Similarly, loans to households for house purchase are usually guaranteed by collateral; therefore, their margins are lower and less affected by changes in external circumstances.

Across the Baltic countries, the long-term pass-through from funding costs to lending rates tends to be higher in Lithuania in the majority of considered lending segments, especially after taking into account the direct influence of risk factors (Tables 41.1 and 41.2). However, with some exceptions, the differences between the long-run pass-through coefficients are not principal. In the segment of small and medium sized loans to enterprises, the long-run pass-through coefficients, depending on the model specification, range from 0.60 to 0.76 in Latvia, 0.62 to 0.74 in Estonia and 0.67 to 0.84 in Lithuania. In the segment of large loans to enterprises, the long-run pass-through coefficients in Latvia, Estonia and Lithuania are in the range from 0.74 to 0.86, 0.72 to 0.92 and 0.73 to 0.91, respectively. Similarly, 70–82% of changes in funding costs measure are transmitted to interest rates on loans to households for house purchase in Latvia, 72–85% to the respective rates in Estonia and 75–95% in Lithuania. In the segment of loans to households for other purposes, the pass-through coefficient is significantly smaller in Latvia (in the range from 0.45 to 0.58), but relatively close in Lithuania (in the range from 0.55 to 0.73) and Estonia (from 0.63 to 0.74).

The credit risk of clients plays the most important role in determining lending rates in Latvia as compared to the rest of the Baltic countries (Tables 41.1 and 41.2). This applies mostly to small and medium sized loans to enterprises as well as consumption and other loans to households. For loans to households for house purchase, the effect of borrowers' credit risk is the smallest in Estonia, while relatively similar in Latvia and Lithuania. At the same time, the creditworthiness of borrowers is almost equally important in all three Baltic States in the segment of large loans to enterprises. The measure of the credit risk of the banking system is significant in the last specification of long-term relationship in all segments of loans at least for one of all three Baltic States.

41.2.3 Interpretation of Estimated Short-Run Equation of the Error Correction Model

Table 41.3 presents the results of estimating the short-run equation of the model for loans to households and Table 41.4 does it for loans to enterprises. The results

are available for five model specifications across the three Baltic States. Both tables show the estimated coefficients before the respective explanatory variable and their statistical significance as well as additional information about adjustment time of lending rates and adjusted coefficients of determination of estimated regressions.

Assessment of the short-run equation of the error correction model shows that in the Baltic countries a relatively large part of changes in funding costs of banks is covered by the adjustment of lending rates at the same point of time (Tables 41.3 and 41.4). The difference of the corresponding measure of funding costs is statistically significant in most lending segments in the Baltic States, reflecting a strong short-run relationship between the mentioned variables. In addition, the estimated coefficients for the short-term pass-through $\beta_{j,i,0}^{SR}$ are comparatively high for loans to enterprises and households for house purchase. In many of the analysed cases across the Baltic countries, especially for loans to enterprises, the short-term pass-through is higher than 50%. If all the other factors affecting lending interest are held constant, an increase by one percentage point in the measure of funding costs of banks in most lending segments across the Baltic States would transform into an increase that is on average larger than 0.5 percentage points.

The average time necessary for lending rates on newly granted loans to enterprises to adjust to changes in the funding costs of banks is less than 3 months in all three Baltic countries, if those specifications of the model are considered that describe the patterns observed in the data in the most precise way (Tables 41.3 and 41.4).

The average time necessary for lending rates on newly granted loans to households to adjust to changes in the funding costs of banks, as a rule, is longer in all Baltic countries. Nevertheless, the adjustment of interest rates on loans to households could be evaluated as relatively fast. The adjustment time of interest rates on loans to households for house purchase lasts on average from 2 to 6 months in the Baltic countries, if the most appropriate specification of the model is taken into account. Similarly, the adjustment time of interest rates on loans for consumption is on average 2–3 months, and the adjustment time of interest rates on loans to households for other purchases is 1–3 months.

Across the Baltic countries, the short-term pass-through from funding costs to lending rates tends to be higher for loans to households in Lithuania, for large loans to enterprises in Estonia, and for small and medium loans to enterprises in Latvia (Tables 41.3 and 41.4). The average time necessary for lending rates on newly granted loans to households for house purchase to adjust to changes in the funding costs of banks is the shortest in Latvia, but the average time necessary for the full adjustment of lending rates on newly granted consumption loans and loans to households for other purposes—in Lithuania. Interest rates on large loans to enterprises adjust faster in Estonia (immediately or during a month), but on small and medium loans to enterprises in Latvia (immediately or during 3 months).

Figure 41.1 shows the level of lending rates to enterprises from 2007 till 2015 in the three Baltic States together with the contribution of market reference rates, borrowers' risk and bank risk. In all three countries, lending rates are affected by reference money market rates, but, in the last years, changes in the money

Table 41.3 Assessment of short-run relationship for loans to households

Specification	Latvia			Lithuania			Estonia		
	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}
<i>Loans for house purchase</i>									
I	0.2*	-0.3***	35.6%	0.7***	-0.1*	50.0%	0.4***	-0.1**	51.5%
II	0.3*	-0.3***	29.1%	0.3**	-0.1**	23.6%	0.4***	-0.1*	46.4%
III	0.5***	-0.4***	40.3%	0.7***	-0.1*	53.1%	0.5***	-0.1**	51.5%
IV	0.4***	-0.4***	28.1%	0.5***	-0.1*	17.6%	0.4***	-0.1**	46.8%
V	0.4***	-0.4***	42.6%	0.7***	-0.1**	53.5%	0.5***	-0.1**	50.8%
<i>Consumption loans (accounting for euro introduction effect)</i>									
I	x			0.6***	0.0	49.3%	-0.1	-0.3***	8.3%
II	x			-0.1	-0.4***	36.7%	-0.4	-0.3***	8.5%
III	x			0.4	-0.4***	37.3%	0.2	-0.3***	8.3%
IV	x			0.4	-0.4***	36.3%	0.1	-0.3***	8.4%
V	x			0.4	-0.5***	38.6%	x		
<i>Loans for other purposes</i>									
I	-0.2	-0.3***	37.8%	0.7**	-0.2**	33.7%	0.6	-0.5***	24.4%
II	-0.9*	-0.4***	40.2%	0.6*	-0.2**	31.0%	-0.1	-0.5***	23.3%
III	0.6	-0.6***	40.1%	0.8***	-0.4***	32.7%	0.7	-0.5***	23.9%
IV	-0.3	-0.6***	39.3%	0.8**	-0.3***	28.2%	0.2	-0.5***	22.7%
V	0.5	-0.5***	39.2%	0.7**	-0.7***	38.1%	x		

Note: Any p -value less than 0.001 is designated with three (***) asterisks, p -value over or equal to 0.001 but less than 0.01—with two (**) asterisks, p -value over or equal to 0.01 but less than 0.05—with one (*) asterisk. 'x' denotes cases where at least one variable has a wrong sign in the long-term equation
 Source: author's calculations based on the data from ECB Statistical Data Warehouse and national banks of Latvia, Lithuania and Estonia

Table 41.4 Assessment of short-run relationship for loans to enterprises

Specification	Latvia			Lithuania			Estonia					
	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time
<i>Small and medium loans</i>												
I	0.6	-0.2**	33.9%	3M	0.5**	-0.1	36.9%	7M	0.4*	-0.1**	34.7%	5M
II	1.3***	-0.1*	41.1%	0M	0.6***	-0.1**	24.9%	4M	0.4*	-0.1*	33.1%	6M
III	0.9**	-0.3**	35.0%	1M	0.6***	-0.1**	39.2%	3M	0.6***	-0.2***	36.0%	3M
IV	1.4***	-0.3***	36.2%	0M	0.7***	-0.1*	23.1%	3M	0.7***	-0.2***	36.1%	2M
V	0.9**	-0.3**	35.0%	1M	0.6***	-0.2**	40.7%	2M	0.6***	-0.2***	36.6%	2M
<i>Large loans</i>												
<i>Latvia</i>												
	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time
I	0.7*	-0.5***	50.7%	1M	0.6**	-0.3***	32.2%	2M	0.7**	-0.3**	44.5%	1M
II	-0.3	-0.8***	44.2%	2M	0.4	-0.3***	25.9%	3M	0.8**	-0.2**	42.1%	1M
III	0.9**	-1.0***	53.1%	1M	0.6***	-0.6***	34.5%	1M	1.0***	-0.2*	43.6%	0M
IV	0.1	-0.9***	43.4%	2M	0.5*	-0.3***	25.6%	2M	1.3***	-0.1	42.4%	0M
V	1.0***	-1.1***	55.2%	1M	0.6***	-0.6***	38.2%	1M	1.0***	-0.3**	42.0%	1M
<i>Estonia (since 2008)</i>												
	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time	$\Delta RR_{i,t}$	$\widehat{u}_{j,i,t-1}$	R^2_{adj}	Time

Note: Any p -value less than 0.001 is designated with three (***) asterisks, p -value over or equal to 0.001, but less than 0.01—with two (**) asterisks, p -value over or equal to 0.01 but less than 0.05—with one (*) asterisk. 'x' denotes cases where at least one variable has a wrong sign in the long-term equation

Source: author's calculations based on the data from ECB Statistical Data Warehouse and national banks of Latvia, Lithuania and Estonia

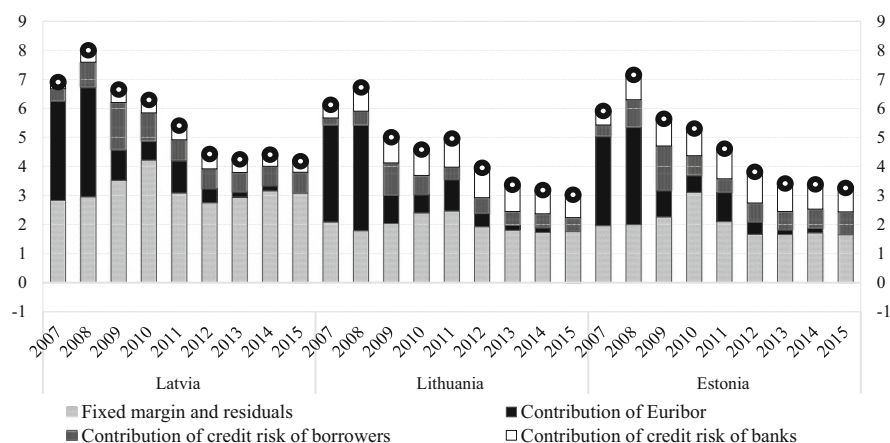


Fig. 41.1 Lending rates on small and medium loans to enterprises in the Baltic countries. Source: author's calculations based on the data from ECB Statistical Data Warehouse and national banks of Latvia, Lithuania and Estonia

market rates have a relatively small contribution. In 2008, lending rates on small and medium loans to enterprises were affected upwards by the slight increase in bank risk. In 2009, the fall in reference money market rates have put downward pressure on lending rates, but the pass-through was obstructed by the substantial increase in borrowers' risk. The contribution of risk factors has decreased somewhat since the peak of the global financial crisis, the European debt crisis, and since the correction of housing prices in the local real-estate markets. Still, risk factors explain a relatively large part of lending rates in the Baltic countries.

41.2.4 Evaluation of Different Specifications of the Error Correction Model

In the Baltic countries, there is no clear evidence that the measure of funding costs based on the weighted average cost of liabilities serves better than simple 3-month EURIBOR interest rate (Tables 41.1, 41.2, 41.3 and 41.4). However, the measure based on the weighted average cost of liabilities, similar to the measure based on the 3-month EURIBOR interest rate, tends to be statistically significant and has a positive sign in the long-run equations across different lending segments and across the three Baltic countries. According to the obtained coefficients of determination pertaining to the short-run relationship between lending rates and considered explanatory variables, the short-run dynamics of lending rates could be explained better, if the comparable specification includes 3-month EURIBOR. Comparing the results of model specifications that include the measure of weighted average cost of liabilities with the corresponding specifications that include the

3-month EURIBOR rate (the first specification with the second and the third with the fourth one), the long-run impact of the measure based on weighted average cost of liabilities on lending rates tends to be higher than the long-run impact of 3-month EURIBOR rates in different lending segments in all Baltic countries. In the short run, however, changes of weighted average cost of liabilities tend to influence short-term fluctuations of lending rates to a smaller extent. The adjustment to the long-run equilibrium tends to take a longer period of time in most lending segments of the Baltic States, if the measure of weighted average cost of liabilities is considered.

In almost all lending segments in each of the three Baltic States, models of lending rates strongly benefit from the inclusion of the measure characterising creditworthiness of borrowers (Tables 41.1, 41.2, 41.3 and 41.4). In the third specification where lending rates are explained by 3-month EURIBOR and the proxy for creditworthiness of borrowers, the latter measure is statistically significant and has a negative sign in the long-run equation (except loans to households for other purposes in Estonia). In this specification in comparison with the simple relationship between lending rates and 3-month EURIBOR (the first specification), the long-run pass-through coefficient of reference money market rate to lending rate tends to be slightly higher and to have greater statistical significance across different lending segments and all three Baltic States. In addition, the short-run dynamics of lending rates is also explained better, if creditworthiness of borrowers is considered together with the 3-month EURIBOR rate. The third specification of the model tends to have the highest coefficient of determination among first four specifications of the model for loans to enterprises regardless of their size and for loans to households for house purchase in all Baltic States. The estimation of the related long-term relationships with weighted average costs of liabilities also provides supportive evidence for inclusion of the proxy of creditworthiness of borrowers. The corresponding results are less encouraging, if the short-run equations are considered.

Another measure reflecting banking risk is also helpful in explaining the dynamics of lending rates in the Baltic countries (Tables 41.1, 41.2, 41.3 and 41.4). In the last specification, linking lending rates to the 3-month EURIBOR rate, the proxy for creditworthiness of borrowers and the proxy for banking risk, the latter risk factor is statistically significant and has a positive sign in the long-term equation in such lending segments as large loans to enterprises, small and medium term loans to enterprises, loans to households for house purchase and loans to households to other purposes at least in two of the three Baltic countries. The credit risk measure of banking system is insignificant in the long-term equation for loans to households for house purchase in Latvia as well as for consumption loans in Latvia and Lithuania. The sign of the proxy for creditworthiness of borrowers becomes positive (theoretically wrong) after the inclusion of the proxy for banking risk in the third specification in the case of consumption loans and loans to households for house purchase in Estonia. In the short run, the proxy for banking risk often appears insignificant. However, in more than a half of cases across different lending segments and three Baltic countries the short-run equation of the error correction model has the highest coefficient of determination, if the fifth specification of the model with the proxy of banking risk is considered.

Taking into account the sign and statistical significance of explanatory variables in the long-run equation, the best specification could be selected, on the one hand, between the first, third and fifth specifications that include the 3-month EURIBOR rate and, on the other hand, between the second and fourth specifications that include the measure based on weighted costs of liabilities (see numbers in bold in Tables 41.1 and 41.2). They show that the specification with the highest coefficient of determination in the short-run equation could be considered to be superior (see numbers in bold in Tables 41.3 and 41.4). Following the described rule of thumb, in seven of the fourteen cases the fifth specification of the model which includes the proxy of creditworthiness of borrowers and the proxy for banking risk, appears to be the most appropriate, but in four of the fourteen cases, the fourth specification which includes the measure of weighted average cost of liabilities and the proxy of creditworthiness of borrowers, could be selected as the leading one.

41.3 Conclusions, Proposals and Recommendations

1. Despite the rising popularity of the measure of funding costs based on the weighted average cost of liabilities in the estimation of the pass-through of funding costs to lending rates, the 3-month EURIBOR rate better describes the dynamics of lending rates in the Baltic States. When analysing the dynamics of lending rates in the Baltic States, the measure characterising creditworthiness of borrowers must be taken into account, as it is a significant factor determining the lending rate dynamics in the Baltic countries. In addition, the analysis of the dynamics of lending rates in the Baltic States could benefit from the inclusion of the measure reflecting banking risk in the region. However, this measure should be used with caution as its importance notably varies over time.
2. In the Baltic countries, the long-run relationship between lending rates and the measure of bank funding costs is strong and tends to be the highest for loans to enterprises and loans to households for house purchase. In the same lending segments, creditworthiness of borrowers has a relatively smaller effect on lending rates. Lending rates on loans to enterprises adjust to changes in funding costs more quickly, i.e., in less than 3 months. Adjustment of interest rates on loans to households takes a longer time span, but for the best specifications of the model, which take into account risk considerations, does not exceed 6 months.
3. In the Baltic countries, the long-run level of lending rates is affected by the same factors. However, the strength of their influence slightly differs. In general, the long-term pass-through from funding costs to lending rates tends to be higher in Lithuania, but creditworthiness of borrowers appears to have the highest influence on lending rates in Latvia. The time necessary for different lending rates to adjust to changes in funding costs of banks varies across the Baltic States. Lending rates tend to adjust faster to changes in funding costs of banks for consumption loans and loans to households for other purposes in Lithuania,

for loans to households for house purchase and small and medium loans to enterprises in Latvia as well as for large loans to enterprises in Estonia.

4. The influence of borrowers' risk and bank risk on changes in lending rates in the Baltic countries was most prominent in 2009. However, the effect of those factors decreased later; nevertheless, their influence remains higher than before the global financial crisis and corrections of housing prices in the local real-estate markets. In the future, the expansionary monetary policy of the ECB will reduce the level of lending rates in the Baltic States. However, banks could be reluctant to decrease them appropriately due to risk and profitability considerations.
5. The analysis of lending rate dynamics in the Baltic countries shows that their experience is similar to the experience of other euro area countries in respect that the credit risk of borrowers and banking risk have a significant role in determination of the lending rate dynamics in the region. On the other hand, the use of the weighted average cost of liabilities as an alternative measure of bank funding costs added little value to the analysis of the dynamics of lending rates in the Baltic States. In other euro area countries, this measure substantially improved the analysis of the pass-through of bank funding costs to lending rates. The pass-through from bank funding rates to lending rates is relatively high in the Baltic countries vis-à-vis the other countries, especially when risk considerations are taken into account.
6. The analysis of lending rates in the Baltic countries could be developed further by considering alternative measures of borrowers' credit risk and banking risk as well as alternative econometric models for the analysis. An interesting area of investigation would be the stability of pass-through coefficients over time. An additional insight could be gained from the analysis of investigation how a partial pass-through of interest rates impacts the overall development of the economy.

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Chapter 42

Modelling Farmers' Behaviour Toward Risk in a Large Scale Positive Mathematical Programming (PMP) Model

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Abstract Agricultural production is characterized for being a risky business due to weather variability, market instability, plant diseases as well as climate change and political economy uncertainty. The modelling of risk at farm level is not new, however, the inclusion of risk in Positive Mathematical Programming (PMP) models is particularly challenging. Most of the few existing PMP-risk approaches have been conducted at farm-type level and for a very limited and specific sample of farms. This implies that the modelling of risk and uncertainty at individual farm level and in a large scale system is still a challenging task. The aim of this paper is to formulate, estimate and test a robust methodology for explicitly modelling risk to be incorporated in an EU-wide individual farm model for Common Agricultural Policy (CAP) analysis, named IFM-CAP. Results show that there is a clear trade-off between the behavioural model (BM) and the behavioural risk model (BRM). Albeit the results show that both alternatives provide very close estimates, the latter increases three times the computation time required for estimation. Despite this, we are convinced that the modelling of risk is crucial to better understand farmer behaviour and to accurately evaluate the impacts of risk management related policies (i.e. insurance schemes).

Keywords Farmers' behaviour • Risk • Large scale Positive Mathematical Programming • Common Agricultural Policy • Farm Level Model

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42.1 Introduction

Agricultural production is largely characterized for being a risky business due to weather variability, market instability, plant diseases incidences, and even more today due to climate change and political economy uncertainty. Managing agricultural risk is, therefore, particularly important, mainly for smallholder farmers, who are usually vulnerable and lack the resources to absorb shocks. The new CAP reform also adds new arguments for the analysis of risk in farm production, as it establishes the so-called *risk management toolkit*, which includes three measures to compensate farmers' income losses due to unpredictable events (OJEU 2013): (1) financial contributions to premiums for crop, animal and plant insurance, (2) financial contributions to mutual funds and (3) an income stabilization tool.

Production theory and empirical analysis have devoted a large effort to account for uncertainty in farming and the body of literature and models for such purposes is increasingly dealing with different types of risks and at various scales (Antón et al. 2013; Lehmann et al. 2013; Graveline et al. 2012; Serra et al. 2006; Serra et al. 2008; Sckokai and Moro 2006; Koundouri et al. 2009).

Focusing at the micro-level, several farm models considering farmers decisions under risk and uncertainty can be found in the literature. These models consider the impact of risk attitudes on farmers decisions taken in an uncertain environment (e.g. price and output volatility) as well as the explicitly impact of agricultural policies on the riskiness of the farm business. Most of these models are based on mathematical programming, including linear (LP) and non-linear (NLP) programming models. This approach consists in solving at given prices and unit costs, a general maximization problem in terms of input choice and land decisions, subject to a set of constraints representing production technology and policy restrictions. Econometric (dual or reduced form) models under uncertainty have been less exploited due to the limited number of inputs and outputs that can be simultaneously considered. Among the few tentative available in the literature is the methodology proposed by Coyle (1992, 1999) and implemented by Sckokai and Moro (2006) which relies on the specification of an indirect utility function, obtained from maximizing the expected utility of wealth.

The introduction of risk in farm linear programming models has been pioneered by Hazell and Norton (1986), who developed several alternatives based mainly on the expected utility paradigm. Some of examples are the mean–variance analysis, the MOTAD model, the safety first model or the target-MOTAD model (Hazell and Norton 1986). Others methodologies such as the chance constrained programming (Zhu et al. 1994) or the different variants of stochastic programming using discrete, dynamic or recursive approaches (Blanco and Flichman 2002) have also been used.

More recently, after the development of the positive mathematical programming (PMP) approach, there is a growing need to incorporate risk in a more sophisticated programming approach, but, at present, the literature on this topic is rather scarce. The PMP is a method proposed by Howitt (1995) to calibrate mathematical programming models to observed behaviour during a reference period without using

additional calibration constraints which are difficult to justify in a way consistent with existing economic theory. In PMP calibrated models, the observed activity levels are used to estimate unobserved non-linear costs which are omitted from the linear cost function of LP models because of data limitations and simplification purposes. Non-linear costs are related to issues like managerial capacity, fixed costs (e.g. machinery, buildings) and risk. Since the first introduction of PMP by Howitt (1995), a number of PMP variants have been developed based on different assumptions resulting in different model forecasts.¹

In most of the applied PMP models, risk attitudes driving farmers' performance are embedded in the PMP terms (Howitt 1995). Only few authors have proposed alternatives to explicitly model risk by separating the effect of the covariance matrix from that of the quadratic PMP terms in order to measure the effects of risk on farmers' economic decisions (Heckeley 2002; Paris and Arfini 2000; Louhichi et al. 2010; Severini and Cortignani 2012; Arata et al. 2014; Jansson et al. 2014; Petsakos and Rozakis 2015). However, most of these PMP-risk alternatives have been conducted at farm-type level and for a very limited and specific sample of farms. To the best of our knowledge, only Jansson et al. (2014) dealt with 323 farm types based on FADN data to show the applicability of their methodology. All the models with a full EU coverage such as CAPRI-FT (Gocht and Britz 2011; Gocht et al. 2013) and AROPAj (De Cara and Jayet 2000) do not explicitly consider risk as a factor influencing production decisions. This implies that the modelling of risk and uncertainty at farm level and in a large scale system is still a challenging task.

The aim of this paper is to formulate and test a robust methodology for explicitly modelling risk to be incorporated in an EU-wide individual farm model for Common Agricultural Policy (CAP) analysis, named IFM-CAP (Louhichi et al. 2015). IFM-CAP is designed to assess the impacts of CAP on farm economic and environmental performances. The rationale for such a farm-level model is based on the increasing demand for a micro-simulation tool capable to model farm-specific policies and to capture farm heterogeneity across the EU in terms of policy representation and impacts. Based on PMP, IFM-CAP seeks to improve the quality of policy assessment upon existing aggregate and aggregated farm-group models and to provide assessment of distributional effects over the EU farm population. To guarantee the highest representativeness of the EU agricultural sector, the model is applied to every EU-FADN (Farm Accountancy Data Network) individual farm (around 60,500 farms). In the current IFM-CAP version, farmers are assumed to be risk-neutral (i.e. profit maximizer), which is unrealistic given the uncertain and risky world in which they operate and the limited ability to foresee changes in several key factors that determine their decision-making (e.g. prices, yields and policies, among others).

The paper is structured as follows: in Sect. 42.2 the proposed methodology for modelling risk in the IFM-CAP framework is described and justified. Model

¹For a review on PMP models, see Henry de Frahan et al. (2007), Mérel and Bucaram (2010), Paris (2011) and Heckeley et al. (2012).

specification and assumptions before and after the implementation of the risk approach are also presented. In Sect. 42.3, the results of the application of the risk model to FADN sample farms (i.e. 6735 individual farms) in Spain are discussed. In Sect. 42.4, we highlight the main findings of the study and stress the value added of our results.

42.2 Materials and Methods

The key factors used in the literature to choose the model specification for including risk in mathematical programming models are the following: (1) the theory of decision-making under uncertainty, (2) the form of the utility function, (3) the sources of risk and (4) the calibration procedure.

Based on these factors, the main aim of this section is to present the principal features of the selected risk approach to be used within the IFM-CAP framework. Given the large scale application (full EU coverage) of the IFM-CAP model and its production activity coverage (i.e. crop and livestock), two additional factors are considered while selecting the suitable risk approach: computation time and model parameterization and calibration.

42.2.1 Model Specification

Most empirical studies consider that farmers project their expected performance behaving as risk averse and making decisions based on their past experience. This risk aversion is represented by the decision-maker's utility function, which determines the psychological value of each of the potential outcomes of the prospect. The Expected Utility Theory (EUT) has been the general basis for the inclusion of farmers' risk attitudes in mathematical programming models (Hazell and Norton 1986). Assuming that each decision-maker knows the values of the probabilities associated with each outcome, she/he will choose the prospect with the highest expected utility given by:

$$\text{Expected Utility}(X) = \sum_i p_i U(x_i) \quad (42.1)$$

where p_i and $U(x_i)$ denote the probability and the utility of outcome x_i , respectively.

Note that, in expected utility models, the value (utility) of an outcome does not coincide with the outcome (in general $U(x_i) \neq x_i$), meanwhile the psychological value of each probability p_i is always this very same probability p_i , which is used in the valuation of the prospect with no additional transformation.

The mean-variance analysis (E-V) is the general method used for the approximation of utility functions based on the EUT (Markowitz 1959). For the practical

application of E-V, Markowitz (2014) states that the necessary and sufficient condition is a careful choice from a mean–variance efficient frontier which will approximately maximize expected utility for a wide variety of concave (risk-averse) utility functions.

According to this method, farmers expected utility can be defined as the expected income and the associated income variance. Indeed, it is assumed that farmers select a production plan which minimizes the variance of income caused by a set of stochastic variables for a given expected income level. Following the mean–variance (E-V) approach with a Constant Absolute Risk Aversion (CARA) specification (Pratt 1964), farmers' utility maximization can be represented as follows (Hazell and Norton 1986):

$$E[U(Z)] = E[Z] - \frac{\varphi}{2} V(Z) \quad (42.2)$$

where $U(\cdot)$ is the utility function on income (Z) following a quadratic form (Freund 1956), $E[U(Z)]$ is the expected utility, $E[Z]$ is the expected income, φ is the absolute risk aversion coefficient according to CARA specification and $V[Z]$ is the variance of income (Z).

More sophisticated specifications consider constant relative risk aversion (CRRA) or decreasing absolute risk aversion (DARA). For instance, Petsakos and Rozakis (2015) develop a non-linear E-V specification derived from a logarithmic utility function and propose an endogenous definition of the decreasing risk aversion coefficient (DARA). However, CARA is wider employed in empirical agricultural research because it implies that the utility function is almost quadratic in the parameters, which simplifies the resolution of the optimization programming problem (Severini and Cortignani 2012). The computational advantage of the selected E-V approach with CARA specification and its easy numerical solving were one of the main reasons for being selected in the IFM-CAP framework.

Regarding the stochastic variables that determines the value of the expected income, most of the literature incorporates uncertainty in the gross margin per unit of activity (Severini and Cortignani 2012; Jansson et al. 2014) or in the revenues per unit of activity (see Coyle 1999; Sckokai and Moro 2006; Paris and Arfini 2000; Arata et al. 2014; Petsakos and Rozakis 2015). In the former case, the authors assume that prices, yields and costs are stochastic. In the later, some authors argue that costs are non-random because in static decisions models all the costs are known when decisions are made (Antle 1983; Petsakos and Rozakis 2015), while other authors state that costs are less stochastic than revenues from the farmer's perspective, so that the variance in the gross margin can be approximated by the variance in revenues (Jansson et al. 2014).

In the IFM-CAP framework, we opted for the second approach by considering uncertainty only in prices and yields (i.e. revenues), but without differentiating between sources of uncertainty. In fact, FADN provides time series on production value, production quantity and production area per crop, which allows to compute the prices (euros/ton) and yields (ton/ha) per crop as well as their variability.

However, this information is not available for unit costs per crop, so that uncertainty is only considered in revenues per unit of activity (see Sect. 42.2.3).

The general mathematical formulation of the IFM-CAP model without risk (i.e. behavioural model) can be written as follows² (Louhichi et al. 2015):

$$\begin{aligned} \text{Maximise } \pi &= E[\mathbf{p} \circ \mathbf{y}]'\mathbf{x} + \mathbf{s}'\mathbf{x} - \mathbf{C}'\mathbf{x} - \mathbf{d}'\mathbf{x} - \frac{1}{2}\mathbf{x}'\mathbf{Q}\mathbf{x} \\ \text{s.t.} \end{aligned} \quad (42.3)$$

$$\mathbf{A}\mathbf{x} \leq \mathbf{b} [\boldsymbol{\rho}] \quad (42.4)$$

$$\mathbf{x} \geq 0 \quad (42.5)$$

where π is the farm profit to be maximized. It is defined as the sum of expected gross margins minus a non-linear (quadratic) activity-specific (behavioural) function. The gross margin is the total revenue including sales from agricultural products and compensation payments (coupled) minus the accounting variable costs of production activities.

Adopting the assumptions indicated above, the conversion to a behavioural-risk model is straightforward:

$$\begin{aligned} \text{Maximise } E(U) &= E[\mathbf{p} \circ \mathbf{y}]'\mathbf{x} + \mathbf{s}'\mathbf{x} - \mathbf{C}'\mathbf{x} - \mathbf{d}'\mathbf{x} - \frac{1}{2}\mathbf{x}'\mathbf{Q}\mathbf{x} - \frac{\varphi}{2}\mathbf{x}'\boldsymbol{\Sigma}\mathbf{x} \\ \text{s.t.} \end{aligned} \quad (42.6)$$

$$\mathbf{A}\mathbf{x} \leq \mathbf{b} [\boldsymbol{\rho}] \quad (42.7)$$

$$\mathbf{x} \geq 0 \quad (42.8)$$

where $E(U)$ is the farm expected utility to be maximized. It is defined as the sum of expected gross margins minus a non-linear (quadratic) activity-specific (behavioural) function minus a risk component defined as farm-specific constant absolute risk aversion (CARA) coefficient (φ_f) times a farm-type covariance of activity revenues (and hence income) due to price and yield variations (\mathbf{S}_f).

In both model specifications, to render equations easily understandable, typeset vectors are designated by bold lowercase letters, typeset matrices by uppercase letters and scalars by italic letters. For simplicity, indices for farms are omitted. \mathbf{x} is the $(N \times 1)$ vector of non-negative activity levels (i.e. acreages and animal heads) for each agricultural activity i , \mathbf{p} is the $(N \times 1)$ vector of product prices (including feed and young animal prices), \mathbf{y} is the $(N \times 1)$ vector of yields, \mathbf{s} is the $(N \times 1)$ vector of production subsidies (coupled payments), \mathbf{C} is the $(K \times N)$ matrix of accounting unit cost for K input categories (seed, fertilizer, plant protection, other specific costs and feeding costs), \mathbf{d} is the $(N \times 1)$ vector of the linear part of the behavioural

²The symbol \circ indicates the Hadamard product.

activity function, \mathbf{Q} is the $(N \times N)$ symmetric, positive (semi-)definite matrix of the quadratic part of the behavioural activity function, φ is the constant absolute risk aversion coefficient and $\mathbf{\Sigma}$ is the $(N \times N)$ symmetric, positive (semi-)definite matrix of the covariance activity revenues per ha or per head. \mathbf{Q} matrix is defined as a farm-type specific matrix \mathbf{B}_{fi} weighted by a farm-specific scaling factor δ_f , ($\mathbf{Q}_f = \delta_f \mathbf{B}_{fi} \delta_f'$), following Heckelei and Britz (2000) specification.

The matrix \mathbf{A} is the $(N \times M)$ matrix of coefficients for M resource and policy constraints (land and quotas), \mathbf{b} is the $(M \times 1)$ vector of available resources (arable and grassland) and upper bounds to the policy constraints and $\boldsymbol{\rho}$ is the vector of their corresponding shadow prices.

Prices, yields, accounting unit cost, subsidies, matrix of coefficients, quotas (sugar beet and milk) and land availability are derived from FADN assuming that they are known with exactitude. The unknown parameters \mathbf{d} , \mathbf{Q} , $\boldsymbol{\rho}$, φ and $\mathbf{\Sigma}$ are estimated simultaneously in each NUTS2-region, as explained in the next section. All the unknown parameters are farm-specific, except \mathbf{B} and \mathbf{S} matrix which are farm-type specific.

Therefore, for easier comparison between both models, the quadratic terms that allow model calibration can be written as follows:

- Behavioural model (BM): $T_f = Q_f = \delta_f \mathbf{B}_{fi} \delta_f'$
- Behavioural and risk model (BRM): $T_f = \delta_f \mathbf{B}_{fi} \delta_f' + \varphi_f \mathbf{S}_{fi}$, both quadratic terms are composed by a farm-type matrix and a farm-specific scaling factor.

\mathbf{B} matrixes in both models are different, while \mathbf{T} can be similar.

42.2.2 Model Calibration

The aim of the calibration process is to ensure that the observed activity levels (i.e. crop allocation and herd size) during the base year period are exactly reproduced by the optimal solution of the programming model. Focusing on the behavioural-risk model, this consists of recovering the set of unknown parameters \mathbf{d} , \mathbf{Q} , $\boldsymbol{\rho}$, φ and $\mathbf{\Sigma}$, so that the optimization model (Eqs. (42.6) and (42.7)) replicates exactly the observed activity levels (\mathbf{x}^0) of the base year. To perform the estimation, we use a bayesian approach. First, we derive the first-order conditions of the optimization model (Eqs. (42.6) and (42.7)) that is assumed to approximate farmer behaviour (Heckelei 2002) and, second, we apply the Highest Posterior Density (HPD) method to estimate the unknown parameters. This Bayesian approach was proposed by Heckelei et al. (2005) as an alternative to entropy methods for deriving solutions to underdetermined systems of equations. The main advantage is that the HPD method allows a more straightforward formulation of available priori information and a clearly defined estimation objective.

In order to reduce the arbitrary parameter specifications and estimate more reliable cost functions covering all the parameters, we use multiple observations (cross-sectional data) and prior information on supply elasticities ($\bar{\epsilon}$) and on dual

values of constraints ($\bar{\rho}$) to calibrate the model (Louhichi et al. 2015). Supply elasticities are taken from available econometric studies at the NUTS2 level (Jansson and Heckelei 2011). Prior information on dual values of resources is derived from FADN. The final goal of this estimation/calibration procedure is not only to replicate exactly the observed activity levels, but also to reproduce, as closely as possible, the given farm dual values, farm-type covariance matrix of revenues (\mathbf{S}) and NUTS2 own-price supply elasticities $diag(\boldsymbol{\epsilon})$. Moreover, the estimated farmers' constant absolute ($\boldsymbol{\varphi}$) and relative (CRRA = $\boldsymbol{\varphi} E(Z)$) risk aversion coefficients should be consistent with the range indicated in the literature.

The complete specification of the HPD estimator for the behavioural-risk model is as follows:

$$\text{Min} \left[\sum_f \Psi'_f \frac{(\rho_f - \bar{\rho}_r)^2}{(\sigma_f^\rho)^2} + \sum_r \tilde{x}_r \frac{(\boldsymbol{\epsilon}_r - \bar{\boldsymbol{\epsilon}}_r)^2}{(\sigma_r^\epsilon)^2} + \sum_f \Psi'_f \sqrt{\frac{1}{\dim(\boldsymbol{\Sigma})^2} \sum_{ij} \frac{(s_{ij}^2 - \sigma_{ij}^2)^2}{\sum_i \sigma_{ii}^2}} \right] \tag{42.9}$$

s.t.

$$E[\mathbf{p}_f \circ \mathbf{y}_f] + \mathbf{s}_f - \mathbf{C}_f - \mathbf{A}'_f \boldsymbol{\rho}_f - \mathbf{d}_f - \mathbf{T}_f \mathbf{x}_f^0 = 0 \tag{42.10}$$

$$\mathbf{b}_f - \mathbf{A}_f \mathbf{x}_f^0 = 0 \tag{42.11}$$

$$\boldsymbol{\epsilon}_f = \text{diag} \left[\mathbf{T}_f^{-1} - \mathbf{T}_f^{-1} \mathbf{A}'_f (\mathbf{A}_f \mathbf{T}_f^{-1} \mathbf{A}'_f)^{-1} \mathbf{A}_f \mathbf{T}_f^{-1} \right] \circ \frac{E[\mathbf{p}_f \circ \mathbf{y}_f] - \mathbf{c}_f}{\mathbf{x}_f^0} \tag{42.12}$$

$$\boldsymbol{\epsilon}_r = \frac{\sum_f \boldsymbol{\epsilon}_f \mathbf{x}_f^0 w_f}{\sum_f \mathbf{x}_f^0 w_f} \tag{42.13}$$

$$\mathbf{B}_{ft} = \mathbf{L}'_{q,ft} \mathbf{L}_{q,ft} \tag{42.14}$$

$$\mathbf{Q}_f = \boldsymbol{\delta}_f \mathbf{B}_{ft} \boldsymbol{\delta}'_f \tag{42.15}$$

$$\mathbf{S}_{ft} = \mathbf{L}'_{s,ft} \mathbf{L}_{s,ft} \tag{42.16}$$

$$\mathbf{T}_f = \mathbf{Q}_f + \boldsymbol{\varphi}_f \mathbf{S}_{ft} \tag{42.17}$$

$$\boldsymbol{\rho}_f, \boldsymbol{\varphi}_f \geq 0 \tag{42.18}$$

where the decision variables are $L_{q,ft}$, $L_{s,ft}$, d_f , ρ_f and φ_f for all farm f and farm-type ft in the NUTS region r . Notice that $\sum_{i,j} \frac{(s_{ij}^2 - \sigma_{ij}^2)^2}{\sum_i \sigma_{ii}^2}$ is the Chi-square distance between S_{ft} ($S_{ft} = s_{ij}^2$) and Σ ($\Sigma = \sigma_{ij}^2$) and $\frac{1}{\dim(\Sigma)^2}$ is a scaling factor. Table 42.1 reports all the indexes, parameters and variables used in the HPD estimator.

The constraints defined in Eqs. (42.10) and (42.11) represent the first-order conditions of the optimization model (Eqs. (42.6) and (42.7)) with equality constraints (i.e. data consistency constraints). Equations (42.12) and (42.13) compute supply elasticities at farm and NUTS2 levels. Equations (42.15) and (42.17) calculate the farm-specific Q matrix and the farm-type covariance matrix of activity revenues, respectively. Equations (42.14) and (42.16) are the Cholesky's decomposition which ensures that the quadratic part of the activities' implicit cost function is symmetric, positive (semi-)definite matrix. Finally, the last Eq. (42.18) corresponds to the non-negativity constraints of the optimization problem.³

42.2.3 Data

The implementation of the proposed methodology for modelling risk in IFM-CAP requires two different sets of data: (1) the data used in the IFM-CAP model without risk specification and (2) the data necessary to calculate the variance of the stochastic variables (i.e. revenues estimated using FADN prices and yields) in the PMP risk model specification. The former is described in-depth in Louhichi et al. (2015). For the latter, covariance matrices were estimated using FADN data from the six previous years, i.e., 2004–2009.

Within each NUTS2, the covariance matrix of revenues per hectare has been computed using pairwise complete observations. Given two activities, the sample size is determined by the number of farms that have carried out these two activities in the period 2004–2009. We observe the following three main results:

- A large number of estimations are calculated with 9 or less observations, which is a very small sample size to obtain reliable conclusions.
- Estimations show large differences among NUTS2 levels. For instance, the standard deviation for OVEG (Other Vegetables) in the region ES41 is 1021.01, whereas in ES61 is forty times larger (40,322.82).
- We also observe relevant differences between NUTS2 in estimations obtained with larger samples. For example, the standard deviation for MAIZ (fodder maize) varies from 238.59 (ES30) to 761.07 (ES11), and for RYEM (Rye and Meslin) varies from 66.13 (ES61) to 388.37 (ES43).

³The calibration of the PMP models is implemented with R. The key calibration algorithms have been taken from two R libraries: *quadprog* and *Alabama*.

Table 42.1 Indexes, parameters and variables used in the HPD estimator

Indexes	Description
f	Farm
$\hat{f}t$	Farm type (according to FT14)
i, j	Agricultural activities (36 crops)
N	Number of farms in a NUTS2 region
n	Number of activities
m	Number of resource constraints
Parameters	Description
\mathbf{x}_f^0	$(n \times 1)$ vector of observed activity levels (ha)
\mathbf{p}_f	$(n \times 1)$ vector of farm product prices (€/Ton)
\mathbf{y}_f	$(n \times 1)$ vector of yield per activity (Ton/ha)
\mathbf{s}_f	$(n \times 1)$ vector of subsidies (€/ha)
\mathbf{c}_f	$(n \times 1)$ vector of costs per unit of activity (€/ha)
$\mathbf{p}_f \circ \mathbf{y}_f$	$(n \times 1)$ vector of revenues per unit of activity (€/ha)
$E[\mathbf{p}_f \circ \mathbf{y}_f]$	$(n \times 1)$ vector of expected revenues per unit of activity (€/ha)
\mathbf{b}_f	$(m \times 1)$ vector of available resource levels
\mathbf{A}_f	$(m \times n)$ matrix of coefficients in resource constraints
σ_{ij}^2	scalar, covariance of the revenue between activities i and j . NUTS2 level
Σ	$(n \times n)$ covariance matrix of revenues ($\Sigma = (\sigma_{ij}^2)$). NUTS2 level
\mathbf{D}_f	$(n \times n)$ diagonal matrix of scaling factors ($diag(\mathbf{D}_f) = 1/\sqrt{\mathbf{x}_f^0}$)
σ_r^ρ	$(m \times 1)$ vector of weighted standard deviations of the resource shadow prices
$\bar{\epsilon}_r$	$(n \times 1)$ vector of means of own-price elasticities of supply
σ_r^ϵ	$(n \times 1)$ vector of standard deviations of own-price elasticities of supply. It is assumed to be 50 % of the mean elasticities
w_f	scalar, farm weighting factor
Ψ_f	scalar, farm weight within N ($\Psi_f = w_f / \sum_{f \in N} w_f$)
$\hat{\mathbf{x}}$	$(n \times 1)$ vector of normalized weights of observed activities ($\hat{\mathbf{x}} = N \mathbf{x}_{f0} / \sum_{f \in N} \mathbf{x}_{f0}$)
Variables	Description
ϵ_r	$(n \times 1)$ vector of estimated means of own-price elasticities of supply
\mathbf{Q}_f	$(n \times n)$ symmetric (semi-)positive matrix. Quadratic term of the behavioural activity function.
$\mathbf{B}_{\hat{f}t}$	$(n \times n)$ symmetric (semi-)positive matrix. Quadratic term of the behavioural activity function.
s_{ij}^2	scalar, element ij of the quadratic term of the risk activity function. Farm-type specific
$\mathbf{S}_{\hat{f}t}$	$(n \times n)$ symmetric (semi-)positive matrix. Quadratic term of the risk activity function. ($\mathbf{S} = (s_{ij}^2)$)
$\mathbf{L}_{q,\hat{f}t}, \mathbf{L}_{s,\hat{f}t}$	$(n \times n)$ matrices employed to obtain the Cholesky's decomposition of matrices \mathbf{Q} and \mathbf{S} , respectively
\mathbf{T}_f	$(n \times n)$ symmetric (semi-)positive matrix. ($\mathbf{T} = \mathbf{Q} + \phi \mathbf{S}$)
\mathbf{d}_f	$(n \times 1)$ vector. Linear term of the behavioural activity function
φ_f	Absolute risk aversion coefficient
ρ_f	$(n \times 1)$ vector of calibration constraints shadow values

Since some of the combinations of activities are uncommon for some types of farms, the sample sizes for each pair of activities within each type of farm in each NUTS2 region are small, less than 10 farms in most of the cases. For this reason, it is not possible to use different covariance matrices for each type of farm and the estimation of covariance variables should be carried at NUTS2 level. We selected the 10 NUTS2 regions where crop activities are more relevant than livestock activities. After having selected the NUTS2 regions, sample farms will be chosen by their farm-type (FT14) focusing on those specialized crops. Finally, the following ten Spanish NUTS2 regions are used in the validation: ES11, ES12, ES13, ES21, ES23, ES30, ES43, ES53, ES62 and ES70. The test-sample consists of 6735 farms in Spain.

42.3 Results and Discussions

42.3.1 Comparing BM and BRM Models Performance

The calibration of both BM and BRM has been successfully completed for all the ten NUTS2 regions, so that they reproduce the base year observed activity levels. However, the incorporation of risk triples computing time. As shown in Table 42.2, the fit between the estimated variables and prior is higher in the BM than in the BRM, i.e., the mean value function is lower than that for the model with risk activity function. The last quadratic term of the objective function in the HPD estimator of the BRM (Eq. (42.9)) is not included in the specification of the HPD estimator of the BM. For the sake of comparability, Table 42.2 presents an additional column between BM and BRM with the value of the two terms of the objective function that appear in both HPD estimators. It shows the isolated effect of the inclusion of the risk terms on the deviation of estimated dual values (ρ_f) and regional elasticities (ϵ_r) from the priors.

Table 42.2 Value function for HPD model by NUTS2

NUTS2	BM	Intermediate value function	BRM
ES11	35.8	158.8	200.0
ES12	16.9	67.8	88.6
ES13	35.7	143.2	145.4
ES21	63.4	274.5	312.9
ES23	25.9	163.0	172.9
ES30	27.3	120.2	154.3
ES43	85.6	346.9	356.2
ES53	36.4	226.5	390.2
ES62	53.7	219.4	446.8
ES70	23.2	126.2	556.3

The calibration results in farm-specific positive CARA coefficients. The mean (median) CARA coefficient is 0.00032 (0.00004), with a high dispersion in the estimated values. These estimations of the CARA coefficients are quite similar than the ones estimated in Arata et al. (2014). Moreover, the average constant relative risk aversion (CRRA) is 5.8, which is consistent with the average value of 6.1 indicated in the literature (Chavas and Holt 1996). CRRA coefficients are weakly but significantly and negatively correlated with the number of activities, but the correlation with the size of the farm (hectares of total land) is insignificant.

The validation analysis has been completed with a comparison of the risk aversion coefficient for the different NUST2 areas and farm-types (Tables 42.3 and 42.4). Risk aversion varies significantly between regions and farm-types. In average,

Table 42.3 CARA coefficient for HPD model by NUTS2

NUTS2	Mean	Median
ES11	0.00048	0.00053
ES12	0.00079	0.00080
ES13	0.00047	0.00049
ES21	0.00102	0.00118
ES23	0.00024	0.00016
ES30	0.00033	0.00004
ES43	0.00015	0.00004
ES53	0.00000	0.00000
ES62	0.00001	0.00000
ES70	0.00010	0.00000

Table 42.4 CARA coefficient HPD model by farm type

Farm type	Code	Mean	Median
Cereals, oilseed and protein crops	13	0.00001	0.00000
General field cropping	14	0.00002	0.00002
Horticulture	20	0.00001	0.00000
Vineyards	31	0.00034	0.00016
Fruit	32	0.00004	0.00000
Olive	33	0.00040	0.00045
Permanent crops	34	0.00037	0.00059
Dairy farms	41	0.00074	0.00053
Sheep and goats	44	0.00034	0.00004
Cattle-rearing and fattening	45	0.00023	0.00004
Pigs and poultry	50	0.00033	0.00032
Mixed crops	60	0.00002	0.00001
Mixed livestock	70	0.00012	0.00010
Mixed crops and livestock	80	0.00005	0.00006

Table 42.5 Prior and estimated and simulated own-prices elasticities for BARL

NUTS2	Prior	BM		BRM		Quality measure	
		Estimation	Simulation	Estimation	Simulation	BM	BRM
ES13	0.854	0.826	0.826	0.805	0.805	0.000	0.000
ES21	1.285	0.685	0.685	0.682	0.682	0.000	0.000
ES23	0.978	0.473	0.477	0.477	0.477	0.000	0.000
ES30	0.657	0.452	0.452	0.463	0.463	0.000	0.000
ES43	1.991	0.862	0.862	0.913	0.908	0.000	0.004
ES53	1.540	0.732	0.732	0.733	0.733	0.000	0.000
ES62	3.848	1.067	1.047	1.096	1.076	0.007	0.007

Table 42.6 Prior, estimated and simulated own-prices elasticities for OLIV

NUTS2	Prior	BM		BRM		Quality measure	
		Estimation	Simulation	Estimation	Simulation	BM	BRM
ES23	0.100	0.062	0.062	0.072	0.072	0.000	0.000
ES30	0.100	0.079	0.079	0.079	0.079	0.000	0.000
ES43	0.100	0.020	0.020	0.020	0.020	0.000	0.000
ES53	0.100	0.138	0.138	0.138	0.138	0.000	0.000
ES62	0.100	0.115	0.115	0.117	0.117	0.000	0.000

Table 42.7 Prior, estimated and simulated own-prices elasticities for SWHE

NUTS2	Prior	BM		BRM		Quality measure	
		Estimation	Simulation	Estimation	Simulation	BM	BRM
ES11	1.764	1.078	1.078	1.075	1.075	0.000	0.000
ES13	1.013	0.133	0.133	0.115	0.115	0.000	0.000
ES21	0.597	0.382	0.382	0.382	0.382	0.000	0.000
ES23	1.012	0.663	0.662	0.399	0.398	0.000	0.000
ES30	1.481	0.907	0.907	0.993	0.993	0.000	0.000
ES43	1.464	1.112	1.112	1.141	1.141	0.000	0.000
ES53	2.551	2.035	2.035	2.043	2.043	0.000	0.000
ES62	7.891	2.696	2.696	2.714	2.714	0.000	0.000

farms belonging to the NUTS2 regions ES21 and ES12, and to the farm-type 41, are the more risk averse.

Tables 42.5, 42.6, 42.7 and 42.8 present the weighted averages of the estimated (using HPD) and simulated elasticities (using the calibrated model) as well as the measure of their quality, quantified through the sum of the normalized square deviations of simulated own-prices from estimated own-price. For the sake of simplicity, we show the results for the following four activities: soft wheat (SWHE), barley (BARL), olives for oil (OLIV) and grapes for wine production (TWIN). The main conclusions can be summarized as follows:

Table 42.8 Prior, estimated and simulated own-prices elasticities for TWIN

NUTS2	Prior	BM		BRM		Quality measure	
		Estimation	Simulation	Estimation	Simulation	BM	BRM
ES11	0.100	0.099	0.099	0.099	0.099	0.000	0.000
ES21	0.100	0.000	0.000	0.000	0.000	0.000	0.000
ES23	0.100	0.058	0.058	0.057	0.057	0.004	0.002
ES30	0.100	0.081	0.081	0.084	0.084	0.000	0.000
ES43	0.100	0.028	0.028	0.027	0.027	0.000	0.000
ES53	0.100	0.095	0.095	0.095	0.095	0.000	0.000
ES62	0.100	0.086	0.086	0.089	0.089	0.000	0.000
ES70	0.100	0.000	0.000	0.000	0.000	0.000	0.000

- In general, the estimations of the elasticities with both models underestimate priors. Around 88 % of the estimations are lower than their priors.
- The capacities of both calibrated models for the estimation of elasticities are very similar. However, BM estimations are slightly closer to priors than those of the BRM. Out of the 181 combinations of NUTS2 and crops for which the present elasticity analysis has been implemented, in 59 % of the cases the elasticities estimated from the BM fit better to the corresponding prior. This result is not surprising because the source of the BM terms is a model that minimizes the sum of normalized square deviations of estimated own-price elasticities from priors, while BRM is derived from models that minimize the sum and the deviation of estimated covariance matrix from the observed one.
- Simulated elasticities reproduce almost perfectly the estimated ones. The quality measure indicates that in 58 % of the cases BRM performs better than BM.

42.3.2 Sensitivity Analysis

This section presents the results of three sensitivity analyses to variations in the (1) gross margin due to changes in the revenues, (2) premiums and (3) price volatility.

Figure 42.1 shows weighted total activity under levels of gross margin that ranges from -50% to 50% with respect to the actual value in step of 10% . For each crop, its figure shows weighted total activity for the two calibrated models: behavioural model (*solid line*) and behavioural and risk model (*dashed line*). In general, the results show that there are not relevant differences between the sensitivity of the BM and BRM. However, we observed that for the four crops, the total activity is slightly Less elastic in BRM than in the BM. The dashed lines are above (below) the solid line for negative (positive) variations in the gross margin. This result is also observed in Severini and Cortignani (2012), who state that it is consistent with what is expected from the theory.

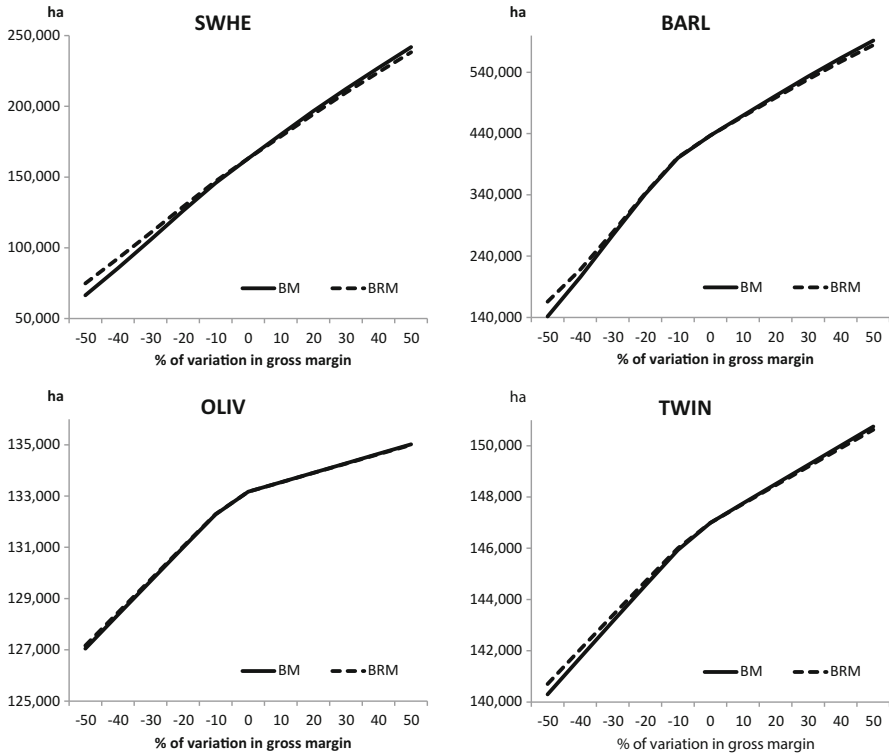


Fig. 42.1 Total supply under different levels of gross margin

Figure 42.2 shows total activity for a selection of crops in four scenarios: (1) premiums are completely removed, (2) premiums are halved, (3) premiums remain unchanged and (4) premiums increase 50%. Again both the calibrated BM and BRM models exhibit very similar sensitivity to changes in premiums, although it tends to be less elastic in the BRM.

Finally, we study the effect of changing the variability of the gross margin of a crop in its total activity (ha): the variance levels of the gross margin of that crop increase by 25% and 50% from the estimated value. For each increment in the crop variance, we evaluate the aggregated activity under different levels of gross margin (Fig. 42.3). For each crop, the graph represents the total activity for the three levels of variance: estimated value (solid line), 25% increment (dashed line) and 50% increment (dotted line). In this case, we obtain similar results for all the crops: a change in the variance level of a crop gross margin has an impact on total activity level. As expected, an increment in the variability (i.e. in the risk level) of a crop reduces the total supply of this crop, since farmers have been identified as being risk-averse. The percentage of downshift in the total supply for a 1% in the increment of

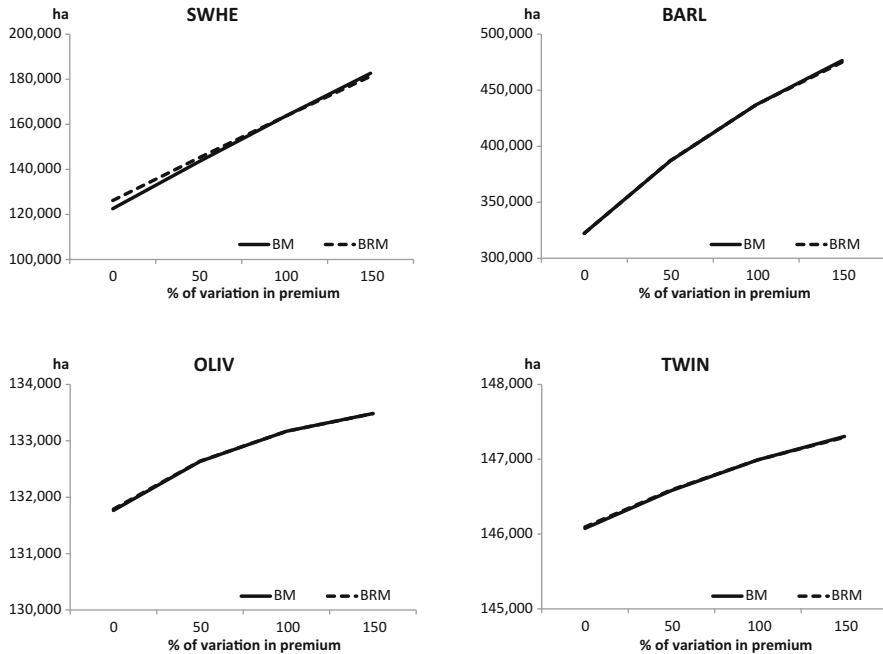


Fig. 4.2.2 Total supply under different levels of premiums

the variance depends on the crop: 0.049, 0.105, 0.033 and 0.132 for SWHE, BARL, OLIV and TWIN, respectively.

42.4 Conclusion

In this paper, we assessed the added value of incorporating risk terms in the IFM-CAP model proposed by Louhichi et al. (2015). The proposed methodology for modelling risk was based on the mean–variance approach and calibrated at individual farm level using a bayesian approach method.

Despite of the considerable complexity of the estimator, the calibration terms were successfully obtained. However, there is a clear trade-off between the behavioural model (BM) and the behavioural and risk model (BRM). Albeit the results show that both models provide very close estimates, which is corroborated by the sensitivity analysis, the latter increases three times the computation time required for estimation. As argued by Pannell et al. (2000), if the focus were placed on directly supporting farmers' decision making, probably a risk-aversion model specification would not add significant extra value respect to a model based on risk neutrality. However, the modelling of risk is still crucial for the evaluation

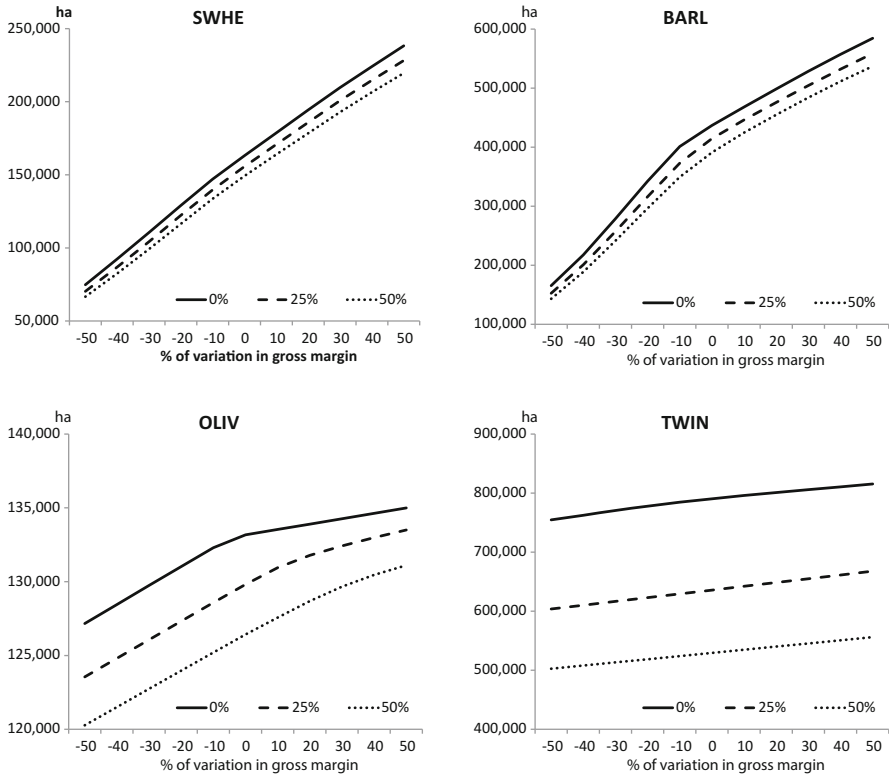


Fig. 42.3 Sensitivity analysis to the variability of the gross margin

of policies related to the adoption by farmers of insurance schemes (Severini and Cortignani 2012) or agricultural innovations (Pannell et al. 2014). Within the IFM-CAP framework, the consideration of risk is more than needed despite its complexity and heavy computational requirement. A part from the fact that the post 2013 CAP reform included new arguments for the analysis of risk in farm production with the so-called *risk management toolkit*, we are convinced that ignoring risk in a farm-level simulation model may lead to biased results and thus diminish its usefulness for impact analysis.

Finally, the tested model specification may present some limitations. Gomez-Limon et al. (2003) state that farmers' decision-making processes involve several different objectives, so that the reduction of the problem to a utility function with a sole monetary attribute may not fully explain his/her behaviour, limitation that can only be overcome including other objectives in a multi-criteria technique. However, in the framework of IFM-CAP, it would increase even more the complexity of the model structure and specification as well as the time necessary for model convergence.

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Chapter 43

CAPM Model, Beta and Relationship with Credit Rating

Lucia Michalkova and Katarina Kramarova

Abstract Capital asset pricing model (CAPM) is one of the most significant models in finance. The expected return for a stock is related to Beta which is the measure of market especially systematic risk. Recent researches show that Beta calculated by CAPM is very sensitive variable. Many studies have investigated the influence of variables to Beta, e.g., credit rating. The credit rating agencies as providers of information have a crucial importance for market participants and regulators. The aim of this contribution is to present the key studies examined linkage between credit rating and systematic risk as well as to present CAPM model, credit rating measures and their advantages and disadvantage.

Keywords Credit rating • Credit risk • CAPM • Portfolio theory

43.1 Introduction

The financial risk has a critical role in investment decisions (Dengov & Gregova, 2010). It is important to remember that risk is always current in financial markets and that it is necessary for investors to measure the risk and know its components (Kliestik et al. 2015). Since the development of Markowitz portfolio theory (1952) we can analyse and diversify the specific (unsystematic) part of total risk. Therefore, systematic risk is the most important part of the investor's risk measured by beta. It measures the covariance between a single stock and the market. Beta is also a measure of market risk which consists of several parts and this paper focuses on the relationship between beta and credit risk.

Credit risk is defined as “the risk that counterparty do not have ability and willingness to fulfill its obligations” (Valaskova et al. 2014). There are many measures of credit risk like credit scoring models, reduced or structural models but the most often measure used as a proxy for the credit risk is credit rating. Credit

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rating agencies make a judgement of companies' ability to meet its obligations (Spuchlakova et al. 2015). There were lots of criticisms responding to the role of rating agencies in the financial crisis. The bond rating information influences current prices of bonds as well as company's stock price. The contribution is divided into three parts: the impact of credit rating to systematic risk; theoretical foundation of CAPM and disadvantage of it and finally credit rating as a measure of credit risk and the criticism of rating agencies.

43.2 Impact of Credit Rating to Systematic Risk

The relationship between systematic risk and credit rating has been a matter of interest to many studies, researches and articles. In fact there are many studies about systematic risk and credit rating. Schwendiman and Pinches (1975) show in their study an inverse relationship between these measures, i.e., higher rating leads to lower Beta, unfortunately it can be found the only study describes credit rating and Beta relation. On the other hand, well-developed field of research is relationship between credit rating changes and price and risk of stocks (European Central Bank, 2004). Impson et al. (1992) examined 400 downgrades and almost 300 upgrades, resulted that downgrades led to increase of the systematic risk but there was no reaction found for upgrades. Hand et al. (1992) say that price reaction to rating changes and the effect on stock returns is asymmetrical, the market reacts more strongly to rating downgrades than to rating upgrades. Asymmetry is more significant for stocks than for bonds and also it was found that abnormal bond returns were stronger for speculative grade debt.

Dichev and Piotroski (2001) said that negative abnormal stock returns is between 10 and 14 % in the first year following downgrades. Furthermore, the underperformance is more pronounced for small or low credit quality companies. This finding could be due to greater information inefficiencies for smaller companies due to less analyst coverage or it could be due to the fact that rating agencies expend more resources on detecting deteriorations in company balance sheets than they do on detecting improvements in earnings. A further explanation is, of course, that stock markets overreact to rating downgrades (Abad-Romero & Robles-Fernandez, 2006).

There is another theory connected with rating changes: wealth redistribution hypothesis. Many researchers think that securities with poor credit rating are expected to be riskier than securities with higher level of rating. Zaima and McCarthy (1988) maintained that there is conflict between bondholders and shareholders. For example, if bond is downgraded due to an increase of risk a lower rating will cause decrease of bond prices and this decrease will transferred to the shareholders. All in all it means that downgraded credit rating causes increased stock price and vice versa. Goh and Ederington (1993) have written that not all rating downgrades are bad news for stockholders. Downgrades due to change in financial leverage indicate transfers of wealth from bondholders to stockholders. Thus, downgrades associated with a decline in financial outlooks have an effect on market.

43.3 Theoretical Foundation of CAPM Model

One of the most important models on the market valuation of capital is the Capital Asset Pricing Model developed independently in 1964–1966 by Sharpe (1964); Lintner (1965); Mossin (1966).

CAPM model is based on several assumptions:

1. all investment portfolios are estimated in terms of expected return and standard deviation of return,
2. all investors are assumed to define the relevant single period,
3. every asset traded on capital market is infinitely divisible,
4. all investors have same information about investments,
5. there are no transaction costs and no income taxes,
6. there is riskless rate and the investors can lend and borrow any amount of money at this rate of interest equal to the rate of riskless securities,
7. risk-free rate of return is same for investors in total,
8. no individual investor can affect prices by an single action,
9. all investors are assumed to have identical expatiations with respect to expected returns and the variance of returns of portfolio Cisco and Kliestik (2013).

Due to the assumption of homogeneous expectations and the same risk-free interest rate for borrowing and lending efficient frontier created by Markowitz changes. Each investor holds a combination of risky assets and risk-free asset which is defined as “two-fund separation theorem” Buc and Kliestik (2013). Risky portfolio is the same for all investors and it consists of all risky assets, so it must be the market portfolio. The new efficient frontier is represented by a straight line known as the capital market line shown in Fig. 43.1. All efficient portfolios would lie along this line.

Return and risk of a portfolio lying on CML are:

$$E(r_i) = x * r_f + (1 - x) * E(r_M) \quad (43.1)$$

$$\sigma_i = (1 - x) * \sigma_M \quad (43.2)$$

where

$E(r_i)$ —expected return of portfolio,

x —proportion of risk-free asset,

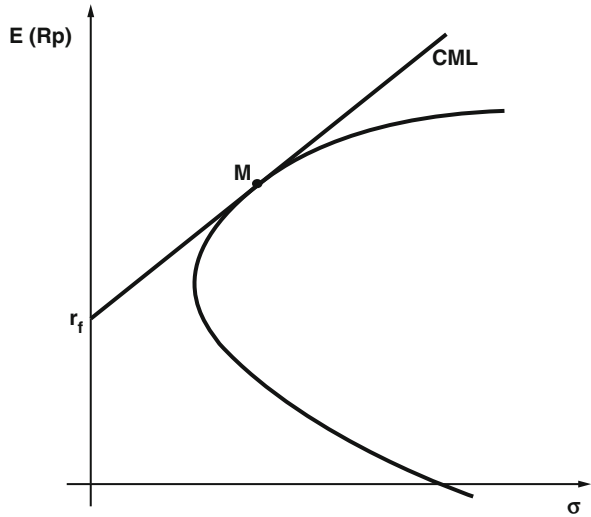
r_f —return of risk-free asset,

$E(r_M)$ —expected return of market portfolio,

σ_i —variance of portfolio,

σ_M —variance of market portfolio.

Fig. 43.1 Capital market line (according to Elton et al. 2003)



We adjust the formula for the variance and substitute it into the expression for the expected return. Then CAPM formula is

$$E(r_i) = r_f + \left(\frac{E(r_M) - r_f}{\sigma_M} \right) \sigma_{iM} = r_f + \frac{\sigma_{iM}}{\sigma_i^2} (E(r_M) - r_f) \tag{43.3}$$

However, there is also another form of CAPM equation as follows:

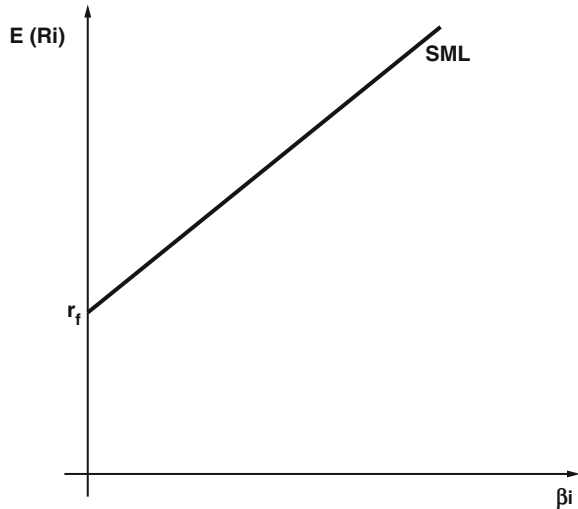
$$E(r_i) = r_f + \beta (E(r_M) - r_f) \tag{43.4}$$

$$\beta = \frac{\sigma_{iM}}{\sigma_i^2} \tag{43.5}$$

Equation (43.4) represents security market line (SML), shown in Fig. 43.2, which is the relationship between Beta (a measure of systematic risk) and expected return of assets. It validates that systematic risk is the only important part to determine expected return of asset and high Beta is expected to give a higher return of stock and vice versa. If a market is in equilibrium, return of any asset is laid on SML. Hence, if an asset gives high return than CAPM valuation’s expected return, this asset (e.g. stock) is undervalued. Stockholders will purchase the asset and at the same time potential future stockholders will not buy this asset until the return is equal to expected return.

CAPM model has been criticized, too. The first disadvantage of the model is the choice of risk-free asset. The authors of the model considered of 3-month Treasury bill (T-bill). Nowadays government bonds are no longer considered as risk-free. Even countries (issuers) can get into troubles caused by inflation, changes in foreign exchange rate or increasing debt (Greece, Spain, etc.). Another disadvantage

Fig. 43.2 Security market line (according to Elton et al. 2003)



is assumption associated by efficient market hypothesis. In general the theory is dealing with idea that prices in any time fully reflect all available information (Grublova 2010). This assumption also makes the model hardly applicable to financial market. There are anomalies of the efficient market hypothesis and these weaknesses have led to using other financial theory such as behavioural finance (Sivak et al., 2015).

43.4 Credit Rating as a Measure of Credit Risk

The rating models for estimating credit risk are based on the valuation of selected quantitative and qualitative indicators. The rating assignment process is divided into two steps: assignment of the rating and estimation of the probability of default or the probability of migration to another rating category (Brealey et al., 2010). Rating can be assigned, in general, by any entity of the financial market (e.g. by banks) but there are three major global credit rating agencies (CRA): Standard & Poor's (S & P), Moody's Investors Service and Fitch Investors Service (Misankova and Kral 2015). Their important position in the financial market is supported by several facts:

- many financial entities (banks, pension funds, etc.) can invest only in debt securities evaluated by one of the CRA,
- both issuer's and issue's credit rating affect interest for borrowed funds,
- growth of debt financing in recent decades,
- many investors replace their own assessment of debtor's ability to meet its financial obligations by rating.

Table 43.1 Credit rating categories

Investment Grade	S & P	Moody's	Fitch
	AAA	AAA	AAA
	AA+	Aa1	AA+
	AA	Aa2	AA
	AA-	Aa3	AA-
	A+	A1	A+
	A	A2	A
	A-	A3	A-
	BBB+	Baa1	BBB+
	BBB	Baa2	BBB
	BBB-	Baa3	BBB-
Speculative grade	BB+	Ba1	BB+
	BB	Ba2	BB
	BB-	Ba3	BB-
	B+	B1	B+
	B	B2	B
	B-	B3	B-
	CCC+	Caa1	CCC+
	CCC	Caa2	CCC
	CCC-	Caa3	CCC-
	CC	Ca	CC
	C	Ca	C
			CC-
	D	D	DDD

The ratings range is from AAA to D or DDD in default and there are also 21 or 23 different rating categories depending on the CRA. There are distinguished two terms of credit statuses; investment and speculative grade. Investment grade describes debtor's relatively high level of credit quality and creditworthiness. On the other side, speculative grade insinuates probability of debtor's lower ability to repay his debt. Rating symbols for the three biggest CRAs are shown in Table 43.1.

These credit ratings are used by many different financial institutions, e.g., investors, issuers, banks and another financial institutions. International CRAs have crucial position in credit rating evaluation process. Hence, they are often criticized Kliestik et al. (2014). Firstly, they are not subject to any external control. Secondly, they are funded by debt issuers leading to a conflict of interest. CRAs are blamed for underestimating the credit risk and the study by Jiang et al. (2011) examined the relationship between rating and method of agency's financing in 1971–1978. In the first four years, Moody's used a system "issuer pays" and S & P used system "investor pays", there was a significant difference between judgements. Since 1974, both agencies have been using the same system of financing ("issuer pays") and their average judgements have been closer what have been caused by the increase of average rating assigned by S & P. Thirdly, rating is an assessment of credit risk but many investors thought that the rating involves market risk as well as liquidity

risk which led to wrong investment decisions. These reasons show some degree of judgement inaccuracy and CRA has been trying to rebuild their reputation.

43.5 Conclusion

Credit rating is a measure of credit risk; credit risk is an essential part of systematic risk. Therefore a lower rating should indicate a higher credit risk and those companies should have a higher beta as result of high level of credit risk. This result has also been examined in studies focused on relationship between credit rating changes and Beta where a downgrade has been followed by an increase in systematic risk. Both, credit rating and Beta are criticized but they are still one of the most important models in corporate finance.

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Chapter 44

Shocks Transmission Through Real Channel: The Case of the Central and Eastern European Countries

Vilma Deltuaitė

Abstract While the Central and Eastern European countries (CEECs) are among the world's most open economies, this group of countries is very vulnerable to the external shocks that can be transmitted through real channel. Besides, most of the scientists focus on the transmission of shocks to the real economy in the USA, China, and other largest world economies. For this reason this empirical study focuses on macroeconomic shocks transmission through real channel in the CEECs countries. The empirical results show a strong effect of real GDP shock in main export partners on the real GDP in the CEECs countries and this effect is almost the same strong as the GDP shock in the domestic countries. The empirical results suggest that real exports flows of the CEECs react to the external shocks in the main export countries stronger compared to GDP. The empirical results confirm that the CEECs are very sensitive to shocks in main export partners; however, the effect is not very long lasting suggesting that CEECs adjust to the external macroeconomic changes.

Keywords Central and Eastern European countries (CEECs) • External shocks

44.1 Introduction

While the Central and Eastern European countries (CEECs) are among the world's most open economies, this group of countries is very vulnerable to the external shocks that can be transmitted through real channel. Small economies like CEECs specialize in producing few goods and services in order to attain optimal scale and be competitive. Due to the small size of their domestic markets small countries must export those goods and services in exchange for the imports of the goods and

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services those are not produced in these countries. Besides, most of scientists focus on the transmission of shocks to the real economy in the USA, China, and other largest world economies.

For this reason this empirical study focuses on macroeconomic shocks transmission through real channel in the CEECs countries. The main research questions are: can the spillover effect from the main export partners transmit to the CEECs and which type of macroeconomic shocks cause the spillover effect transmission? The objective of this study—to identify the macroeconomic shocks transmission through real channel in the CEECs. The research object—the CEECs. The research methods: the systemic, logical, and comparative analysis of the scientific literature and statistical method: panel VAR models and the Generalized Impulse Response (GIR) analysis.

44.2 Literature Review

This section provides a brief literature review on different shocks transmission with a special focus on shocks transmission through real channel. Despite the fact that most of scientists focus on monetary policy transmission through different channels, there are some empirical studies investigating the transmission of shocks to the real economy with a special focus on the USA, China, and other largest world economies. However, the scientific literature provides very little evidence on macroeconomic shocks transmission in emerging economies.

Disyatat and Vongsinsirikul (2003), Atta-Mensah and Dib (2008), Kubo (2008), Sun et al. (2010), Apergis et al. (2012), Macit (2012), Airaudo et al. (2013), Mora (2013), Ono (2013), Duncan (2014), Ciccarelli et al. (2015), Hanson and Stein (2015), and many other scientists focus on monetary policy transmission mechanism. They investigate different channels through which monetary policy decisions affect the economy and examine the impact of the central bank's monetary policy actions. Most of them (Atta-Mensah and Dib 2008; Apergis et al. 2012; Mora 2013; Duncan 2014; Ciccarelli et al. 2015) focus on the role of the bank lending channel as a transmission mechanism of monetary policy shocks. For instance, Ciccarelli et al. (2015) focus on monetary policy's real effects through credit supply and demand and find that the credit channel amplifies a monetary policy shock on GDP and prices through the balance sheets of firms, households, and banks. While emerging market economies are characterized by pro- or acyclical monetary policies and high output volatility, Duncan (2014) argues that those facts can be related to a long-run feature of the economy—its institutional quality (law and order, government stability, investment profile, etc.) and presents evidence that there is a link between institutional quality of country and the cyclicity of its monetary policy as well as the volatilities of output and the nominal interest rate.

Many scientists investigating the transmission of shocks to the real economy focus on the USA, China, and other largest world economies. For instance,

Aysun (2016) using US bank-level data found that the transmission of shocks to the real economy operates mostly through large bank lending and borrower balance sheets. Bagliano and Morana (2012) investigated both the within-US and international channels of transmission of macroeconomic and financial shocks. They find that the real effects of financial shocks within the USA were transmitted through an asset prices channel, rather than a liquidity channel. The empirical results also suggest that the financial disturbances to the world economy were transmitted through US house and stock price dynamics while the trade channel is the key transmission mechanism of real shocks. Baur (2012) also studied the spread of the Global Financial Crisis of 2007–2009 (GFC) from the financial sector to the real economy testing different channels of financial contagion across countries and sectors. The empirical results suggest that the GFC led to an increased co-movement of returns between financial sector stocks and real economy stocks and among financial sector stocks across countries. The results also show that some sectors in particular Telecommunications, Healthcare, and Technology were less severely affected by the GFC. Carrière-Swallow and Céspedes (2013) investigated reactions to macroeconomic shocks across countries. They state that emerging economies, in comparison to the USA and other developed countries, suffer much more severe falls in investment and private consumption following an exogenous uncertainty shock. Chudik and Fratzscher (2011) analysed the role that the tightening in liquidity conditions and the collapse in risk appetite played for the global transmission of the GFC. The empirical results are very diverse and depend on the development level of economy. While liquidity shocks have had a more severe impact on advanced economies, it was mainly the decline in risk appetite that affected emerging market economies. The tightening of financial conditions was a key transmission channel for advanced economies, whereas for emerging markets it was mainly the real side of the economy that suffered. Claessens et al. (2012) examined how the GFC affected firm performance and how various linkages propagated shocks across borders. The empirical results show that the GFC had a more severe negative impact on firms with greater sensitivity to business cycle and trade developments, particularly in more open economies. Feldkircher and Huber (2016) analysed international spillovers of expansionary US aggregate demand and supply shocks, and of a contractionary US monetary policy shock. The empirical results show significant spillovers of all three shocks, with the monetary policy shock impacting most strongly on international output. The results suggest that US shocks tend to spread globally through trade and financial channels. Giesecke et al. (2014) studied the macroeconomic effects of bond market crises and banking crises within the USA. They find that corporate default crises have far fewer real effects than do banking crises. Hui and Chan (2014) examined contagion across equity and securitized real estate markets of Hong Kong, USA, and UK during the GFC. The empirical results show a highly significant evidence of contagion between the equity and real estate markets in both directions, in particular, the contagion between US's equity and real estate markets is the most significant reflecting that the USA is the centre of shock of the GFC. Merola (2015) assessed the impact of financial frictions on the US business cycle. The analysis supports the role of financial channels in

transmitting dysfunctions from financial markets to the real economy. Pang and Siklos (2016) analysed spillover effects between China and USA under different maintained assumptions about the exogeneity of the macroeconomic relationship between them. They find that inflation in China responds to credit shocks and the monetary transmission mechanism in China resembles that of the USA even if the channels through which monetary policy affects their respective economies differ. Finally, spillovers from the USA to China are significant and originate from both the real and financial sectors of the US economy. Pyun and An (2016) investigated the role of financial integration in the spread of the GFC. They find that during the GFC, the business cycle co-movements between the USA and the rest of the world were stronger when the level of capital market integration between US and a data sample country was higher. However, the business cycle co-movements were weaker when the level of credit market integration was higher.

The scientific literature provides very little evidence on macroeconomic shocks transmission in emerging economies. Levintal (2013) studied the impact of shocks to banks' balance sheets on real economic activity. The empirical results suggest that industries that depend more heavily on external finance respond more strongly to bank income shocks, suggesting that banking shocks propagate to the real economy. The results show that banking shocks last for 2 years, but it is economically significant mainly for large shocks, which are relatively rare. Kroszner et al. (2007) analysed the mechanisms linking financial shocks and real activity. They find that economic sectors highly dependent on external finance tend to experience a substantially greater contraction of value added during a banking crisis in countries with deeper financial systems. Gorea and Radev (2014) examined the determinants of joint default risk of euro area countries. They find that financial linkages are an active contagion transmission channel only in the case of the troubled periphery euro area economies. During the European sovereign debt crisis, real economy linkages play a more important role in transmitting shocks from the euro area periphery towards its core. Euro zone countries that have stronger trade interconnections with troubled economies tend to have a higher expected joint default risk. Minetti and Peng (2013) investigated a small open economy with constraints in both the domestic and the international credit market. They find that the interaction between lending and borrowing constraints is a channel through which real interest rate shocks generate fluctuations in output, real estate prices, and consumption. External financial liberalization not only increases volatility and affects welfare more than domestic liberalization but also mitigates the destabilizing impact of domestic deregulation. Poutineau and Vermandel (2015) evaluated the impact of interbank and corporate cross-border flows on business cycles in a European Monetary Union (EMU). They find evidence that this cross-border channel plays a key role as an amplifying mechanism in the diffusion of asymmetric shocks. The empirical results also reveal that under banking globalization, most national variables and the central bank interest rate are less sensitive to financial shocks while investment and current account imbalances are more sensitive to financial shocks. Finally, empirical analysis shows that cross-border lending has affected the transmission of the GFC between the two groups of countries. Samake and Yang (2014) investigated business

cycle transmission from BRICS (Brazil, Russia, India, China, and South Africa) to low-income countries (LICs) through trade, FDI, technology, and exchange rates channels. The estimation results show that there are significant direct spillovers from BRICS to LICs.

In summary, the analysis of the scientific literature reveals that the shocks transmission from major economies to the rest of the world through different channels is observed, particular, to the emerging and developing countries.

44.3 Research Methodology and Data

This empirical study focuses on shocks transmission through real channel and applies impulse response analysis. Impulse response functions show the effects of shocks on the adjustment path of the variables and are useful in assessing how shocks to economic variables reverberate through a panel VAR system. Panel VAR models seem particularly suited to address issues that are currently at the centre stage of discussions in academics and in the policy arena, as they are able to (1) capture both static and dynamic interdependencies, (2) treat the links across units in an unrestricted fashion, (3) easily incorporate time variations in the coefficients and in the variance of the shocks, and (4) account for cross sectional dynamic heterogeneities. Panel VAR models are built with the same logic of standard VARs but, by adding a cross sectional dimension, they are a much more powerful tool to address interesting policy questions related, e.g., to the transmission of shocks across borders.

The investigation of shocks transmission through real channel was examined by applying the Generalized Impulse Response (GIR) analysis introduced by Koop et al. (1996) and Pesaran and Shin (1998). Impulse response functions measure the time profile of the effect of shocks on the expected future values of variables in a dynamic panel VAR system (1), i.e., the impulse responses outline the reaction of one variable to a shock in another variable of panel VAR system (2–3). In order to solve variables ordering problem, this empirical study applied the generalized approach that is invariant to the ordering of the variables in the panel VAR system while the traditional impulse response analysis yields different results depending on the variables ordering. Panel VAR models have the same structure as VAR models, in the sense that all variables are assumed to be endogenous and interdependent, but a cross sectional dimension is added to the representation (1):

$$Y_{i,t} = A_{0i}(t) + A_i(l)Y_{t-1} + u_{i,t}, \quad i = 1, \dots, N, \quad t = 1, \dots, T, \quad u_{i,t} \sim WN(0, \Sigma_\varepsilon) \quad (44.1)$$

where $Y_{i,t}$ is the vector of G variables for each country $i = 1, \dots, N$, $u_{i,t}$ is a $G \times 1$ vector of random disturbances, $A_{0i}(t)$ is a G -dimensional vector of variables' intercept, and A_i is G -dimensional coefficients' matrices, and both $A_{0i}(t)$ and A_i may depend on country i .

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + U_t = \Phi(B)U_t = \sum_{i=0}^{\infty} \Phi_i U_{t-i} \quad (44.2)$$

$$\Phi_i = A_1 \Phi_{i-1} + A_2 \Phi_{i-2} + \dots + A_p \Phi_{i-p} \quad (44.3)$$

where Y_t is a G -dimensional vector of variables at time t ; Φ_i is the coefficients measuring the impulse response, e.g., $\Phi_{jk,i}$ represents the response of variable j to a positive shock of one standard deviation in variable k occurring i -th period ago.

The ‘right’ number of lags in a panel VAR models will be selected using different criteria: sequential modified LR test statistic, Final prediction error, Akaike information criterion, Schwarz information criterion, and Hannan–Quinn information criterion. The following VAR residuals tests will be performed in order to confirm the robustness of VAR models estimates: VAR residual serial correlation LM tests, VAR residual normality tests, and Cholesky (Lutkepohl) White Heteroskedasticity test.

This empirical study focuses on annual data for 11 CEECs: Bulgaria (BGR), Czech Republic (CZE), Croatia (HRV), Estonia (EST), Hungary (HUN), Latvia (LVA), Lithuania (LTU), Poland (POL), Romania (ROM), Slovakia (SVK), and Slovenia (SVN). Annual data for the period of 2004–2014 have been obtained from different sources: bilateral export of goods data has been extracted from IMF Direction of Trade Statistics (DOTS), bilateral exchange rates—from United Nations Conference on Trade and Development (UNCTAD), and all the others—from World DataBank (World Development Indicators).

The dependent variables in the panel VAR models are real GDP change and real total export of goods change in the CEECs while different macroeconomic shocks (inflation, exchange rate, GDP, and its components (export, final consumption expenditure, investment, and import)) are calculated as weighted averages of these variables in main export partners of the CEECs representing more than 80–90 % of total export to the world (33 countries). The total list of dependent and independent variables in the panel VAR models is presented in Table 44.1.

44.4 Research Results

This empirical study investigates the macroeconomic shocks (inflation, exchange rate, GDP, and its components (export, final consumption expenditure, investment, and import)) transmission in CEECs from main export partners. The dependent variables in the panel VAR models are real GDP change and real total export of goods change in the CEECs.

While different criteria on lag numbers selection suggest to include 3 or 6 lags in the first model where dependent variable is real GDP change, two different panel VAR models with 3 and 6 lags are constructed (Tables 44.2 and 44.3). The results of panel VAR model where dependent variable is real export change with 6 lags are presented in Tables 44.4 and 44.5.

Table 44.1 The list of dependent and independent variables in the panel VAR models

Variable	Description of variable
Real GDP change (RGDP)	Real gross domestic product (GDP) change is an inflation-adjusted (GDP deflator) measure that reflects the value of all goods and services produced by a domestic economy in a given year, expressed in base-year prices
Real total export of goods change (REXPOR)	Real total export of goods change is an inflation-adjusted (GDP deflator) measure that represents the value of all goods provided by a domestic economy to the rest of the world in a given year, expressed in base-year prices
Inflation shock (INFLATION_S)	Inflation shock is a weighted inflation (GDP deflator) change in the main export partners of a domestic economy that reflects the rate of price changes by applying annual bilateral export data of its export partners as weights
Exchange rate shock (EXCHANGE_S)	Exchange rate shock is a weighted exchange rate change between domestic country and its main export partners that reflects the bilateral exchange rate changes by applying annual bilateral export data of its export partners as weights
GDP shock (GDP_S)	GDP shock is a weighted real GDP change in the main export partners of a domestic economy that reflects the rate of real GDP changes by applying annual bilateral export data of its export partners as weights
Export shock (EXPORT_S)	Export shock is a weighted real export of goods and services change in the main export partners of a domestic economy that reflects the rate of real export changes by applying annual bilateral export data of its export partners as weights
Final consumption expenditure shock (CONSUMPTION_S)	Final consumption expenditure shock is a weighted real final consumption expenditure (the sum of private and general government consumption) change in the main export partners of a domestic economy that reflects the rate of real export changes by applying annual bilateral export data of its export partners as weights
Investment shock (INVESTMENT_S)	Investment shock is a weighted real gross domestic investment (gross capital formation) change in the main export partners of a domestic economy that reflects the rate of real gross domestic investment by applying annual bilateral export data of its export partners as weights
Import shock (IMPORT_S)	Import shock is a weighted real import of goods and services change in the main export partners of a domestic economy that reflects the rate of real import changes by applying annual bilateral export data of its export partners as weights

Table 44.2 The results on VAR lag order selection criteria (endogenous variables: RGDP, GDP_S INFLATION_S, EXCHANGE_S, exogenous variables: C)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-301.3684	NA	12.53974	13.88038	14.04258	13.94053
1	-255.6804	80.99224	3.265340	12.53093	13.34192	12.83168
2	-205.5938	79.68323	0.707117	10.98154	12.44133	11.52290
3	-149.3290	79.28229 ^a	0.119126	9.151317	11.25990 ^a	9.933283 ^a
4	-138.8141	12.90460	0.168364	9.400641	12.15803	10.42321
5	-114.2607	25.66943	0.135029	9.011852	12.41803	10.27503
6	-87.72919	22.91362	0.110234 ^a	8.533145 ^a	12.58812	10.03693

LR sequential modified LR test statistic (each test at 5 % level); *FPE* Final prediction error; *AIC* Akaike information criterion; *SC* Schwarz information criterion; *HQ* Hannan-Quinn information criterion

^aIndicates lag order selected by the criterion

The empirical results of generalized impulse response analysis are presented in Fig. 44.1. The responses in the first panel VAR model show a strong effect of real GDP shock in main export partners on the real GDP in the CEECs countries and this effect is almost the same strong as the GDP shock in the domestic countries. The effect of inflation shock is also significant; however, the effect of all these macroeconomic shocks is short-lasting while after 2 years real GDP has settled back to its pre-shock level and the effect disappears after 5 years. However, the effect of real exchange rate shock is not observed. The results of the second panel VAR model suggest that the effect of GDP shock is much weaker compared to the domestic GDP shock. The estimates of the third panel VAR model show that real exports flows of the CEECs react to the external shocks in the main export countries stronger compared to the second panel VAR model with the same number of lags included. Even though the impact of macroeconomic shocks is generally short-lived, all responses are large in scale. Figure 44.1 indicates that the CEECs respond most strongly to changes in GDP, export, and inflation shocks in main export partners (excluding itself), peaking in the first year with a response value of around 2–3 %. The reaction of the CEEC to the real exchange rate shocks is least significant. The results of generalized impulse response analysis confirm that the CEECs are very open economies and very sensitive to shocks in main export partners; however, the effect is not very long lasting suggesting that CEECs adjust to the external macroeconomic changes.

The estimates of panel VAR models where different shocks of GDP's components are included presented in Table 44.8. In presented panel VAR models (Model 4 and Model 5) 5 lags are included based on the results on VAR lag order selection criteria (Tables 44.6 and 44.7).

The empirical results of generalized impulse response analysis are presented in Fig. 44.2. The responses in the fourth panel VAR model show a contrary effect of GDP's components shocks in main export partners on the real GDP in the CEECs countries in the first year. Only stronger effect of consumption in main export

Table 44.3 The panel VAR estimates for Model 1 (dependent variable—RGDP, number of lags included—3), and Model 2 (dependent variable—RGDP, number of lags included—6)

Variable	Model 1			Model 2		
	Coefficient	Standard error	t-statistic	Coefficient	Standard error	t-statistic
RGDP(−1)	0.770332	−0.19466	3.95727	0.240258	−0.19086	1.25881
RGDP(−2)	−0.166538	−0.22038	−0.75570	0.222772	−0.14318	1.55591
RGDP(−3)	−0.2199	−0.17977	−1.22320	−0.10973	−0.11878	−0.92383
RGDP(−4)				−0.135976	−0.13227	−1.02803
RGDP(−5)				0.055749	−0.12068	0.46197
RGDP(−6)				0.276032	−0.13344	2.06864
GDP_S(−1)	−0.695003	−0.44817	−1.55075	−0.596086	−0.80978	−0.73611
GDP_S(−2)	−0.173917	−0.4103	−0.42388	−0.746403	−0.5143	−1.45130
GDP_S(−3)	−0.138876	−0.32033	−0.43354	0.697574	−0.44916	1.55306
GDP_S(−4)				0.692687	−0.55626	1.24525
GDP_S(−5)				−0.445148	−0.45573	−0.97677
GDP_S(−6)				2.510168	−1.22898	2.04248
INFLATION_S(−1)	−1.354561	−0.44262	−3.06031	0.144831	−0.71656	0.20212
INFLATION_S(−2)	0.278879	−0.5504	0.50669	0.126549	−0.51398	0.24621
INFLATION_S(−3)	0.574369	−0.4534	1.26680	−0.310084	−0.52561	−0.58995
INFLATION_S(−4)				0.806927	−0.53702	1.50261
INFLATION_S(−5)				−0.750652	−0.67012	−1.12017
INFLATION_S(−6)				0.299177	−0.92443	0.32364
EXCHANGE_S(−1)	−0.179409	−0.13989	−1.28251	−0.014247	−0.2617	−0.05444
EXCHANGE_S(−2)	0.014844	−0.13994	0.10607	0.00345	−0.09701	0.03557
EXCHANGE_S(−3)	−0.097695	−0.12361	−0.79034	0.154451	−0.07791	1.98254
EXCHANGE_S(−4)				0.183691	−0.10999	1.67010
EXCHANGE_S(−5)				0.05413	−0.07695	0.70340
EXCHANGE_S(−6)				−0.17688	−0.09046	−1.95535
C	2.936009	−1.22905	2.38885	−7.74833	−2.81602	−2.75152
R-squared	0.483067			0.877807		
Adj. R-squared	0.386142			0.723459		
Sum sq. resids	820.7098			26.22103		
S.E. equation	3.581004			1.174757		
F-statistic	4.983923			5.687177		
Log likelihood	−200.3633			−51.04548		
Akaike AIC	5.541904			3.456613		
Schwarz SC	5.937611			4.470357		
Mean dependent	0.495141			1.945708		
S.D. dependent	4.570574			2.233923		

Table 44.4 The results on VAR lag order selection criteria (endogenous variables: REXPORT, GDP_S, INFLATION_S, EXCHANGE_S, exogenous variables: C)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-383.8532	NA	532.8355	17.62969	17.79189	17.68984
1	-337.0079	83.04398	131.6392	16.22763	17.03862	16.52839
2	-272.7873	102.1690	14.99463	14.03579	15.49558	14.57715
3	-213.2707	83.86441	2.179007	12.05776	14.16635	12.83972
4	-184.3547	35.48776	1.334290	11.47067	14.22805	12.49324
5	-154.3587	31.35951	0.835576	10.83448	14.24066	12.09766
6	-116.9158	32.33700 ^a	0.415413 ^a	9.859810 ^a	13.91479 ^a	11.36359 ^a

LR sequential modified LR test statistic (each test at 5 % level), *FPE* Final prediction error, *AIC* Akaike information criterion, *SC* Schwarz information criterion, *HQ* Hannan–Quinn information criterion

^aIndicates lag order selected by the criterion

countries is observed in the CECCs in the second year while the effect of other macroeconomic shocks is not significant. However, the effect of inflation, exchange rate, consumption, import, and investment is more significant on the real export flows from the CEECs (Table 44.8).

44.5 Conclusions

The empirical results of generalized impulse response analysis show a strong effect of real GDP shock in main export partners on the real GDP in the CEECs countries and this effect is almost the same strong as the GDP shock in the domestic countries. The empirical results suggest that real exports flows of the CEECs react to the external shocks in the main export countries stronger compared to GDP of these countries. The results of generalized impulse response analysis confirm that the CEECs are very open economies and very sensitive to shocks in main export partners; however, the effect is not very long lasting suggesting that CEECs adjust to the external macroeconomic changes.

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Table 44.5 The panel VAR estimates of Model 3 (dependent variable—REXPORT, number of lags included—6)

Variable	Coefficient	Standard error	<i>t</i> -Statistic
REXPORT(−1)	0.094916	0.23288	0.40758
REXPORT(−2)	−0.138691	0.17050	−0.81344
REXPORT(−3)	0.150261	0.16801	0.89438
REXPORT(−4)	−0.348018	0.14162	−2.45745
REXPORT(−5)	0.310691	0.14962	2.07651
REXPORT(−6)	0.109277	0.15018	0.72764
GDP_S(−1)	8.753533	4.16214	2.10313
GDP_S(−2)	−8.806772	2.07778	−4.23856
GDP_S(−3)	−1.910006	2.03049	−0.94066
GDP_S(−4)	−6.658565	2.34975	−2.83373
GDP_S(−5)	−6.315727	2.28785	−2.76055
GDP_S(−6)	−3.672315	5.11744	−0.71761
INFLATION_S(−1)	1.661248	2.86337	0.58017
INFLATION_S(−2)	0.623974	2.32659	0.26819
INFLATION_S(−3)	0.049646	1.94560	0.02552
INFLATION_S(−4)	4.786284	2.38700	2.00514
INFLATION_S(−5)	−0.014341	3.05741	−0.00469
INFLATION_S(−6)	−5.375031	3.05465	−1.75963
EXCHANGE_S(−1)	0.314455	1.09694	0.28667
EXCHANGE_S(−2)	−1.068696	0.46716	−2.28763
EXCHANGE_S(−3)	−0.310746	0.40052	−0.77585
EXCHANGE_S(−4)	−0.598635	0.36469	−1.64149
EXCHANGE_S(−5)	0.713041	0.30252	2.35697
EXCHANGE_S(−6)	−0.108673	0.36060	−0.30137
C	13.55663	10.7332	1.26305
<i>R</i> -squared	0.951100		
Adj. <i>R</i> -squared	0.889331		
Sum sq. resids	575.0833		
S.E. equation	5.501595		
<i>F</i> -statistic	15.39781		
Log likelihood	−118.9805		
Akaike AIC	6.544566		
Schwarz SC	7.558310		
Mean dependent	5.276386		
S.D. dependent	16.53775		

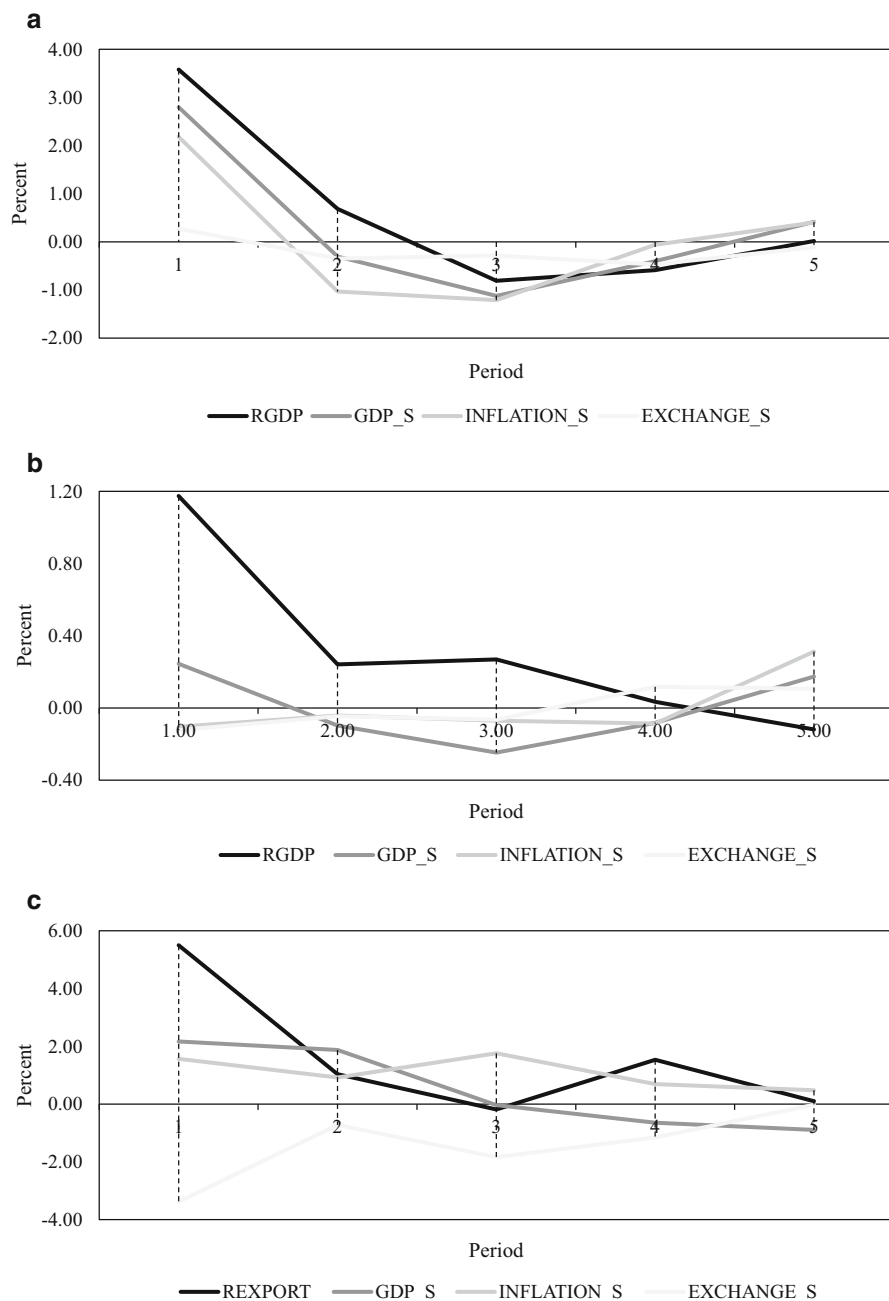


Fig. 44.1 **a** The response of domestic economy in terms of real GDP to generalized one S.D. innovation (shocks in its main export partners) (number of lags in VAR—3), **b** The response of domestic economy in terms of real GDP to generalized one S.D. innovation (shocks in its main export partners) (number of lags in VAR—6), **c** The response of domestic economy in terms of real export to generalized one S.D. innovation (shocks in its main export partners) (number of lags in VAR—6)

Table 44.6 The results on VAR lag order selection criteria (endogenous variables: RGDP, INFLATION_S, EXCHANGE_S, EXPORT_S, CONSUMPTION_S, IMPORT_S, INVESTMENT_S, exogenous variables: C)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-724.9910	NA	856.4038	26.61785	26.87333	26.71665
1	-576.3394	254.0590	23.18643	22.99416	25.03799	23.78453
2	-472.8326	150.5554	3.476695	21.01209	24.84427	22.49403
3	-363.7805	130.8624	0.493777	18.82838	24.44892	21.00189
4	-290.1452	69.61885	0.331091	17.93255	25.34144	20.79763
5	-140.3305	103.5083 ^a	0.022432 ^a	14.26656 ^a	23.46380 ^a	17.82321 ^a

LR sequential modified LR test statistic (each test at 5 % level), FPE Final prediction error, AIC Akaike information criterion, SC Schwarz information criterion, HQ Hannan–Quinn information criterion

^aIndicates lag order selected by the criterion

Table 44.7 The results on VAR lag order selection criteria (endogenous variables: REX-PORT, INFLATION_S, EXCHANGE_S, EXPORT_S, CONSUMPTION_S, IMPORT_S, INVESTMENT_S, exogenous variables: C)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-804.1264	NA	15220.43	29.49551	29.75098	29.59430
1	-643.4572	274.5983	266.1909	25.43481	27.47864	26.22517
2	-531.6197	162.6727	29.48250	23.14981	26.98199	24.63174
3	-437.7419	112.6533	7.270567	21.51789	27.13842	23.69139
4	-368.9215	65.06660	5.807961	20.79715	28.20603	23.66222
5	-204.2541	113.7702 ^a	0.229289 ^a	16.59106 ^a	25.78830 ^a	20.14770 ^a

LR sequential modified LR test statistic (each test at 5 % level); FPE Final prediction error; AIC Akaike information criterion; SC Schwarz information criterion; HQ Hannan–Quinn information criterion

^aIndicates lag order selected by the criterion

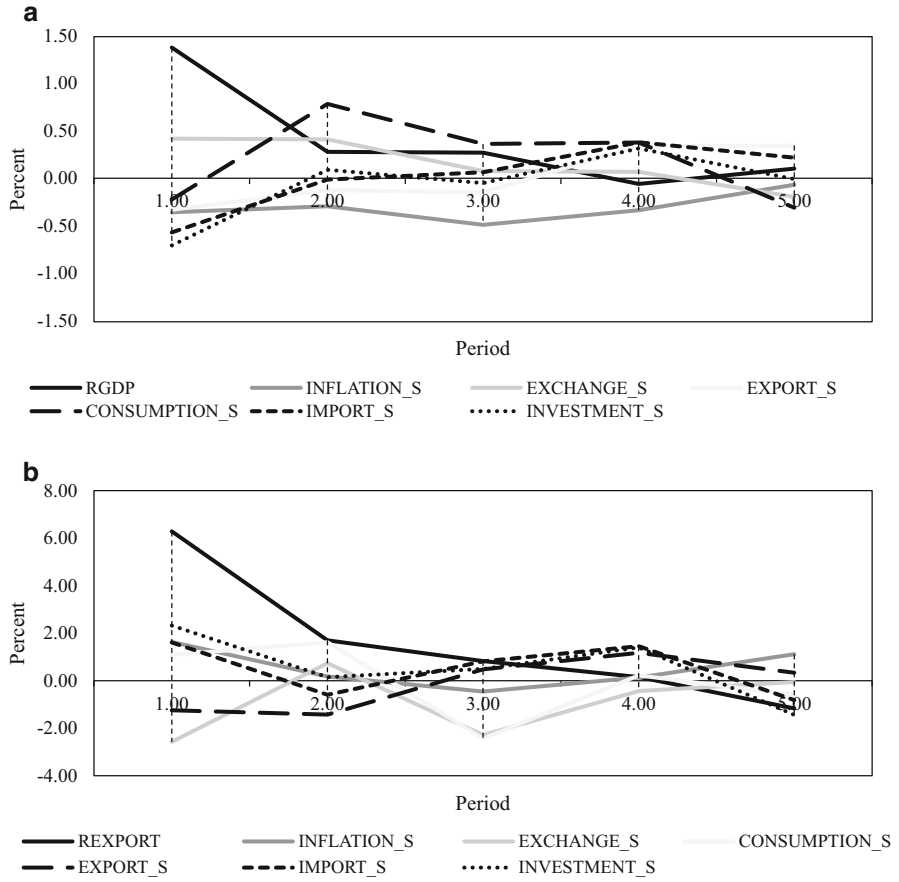


Fig. 44.2 a The response of domestic economy in terms of real GDP to generalized one S.D. innovation (shocks in its main export partners) (number of lags in VAR—5), **b** The response of domestic economy in terms of real export to generalized one S.D. innovation (shocks in its main export partners) (number of lags in VAR—5)

Table 44.8 The panel VAR estimates for Model 4 (dependent variable—RGDP, number of lags included—5), and Model 5 (dependent variable—REXPORT, number of lags included—5)

Variable	Model 4			Model 5		
	Coefficient	Standard error	t-statistic	Coefficient	Standard error	t-statistic
RGDP(-1)	0.342029	0.15178	2.25350			
RGDP(-2)	-0.02921	0.17033	-0.17151			
RGDP(-3)	0.174093	0.16354	1.06451			
RGDP(-4)	-0.12432	0.18338	-0.67795			
RGDP(-5)	0.099694	0.14853	0.67119			
REXPORT(-1)				0.416355	0.27044	1.53955
REXPORT(-2)				-0.26765	0.26390	-1.01421
REXPORT(-3)				0.060362	0.22552	0.26766
REXPORT(-4)				-0.06769	0.24558	-0.27567
REXPORT(-5)				0.128215	0.20911	0.61313
INFLATION_S(-1)	-0.64626	0.57959	-1.11504	-1.19819	3.03949	-0.39421
INFLATION_S(-2)	-0.56646	0.64804	-0.87413	0.681227	3.31667	0.20539
INFLATION_S(-3)	0.736817	0.51965	1.41791	0.135818	2.41883	0.05615
INFLATION_S(-4)	0.187585	0.62512	0.30008	1.171907	3.18221	0.36827
INFLATION_S(-5)	0.652117	0.53002	1.23037	1.210632	2.46034	0.49206
EXCHANGE_S(-1)	-0.10158	0.10122	-1.00354	0.489507	0.49293	0.99305
EXCHANGE_S(-2)	0.017999	0.08593	0.20946	-0.94684	0.47055	-2.01220
EXCHANGE_S(-3)	-0.00043	0.08888	-0.00485	-0.08979	0.41559	-0.21606
EXCHANGE_S(-4)	0.166875	0.09119	1.82988	-0.06034	0.40123	-0.15041
EXCHANGE_S(-5)	0.067492	0.08664	0.77899	0.329130	0.37150	0.88596
EXPORT_S(-1)	0.582929	0.57616	1.01175	1.622869	2.30829	0.70306
EXPORT_S(-2)	-0.52322	0.63328	-0.82623	-4.32173	2.55780	-1.68963
EXPORT_S(-3)	0.359448	0.42237	0.85102	1.346741	1.76498	0.76303
EXPORT_S(-4)	0.282850	0.38971	0.72579	2.244499	1.74083	1.28933
EXPORT_S(-5)	0.227754	0.42493	0.53598	-1.63078	1.80533	-0.90332
CONSUMPTION_S(-1)	2.453537	1.09195	2.24694	3.610971	5.16128	0.69963
CONSUMPTION_S(-2)	-0.84221	1.53603	-0.54831	-10.0306	6.53106	-1.53584
CONSUMPTION_S(-3)	0.648965	1.42734	0.45467	5.289018	6.18139	0.85564
CONSUMPTION_S(-4)	-0.46933	1.23836	-0.37900	-1.92667	5.28788	-0.36436
CONSUMPTION_S(-5)	0.842426	0.91266	0.92305	-1.40089	3.65082	-0.38372
IMPORT_S(-1)	-1.43840	0.90161	-1.59538	-3.16575	3.43437	-0.92179
IMPORT_S(-2)	1.086936	0.89929	1.20866	4.627668	3.27503	1.41302
IMPORT_S(-3)	0.012795	0.72171	0.01773	0.428412	2.75373	0.15558
IMPORT_S(-4)	0.210116	0.59815	0.35128	-2.14977	2.88385	-0.74545
IMPORT_S(-5)	-0.09773	0.68318	-0.14305	2.418388	2.84005	0.85153
INVESTMENT_S(-1)	0.599334	0.49713	1.20560	0.279355	1.84705	0.15124
INVESTMENT_S(-2)	-0.47217	0.41423	-1.13989	0.309754	1.52886	0.20260

(continued)

Table 44.8 (continued)

Variable	Model 4			Model 5		
	Coefficient	Standard error	t-statistic	Coefficient	Standard error	t-statistic
INVESTMENT_S(-3)	-0.23873	0.41589	-0.57405	-0.61794	1.59030	-0.38857
INVESTMENT_S(-4)	-0.23548	0.30441	-0.77356	0.840052	1.76691	0.47543
INVESTMENT_S(-5)	0.024748	0.43194	0.05730	0.138149	2.07379	0.06662
C	-4.54737	3.37361	-1.34793	0.462025	13.8440	0.03337
R-squared	0.873918			0.941337		
Adj. R-squared	0.641663			0.833273		
Sum sq. resids	35.94945			751.0298		
S.E. equation	1.375528			6.287121		
F-statistic	3.762745			8.710913		
Log likelihood	-66.3480			-149.929		
Akaike AIC	3.721749			6.761080		
Schwarz SC	5.035639			8.074971		
Mean dependent	1.755365			7.106213		
S.D. dependent	2.297859			15.39743		

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Chapter 45

Health Capital as a Factor of Social and Economic Development of the Russian Federation's Regions

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Abstract This chapter is devoted to the role of health capital in the human development system. However, the basis of the research is human capital. The main strategic positions in the formation and preservation of health capital that are used as an assessment of human development are listed. The concept of human development in regions of the Russian Federation is based on indices calculated by experts of the Development Program of the United Nations (PDUN). There are some main indices in this research. This concept was calculated together with a group of independent international experts. The obtained data are used with analytical developments and statistical data of national institutes and international organizations. For carrying out calculations, the correlation method using the Fisher statistics was used.

Keywords Health capital • Human capital • Economic development • Human development

45.1 Introduction

Health capital is an integral part of human capital. Investments in health capital are expressed as preservation of working capacity resulting from reduction of incidence and increase in the productive period of life. Health level mainly depends on the quality of the health service care that accompanies the person from birth to retirement age. Investments in health provide normal turnover of labor in production. Decreases in health and increased disease incidence are expressed as disability. Certainly, when there are fewer diseases, the level of health of the population of the country and the return from capital investments in health care are higher.

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As an assessment of human development, the main strategic positions in the formation and preservation of health capital are as follows (Fakhrutdinova et al. 2014):

- Creation of an adequate system of healthy reproduction of new generations and material and social support of young families
- Inclusion of vital and labor potential of the population in economic processes with development of a health insurance system and preventive medical help (Choi and Shin 2015)
- Development of the ideology and implementation of healthy lifestyle programs according to modern conditions of social, economic, and information development of the society (Carvalho et al. 2015)
- Development and implementation of programs for rehabilitation (restoration) of health through the system of medical and sanatorium organizations
- Improvement of the preparation system of medical injections, taking into account prospects of the demands on medical technology and the corresponding development of the organizational and functional structure of health care
- Realization of hi-tech medical care on the basis of modern knowledge of the medico-biological processes of the human body
- Medico-social examination of plans and projects, including strategic development of territories, to implementation of social and economic programs and the introduction of new production technologies (Yagudin et al. 2014)

45.2 Methodology

In our research work, we consider the following indices that reflect the level of human development, namely, education index, index of innovations, index of information and communication technologies, life expectancy index, and also GRP (gross rating point) per capita.

When calculating the general economic and social indicators, indicators of the annual growth of GRP and the value of the human development index (HDI) of the region are considered. For our purpose, to offer a model of human capital assessment, a complex of parameters has been chosen in the form of indices defining education level, level of innovative development of the country, level of information and communication technologies of the country (ICT), and life expectancy.

To achievement the main aim in our work, the optimal variant is creation of a regression model in which HDI is a dependent variable and factors in the form of index indicators are GRP and components of human capital.

Proceeding from the submitted table, the Republic of Tatarstan is one of the most developed regions according to the human development index after Moscow, St. Petersburg, and the Tyumen, Sakhalin, and Belgorod regions (Glebova et al. 2014). Further using the qualitative model constructed by us, we reveal its efficiency among regions and define their rating assessment.

45.3 Data

Data of the Russian office of the Development Program of the United Nations (PDUN) about human development in the form of the indices given in Table 45.1 have been taken as a basis of the calculation of the regression model (<http://gtmarket.ru/news/2013/06/17/6014>). For the analysis indicators on ten territorial subjects of the Russian Federation with the highest value, an index of human development has been used. In our work, both a dependent variable and factors that influence a variable which were already mentioned are investigated. As the initial stage of creation of the model it is necessary to consider the definition of extent of influence of each factor on a variable by finding the corresponding correlation coefficients (Table 45.2) and, at the same time, using the following formula of correlation (r) (<http://www.kebc.papk.su/index.files/statistik/lectio12.htm>):

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} \quad (45.1)$$

An insufficiently high correlation coefficient inclusion in the model of the corresponding factor is represented as inexpedient because it will only allow worsening the general quality of the model by decreasing its explanatory ability.

To estimate the interrelation of all factors and how they influence the human development index of territorial subjects of the Russian Federation, we take some of the components of the given indexes. The index of education is replaced with the literacy level, and a share of pupils, and an index of innovations with the organizations that are carrying out research and development and also the number of personnel that are carrying out research and development; instead of the ICT index, we take the organizations using personal computers and a global information network. The table of correlation coefficients of a dependent variable in pairs with each factor is given next.

45.4 Empirical Results

As it is possible to observe from the table of paired correlation coefficients of factors already stated from a dependent variable, not all factors could be included in the model. It is seen in the table that the direct positive and received coefficients of correlation indicate interdependence between the strong extent of the factor communication between HDI and GRP (0.9304). Between HDI and literacy level is a strong extent of communication (0.8854). Between HDI and life expectancy, the coefficient of correlation is 0.7128. Between HDI and the number of organizations that are carrying out research and development, the correlation is 0.8848, and

Table 45.1 Human Development Index (HDI) in the regions of Russia (<http://gmarket.ru/ratings/human-development-index/human-development-index-info>)

Region	HDI	GRP per capita million rubles	Literacy level (%)	Pupil's share (%)	Life expectancy (years)	Organizations that are carrying out research and developments	Number of personnel occupied with research and development, persons	Using ICT in the organizations (%)		
								Organizations using personal computers	Organizations using global information networks	Organizations using global information networks
Moscow	0.931	10,577,810.2	99.99	0.953	73.56	733	237,626	100	98.6	98.6
St. Petersburg	0.887	2,291,992.9	99.9	0.908	71.49	346	81,000	98.6	96.7	96.7
Tyumen region	0.887	4,618,711.0	99.7	0.755	69.72	59	6,750	95.3	90.9	90.9
Sakhalin region	0.871	641,602.9	99.7	0.714	65.01	15	869	92.5	88.4	88.4
Belgorod region	0.866	546,151.5	99.7	0.757	71.29	16	1,198	97.3	88.0	88.0
Republic of Tatarstan	0.864	1,436,932.6	99.7	0.771	70.43	106	13,258	99.1	96.1	96.1
Krasnoyarsk Krai	0.854	1,192,648.5	99.6	0.754	67.76	53	6748	93.1	79.5	79.5
Komi Republic	0.853	480,763.7	99.7	0.813	67.20	21	1748	84.2	77.0	77.0
Tomsk region	0.852	374,171.6	99.7	0.828	68.61	57	8,795	98.5	96.4	96.4
Republic of Sakha	0.844	540,411.7	99.6	0.780	66.78	23	2,379	91.3	73.1	73.1

Table 45.2 Correlation coefficients of factors and dependent variables

	Correlation coefficient (<i>R</i>)
HDI	1
GRP per capita million rubles	0.9304
Literacy level	0.8854
Pupil's share	0.6472
Life expectancy	0.7128
Organizations that are carrying out research and development	0.8848
Number of personnel occupied with research and development	0.8836
Organizations using personal computers	0.5204
Organizations using global information networks	0.6444

between HDI and number of personnel that are carrying out developments, the correlation is equal to 0.8836.

It is possible to notice that not all factors could be included in the model in view of the average absolute value of the coefficient. The factors designated in this work do not have a high coefficient of correlation from a dependent variable that allows claiming the inexpediency of their inclusion in the model as factors (Mikhaylov et al. 2014). As the reason for the low interrelationship of factors with a dependent variable, it is possible to point to the low extent of orientation of society, organization, or the specific person to new external information and a large orientation to the already current situation, both in the economy and in society in general.

Also, there is a problem of multicollinearity existing in the model. The multicollinearity negatively affects results that will be achieved by means of the model. The negative side of multicollinearity consists of the distortion of standard mistakes at the coefficients. It negatively affects the general quality of the model and does not allow claiming the importance of this or that factor with a high degree of reliability.

We excluded factors that are not expedient for inclusion in the model according to regions. On the basis of the received coefficients of correlation, we removed the regression equation on factors influencing HDI:

$$y = 0.93x_1 + 0.885x_2 + 0.713x_4 + 0.885x_5 + 0.884x_6, \quad (45.2)$$

where $y = \text{HDI}$; $x_1 = \text{GRP per capita, 1 million rubles}$; $x_2 = \text{level of literacy of the population, \%}$; $x_4 = \text{life expectancy}$; $x_5 = \text{the organizations that are carrying out research and development}$; and $x_6 = \text{the number of personnel occupied with research and development}$.

From the constructed model, it is possible to notice that each indicator included in the model is significant and can be included in the total equation. This equation describes the dependence of the volume of the human development index on various factors in regions of the Russian Federation. Further, using the derived regression equation, we can carry out an inspection of the general quality of the model

(an importance assessment) in general by means of Fisher's statistics (*F*-statistics) (<https://university.prognoz.ru/biu/ru/> Fisher's statistics).

The value of the coefficient of determination in the model is 0.9735923 ($R^2 = 0.97359223$), which attests to the excellent descriptive ability of the model. The high value of the *F*-statistics, 29.494176, allows us to say that the model is significant in general as it is more *F*-statistics *F*-critical (6.26). So, it can be used for further study of interrelationships between variables and to trust results derived with use of the model.

45.5 Conclusion

In conclusion, we can say that, as a result of the calculations we have carried out, the derived model is significant. However, it is worth approaching this process carefully to retain economic sense in the regression model derived after such operations. Therefore, the optimal variant is to leave factors that are the integral components of HDI in the model, such as the level of literacy of the population, the index of innovations, which in this case is understood as the organizations that are carrying out research and development, the number of personnel occupied with research and development, the life expectancy of the population, and also GRP per capita. At the same time we exclude such factors as the ICT index (organizations using global information networks and organizations using personal computers) and the share of pupils at the ages of 7–24 years because these indicators have no high coefficient of correlation from a dependent variable that allows us to claim the inexpediency of their inclusion in the model as factors.

Thus, it is possible to draw the conclusion that the model offered by us is qualitative and significant. The model has been developed by us for identification of the essential factors influencing the level of human potential and the degree of their interrelationship, for the attempt of forecasting results of innovative development of regions of the Russian Federation at the set expected values of other sites. Nevertheless, new approaches for the development of education and sciences are necessary for Russia to pay special attention to the improvement of health and the improvement of regional policy, the role of civil society, and business in transition to sustainable development.

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Chapter 46

Corporate Governance, Insider Trading, and Stock Returns in the Greek Technology Sector

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Abstract Insider trading and corporate governance have been two major interrelated issues that are of main concern in all capital markets around the world. This paper examines the effect that corporate governance characteristics have on the stock price reaction caused by insider trading announcements. Based on the event study methodology, we have examined 636 announcements of insider transactions of 14 companies in the Athens Stock Exchange technology sector, during 2007 and 2013, and selected corporate governance characteristics such as the identity of the insider, ownership structure, separation of ownership and control, and financial variables. Our findings suggest that there the identity of the insider, and especially the CEO, has an effect on the abnormal stock returns. Ownership structure and high levels of ownership concentration and control seem to have an effect in abnormal stock returns of the firms only in long periods of time after the announcement.

Keywords Corporate governance • Stock returns • Ownership structure • Event study • Greece

JEL Classification G11, G34

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46.1 Introduction

Insider trading is a common phenomenon in capital markets around the world but also a very important issue for the operation of stock markets and the protection of shareholders (La Porta et al. 2002). Executives and member of the board of the firms possess superior information concerning both the everyday operation of the firm but also about the long-term strategic plans, compared to the shareholders, and therefore are able to gain abnormal profits from their trades (Seyhun 1986; Ravina and Sapienza 2010).

The importance of insider trading is recognized by practitioners, academics, and regulators around the world. It has long been recognized that insiders are able to trade on private information and hence earn abnormal returns on their trades. In most countries legislation does not allow insiders to perform and transaction, whether it is buying or selling stocks, without prior disclosure of this information to outsiders (Bainbridge 1999; Maug 2002). Supporters of insider trading regulation argue that nondisclosed transactions by insiders are damaging shareholders' wealth and undermine their trust in both the company and the efficient operation of the market (Hamill et al. 2002).

Apart from the regulation approach, there has been evidence in literature that corporate governance can play a vital role in controlling insiders and insider trading affecting the performance of the firms and the decision for investments (Shleifer and Vishny 1997; Demsetz and Villalonga 2001; Bebchuk and Weisbach 2010). A sound corporate governance system can refrain managers from taking decisions that are harmful to the firm, as controlling shareholders can prevent abusive actions by monitoring and disciplining accordingly underperforming managers (Cziraki et al. 2014), with the use of corporate governance internal and external mechanisms (Shleifer and Vishny 1997).

Despite the importance of the issue, it has not been until recently that academic research has focused its attention in other countries apart the US and the UK stock market (Leledakis et al. 2010) and more specifically in stock markets in countries that are categorized in the continental system of corporate governance, as Greece is (La Porta et al. 2002).

Our paper focuses on the relationship of insider trading, with corporate governance mechanisms, namely, ownership structure, the separation of ownership and control, the insiders' capacity within the firm, and firm-specific variables. 636 announcements of insider trading of 14 software and hardware firms listed in ATHEX during the period 2007–2013 are examined, and an OLS regression is estimated to examine the relationship between abnormal returns generated by insider trading, measured by cumulative abnormal returns (CARs), and the above-mentioned corporate governance variables. Our work extends the work of Leledakis et al. (2010) and Antoniadis et al. (2015), and to the best of our knowledge, there is no published paper that provides relevant evidence for the Greek stock market.

The remainder of the paper is structured as follows. Section 46.2 reviews the literature on the relationship of insider trading and ownership structure and

corporate governance. Section 46.3 analyzes the characteristics of the sample surveyed and the methodology used. In Sect. 46.4 the results of the econometric analysis are presented and discussed. Finally, Sect. 46.5 concludes the paper.

46.2 Literature Review

Among the plethora of definitions of corporate governance, there is one that stands out for its simplicity and accuracy. It is the one provided by Shleifer and Vishny (1997) that defines corporate governance as “the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment”. That is especially important in the case of insider trading as it is widely accepted to be a manifestation of agency problem that can lead to shareholders’ wealth expropriation (Beny 2004).

According to Hamill et al. (2002), insiders trade either for liquidity reasons or because they are in possession of crucial nondisclosed information. In the latter case, the insider could possibly aim to earn short-term profits by this transaction or wish to provide the market with a signal regarding firm value in relation to firm-, industry-, or market-specific developments. Therefore, if insiders sell their stocks for information reason, they relay a negative signal to the market as their action must be based on information that would lead to a decrease of the value of the firm. These kind of insider trading transactions should bear insiders with abnormal returns at the expense of the shareholders (Hamill et al. 2002) which violates the principle of equal treatment of shareholders (Betzer and Theissen 2009).

Ownership structure and the existence of blockholders is a significant corporate governance that can provide some remedy in the agency problem, associated with the separation of ownership and control and the existence of insiders (Shleifer and Vishny 1997). Bhide (1993) suggests that an increase in the percentage of shares shareholders own increases their motivation for better and more active monitoring of the insiders. Morck et al. (2000) found a positive relationship between ownership concentration and firm performance in terms of firm value. Similarly, Thomsen and Pedersen (2000) argue that the existence of significant blockholders has a positive relationship with the growth of the firm in terms of turnover and in terms of firm value measured by the ratio market-to-book value (MV/BV). For Greece, Kapopoulos and Lazaretou (2007) reported a positive relationship between ownership concentration and firm profitability. More recently Alimehmeti and Paletta (2012) also found a positive relationship between ownership concentration and firm value.

Despite the fact that the existence of a sound corporate governance framework has been shown to decrease agency costs, little evidence exists on the ways it would alleviate profitable insider trading at the expense of the shareholders. Fidrmuc et al. (2006) in a similar fashion presented the concept of blockholder as a mechanism for monitoring insider trading. As large shareholders have a greater stake in the company, they have stronger incentives and larger voting power to

effectively monitor and control insiders' actions. That is also more evident when the blockholder is also the CEO of the firm (Adams et al. 2005). Price reactions after purchases are smaller when blockholders are present, who are likely to monitor not only management but also other shareholders such as unrelated individuals, families, or corporations. Therefore, insider trades are less informative, as Hamill et al. (2002) defines them, at firms with intensive monitoring. Cziraki et al. (2014) also provide two explanations, through which good corporate governance impacts insider trading: increased shareholder awareness and blockholder monitoring.

This relationship is also reported by Fidrmuc et al. (2006) who found that the positive reaction of stock prices in buying transaction is bigger when there are institutional shareholders in the firms than in firms with individual shareholders. In one of the rare papers concerning the Greek stock market, Leledakis et al. (2010) used the event study methodology to examine the reaction of the market to the announcements of insider trading. Their results indicate the existence of agency problem as the impact of announcement of insider trading in widely held firms is larger compared to firms with more concentrated ownership structure, and it is also affected by the position the insider holds within the firm. Antoniadis et al. (2015) also examined the effect of insider trading in the abnormal returns of stock prices of the firms of the technology sector in the Athens Stock Exchange Market and found that purchasing transactions do not affect abnormal stock returns and stock prices, while selling transactions have a positive effect prior to the announcement and negative afterward. However, in a recent paper for ownership structure and insider trading in China, He and Rui (2016) did not find a significant relationship between an ownership structure and the market reaction to insider sales.

The capacity in which an insider is a part of the firm is also important for the effect insider trading has on the stock returns (Seyhun 1986). Members of the Board of Directors possess information superior to that available to the management of the firm, the blockholders, and the rest of the shareholders (Gregory et al. 2009). Especially the CEO of the firm is under the spotlight of attention, concerning his action, and therefore his transactions are of utmost importance as a signal for outsiders (Jeng et al. 2003; Adams et al. 2005).

Apart from the corporate governance mechanisms, there are a number of financial variables that according to literature affect insider trading. Dickgiesser and Kaserer (2009) in their research for Germany found out that the size of the firm affects negatively the abnormal returns of insider trading in event windows larger than 10 days after stock buys announcement were made. Capital structure and debt can also be seen as a measure of corporate governance (Shleifer and Vishny 1997). Jiraporn et al. (2012) report that firms' financial leverage can play an important role in reducing conflicts of interests and agency cost, acting as a substitute corporate governance mechanism. However, the results on the effect leverage has on insider trading are inconclusive (Dhaliwal et al. 2006; Penman et al. 2007).

Finally, another variable affecting abnormal returns of insider trading, which is examined by the literature, is the value of the shares traded in the transaction that is found to have a positive effect in the abnormal returns when it concerns buying shares and negative but less important for selling shares (Gregory et al. 2009).

46.3 Data and Methodology

In our research the effect that the announcements of insider trading to the stock prices will be used as a dependent variable, and that variable will be regressed with three sets of corporate governance variables related to ownership structure, the identity and the capacity of the insiders, and financial characteristics of the firms. The sample used consists of the announcements concerning purchase and selling of shares from insiders of 14 technology firms (computer software and hardware) of the ATHEX during the period 2007–2013. The announcements and the corporate governance and financial data were provided by the official web page of the ATHEX (www.helex.gr) and the investor relations section of the sites of the websites of the 14 firms. Data for the stock prices and the market index was acquired by Bloomberg database. A total number of 636 events were identified, 498 concerning share buys and 138 concerning selling of shares, after excluding non-statistical important events and outliers.

The effect of the announcement in stock returns is calculated by the use of the event study methodology (Brown and Warner 1985; Campbell et al. 1997, pp. 149–168; McKinlay 1997) and more specifically by the cumulative abnormal returns the event has on a specific time window around the event. Event studies that examine the effect of specific events in the stock prices reactions before and after the event can provide significant insight on the existence of agency problem and agency cost (Shleifer and Vishny 1997). The announcements concern selling and buying of shares by relevant persons excluding changes of voting rights of corporations and other organizations.

The first step of our study was to estimate the cumulative abnormal returns (CARs) of every event, by estimating the beta coefficient for the return of each firm's stock return in relation to the market returns of the General Index of the ATHEX market, using an estimation window of 160 days [−180, −21], using the OLS method for Eq. (46.1):

$$R_{it} = \alpha_i + b_i \cdot R_{mt} + \varepsilon_{it}, \quad (46.1)$$

where at time t R_{it} is the actual return of the stock i , R_{mt} is the return of the market, α_i and b_i are the coefficients of the OLS model, and ε_{it} is the zero disturbance term with $E(\varepsilon_{it}) = 0$ and $\text{Var}(\varepsilon_{it}) = \sigma_{\varepsilon_{it}}^2$.

The following step is to calculate abnormal returns (AR_{it}) that are estimated as the difference of expected return for time t and actual returns of the stock i for time t as follows in Eq. (46.1):

$$\text{AR}_{it} = R_{it} - \hat{R}_{it} = R_{it} - (\hat{\alpha} + \hat{b} \cdot R_{mt}) \quad (46.2)$$

where $\hat{\alpha}$, \hat{b} are the estimates for the coefficients α_i and b_i .

Cumulative abnormal returns (CARs) are then calculated as the sum of all abnormal returns for each firm (AR_{it}) during the event window where $t \in [t_1, t_2]$:

$$CAR_{i,(-t_1,t_2)} = \sum_{t=-t_1}^{t_2} AR_{it} \quad (46.3)$$

The event window is set around the day $t = 0$ which is the announcement of the transaction, and a number of event windows were then calculated within a time frame $[-t_1, t_2]$ that equals to $[-20, +20]$ days.

After the dependent variable CAR has been calculated, our attention focus on the independent variables that were identified by relevant literature in Sect. 46.2, which will be used in order to estimate *regression* (46.4) using OLS, for announcement regarding share buys and for announcement regarding share sales separately:

$$\begin{aligned} CAR(\tau_1, \tau_2)_i = & \alpha + \beta_1 CEO_i + \beta_2 MEMBER_i + \beta_3 NONE_{EXEC}_i + \beta_4 TRANSACT_i \\ & + \beta_5 CEO_{BLOCK}_i + \beta_6 C1_i + \beta_7 C5_i + \beta_8 LNME_i + \beta_9 LNBTM_i \\ & + \beta_{10} LNATB_i + u_i \end{aligned} \quad (46.4)$$

where (τ_1, τ_2) are the event windows $(-2, 0)$, $(-1, 0)$, $(0, +1)$, $(0, +2)$, $(0, +10)$, and $(0, +20)$, i is the observation of our sample, α is the constant term of the regression, $\beta_1 \dots \beta_{10}$ is the estimated coefficients of the independent variables, and finally u_i is the disturbance term.

In Table 46.1 the definitions of the independent variable are offered. The variables used fall in three main categories, describing the characteristics of the insiders transactions variables (*CEO*, *MEMBER*, *NONE_EXEC*, *TRANSACT*), the ownership structure and the separation of ownership and control variables (*C1*, *C5*, *CEO_BLOCK*), and the financial characteristics of the firm (*LNME*, *LNBTM*, *LNATB*).

Table 46.1 Variable definition

Variable	Definition
CEO	= 1 if the insider is the CEO and 0 if otherwise
MEMBER	= 1 if the insider is a member of the BoD and 0 if otherwise
NONE_EXEC	= 1 if the insider is a nonexecutive member of the BoD, 0 if otherwise
TRANSACT	Transaction volume divided by the mean capitalization value of the equity during the period $t = -180$ to $t = -21$
CEO_BLOCK	= 1 if the insider is the CEO who holds the largest block of shares in the firm and 0 if otherwise
C1	The percentage of share held by the largest blockholder
C5	The percentage of shares held by the largest five shareholders
LNME	The logarithm of the average market value of equity during the period $t = -180$ to $t = -21$
LNBTM	The logarithm of the average market-to-book value during the period $t = -180$ to $t = -21$
LNATB	The logarithm of the ratio of total assets to book value

Those variables are in line with the relevant literature. Gregory et al. (2009) and Dickgiesser and Kaserer (2009) suggest that the effect of an insider's position, in the Board of Director, on abnormal returns should be positive. Additionally, we use the *TRANSACT* variable to measure the effect the volume of the transaction has on abnormal return and examine whether the motives on the transaction are informative or seeing liquidity. The ownership structure variables *C1* and *C5* capture the influence ownership structure has on abnormal returns and check for the enhanced monitoring hypothesis due to the existence of blockholders, as suggested by Adams et al. (2005), Fidrmuc et al. (2006) and Betzer and Theissen (2009). The separation of ownership and control is examined by the *CEO_BLOCK* variable, in order to examine the nature of the agency problem in Greece.

Finally, three more control variables are included that capture the company financial characteristics, namely, the capitalization of the firm *LNME*, the value of the firm *LNBTM*, and the financial leverage of the firm measured by *LNATB* (Fama and French 1992; Dickgiesser and Kaserer 2009). In the following section, the results of the estimated regression are presented.

46.4 Empirical Results

In Table 46.2 descriptive summary statistics for the cross-sectional regression sample consisting of a total of 636 observations are presented, broken down in purchases and sales. Panel A reports purchases and Panel B sales trading announcements.

Transactions concerning purchases are mostly executed by member of the Board of Directors, compared to sales transactions. The volume of the transactions however is bigger in the case of sales. Ownership concentration higher in purchase transactions, but when we control for the case where the CEO is also the bigger blockholder, is higher in purchases announcements.

In Tables 46.3 and 46.4, the results of the regression estimation for Eq. (46.4) for purchases and sales announcement are presented, respectively. As a general observation, we must note that the model seems to have better explanatory power for CARs in long periods of time after the announcements (0, +10) and (0, +20). All 12 estimated regressions are statistical important since the *F* value exceeds the critical value. No multicollinearity issues were detected in all 12 models.

When purchase transactions are performed by CEOs, the dependent variable CAR is affected positively for the time frames (0, +10) and (0, +20) by +0.043 and +0.042, respectively. On the other hand, when the announced purchase transactions are performed by members of the Board of Directors, then CARs are affected negatively for the event windows (0, +10) and (0, +20), -0.059 and -0.057, respectively. Nonexecutive members of the BoD purchasing stocks announcements influence positively CARs 1 day before the announcement (+0.016) and 1 day after the announcement (+0.020).

Table 46.2 Descriptive statistics of control variables for the buy and sale equations

	Mean	Std. dev.	Skewness	Kurtosis	Jarque-Bera	Observ.
<i>Panel A. Insider purchases</i>						
CEO	0.7028	0.4575	-0.8875	17.877	95.87	498
MEMBER	0.9317	0.2525	-34.235	127.203	2933.35	498
NONE_EXEC	0.1426	0.3500	20.446	51.804	445.61	498
TRANSACT	0.0009	0.0027	100.028	1.371.386	381663.00	498
CEO_BLOCK	0.7410	0.4385	-11.000	22.101	113.38	498
C1	0.4301	0.1930	-0.1851	17.250	36.57	498
C5	0.7347	0.1128	-0.4392	31.836	16.70	498
LNME	172.997	13.211	12.889	46.851	196.79	498
LNBTM	-0.2554	0.9326	-13.600	75.964	591.90	498
LNATB	0.6222	0.4061	13.494	47.353	213.61	498
<i>Panel B. Insider sales</i>						
CEO	0.3333	0.4731	0.7071	15.000	24.43	138
MEMBER	0.8841	0.3213	-23.992	67.561	213.51	138
NONE_EXEC	0.1087	0.3124	25.143	73.220	252.81	138
TRANSACT	0.0027	0.0078	78.191	755.010	31630.45	138
CEO_BLOCK	0.5580	0.4984	-0.2335	10.545	23.01	138
C1	0.3922	0.1983	0.3512	14.798	16.12	138
C5	0.6392	0.1780	0.1336	13.062	16.90	138
LNME	191.954	20.098	-0.0886	12.379	18.03	138
LNBTM	-0.9095	0.9560	0.4655	26.263	5.78	138
LNATB	0.6664	0.3874	20.023	136.120	739.73	138

The abnormal returns generated by sales announcements are not affected whether the insider is the CEO of the firm or a member of the BoD. Only when the transactions are performed by nonexecutive members of the board, CARs are influenced negatively for the event window of $(-2, 0)$, $(0, +1)$, $(0, +2)$, and $(0, +20)$ by -0.017 , -0.016 , -0.020 , and -0.053 , respectively. When the CEO is also the main shareholder of the firm, there is a positive (negative) and statistically significant impact on CAR in the case of purchases (sales) announcements 2 days and 1 day before the announcement.

The volume of the announced transaction has a consistently positive effect on purchases, and negative on sales, but in that case it is only statistically significant for the $(0, +20)$ period of time.

As far as corporate ownership is concerned, the percentage of the share of the largest shareholder has no effect on CARs in the case of purchases and negative effect in the case of sales announcements. Variable C5 that measures ownership concentration of the firm has a negative effect in purchases for the periods $(0, +10)$ and $(0, +20)$, -0.137 and -0.159 , respectively, as it can be seen in Table 46.3. In the case of sales, the effect on abnormal returns is positive and more specifically equals to $+0.078$, $+0.186$, and $+0.239$ on the event windows $(0, +2)$, $(0, +10)$, and $(0, +20)$, respectively. Finally, the financial control variables have a negative

Table 46.3 OLS estimates for purchases

	CAR (-2, 0)	CAR (-1, 0)	CAR (0, +1)	CAR (0, +2)	CAR (0, +10)	CAR (0, +20)
Constant	-0.034 (-0.602)	-0.012 (-0.276)	0.072* (1.759)	0.124** (2.368)	0.375*** (4.115)	0.432*** (3.591)
CEO	0.003 (0.259)	-0.003 (-0.465)	0.008 (1.048)	0.006 (0.622)	0.043*** (2.624)	0.042** (1.943)
MEMBER	0.004 (0.401)	0.010 (1.044)	-0.006 (-0.694)	-0.013 (-1.133)	-0.059*** (-2.903)	-0.057** (-2.143)
NONE_EXEC	0.018 (1.576)	0.016* (1.909)	0.020** (2.446)	0.017 (1.577)	0.015 (0.847)	0.028 (1.157)
CEO_BLOCK	0.021** (2.107)	0.020*** (2.729)	0.005 (0.681)	0.005 (0.594)	-0.033** (-2.086)	-0.016 (-0.784)
TRANSACT	1.843** (2.034)	1.109 (1.622)	0.716 (1.073)	2.200*** (2.599)	5.388*** (3.655)	5.722*** (2.937)
C1	0.022 (1.497)	0.020* (1.783)	0.005 (0.451)	-0.002 (-0.131)	-0.022 (-0.905)	-0.004 (-0.130)
C5	-0.011 (-0.509)	-0.015 (-0.890)	-0.023 (-1.390)	-0.021 (-1.039)	-0.137*** (-3.661)	-0.159*** (-3.336)
LNME	-0.001 (-0.244)	-0.001 (-0.697)	-0.004** (-2.138)	-0.007*** (-2.755)	-0.014*** (-3.158)	-0.018*** (-3.314)
LNBTM	-0.007** (-2.411)	-0.006*** (-2.702)	-0.006** (-2.423)	-0.011*** (-3.804)	-0.008* (-1.652)	-0.017** (-2.725)
LNATB	0.023*** (3.113)	0.016*** (2.883)	0.003 (0.620)	0.006 (0.859)	-0.017 (-1.432)	-0.007 (-0.446)
R ²	5.30 %	6.30 %	3.50 %	5.30 %	9.20 %	7.40 %
Adjusted R ²	3.40 %	4.40 %	1.50 %	3.30 %	7.40 %	5.50 %
N	498	498	498	498	498	498
Max VIF	3.907	3.907	3.907	3.907	3.907	3.907
Avg VIF	2.153	2.153	2.153	2.153	2.153	2.153
F-statistic	2.726	3.264	1.743	2.708	4.943	3.881

Values in brackets are *t* statistics. *, **, and *** denotes statistical significance of 10 %, 5 %, and 1 %, respectively

impact on both purchases and sales announcements but not statistically significant for all time frames.

46.5 Conclusions

In this paper the relationship between insider trading and corporate governance is examined. More specific we examined the relationship between abnormal returns, measured by CARs occurring on insider trading announcement, ownership struc-

Table 46.4 OLS estimates for sales

	CAR (-2, 0)	CAR (-1, 0)	CAR (0, +1)	CAR (0, +2)	CAR (0, +10)	CAR (0, +20)
Constant	0.044 (0.483)	0.048 (0.590)	0.056 (0.656)	0.106 (1.015)	-0.028 (-0.167)	-0.352* (-1.667)
CEO	0.004 (0.440)	0.014 (1.622)	-0.007 (-0.826)	0.002 (0.188)	0.004 (0.227)	0.020 (0.918)
MEMBER	0.018* (1.730)	0.015 (1.585)	0.015 (1.522)	0.012 (0.989)	0.004 (0.181)	0.012 (0.501)
NONE_EXEC	-0.017* (-1.772)	-0.011 (-1.240)	-0.016* (-1.696)	-0.020* (-1.809)	-0.017 (-0.916)	-0.053** (-2.338)
CEO_BLOCK	-0.026** (-2.604)	-0.026*** (-2.961)	-0.007 (-0.704)	-0.011 (-0.998)	0.036* (1.949)	0.007 (0.306)
TRANSACT	-0.085 (-0.243)	-0.063 (-0.202)	-0.246 (-0.752)	0.311 (0.773)	-0.661 (-1.020)	-2.347*** (-2.891)
C1	0.063* (1.703)	0.009 (0.284)	-0.011 (-0.321)	-0.050 (-1.173)	-0.158** (-2.287)	0.074 (0.855)
C5	-0.015 (-0.393)	0.047 (1.405)	0.055 (1.560)	0.078* (1.793)	0.186*** (2.659)	0.239*** (2.717)
LNME	-0.004 (-1.053)	-0.005 (-1.407)	-0.005 (-1.303)	-0.008 (-1.617)	-0.001 (-0.150)	0.007 (0.785)
LNBTM	0.000 (0.023)	-0.002 (-0.537)	-0.011** (-2.332)	-0.016*** (-2.731)	-0.026*** (-2.786)	-0.016 (-1.359)
LNATB	0.033*** (3.775)	0.029*** (3.671)	-0.002 (-0.254)	-0.004 (-0.424)	-0.055*** (-3.341)	0.030 (1.479)
R ²	19.20 %	22.10 %	13.90 %	16.30 %	18.00 %	23.30 %
Adjusted R ²	12.80 %	13.90 %	7.10 %	9.70 %	11.60 %	17.30 %
N	138	138	138	138	138	138
Max VIF	10.718	10.718	10.718	10.718	10.718	10.718
Avg. VIF	4.184	4.184	4.184	4.184	4.184	4.184
F-statistic	3.009	3.594	2.047	2.474	2.795	3.877

Values in brackets are *t* statistics. *, **, and *** denotes statistical significance of 10 %, 5 %, and 1 %, respectively

ture, the capacity in which a person is considered to be an insider, and financial control variables for the software and hardware firms of the Greek technology sector in ATHEX, during 2007 and 2013.

Our results are in line with the findings of Dickgiesser and Kaserer (2009) as well as with the ones provided by Gregory et al. (2009), as there is evidence that the insiders performing the transaction affect abnormal stock returns, but not in a clear and homogenous manner. Our findings are also in line with relevant theory since investors and outsiders tend to take under consideration the information advantage the CEO and other executives hold (Fidrmuc et al. 2006) especially in the case of stock purchases and when there is no separation of ownership and control. But

these results should be considered in the adverse economic environment in which the Greek stock market and the firms examined operate in that could lead insiders of Greek firms to perform insider trading for reason beyond the ones suggested by Hamill et al. (2002). Finally, our findings are inconclusive regarding the way ownership structure and concentration affect abnormal returns created by insider trading. There seems to be a negative (positive) relationship for purchasing (selling) announcements, but the pattern is not clear and concerns only long periods of time following the event. Further study of transactions concerning only executive members of the Board with a bigger sample of firms and announcements, from various industries, could shed more light on this relationship.

Future research should focus examining further in greater detail corporate governance mechanisms, including variables such as the size of the Board of Directors, the existence of committees, (especially the audit committee) that affect the information content of announcements, and the interaction of insiders and outsiders on their decisions to sell or buy shares of a firm. The present research could also be extended to other sectors and industries, to investigate whether there are differences of patterns between different sectors of economic activity. This line of research would benefit both investors and regulators in dealing with insider trading especially in periods of financial crisis.

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Chapter 47

Internal Audit Disclosure Regarding to External Audit in Greece

Georgia Boskou, Efstathios Kirkos, and Charalambos Spathis

Abstract This study's objective is to assess the factors that influence disclosure of internal audit (IA) in Greece. The data was hand collected and obtained from 2014 annual financial reports from 173 companies listed in Athens Stock Exchange (ASE). We assess the internal audit disclosure in terms of internal audit operations, corporate governance, and quantity of disclosure. Previous literature was chosen so as to highlight significant independent variables that are related to external audit. Linear regression analysis examines the association between internal audit operations (IAO), corporate governance code (CGC) and number of words (NW), and seven principal factors. In attempt to define IA Disclosure (IAD), we consider the disclosure of an internal audit function analyzing in operational and procedural aspects and at the same time with aspects of annual report text content. The results indicate internal audit disclosure, on the main sample of Greek listed firms, as well as the existence of significant associations between the degrees of disclosure to some external audit variables.

Keywords Internal audit disclosure • External audit • Corporate governance • Greece

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47.1 Introduction

Auditing is an integral part of capital markets and has drawn an unprecedented high level of attention, due to the high-profile corporate scandals, such as Enron, Parmalat, WorldCom, Tyco, etc., and the financial crisis that the whole world faces. The high-profile financial reporting scandals that have marked the first decade of this century have pointed out the weaknesses of both management and control in business and especially in listed companies, have provided evidence that the auditing practices should be enriched and improved, and have led to revisions in internal control regulations globally (Kirkos et al. 2007a, b). IA regulations have been the subject of an ongoing debate among academics, regulations, and practitioners worldwide, and there is a controversy concerning its effectiveness in the aftermath of the current financial crisis (Altamuro and Beatty 2010). The Internal Audit Function (IAF) was originally designed to help ensure reliable accounting information and to safeguard companies assets and at the same time to provide reasonable assurance as far as the reliability of financial reporting is concerned (COSO 1992). As a result of the explosion of internal control systems, it was necessary for IA to shift from auditing outcomes to auditing systems. In the wake of recent business scandals, many organizations are currently reconsidering their IA functions whether this is done on a voluntary basis or by enforcement of new laws, regulations, and guidelines that derives from Sarbanes-Oxley Act, SEC rules, comply-or-explain regime, and others. Continuous changes in regulations have created an increased focus on effective corporate governance (CG) and internal audit quality (IAQ). The OECD (Organization for Economic Cooperation and Development) published the “Corporate Governance Principles” in 1999. We use the term “corporate governance” to define the way companies are governed and audited. CG, both as a concept and as a method of verification of transparency, the effective financial reporting and the way companies function, is considered as top priority for the investors in the money market since 1990s (Xanthakis et al. 2003). Different choices are made by different countries regarding the reporting of internal control (IC) in annual reports. Anglo-Saxon countries, along with the USA, became pioneers in this issue by legislating laws such as Cadbury and Sarbanes-Oxley (SOX). The European Commission (2006) has decided to follow the “comply-or-explain principle” with regard to CG regulation, meaning the management has either to comply with the applicable internal control regulations of the member state or explain and report why they haven’t done so. The Greek Code of Corporate Governance (EKED) has been drawn up with the initiative of the Association of Corporations and Industries (SEB) and was modified afterward in the framework of its first review by the Greek Council of Corporate Governance (ESED) on 28 June 2013. The aims of the code are the constant improvement of the Greek corporate institutional framework and the wider corporate environment, as well as the increase of the investors’ trust, not only to the total of the listed firms but also to each one of them separately, broadening at the same time the horizons of attracting entrepreneurial capitals. The code is followed by the “comply-or-explain” approach

and demands from the listed firms that choose to implement it: to make known the specific intention of theirs and either to comply with the total of the special practices of the code or else to explain the reasons for their noncompliance with the specific special practices (EKED, SEB 2013).

Various implicated members perceived the concept of audit quality differently. Audit committees and executive management are continuously setting a higher demand from the internal audit function so as to fulfill corporate governance responsibilities. On the other hand, in order to be responsive to such stakeholder needs, internal audit functions should operate at the highest levels of quality and commit to constant evaluation and improvement of the effectiveness of internal audit. The Institute of Internal Auditors (IIA) considers important the regular assessment of IAF by an external party regularly. The abundant positive developments may be drawn toward the improvement of financial reporting. The work of the International Accounting Standards Board (IASB) and International Federation of Accountants (IFAC), along with International Organization of Securities Commissions (IOSCO) and others, in recent years has as a result the improvement of the standards setting process and the quality of the resulting standards. The efforts of IASB and IFAC are part of a greater initiative for the enhancement of the quality of financial reporting and auditing globally as this has been an official decision under the guidance of the International Forum of Accountancy Development (IFAD) (Needles et al. 2002).

The *purpose* of this paper is the investigation of IAD, in annual reports of the listed in ASE companies, covering the majority of the sectors, with the characteristics of the external audit, as they have been defined by the legislation and the CGC. Our study goes beyond a single framework including three components that reveal disclosure: internal audit operations, corporate governance, and the amount of words used to describe the internal audit in the annual reports, taking into account at the same time regulatory evolution. We also examine whether the extent of disclosure varies according to the external audit characteristics.

The rest of the paper is structured as follows:

- In Sect. 47.2 the literature on IAD is examined and specifically the literature on IAQ and Internal Audit Compliance (IAC).
- In Sect. 47.3 a methodological approach gives a description of the related indicators, the techniques, and the regression model that is adopted in this study and the sample that is being considered.
- In Sect. 47.4 results, in order to assess whether a relationship between the IAD and the seven factors does exist, in companies listed in ASE and also limitations and directions for future research are presented.

47.2 Literature Review

An internal control system represents an important tool for investors to assess the adequacy of corporate reporting practices. For example, IAQ is an important factor in achieving good financial reporting policy (Krishnan 2005). What is defined as a

system of internal auditing are all the procedures that are put in force by the board, the administration, and the rest of the staff of a company, targeting at the ensuring of the effectiveness and the efficiency of the company tasks, the credibility of financial informing, and the compliance with the applied laws and regulations (Kontogeorgis 2013). Before the Sarbanes-Oxley Act of 2002 (SOX) was put into force, internal audit's services primary aim was detection not prevention. Internal auditors were shifting approaches from confrontational to partnering with management and from a controls approach to a risk-based one (Hass et al. 2006). Cooper et al. (2006) mentioned that what Sarbanes-Oxley Act actually did was to add the dimension of internal financial reporting assurance that internal auditors and audit committees expected and hoped for. The rules for corporate governance, disclosure, and reporting were expanded with the Sarbanes-Oxley Act (SOX) of 2002. SOX have put the emphasis on the critical role of internal control over financial reporting attempting to improve accountability and bring back investor confidence. To be more exact, Section 404 of the SOX—"Enhanced financial disclosures, management assessment of internal control" in conjunction with the related SEC rules and Auditing Standard No. 2 established by the Public Company Accounting Oversight Board (PCAOB)—considers absolutely essential that the management of a public company issues annual reports on how effective the company's internal control has been over financial reporting. A report on internal control over financial reporting, that should include not only an opinion on management's assessment but also an opinion on the effectiveness of the company's internal control over financial reporting, is required from the company's independent auditor in conjunction with the audit of the company's financial statements.

A number of studies assess the extent of influence on investor confidence and investment decisions that a descriptive Internal Audit Report (IAR) may have. Major findings include the following:

What Wagner and Dittmar (2006) and Shelton and Whittington (2009) perceived when they examined the effects of results of Section 404 of the SOX was that unfavorable audit opinions of the effectiveness of internal control are related to higher assessment of company risks as well as a weakness of disclosure of internal control over financial reporting. Holt and DeZoort (2009) motivated by the need for transparency in company governance found in their study that the addition of IAR increased the investors' confidence on financial reporting. Song et al. (2010) confirm the positive effect of Section 404 of the SOX on internal control reports and the internal control's quality influence on auditor opinion assessments. Another study carried out by Krishnan (2005) revealed that audit committee affects positively IAQ when companies are audited by Big-4 firm. Gao and Kling (2012) in their study found that auditors' opinions increase the compliance to mandatory disclosure requirements. Prawitt et al. (2009) examined the relation between internal audit function quality and earnings management and conclude that the higher the quality of IAF, the lower abnormal accruals measure and the greater the likelihood to stick to analyst earnings prediction. Various studies have showed a correlation between the size and the composition of the board and the quality of accounting

information (Beasley 1996; Klein 2002; Peasnell and Pope 2005). In an attempt to study the relationship between internal control reporting and accrual quality in an alternative internal control regime based on the “comply-or-explain principle” in the Netherlands, they Van de Poel and Vanstraelen (2001) found that the noncompliance rate of providing a statement of effective internal controls is relatively high and that companies give generic explanations for noncompliance or no explanation at all. In addition, they found that the noncompliance rate of providing a statement of effective internal controls is relatively high (Van de Poel and Vanstraelen 2001). The study in France indicates that the choice of the internal control framework and the firm characteristics such as size influence the content of the information disclosed about governance, internal control, and management practices (Mandzila and Zeghal 2016). Studies conducted in Italy have shown that the interplay between governance and disclosure is associated with concentrated ownership and high shareholder representation in the board (Allegrini and Greco 2011).

Against this background, the following hypotheses are formulated:

H1 In a comply-or-explain regime, internal audit operations (IAO) are associated with external auditors’ report.

H2 In a comply-or-explain regime, there is an association between corporate governance code (CGC) and external auditors’ report.

H3 In a comply-or-explain regime, number of words (NW) regarding Internal Audit in Annual Reports is related with external auditors’ report.

47.3 Methodology

47.3.1 Sample Size

Studies of IAD and IAQ are outnumbered by studies of external audits. This present research investigates factors that may influence IAD within listed companies in ASE during the crisis period and especially the year 2014.

Specifically the sample consists of 233 companies listed in Athens Stock Exchange (ASE) of most of the sectors. In line with previous studies, we exclude from the sample financial, insurances, and property estate, due to differences in reporting and disclosure companies. We also exclude firms from different sectors, whose data was not available as they were on suspension and others because its twelve-month use does not coincide with the calendar year (1/1-31/12) but with the taxable year. Some sectors have not companies at all (Appendix). This leaves us with a final sample of 173 firms on an annual basis observation.

We retrieve financial data, data relevant to the function of IA, and data about the external audit taken from the annual reports. Data on the internal audit requirements and rations were hand collected and manually coded from the annual reports of the companies. We based our study on annual reports on the year 2014, when the

reformed CGC of 2013 was enacted. We carried out content analysis recording results rating from 0 to 1. Zero (0) means that there is no information and one (1) means that information is present. In very few cases the indicators were other than 0 or 1 and referred to a sheer number. When an expression or a word or a number comes up and is related to seek information, it qualifies as complete information so we use 1. In every information that is insufficient or nonexistent, we use 0.

47.3.2 *Research Models*

We use *multiple linear regression* analysis to examine the association between IAD and external auditors' report. The *dependent variables* in this study are:

1. IAO which is a complex variable resulting from the (a) Segmentation of Duties and the Professional Competence and Knowledge Adequacy, (b) Regulation Levels of Approval, and (c) Authorization of Access to files on the financial statements.
2. CGC is a complex variable that derives from: (a) the company reference to the CGC, (b) whether it follows the code, (c) whether it has drawn up a code of its own, (d) whether it declines from the CGC, and (e) whether it has adopted practices that go beyond the law.
3. NW that refers to the number of words used to describe the internal control in annual reports paying specific attention at the processes of drawing up transparent and reliable financial statements.

The factors were identified from a review of previous academic literature studying the internal audit function. We also considered Guidance from International Professional Practices Framework (IPPF) as well as other related documentations. Seven factors were identified as relevant to IAD: opinion with paragraph, number of paragraphs, audit company code, and control variables such as return of assets (ROA), return of equity (ROE), leverage, and company size.

We use the information from the external auditors' reports, as independent variables, to evaluate IAD on:

1. Whether the external auditors' report contains remarks (with paragraph) in the external auditor's evaluation report. If the auditor's report contains remarks, an indicator variable equals 1; otherwise it equals 0.
2. The number of issues external auditors' reports referred to. An indicator equals to the total of the remarks.
3. Whether the auditing company is a member of Big-4 or not. An indicator variable equals 1 if the audit company is a Big-4 member; otherwise it equals 0.

So as to ensure that the factors associated only with high degree of disclosure could be isolated and that they do not belong to the external audit variables mentioned previously, it was essential to include additional control variables which

have been identified by previous literature as being significant ones in the analysis. For example, we examine specific firm characteristics like ROA, ROE, leverage, and company size:

- Return of assets (net income/average total assets) (Mahdy and Park 2014)
- Return of equity (net income/average equity) (Batsinilas and Patatoukas 2012)
- Leverage measured at year end 2013 and 2014. Leverage (as measured in terms of average assets/equity) (Batsinilas and Patatoukas 2012)
- Company size as of 31 Dec 2013 and 31 Dec 2014: size (as measured in terms of the natural logarithm of total assets) (Zeghlal 1984; Klein 2002; Regoliosi and D’Eri 2012)

47.3.3 Empirical Results

Table 47.1 shows the mean and the std. deviation for all variables.

Table 47.2 presents Pearson correlations between the transformed dependent and independent variables. The following correlations support several theoretical hypotheses: *Total CGC* is significantly positively correlated with *number of words*. *Internal audit operations* is significantly positively correlated with *audit company code and number of words*; it also shows that many explanatory variables are significantly correlated with each other. The test of the formal hypothesis is based on linear regression analysis.

Table 47.3 shows low adjusted R square and very satisfactory significance.

Table 47.4 presents the empirical regression analysis results. Significant variables concerning internal audit operations are positively correlated with the *audit company code and negative ROE and leverage*. For total CGC and *number of words* significantly positively variable is *size*.

Table 47.1 Descriptive statistics of all variables

Full sample (n = 173)		
Variable	Mean	Standard deviation
Total CGC	3.58	1.290
Internal audit operations	0.78	1.115
With paragraph	0.31	0.462
Number with paragraph	0.87	1.596
Audit company code	0.21	0.408
ROA	-0.0172	0.0968
ROE	0.0036	3.8925
Leverage	2.9965	68.1129
Size	7.9011	0.8026
Number of words	456.84	281.693

Table 47.2 Pearson correlation coefficients between the variables

Variable	Total CGC	Internal audit operations	With paragraph	Number with paragraph	Audit company code	ROA	ROE	Leverage	Size	Number of words
Total CGC	1									
Internal audit operations	0.186*	1								
With paragraph	0.150*	0.007	1							
Number with paragraph	0.094	0.029	0.718**	1						
Audit company code	0.036	0.305**	-0.065	-0.066	1					
ROA	-0.169*	-0.062	-0.495**	-0.485**	0.063	1				
ROE	-0.094	.039	.006	.162*	.004	.015	1			
Leverage	0.076	-0.071	0.013	-0.129	-0.002	0.008	-0.972**	1		
Size	0.177*	0.078	-0.057	-0.093	0.395**	0.131	-0.083	0.080	1	
Number of words	0.355**	0.382**	0.132	0.052	0.057	-0.081	0.020	-0.015	0.222**	1

*Correlation is significant at the 0.05 level (2 tailed)

**Correlation is significant at the 0.01 level (2 tailed)

Table 47.3 Regression model summary

Dependent variable/regression	Adjusted R square	ANOVA	
		F	Sig.
Internal audit operations	0.084	3.241	0.003 ^a
Total CGC	0.046	2.191	0.038 ^a
Number of words	0.039	1.999	0.058 ^a

^aPredictors: (Constant), size, with paragraph, leverage, audit company code, ROA, number with paragraph, ROE

Table 47.4 Regression coefficients

	Internal audit operations		Total CGC		Number of words	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	1.054	0.230	0.854	0.410	-251.658	0.268
With paragraph	-0.072	0.785	0.292	0.351	108.136	0.115
Number with paragraph	0.039	0.620	-0.011	0.906	-18.377	0.364
Audit company code	0.894	0.000	-0.095	0.714	-22.428	0.692
ROA	-0.562	0.582	-1.931	0.111	-223.332	0.399
ROE	-0.159	0.085	-0.101	0.354	11.709	0.624
Leverage	-0.010	0.061	-0.005	0.463	0.443	0.743
Size	-0.057	0.614	0.334	0.013	87.457	0.003

Predictors: (Constant), opinion with paragraph, number of paragraphs, audit company code, ROA, ROE, leverage, size

47.4 Discussion and Conclusions

The *purpose* of our study is aiming at providing insights into the internal control disclosure, the compliance with the IA regulation, and the relation with the external audit. More specifically, we examine the relation between IAD with CGC regulations as they depict on the annual reports and the present interaction with the indicators of external audit.

The *reasons* we conduct our study in Greece and specifically on companies, which are listed in ASE are the following reasons. Firstly, a corporate governance code is applied in Greece, in particular the “comply-or-explain” regime which by its structure it contains important information on the internal audit system and its application. Secondly, we aimed at viewing the correlation between IAD and the external audit opinion, especially in year 2014 during the peak of the economic crisis that we examine in our sample.

The *results* we found show that the internal audit operations (IAO) which is a complex dependent variable resulting from the (1) Segmentation of Duties and the Professional Competence and Knowledge Adequacy, (2) Regulation Levels of Approval, and (3) Authorization of Access to files on the financial statements is related positively to a great extent with one of the independent variables, that is, “audit company code” which refers to whether the company is a Big-4 member or not and negative with ROE and leverage. Consequently the companies that are audited by Big-4 auditing firms that the strict regulatory framework applied by tend

to implement at a higher degree the IAO. This result is also confirmed by Krishnan (2005) findings. We assume that the strict regulatory framework applied by Big-4 auditing firms make companies comply with the current legislation and the CGC.

Total CGC and NW, the other two dependent variables, are related to the same control variable, which is “size,” which refers to the company’s size. ROA, which is an indicator of how profitable a company, is relative to its total assets, negatively correlated to “Number with Paragraph”. The results show that the bigger the company is in size, (a) the bigger its compliance with CGC is, and (b) the bigger the extension of the content that refers to the internal audit in the annual report. Respectively, reduced company profits are associated with reduced extension of internal audit content in the annual report. Total CGC is positively correlated with number of words. Internal audit operations is significantly positively correlated with audit company code and number of words.

Despite the considerable attention that was given to the method and the design of this paper, some limitations still exist. Firstly, in order to be able to conduct the comprehensive literature review, the focus was kept relatively narrow in IAD and IAQ. Secondly, the existing literature studies the relation between IAD and IAQ and IAC is quite restricted, since reports in IA departments are not publicly available. Results provided by this research cannot be regarded as generally applicable yet, with gathering of only one year data, although this study should contribute to the development of a deeper understanding of the characteristics of Internal Audit Quality.

The suggestions formed after the completion of this present research paper on *future research* could be as follows:

1. Extension of research to other years in order to broaden our knowledge on the disclosure of internal audit overtime of ASE.
2. The correlation of internal audit disclosure with financial sizes. This investigation will provide the possible existence of relations between the internal audit disclosure and the financial sizes of a company.
3. Wider evaluation of the compliance with internal audit models or with corporate governance codes on the part that refers to the known object of internal audit disclosure.
4. The correlation of internal audit disclosure with the external audit and the interaction between them.
5. Focusing analysis on the specific components of the IAD indicator or create other IAD total indicators and attempting to assess the contribution of several CG elements to other aspects of IAQ.
6. Extended the research in the financial insurances and property estate companies in order to see the level of disclosure to this special part of companies.
7. The generalized ability of results since our sample includes only companies required to CG report.

There has been a tremendous increase in the IAD contribution nowadays because of the hard economic conditions that our country faces. IAD can decisively

contribute to improving the competitiveness of Greek company and by extension to Greek economy. This improvement may constitute a factor so as Greece exiting the economic crisis.

Nowadays that the trend is very close to becoming an international standardization, this issue is still open for future comparative research in an international setting so as effective practices can be identified.

Appendix

Companies in ASE 2014	Companies from financial, insurances, and property sector	Companies on suspension	Companies with different calendar and taxable years	Companies' final sample
233	33	21	6	173

Selected industry segments	
Agriculture and fishing	Medical equipment
Airlines	Medical services
Alternative electricity	Mines
Aluminum	Nonferrous metals
Basic chemicals	Oil and gas
Building materials and components	Packaging materials
Business support services	Personal care items
Clothing and accessories	Pharmaceuticals products
Commercial vehicles and trucks	Processing services and management waste
Computer hardware	Publications
Computer services	Refineries
Construction	Refreshments
Conventional electricity	Retail and wholesale of food
Distillation and wine production	Software
Durable consumer goods	Specialty chemicals
Electrical part and equipments	Specialty retailers
Electronic office equipment	Steel
Food	Supplier industry
Furniture	Telecommunications equipment
Hotels	Tobacco
Housing construction	Transport services
Industrial machinery	Travel and tourism
Internet	TV and entertainment
Landline telephony	Water supply
Lucky games	

Excluded industry segments	
Banks	Investment services
Banquet	Life insurance
Brewing	Mobile telephony
Capital management	Participation and property development
CO ₂	Property estate services
Consumers faith	Real estate
Diversified (EEAP)	Real estate investments
General insurance	Recreational services
General trade	Reinsurances
Industrial and commercial services (EEAP)	Shoes
Insurance brokers	Speciality (EEAP)
Insurances and property damages	Specialized financial services
Investment companies	No durable consumer goods
Investment services	

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Chapter 48

Which Factors Are Crucial in Explaining Vulnerability of Countries to the External Macroeconomic Shocks? The Case of the Central and Eastern European Countries

Vilma Deltuaitė

Abstract Many scientists highlight the importance of trade openness on the vulnerability of countries to the external macroeconomic shocks. The scientific literature provides substantial evidence that a domestic economy may suffer a loss due to increased openness of an economy. For this reason this empirical study focuses on vulnerability of countries to the external macroeconomic shocks and macroeconomic shocks transmission through real channel in the CEECs. The main research questions are: which determinants explain vulnerability of countries to the external macroeconomic shocks and which type of external macroeconomic shocks cause the spillover effect transmission? The objective of this study—to identify the determinants explaining vulnerability of countries to the external macroeconomic shocks and the macroeconomic shocks transmission through real channel in the CEECs. The research object—the CEECs. The research methods: the systemic, logical, and comparative analysis of the scientific literature and statistical method: panel regression analysis, cross-sectional panel regression. The main findings are that the exchange rate shock (depreciation of the currencies of the main export partners) positively affects the real GDP growth of CEECs, however, depreciation of foreign currencies decrease the export flows to these countries. The economic growth in the main export partners positively affects the real GDP growth in CEECs and real export flows to these countries and the positive effect is stronger on the real export flows. The increase of consumption in the main export partners positively affects the real GDP growth in the CEECs, however, a negative impact of consumption on the real export flows to the main export partners is observed. The empirical results also suggest about positive impact of import growth in the main export partners. The empirical results on the vulnerability of CEECs to the

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external macroeconomic shocks suggest that the more divergent export structure of a country from world structure is, the higher volatility of country's real GDP is and trade openness of country also increases the volatility of country's real GDP.

Keywords Macroeconomic shocks • real channel • vulnerability • CEECs

48.1 Introduction

Many scientists highlight the importance of trade openness on the vulnerability of countries to the external macroeconomic shocks. Noy (2009) states that natural disasters have a statistically observable adverse impact on the macro-economy in the short run and costlier events lead to more pronounced slowdowns in production. According to Noy (2009), developing countries and smaller economies face much larger output declines following a disaster of similar relative magnitude than do developed countries or larger economies. Cavallo and Frankel (2008) also note that “openness to trade is one factor that has been identified as determining whether a country is prone to sudden stops in capital inflows.” According to Cavallo and Frankel (2008), “the view that openness makes countries more vulnerable to crises comes in a number of forms.” They find that openness indeed makes countries less vulnerable to crises, and that the relationship is even stronger when correcting for the endogeneity of trade. Firstly, a weakening in a country's export markets is sometimes the trigger for a sudden stop in capital flows, so that a high-trade country is more vulnerable. Secondly, sudden stops in finance often extend to a loss in trade credit and that the resulting shrinkage in trade is more painful if trade was a larger share of the economy. Thirdly, openness to trade in practice goes hand in hand with openness to financial flows, for example, because much trade needs multinational corporations, who in turn need to be able to move money across national borders; or because it is harder to enforce capital controls if trade is free. Regardless the specific reasoning, the notion that globalization leads to crises is a generalization that appeals too many. Montalbano (2011) focused on the welfare costs of exposure to shocks and uncertainty linked to trade openness and contributed by presenting a comprehensive review of the literature on the “destabilizing effects” of trade openness. Montalbano (2011) provides a conceptualization of vulnerability and three promising lines of reasoning (macro, micro, and meso) for future research on the link between trade and vulnerability.

While the Central and Eastern European countries (CEECs) are among the world's most open economies, these countries are very sensitive to the external shocks that can be transmitted through real channel. For this reason this empirical study focuses on vulnerability of countries to the external macroeconomic shocks and macroeconomic shocks transmission through real channel in the CEECs. The main research questions are: which determinants explain vulnerability of countries to the external macroeconomic shocks and which type of external macroeconomic shocks cause the spillover effect transmission? The objective of this study—to identify the determinants explaining vulnerability of countries to the external macroeconomic shocks and the macroeconomic shocks transmission through real

channel in the CEECs. The research object—the CEECs. The research methods: the systemic, logical, and comparative analysis of the scientific literature and statistical method: panel regression analysis, cross-sectional panel regression.

48.2 Literature Review

This section provides a brief literature review on determinants explaining vulnerability of countries to the external macroeconomic shocks and different macroeconomic shocks transmission with a special focus on shocks transmission through real channel. Disyatat and Vongsinsirikul (2003), Kroszner et al. (2007), Atta-Mensah and Dib (2008), Kubo (2008), Sun et al. (2010), Chudik and Fratzscher (2011), Baur (2012), Apergis et al. (2012), Bagliano and Morana (2012), Macit (2012), Claessens et al. (2012), Airaudo et al. (2013), Minetti and Peng (2013), Mora (2013), Carrière-Swallow and Céspedes (2013), Levintal (2013), Ono (2013), Duncan (2014), Hui and Chan (2014), Giesecke et al. (2014), Samake and Yang (2014), Gorea and Radev (2014), Ciccarelli et al. (2015), Merola (2015), Hanson and Stein (2015), Poutineau and Vermandel (2015), Aysun (2016), Feldkircher and Huber (2016), Pang and Siklos (2016), Pyun and An (2016), and many other scientists focus on monetary policy transmission through different channels, the transmission of shocks to the real economy with a special focus on the USA, China, and other largest world economies. However, the scientific literature provides very little evidence on determinants explaining vulnerability of countries to the external macroeconomic shocks.

Claessens et al. (2012) examined the impact of global financial crisis of 2007–2009 (GFC) on firm performance and various channels propagated shocks across borders. They find that the GFC had a bigger negative impact on firms with greater sensitivity to business cycle and trade developments, particularly in countries with higher trade openness, while financial openness made limited difference. Elekdag et al. (2015) investigated the development of a dynamic supply chain within Europe—the Germany-Central European (Czech Republic, Hungary, Poland, and Slovakia (CE4)) Supply Chain. They find that as a reflection of strengthening trade linkages, German fiscal spillovers stemming from higher public consumption to the CE4 have increased over time, but are still relatively small and the final demand in Germany is not necessarily the main determinant of CE4 exports to Germany. They also find that increased trade openness in both Germany and the CE4 implies a greater exposure of these countries to global shocks. However, according to Elekdag et al. (2015), Germany plays the role of a regional anchor of stability by better absorbing shocks from other trading partners instead of amplifying their transmission across the Europe. Jin (2006) examined the effects of increasing trade openness on the growth rates of output and of the price level in Japan and Korea. The empirical results show that shocks to trade openness are found to have significant, negative effects on economic growth and inflation in the short run, but no longer-run effects, while openness measures in financial markets also have negative effects on economic growth and inflation in Korea, whereas the effects are not significant in Japan. Milani and Park (2015) studied the implications of globalization for the dynamics of

macroeconomic variables over the business cycle for a small open trade-dependent economy (South Korea). The empirical results show that globalization led to important changes in the macroeconomic environment: domestic variables have become much more sensitive toward global measures, in particular, domestic output and inflation are significantly affected by global output. Naoussi and Tripier (2013) explored the role of trend shocks in explaining the specificities of business cycles in developing countries. Their results suggest a strong relationship between the weight of trend shocks in the source of fluctuations and the level of economic development. The empirical results suggest that the weight of trend shocks is negatively correlated with the level of income, the quality of institutions, and the size of the credit market, and uncorrelated with the volatility of aid received by countries, the inflation rate, and the trend in trade openness. Noy (2009) investigated the impact of natural disasters on the macro-economy. The empirical results suggest that countries with a higher literacy rate, better institutions, higher per capita income, higher degree of openness to trade, and higher levels of government spending are better able to withstand the initial disaster shock and prevent further spillovers into the macro-economy. According to Noy (2009), “countries with more foreign exchange reserves, and higher levels of domestic credit, but with less-open capital accounts appear more robust and better able to endure natural disasters, with less adverse spillover into domestic production.” Rattsø and Torvik (1998) found that the trade restrictions imposed by most Sub-Saharan Africa countries have clearly reduced the openness of their economies, however, the import rationing has introduced new transmission channels for external shocks. The empirical results show that the economies are more vulnerable to external shocks under import rationing than with trade liberalization, and real exchange rate depreciation can result a positive external shock. Vannoorenberghe (2012) shows that the share of exports in the total sales of a firm has a positive and substantial impact on the volatility of its sales and firms with a larger export share have more volatile domestic sales and less volatile exports. Vannoorenberghe (2014) shows that the gains from opening up to international trade are smaller when firms do not fully internalize downward risk. The empirical results show that international trade induces firms to take more risk, raises the equilibrium unemployment rate, increases the volatility of sectoral sales, and increases welfare proportionately less than in the absence of the externality.

In summary, the analysis of the scientific literature reveals that countries with more open economies are more sensitive to the external macroeconomics shocks.

48.3 Research Methodology and Data

This empirical study focuses on macroeconomics shocks transmission through real channel in the CEECs and the vulnerability of this group of countries to the external macroeconomic shocks.

The investigation of macroeconomics shocks transmission through real channel was examined by applying the time and cross-country fixed-effects regression model (48.1).

$$Y_{i,t} = \alpha + \beta_{i,t}X'_{i,t} + \delta_i + \gamma_t + \varepsilon_{i,t}, \quad \varepsilon_{i,t} \sim WN(0, \Sigma_\varepsilon) \quad (48.1)$$

where $Y_{i,t}$ is dependent variable characterizing economic situation in CEECs (real GDP change (RGDP) and real total export of goods change (REXPOT)), $X'_{i,t}$ is a k -vector of regressors (inflation shock (INFLATION_S), exchange rate shock (EXCHANGE_S), GDP shock (GDP_S), export shock (EXPORT_S), final consumption expenditure shock (CONSUMPTION_S), investment shock (INVESTMENT_S), and import shock (IMPORT_S)), and $\varepsilon_{i,t}$ are the error terms for $i = 1, 2, \dots, M$ cross-sectional units (countries) observed for dated periods $t = 1, 2, \dots, T$. The α parameter represents the overall constant in the model, while the δ_i and γ_t represent cross-section and period fixed effects.

The investigation of the vulnerability of countries to the external macroeconomic shocks was examined by applying the cross-sectional (cross-country) regression model (48.2).

$$Y_i = \alpha + \beta_i X'_i + \varepsilon_i, \quad \varepsilon_i \sim WN(0, \Sigma_\varepsilon) \quad (48.2)$$

where Y_i is dependent variable characterizing the vulnerability of CEECs to the external macroeconomic shocks (real GDP volatility (RGDP_V) and real total export of goods volatility (REXPOT_V)), X'_i is a k -vector of regressors (concentration index of export (CONCENTRATION), diversification index of export (DIVERSIFICATION), terms of trade index (TERMS_OF_TRADE), and trade openness (TRADE_OPENNESS)), and ε_i are the error terms for $i = 1, 2, \dots, M$ cross-sectional units (countries). The α parameter represents the overall constant in the model.

The following panel regression residuals tests have been performed in order to confirm the robustness of panel regression models estimates: residual serial correlation LM tests, residual normality tests, and Cholesky (Lutkepohl) White Heteroskedasticity test.

This empirical study focuses on annual data for 11 CEECs: Bulgaria (BGR), Czech Republic (CZE), Croatia (HRV), Estonia (EST), Hungary (HUN), Latvia (LVA), Lithuania (LTU), Poland (POL), Romania (ROM), Slovakia (SVK), and Slovenia (SVN). Annual data for the period of 2004–2014 have been obtained from different sources: bilateral export of goods data has been extracted from IMF Direction of Trade Statistics (DOTS), bilateral exchange rates, data on concentration index of export, diversification index of export, terms of trade index, and trade openness indicator—from United Nations Conference on Trade and Development (UNCTAD), and all the others—from World DataBank (World Development Indicators).

The dependent variables in the panel regression models are real GDP change and real total export of goods change in the CEECs while different macroeconomic shocks (inflation, exchange rate, GDP and its components (export, final consumption expenditure, investment, and import)) are calculated as weighted averages of these variables in main export partners of the CEECs representing more than

80–90 % of total export to the world (33 countries).¹ The total list of dependent and independent variables in the panel regression models is presented in Table 48.1.

48.4 Research Results

This empirical study focuses on macroeconomics shocks transmission through real channel in the CEECs and the vulnerability of this group of countries to the external macroeconomic shocks.

The empirical results on macroeconomics shocks transmission through real channel in the CEECs using fixed-effects panel regression models are quite diverse (Tables 48.2 and 48.3). The empirical results suggest that the exchange rate shock (depreciation of the currencies of the main export partners) positively affects the real GDP growth of CEECs, however, these results are not consistent with the economic theory suggesting that depreciation of foreign currencies decrease the export flows to these countries, thus, decrease the real GDP growth of exporting countries. However, the empirical results presented in Table 48.3 show that depreciation of foreign currencies decrease the export flows to these countries. The economic growth in the main export partners positively affects the real GDP growth in CEECs and real export flows to these countries and the positive effect is stronger on the real export flows. However, the positive effect of inflation shock is statistically significant only in cross-country fixed-effect panel regression models.

The empirical results on macroeconomics shocks (different GDP components) transmission using fixed-effects panel regression models are presented in Tables 48.4 and 48.5. The empirical results on effect of exchange rate shock are diverse: some results suggest that the exchange rate shock (depreciation of the currencies of the main export partners) positively affects the real GDP growth of CEECs, however, depreciation of foreign currencies decrease the export flows to these countries. The increase of consumption in the main export partners positively affects the real GDP growth in the CEECs, however, a negative impact of consumption on the real export flows to the main export partners is observed. The statistically significant positive impact of investment growth and inflation shock on real GDP and real export flows growth of the CEECs is observed only in the cross-country fixed-effect panel regression models. The empirical results also suggest about positive impact of import growth in the main export partners.

¹The total list of main export partners of the CEECs includes 33 countries (TOP-10 export countries of each CEEC have been included in this list): Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Romania, Russia, Serbia, Singapore, Slovakia, Slovenia, Spain, Sweden, Turkey, Ukraine, United Kingdom, USA.

Table 48.1 The list of dependent and independent variables in the panel regression models

Variable	Description of variable
Real GDP change (RGDP)	Real gross domestic product (GDP) change is an inflation-adjusted (GDP deflator) measure that reflects the change of the value of all goods and services produced by a domestic economy in a given year t compared to the previous year, expressed in base-year prices.
Real total export of goods change (REXPOR_T)	Real total export of goods change is an inflation-adjusted (GDP deflator) measure that represents the change of value of all goods provided by a domestic economy to the rest of the world in a given year t compared to the previous year, expressed in base-year prices.
Real GDP volatility (RGDP_V)	Real GDP volatility is a standard deviation of real GDP change during the whole period.
Real total export of goods volatility (REXPOR_T_V)	Real total export of goods volatility is a standard deviation of total export of goods change during the whole period.
Inflation shock (INFLATION_S)	Inflation shock is a weighted inflation (GDP deflator) change in the main export partners of a domestic economy that reflects the rate of price changes by applying annual bilateral export data of its export partners as weights.
Exchange rate shock (EXCHANGE_S)	Exchange rate shock is a weighted exchange rate change between domestic country and its main export partners that reflects the bilateral exchange rate changes by applying annual bilateral export data of its export partners as weights.
GDP shock (GDP_S)	GDP shock is a weighted real GDP change in the main export partners of a domestic economy that reflects the rate of real GDP changes by applying annual bilateral export data of its export partners as weights.
Export shock (EXPORT_S)	Export shock is a weighted real export of goods and services change in the main export partners of a domestic economy that reflects the rate of real export changes by applying annual bilateral export data of its export partners as weights.
Final consumption expenditure shock (CONSUMPTION_S)	Final consumption expenditure shock is a weighted real final consumption expenditure (the sum of private and general government consumption) change in the main export partners of a domestic economy that reflects the rate of real export changes by applying annual bilateral export data of its export partners as weights.
Investment shock (INVESTMENT_S)	Investment shock is a weighted real gross domestic investment (gross capital formation) change in the main export partners of a domestic economy that reflects the rate of real gross domestic investment by applying annual bilateral export data of its export partners as weights.
Import shock (IMPORT_S)	Import shock is a weighted real import of goods and services change in the main export partners of a domestic economy that reflects the rate of real import changes by applying annual bilateral export data of its export partners as weights.

(continued)

Table 48.1 (continued)

Variable	Description of variable
Concentration index of export (CONCENTRATION)	Concentration index of export (also named Herfindahl-Hirschman Index (HHI)) is a measure of the degree of product concentration which is normalized in order to obtain values between 0 and 1. An index value closer to 1 indicates a country's export is highly concentrated on a few products. On the contrary, values closer to 0 reflect export is more homogeneously distributed among a series of products.
Diversification index of export (DIVERSIFICATION)	Diversification index of export is computed by measuring the absolute deviation of the trade structure of a country from world structure. The diversification index of export takes values between 0 and 1. A value closer to 1 indicates greater divergence from the world pattern.
Terms of trade index (TERMS_OF_TRADE)	Terms of trade index is defined as the ratio of the export unit value index to the import unit value index.
Trade openness indicator (TRADE_OPENNESS)	Trade openness indicator is the sum of exports and imports of goods and services measured as a share of gross domestic product.

Table 48.2 The empirical results of fixed-effects panel regression models (dependent variable—real GDP change (RGDP))

Variable	Model 1	Model 2	Model 3
C	-1.043435* (0.626383)	-0.790676 (0.634577)	-0.620531 (0.932698)
EXCHANGE_S	0.220122** (0.068350)	0.227474*** (0.066996)	0.265991*** (0.063836)
GDP_S	1.644739*** (0.115861)	2.369156*** (0.409601)	2.528613*** (0.425052)
INFLATION_S	0.367182* (0.214774)	-0.060416 (0.220886)	-0.186341 (0.366106)
Country FE	Yes	No	Yes
Year FE	No	Yes	Yes
Observations	110	110	110
R ²	0.795162	0.810543	0.858643
S.E. of regression	2.420427	2.315752	2.112131

Standard errors in parentheses

$p < 0.1$

* $p < 0.05$

** $p < 0.01$

The empirical results on the vulnerability of CEECs to the external macroeconomic shocks using cross-country regression models are presented in Table 48.6. The empirical results of this study suggest that the more divergent export structure of a country from world structure is, the higher volatility of country's real GDP is. Trade openness of country also increases the volatility of country's real GDP.

Table 48.3 The empirical results of fixed-effects panel regression models (dependent variable—real total export of goods change (REX-PORT))

Variable	Model 1	Model 2	Model 3
<i>C</i>	-7.423482** (2.859970)	6.771557** (1.889788)	6.685823** (2.892975)
EXCHANGE_S	-1.553063*** (0.312075)	-1.044839*** (0.199516)	-0.930864*** (0.198003)
GDP_S	5.861716*** (0.529003)	-0.118632 (1.219803)	-1.287970 (1.318395)
INFLATION_S	2.083150** (0.980625)	0.414127 (0.657803)	1.018023 (1.135559)
Country FE	Yes	No	Yes
Year FE	No	Yes	Yes
Observations	110	110	110
<i>R</i> ²	0.741893	0.898442	0.917800
S.E. of regression	11.05131	6.896368	6.551254

Standard errors in parentheses

p < 0.1**p* < 0.05***p* < 0.01

48.5 Conclusions

The empirical results on macroeconomics shocks transmission through real channel in the CEECs using fixed-effects panel regression models suggest that the exchange rate shock (depreciation of the currencies of the main export partners) positively affects the real GDP growth of CEECs, however, depreciation of foreign currencies decrease the export flows to these countries. The economic growth in the main export partners positively affects the real GDP growth in CEECs and real export flows to these countries and the positive effect is stronger on the real export flows. The increase of consumption in the main export partners positively affects the real GDP growth in the CEECs, however, a negative impact of consumption on the real export flows to the main export partners is observed. The empirical results also suggest about positive impact of import growth in the main export partners. The empirical results on the vulnerability of CEECs to the external macroeconomic shocks using cross-country regression models suggest that the more divergent export structure of a country from world structure is, the higher volatility of country's real GDP is and trade openness of country also increases the volatility of country's real GDP.

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Table 48.4 The empirical results of fixed-effects panel regression models (dependent variable—real GDP change (RGDP))

Variable	Model 1	Model 2	Model 3
<i>C</i>	1.070451 (0.952359)	1.280744 (0.987559)	0.955602 (1.408505)
CONSUMPTION_S	0.945731*** (0.317573)	0.749420 (0.465699)	0.813420* (0.458297)
EXCHANGE_S	0.167958** (0.082685)	0.233051*** (0.069871)	0.262198*** (0.068408)
EXPORT_S	-0.088579 (0.378033)	-0.531858 (0.350111)	-0.446807 (0.33959)
IMPORT_S	-0.203351 (0.440667)	0.530466 (0.516618)	0.346784 (0.505300)
INFLATION_S	0.204073 (0.290878)	0.075958 (0.224052)	0.238779 (0.408478)
INVESTMENT_S	0.553846*** (0.131146)	0.294272 (0.183304)	0.312971* (0.186954)
Country FE	Yes	No	Yes
Year FE	No	Yes	Yes
Observations	110	110	110
R^2	0.708442	0.805394	0.846523
S.E. of regression	2.933885	2.384169	2.239776

Standard errors in parentheses

 $p < 0.1$ * $p < 0.05$ ** $p < 0.01$

Table 48.5 The empirical results of fixed-effects panel regression models (dependent variable—real total export of goods change (REXPOR))

Variable	Model 1	Model 2	Model 3
<i>C</i>	-1.927546 (3.252559)	4.543109 (2.753190)	9.039640** (3.996993)
CONSUMPTION_S	-0.571449 (1.084597)	-2.624185** (1.298310)	-3.256562** (1.300535)
EXCHANGE_S	-1.694377*** (0.282392)	-1.029844*** (0.194790)	-0.907562*** (0.194124)
EXPORT_S	-0.217510 (1.291083)	-0.826648 (0.976066)	-0.768140 (0.963685)
IMPORT_S	0.699270 (1.504996)	3.184912** (1.440266)	2.507153* (1.433917)
INFLATION_S	2.412392** (0.993426)	0.064949 (0.624628)	-0.677555 (1.159160)
INVESTMENT_S	1.456392*** (0.447898)	-0.303595 (0.511028)	0.059538 (0.530530)
Country FE	Yes	No	Yes
Year FE	No	Yes	Yes
Observations	110	110	110
<i>R</i> ²	0.794449	0.908578	0.925297
S.E. of regression	10.02000	6.646762	6.355937

Standard errors in parentheses

p < 0.1

**p* < 0.05

***p* < 0.01

Table 48.6 The empirical results of cross-sectional panel regression models (dependent variables—real GDP volatility (RGDP_V) and real total export of goods volatility (REXPOR_V))

Variable	Model 1 (RGDP_V)	Model 2 (REXPOR_V)
<i>C</i>	-0.246256* (0.125176)	0.340021 (0.271803)
CONCENTRATION	0.053172 (0.157434)	0.186746 (0.341846)
DIVERSIFICATION	0.298065** (0.104254)	-0.414193 (0.226374)
TERMS_OF_TRADE	0.096526 (0.103627)	0.077154 (0.225011)
TRADE_OPENNESS	0.044345* (0.019990)	-0.045189 (0.043405)
Observations	11	11
<i>R</i> ²	0.770107	0.448831
S.E. of regression	0.011469	0.024903

Standard errors in parentheses

p < 0.1

**p* < 0.05

***p* < 0.01

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Chapter 49

Deterrence, Detection, and Investigation of Economic Fraud and Auditor's Responsibilities Relating to Audit of Financial Statements According to International Standards

John Velentzas, Georgia Broni, and Nick Kartalis

Abstract Fraud is an intentional act that results in a material misstatement in financial statements that are the subject of an audit. The risk of material misstatement refers to the risk that the financial statements are materially misstated and do not present true and fair view. Material misstatements relate to the information included in the financial statements. Material misstatements are such omissions and misstatements of financial information included in the financial statements that can affect the economic decisions of the users of financial statements. In an audit of financial statements, detection risk is the risk that the procedures performed by the auditor will not detect a misstatement that exists and that could be material, individually or in combination with other misstatements.

Keywords Fraud • Auditing

49.1 Definition of Fraud

Fraud is an intentional act by one or more individuals among management, those charged with governance, employees, or third parties, involving the use of deception to obtain an unjust or illegal advantage (ISA 240, para. 11a; Velentzas et al. 2012, p. 209).

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Fraud is an intentional act that results in a material misstatement in financial statements that are the subject of an audit (Association of Certified Fraud Examiners 2002; Velentzas et al. 2013, p. 213).

Fraud risk factors are events or conditions (Boland et al. 2015; James 2013; Rezaee and Lander 1991) that indicate an incentive or pressure to commit fraud or provide an opportunity to commit fraud (ISA 240, para. 11b; Gramling and Myers 2003; Velentzas et al. 2013, p. 208).

49.2 Characteristics of Fraud

Misstatements in the financial statements can arise from either fraud or error (ISA 240, para. 2). The primary distinguishing factor that distinguishes fraud from error is whether the underlying action that results in the misstatement of the financial statements is intentional or unintentional (AICPA,¹ AU Sec. 316, para. 5; Velentzas et al. 2012, p. 212).

Intent is often difficult to determine, particularly in matters involving accounting estimates and the application of accounting principles. For example, unreasonable accounting estimates may be unintentional or may be the result of an intentional attempt to misstate the financial statements. Although the auditor has no responsibility to determine intent, the auditor's responsibility to plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement is relevant in either case (Boone et al. 2013).

Fraud is a broad legal concept. However, the auditor is concerned with fraud that causes a material misstatement in the financial statements.

Two types of intentional misstatements are relevant to the auditor (Velentzas et al. 2013, p. 602):

- Misstatements resulting from fraudulent financial reporting
- Misstatements resulting from misappropriation of assets (sometimes referred to as theft or defalcation)

Unauthorized transactions also are relevant to the auditor when they could cause a misstatement in financial statements. When such transactions are intentional and result in material misstatement of the financial statements, they would fall into one of the two types of fraud discussed in this section.

The auditor may suspect or, in rare cases, identify the occurrence of fraud. However, he does not make legal determinations of whether fraud has actually occurred.

Fraud, whether fraudulent financial reporting or misappropriation of assets, involves incentive or pressure to commit fraud, a perceived opportunity to do so, and some rationalization of the act.

For example (ISA 240 para. A1):

¹American Institute of Certified Public Accountants.

- Incentive or pressure to commit fraudulent financial reporting may exist when management is under pressure, from sources outside or inside the entity, to achieve an expected (and perhaps unrealistic) earnings target or financial outcome—particularly since the consequences to management for failing to meet financial goals can be significant. Similarly, individuals may have an incentive to misappropriate assets, for example, because the individuals are living beyond their means.
- A perceived opportunity to commit fraud may exist when an individual believes internal control can be overridden. For example, because the individual is in a position of trust or has knowledge of specific deficiencies in internal control.
- Individuals may be able to rationalize committing a fraudulent act. Some individuals possess an attitude, character, or set of ethical values that allow them knowingly and intentionally to commit a dishonest act. However, even otherwise honest individuals can commit fraud in an environment that imposes sufficient pressure on them.

Fraudulent financial reporting need not be the result of a grand plan or conspiracy. It may be that management representatives rationalize the appropriateness of a material misstatement, for example, as an aggressive rather than indefensible interpretation of complex accounting rules or as a temporary misstatement of financial statements, including interim statements, expected to be corrected later when operational results improve.

Fraudulent financial reporting involves intentional misstatements, including omissions of amounts or disclosures in financial statements to deceive financial statement users. It can be caused by the efforts of management to manage earnings in order to deceive financial statement users by influencing their perceptions as to the entity's performance and profitability. Such earnings management may start out with small actions or inappropriate adjustment of assumptions and changes in judgments by management. Pressures and incentives may lead these actions to increase to the extent that they result in fraudulent financial reporting. Such a situation could occur when, due to pressures to meet market expectations or a desire to maximize compensation based on performance, management intentionally takes positions that lead to fraudulent financial reporting by materially misstating the financial statements. In some entities, management may be motivated to reduce earnings by a material amount to minimize tax or to inflate earnings to secure bank financing (ISA 240 para. A23).

Fraudulent financial reporting may be accomplished by the following (ISA 240 para. A3):

- Manipulation, falsification (including forgery), or alteration of accounting records or supporting documentation from which the financial statements are prepared
- Misrepresentation in, or intentional omission from, the financial statements of events, transactions, or other significant information
- Intentional misapplication of accounting principles relating to amounts, classification, manner of presentation, or disclosure

Fraudulent financial reporting often involves management override of controls that otherwise may appear to be operating effectively.

Fraud can be committed by management overriding controls using such techniques as (ISA 240 para. A4):

- Recording fictitious journal entries, particularly close to the end of an accounting period, to manipulate operating results or achieve other objectives
- Inappropriately adjusting assumptions and changing judgments used to estimate account balances
- Omitting, advancing, or delaying recognition in the financial statements of events and transactions that have occurred during the reporting period
- Concealing, or not disclosing, facts that could affect the amounts recorded in the financial statements
- Engaging in complex transactions that are structured to misrepresent the financial position or financial performance of the entity
- Altering records and terms related to significant and unusual transactions

Misappropriation of assets involves the theft of an entity's assets and is often perpetrated by employees in relatively small and immaterial amounts. However, it can also involve management who are usually more able to disguise or conceal misappropriations in ways that are difficult to detect.

Misappropriation of assets can be accomplished in various ways including (ISA 240 para. A5):

- Embezzling receipts (e.g., misappropriating collections on accounts receivable or diverting receipts in respect of written-off accounts to personal bank accounts)
- Stealing physical assets or intellectual property (e.g., stealing inventory for personal use or for sale, stealing scrap for resale, colluding with a competitor by disclosing technological data in return for payment)
- Causing an entity to pay for goods and services not received (e.g., payments to fictitious vendors, kickbacks paid by vendors to the entity's purchasing agents in return for inflating prices, payments to fictitious employees)
- Using an entity's assets for personal use (e.g., using the entity's assets as collateral for a personal loan or a loan to a related party)

Misappropriation of assets is often accompanied by false or misleading records or documents in order to conceal the fact that the assets are missing or have been pledged without proper authorization.

Three conditions generally are present when fraud occurs (Rezaee 2005):

First, management or other employees have an incentive or are under pressure, which provides a reason to commit fraud.

Second, circumstances exist (e.g., the absence of controls, ineffective controls, or the ability of management to override controls) that provide an opportunity for a fraud to be perpetrated.

Third, those involved are able to rationalize committing a fraudulent act. Some individuals possess an attitude, character, or set of ethical values that allow them to knowingly and intentionally commit a dishonest act. However, even otherwise

honest individuals can commit fraud in an environment that imposes sufficient pressure on them. The greater the incentive or pressure, the more likely an individual will be able to rationalize the acceptability of committing fraud.

49.3 The Fraud Triangle

The fraud triangle is a model for explaining the factors that cause someone to commit occupational fraud (Velentzas et al. 2013, p. 208).

The fraud triangle is a framework designed to explain the reasoning behind a worker's decision to commit workplace fraud. The three stages, categorized by the effect on the individual, can be summarized as pressure, opportunity, and rationalization.

It consists of three components which, together, lead to fraudulent behavior:

- Perceived unshareable financial need
- Perceived opportunity
- Rationalization

The fraud triangle (Fig. 49.1) describes three factors that are present in every situation of fraud:

- Motive or pressure: the need for committing fraud (need for money or greed)
- Rationalization: the mindset of the fraudster that justifies them to commit fraud
- Opportunity: the situation that enables fraud to occur (often when internal controls are weak or nonexistent)

Fig. 49.1 The fraud triangle



49.3.1 Pressure

Pressure is the perceived need by an individual of a financial need that they believe cannot be solved through legitimate means. For example, an employee believes that they are in risk of foreclosure or repossession and they cannot obtain alternative financing.

49.3.2 Opportunity

Opportunity is the ability of an individual to override the controls or if there are lack of controls in place that an individual could misappropriate assets. For example, if a control is in place that two individuals must prepare and deposit the cash, however, management allows one person to count the cash and make the deposit in the event of an absence, and this creates an opportunity.

49.3.3 Rationalization

Rationalization is the ability of an individual to legitimize or justify the behavior. For example, a disgruntled employee may believe that “it is owed to them,” or a normally honest employee might rationalize that “it is a just a loan, I will pay it back.”

The fraud triangle originated from Donald Cressey’s hypothesis (Cressey 1973, p. 30):

Trusted persons become trust violators when they conceive of themselves as having a financial problem which is non-shareable, are aware this problem can be secretly resolved by violation of the position of financial trust, and are able to apply to their own conduct in that situation verbalizations which enable them to adjust their conceptions of themselves as trusted persons with their conceptions of themselves as users of the entrusted funds or property.

49.4 Responsibility for the Prevention and Detection of Fraud

The primary responsibility for the prevention and detection of fraud rests with both those charged with governance of the entity and management² (Abbott et al. 2000). It is important that management, with the oversight of those charged with

²Where responses to inquiries of management or those charged with governance are inconsistent, the auditor shall investigate the inconsistencies (ISA 240 para. 14).

governance, places a strong emphasis on fraud prevention, which may reduce opportunities for fraud to take place, and fraud deterrence, which could persuade individuals not to commit fraud because of the likelihood of detection and punishment (Rollins and Lanza 1995).

This involves a commitment to creating a culture of honesty and ethical behavior which can be reinforced by an active oversight by those charged with governance (Beatty et al. 2013). Oversight by those charged with governance includes considering the potential for override of controls or other inappropriate influence over the financial reporting process, such as efforts by management to manage earnings in order to influence the perceptions of analysts as to the entity's performance and profitability (Velentzas et al. 2012, p. 602).

49.5 Auditor's Responsibilities

An auditor conducting an audit is responsible for obtaining reasonable assurance that the financial statements taken as a whole are free from material misstatement, whether caused by fraud or error (Velentzas et al. 2012, pp. 208–210). Owing to the inherent limitations of an audit, there is an unavoidable risk that some material misstatements of the financial statements may not be detected.³

An auditor cannot obtain absolute assurance that material misstatements in the financial statements will be detected (Rezaee and Lander 1993).

Because of the concealment aspects of fraudulent activity, including the fact that fraud often involves collusion or falsified documentation, and the need to apply professional judgment in the identification and evaluation of fraud risk factors and other conditions, even a properly planned and performed audit may not detect a material misstatement resulting from fraud (Ridley and Stephens 1996).

The potential effects of inherent limitations are particularly significant in the case of misstatement resulting from fraud (Rezaee 1995). The risk of not detecting a material misstatement resulting from fraud is higher than the risk of not detecting one resulting from error. This is because fraud may involve sophisticated and carefully organized schemes designed to conceal it, such as forgery, deliberate failure to record transactions, or intentional misrepresentations being made to the auditor. Such attempts at concealment may be even more difficult to detect when accompanied by collusion. Collusion may cause the auditor to believe that audit evidence is persuasive when it is, in fact, false. For example, through collusion, false evidence that control activities have been operating effectively may be presented to the auditor, or consistent misleading explanations may be given to the auditor by more than one individual within the entity to explain an unexpected result of an analytical procedure.

³Even though the audit is properly planned and performed in accordance with the ISA's ISA 200, "Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing" para. A51.

As another example, the auditor may receive a false confirmation from a third party that is in collusion with management. Collusion may cause the auditor to believe that evidence is persuasive when it is, in fact, false.

The auditor's ability to detect a fraud depends on factors such as the skillfulness of the perpetrator, the frequency and extent of manipulation, the degree of collusion involved, the relative size of individual amounts manipulated, and the seniority of those individuals involved. While the auditor may be able to identify potential opportunities for fraud to be perpetrated, it is difficult for the auditor to determine whether misstatements in judgment areas such as accounting estimates are caused by fraud or error (ISA 200, para. A51).

Furthermore, the risk of the auditor not detecting a material misstatement resulting from management fraud is greater than for employee fraud, because management is frequently in a position to directly or indirectly manipulate accounting records, present fraudulent financial information, or override control procedures designed to prevent similar frauds by other employees.

Although fraud usually is concealed and management's intent is difficult to determine, the presence of certain conditions may suggest to the auditor the possibility that fraud may exist. For example, a document (e.g., an important contract) may be missing, a subsidiary ledger may not be satisfactorily reconciled to its control account, or the results of an analytical procedure performed during the audit may not be consistent with expectations. However, these conditions may be the result of circumstances other than fraud. Documents may legitimately have been lost or misfiled; the subsidiary ledger may be out of balance with its control account because of an unintentional accounting error; and unexpected analytical relationships may be the result of unanticipated changes in underlying economic factors. Even reports of alleged fraud may not always be reliable because an employee or outsider may be mistaken or may be motivated for unknown reasons to make a false allegation (AICPA, AU Sec. 316, para. 11).

A discussion among the engagement team members and a determination by the engagement partner of which matters are to be communicated to those team members not involved in the discussion is required (ISA 315, para. 10).

The discussion may include such matters as (ISA 240, para. A11):

- An exchange of ideas among engagement team members about how and where they believe the entity's financial statements may be susceptible to material misstatement due to fraud, how management could perpetrate and conceal fraudulent financial reporting, and how assets of the entity could be misappropriated
- A consideration of circumstances that might be indicative of earnings management and the practices that might be followed by management to manage earnings that could lead to fraudulent financial reporting
- A consideration of the known external and internal factors affecting the entity that may create an incentive or pressure for management or others to commit fraud, provide the opportunity for fraud to be perpetrated, and indicate a culture or environment that enables management or others to rationalize committing fraud

- A consideration of management's involvement in overseeing employees with access to cash or other assets susceptible to misappropriation
- A consideration of any unusual or unexplained changes in behavior or lifestyle of management or employees which have come to the attention of the engagement team
- An emphasis on the importance of maintaining a proper state of mind throughout the audit regarding the potential for material misstatement due to fraud
- A consideration of the types of circumstances that, if encountered, might indicate the possibility of fraud
- A consideration of how an element of unpredictability will be incorporated into the nature, timing, and extent of the audit procedures to be performed
- A consideration of the audit procedures that might be selected to respond to the susceptibility of the entity's financial statement to material misstatement due to fraud and whether certain types of audit procedures are more effective than others
- A consideration of any allegations of fraud that have come to the auditor's attention
- A consideration of the risk of management override of controls

49.6 Auditor's Rules of Conduct

A code of ethics is necessary and appropriate for the profession of auditing as it is founded on the trust placed in its objective assurance about risk management, control, and governance.

All auditors are expected to apply and uphold the following principles (Velentzas et al. 2013, p. 111):

49.6.1 Integrity

The integrity of internal auditors establishes trust and thus provides the basis for reliance on their judgment.

Auditors shall:

- Perform their work with honesty, diligence, and responsibility.
- Observe the law and make disclosures expected by the law and the profession.
- Not knowingly be a party to any illegal activity, or engage in acts that are discreditable to the profession of internal auditing or to the organization.
- Respect and contribute to the legitimate and ethical objectives of the organization.

49.6.2 Objectivity

Internal auditors exhibit the highest level of professional objectivity in gathering, evaluating, and communicating information about the activity or process being examined.

Internal auditors make a balanced assessment of all the relevant circumstances and are not unduly influenced by their own interests or by others in forming judgments.

Auditors shall:

- Not participate in any activity or relationship that may impair or be presumed to impair their unbiased assessment. This participation includes those activities or relationships that may be in conflict with the interests of the organization.
- Not accept anything that may impair or be presumed to impair their professional judgment.
- Disclose all material facts known to them that, if not disclosed, may distort the reporting of activities under review.

49.6.3 Confidentiality

Internal auditors respect the value and ownership of information they receive and do not disclose information without appropriate authority unless there is a legal or professional obligation to do so.

Auditors shall:

- Not participate in any activity or relationship that may impair or be presumed to impair their unbiased assessment. This participation includes those activities or relationships that may be in conflict with the interests of the organization.
- Not accept anything that may impair or be presumed to impair their professional judgment.
- Disclose all material facts known to them that, if not disclosed, may distort the reporting of activities under review.
- Be prudent in the use and protection of information acquired in the course of their duties.
- Not use information for any personal gain or in any manner that would be contrary to the law or detrimental to the legitimate and ethical objectives of the organization.

49.6.4 Competency

Internal auditors apply the knowledge, skills, and experience needed in the performance of auditing services.

Auditors shall:

- Engage only in those services for which they have the necessary knowledge, skills, and experience.
- Perform internal auditing services in accordance with the Standards for the Professional Practice of Internal Auditing.
- Continually improve their proficiency and the effectiveness and quality of their services.

49.7 Components of Internal Control

Under the COSO framework, internal control has five components (COSO, Internal Control—Integrated Framework; Velentzas et al. 2013, pp. 213–215):

49.7.1 Control Environment

The control environment sets the tone of an organization, influencing the control consciousness of its people. It is the foundation for all other components of internal control, providing discipline and structure.

Control environment factors include the integrity, ethical values, and competence of the entity's people; management's philosophy and operating style; the way management assigns authority and responsibility and organizes and develops its people; and the attention and direction provided by the board of directors.

49.7.2 Risk Assessment

Every entity faces a variety of risks from external and internal sources that must be assessed. A precondition to risk assessment is the establishment of objectives, linked at different levels and internally consistent. Risk assessment is the identification and analysis of relevant risks to achievement of the objectives, forming a basis for determining how the risks should be managed. Because economic, industry, regulatory, and operating conditions will continue to change, mechanisms are needed to identify and deal with the special risks associated with change.

49.7.3 Control Activities

Control activities are the policies and procedures that help ensure management directives are carried out and that necessary actions are taken to address risks to achievement of the entity's objectives. Control activities occur throughout the organization, at all levels and in all functions. They include a range of activities as diverse as approvals, authorizations, verifications, reconciliations, reviews of operating performance, security of assets, and segregation of duties.

49.7.4 Information and Communication

Pertinent information must be identified, captured, and communicated in a form and time frame that enable people to carry out their responsibilities. Information systems produce reports, containing operational, financial, and compliance-related information, that make it possible to run and control the business. They deal not only with internally generated data but also information about external events, activities, and conditions necessary to informed business decision-making and external reporting.

49.7.5 Monitoring Activities

Internal control systems need to be monitored—a process that assesses the quality of the system's performance over time. This is accomplished through ongoing monitoring activities, separate evaluations or a combination of the two. Ongoing monitoring occurs in the course of operations. It includes regular management and supervisory activities and other actions personnel take in performing their duties.

49.8 Auditor's Objectives

The objectives of the auditor are (Velentzas et al. 2011, p. 354):

- To identify and assess the risks of material misstatement of the financial statements due to fraud
- To obtain sufficient appropriate audit evidence regarding the assessed risks of material misstatement due to fraud, through designing and implementing appropriate responses
- To respond appropriately to fraud or suspected fraud identified during the audit

49.9 Requirements: Professional Skepticism

When obtaining reasonable assurance, the auditor is responsible for maintaining professional skepticism throughout the audit, considering the potential for management override of controls and recognizing the fact that audit procedures that are effective for detecting error may not be effective in detecting fraud. The requirements are designed to assist the auditor in identifying and assessing the risks of material misstatement due to fraud and in designing procedures to detect such misstatement (ISA 240, para. 12).

The auditor shall maintain professional skepticism throughout the audit, recognizing the possibility that a material misstatement due to fraud could exist, notwithstanding the auditor's past experience of the honesty and integrity of the entity's management and those charged with governance (ISA 200, para. 15).

Maintaining professional skepticism requires an ongoing questioning of whether the information and audit evidence obtained suggests that a material misstatement due to fraud may exist. It includes considering the reliability of the information to be used as audit evidence and the controls over its preparation and maintenance where relevant. Due to the characteristics of fraud, the auditor's professional skepticism is particularly important when considering the risks of material misstatement due to fraud (Velentzas et al. 2013, p. 609).

Professional skepticism is an attitude that includes a questioning mind and a critical assessment of audit evidence. The auditor should conduct the engagement with a mindset that recognizes the possibility that a material misstatement due to fraud could be present, regardless of any past experience with the entity and regardless of the auditor's belief about management's honesty and integrity. Furthermore, professional skepticism requires an ongoing questioning of whether the information and evidence obtained suggests that a material misstatement due to fraud has occurred. In exercising professional skepticism in gathering and evaluating evidence, the auditor should not be satisfied with less-than-persuasive evidence because of a belief that management is honest (AICPA, AU Sect. 230, para. 7–9, 316, para. 13).

Unless the auditor has reason to believe the contrary, the auditor may accept records and documents as genuine. If conditions identified during the audit cause the auditor to believe that a document may not be authentic or that terms in a document have been modified but not disclosed to the auditor, the auditor shall investigate further (Velentzas et al. 2013, p. 610).

An audit rarely involves the authentication of documents, nor is the auditor trained as or expected to be an expert in such authentication (ISA 200, para. A47). However, when the auditor identifies conditions that cause the auditor to believe that a document may not be authentic or that terms in a document have been modified but not disclosed to the auditor, possible procedures to investigate further may include (ISA 240, para. A9):

- Confirming directly with the third party
- Using the work of an expert to assess the document's authenticity

49.10 Inquiries of Management: Management's Assessment of the Risk of Material Misstatement Due to Fraud

The auditor obtains an understanding of the entity and its environment, including its internal control. In performing that work, information may come to the auditor's attention that should be considered in identifying risks of material misstatement due to fraud. As part of this work, the auditor should perform the following procedures to obtain information that is used to identify the risks of material misstatement due to fraud (AICPA, AU Sec. 316, para. 19–34; Velentzas et al. 2013, pp. 620–627):

- *Make inquiries of management and others within the entity to obtain their views about the risks of fraud and how they are addressed.*

The auditor should inquire of management about:

- Whether management has knowledge of any fraud or suspected fraud affecting the entity
- Whether management is aware of allegations of fraud or suspected fraud affecting the entity, for example, received in communications from employees, former employees, analysts, regulators, short sellers, or others
- Management's understanding about the risks of fraud in the entity, including any specific fraud risks the entity has identified or account balances or classes of transactions for which a risk of fraud may be likely to exist
- Programs and controls the entity has established to mitigate specific fraud risks the entity has identified, or that otherwise help to prevent, deter, and detect fraud, and how management monitors those programs and controls
- For an entity with multiple locations:
 - The nature and extent of monitoring of operating locations or business segments
 - Whether there are particular operating locations or business segments for which a risk of fraud may be more likely to exist
- Whether and how management communicates to employees its views on business practices and ethical behavior

Examples of others within the entity to whom the auditor may wish to direct these inquiries include:

- Employees with varying levels of authority within the entity, including entity personnel with whom the auditor comes into contact during the course of the audit in obtaining:
 - An understanding of the entity's systems and internal control
 - In observing inventory or performing cutoff procedures
 - In obtaining explanations for fluctuations noted as a result of analytical procedures

- Operating personnel not directly involved in the financial reporting process
- Employees involved in initiating, recording, or processing complex or unusual transactions (e.g., a sales transaction with multiple elements or a significant related party transaction)
- In-house legal counsel
- *Consider any unusual or unexpected relationships that have been identified in performing analytical procedures in planning the audit.*

In planning the audit, the auditor also should perform analytical procedures relating to revenue with the objective of identifying unusual or unexpected relationships involving revenue accounts that may indicate a material misstatement due to fraudulent financial reporting. An example of such an analytical procedure that addresses this objective is a comparison of sales volume, as determined from recorded revenue amounts, with production capacity. An excess of sales volume over production capacity may be indicative of recording fictitious sales. As another example, a trend analysis of revenues by month and sales returns by month during and shortly after the reporting period may indicate the existence of undisclosed side agreements with customers to return goods that would preclude revenue recognition.

- *Consider whether one or more fraud risk factors exist.*

Fraud is usually concealed, so that material misstatements due to fraud are difficult to detect. Nevertheless, the auditor may identify events or conditions that indicate incentives/pressures to perpetrate fraud, opportunities to carry out the fraud, or attitudes/rationalizations to justify a fraudulent action. Such events or conditions are referred to as “fraud risk factors.”

Fraud risk factors do not necessarily indicate the existence of fraud; however, they often are present in circumstances where fraud exists.

- *Consider other information that may be helpful in the identification of risks of material misstatement due to fraud.*

The auditor should consider other information that may be helpful in identifying risks of material misstatement due to fraud. The auditor should consider whether information from the results of procedures relating to the acceptance and continuance of clients and engagements and reviews of interim financial statements may be relevant in the identification of such risks.

Finally, as part of the consideration of audit risk at the individual account balance or class of transaction level, the auditor should consider whether identified inherent risks would provide useful information in identifying the risks of material misstatement due to fraud.

Management accepts responsibility for the entity's internal control and for the preparation of the entity's financial statements. Accordingly, it is appropriate for the auditor to make inquiries of management regarding management's own assessment of the risk of fraud and the controls in place to prevent and detect it (ISA 315, para. 23, and ISA 610).

The nature, extent, and frequency of management's assessment of such risk and controls may vary from entity to entity. In some entities, management may make detailed assessments on an annual basis or as part of continuous monitoring. In other entities, management's assessment may be less structured and less frequent. The nature, extent, and frequency of management's assessment are relevant to the auditor's understanding of the entity's control environment. For example, the fact that management has not made an assessment of the risk of fraud may in some circumstances be indicative of the lack of importance that management places on internal control. In some entities, particularly smaller entities, the focus of management's assessment may be on the risks of employee fraud or misappropriation of assets.

The auditor's inquiries of management may provide useful information concerning the risks of material misstatements in the financial statements resulting from employee fraud. However, such inquiries are unlikely to provide useful information regarding the risks of material misstatement in the financial statements resulting from management fraud. Making inquiries of others within the entity may provide individuals with an opportunity to convey information to the auditor that may not otherwise be communicated.

Examples of others within the entity to whom the auditor may direct inquiries about the existence or suspicion of fraud include:

- Operating personnel not directly involved in the financial reporting process
- Employees with different levels of authority
- Employees involved in initiating, processing, or recording complex or unusual transactions and those who supervise or monitor such employees
- In-house legal counsel
- Chief ethics officer or equivalent person
- The person or persons charged with dealing with allegations of fraud

Management is often in the best position to perpetrate fraud. Accordingly, when evaluating management's responses to inquiries with an attitude of professional skepticism, the auditor may judge it necessary to corroborate responses to inquiries with other information.

The identification of a risk of material misstatement due to fraud involves the application of professional judgment and includes the consideration of the attributes of the risk, including (AICPA, AU Sec. 316, para. 40):

- The type of risk that may exist, that is, whether it involves fraudulent financial reporting or misappropriation of assets
- The significance of the risk, that is, whether it is of a magnitude that could lead to result in a possible material misstatement of the financial statements
- The likelihood of the risk, that is, the likelihood that it will result in a material misstatement in the financial statements
- The pervasiveness of the risk, that is, whether the potential risk is pervasive to the financial statements as a whole or specifically related to a particular assertion, account, or class of transactions

49.11 Unusual or Unexpected Relationships Identified or Other Information

The auditor shall evaluate whether unusual or unexpected relationships that have been identified in performing analytical procedures, including those related to revenue accounts, may indicate risks of material misstatement due to fraud (ISA 240, para. 22).

The auditor shall consider whether other information obtained by the auditor indicates risks of material misstatement due to fraud.

In addition to information obtained from applying analytical procedures, other information obtained about the entity and its environment may be helpful in identifying the risks of material misstatement due to fraud. Information obtained from the auditor's client acceptance and retention processes, and experience gained on other engagements performed for the entity, for example, engagements to review interim financial information, may be relevant in the identification of the risks of material misstatement due to fraud.

49.12 Auditor's Evaluation of Fraud Risk Factors

The auditor shall evaluate whether the information obtained from the other risk assessment procedures and related activities performed indicates that one or more fraud risk factors are present. While fraud risk factors may not necessarily indicate the existence of fraud, they have often been present in circumstances where frauds have occurred and therefore may indicate risks of material misstatement due to fraud.

The fact that fraud is usually concealed can make it very difficult to detect. Nevertheless, the auditor may identify events or conditions that indicate an incentive or pressure to commit fraud or provide an opportunity to commit fraud (fraud risk factors).

For example (ISA 240 para. A23; Velentzas et al. [2012](#), p. 612):

- The need to meet expectations of third parties to obtain additional equity financing may create pressure to commit fraud.
- The granting of significant bonuses if unrealistic profit targets are met may create an incentive to commit fraud.
- A control environment that is not effective may create an opportunity to commit fraud.

Fraud risk factors cannot easily be ranked in order of importance. The significance of fraud risk factors varies widely. Some of these factors will be present in entities where the specific conditions do not present risks of material misstatement. Accordingly, the determination of whether a fraud risk factor is present and whether

it is to be considered in assessing the risks of material misstatement of the financial statements due to fraud requires the exercise of professional judgment (ISA 240, para. A24).

These illustrative risk factors are classified based on the three conditions that are generally present when fraud exists (ISA 240 para. A25):

- An incentive or pressure to commit fraud
- A perceived opportunity to commit fraud
- An ability to rationalize the fraudulent action

Risk factors reflective of an attitude that permits rationalization of the fraudulent action may not be susceptible to observation by the auditor.

Nevertheless, the auditor may become aware of the existence of such information.

The size, complexity, and ownership characteristics of the entity have a significant influence on the consideration of relevant fraud risk factors. For example, in the case of a large entity, there may be factors that generally constrain improper conduct by management, such as (ISA 240, para. A26):

- Effective oversight by those charged with governance
- An effective internal audit function
- The existence and enforcement of a written code of conduct

49.13 Risk Factors Relating to Misstatements Arising from Fraudulent Financial Reporting

Risk factors that relate to misstatements arising from fraudulent financial reporting may be grouped in the following three categories (AICPA, AU Sec. 316A, para. 16; Velentzas et al. 2012, p. 613):

- a. Management's characteristics and influence over the control environment. These pertain to management's abilities, pressures, style, and attitude relating to internal control and the financial reporting process.
- b. Industry conditions. These involve the economic and regulatory environment in which the entity operates.
- c. Operating characteristics and financial stability. These pertain to the nature and complexity of the entity and its transactions, the entity's financial condition, and its profitability.

Examples (AICPA, AU Sec. 316A, para. 17)

49.13.1 Risk Factors Relating to Management's Characteristics and Influence Over the Control Environment

- A motivation for management to engage in fraudulent financial reporting:
 - A significant portion of management's compensation represented by bonuses, stock options, or other incentives, the value of which is contingent upon the entity achieving unduly aggressive targets for operating results, financial position, or cash flow
 - An excessive interest by management in maintaining or increasing the entity's stock price or earnings trend through the use of unusually aggressive accounting practices
 - A practice by management of committing to analysts, creditors, and other third parties to achieve what appears to be unduly aggressive or clearly unrealistic forecasts
 - An interest by management in pursuing inappropriate means to minimize reported earnings for tax-motivated reasons
- A failure by management to display and communicate an appropriate attitude regarding internal control and the financial reporting process:
 - An ineffective means of communicating and supporting the entity's values or ethics or communication of inappropriate values or ethics
 - Domination of management by a single person or small group without compensating controls such as effective oversight by the board of directors or audit committee
 - Inadequate monitoring of significant controls
 - Management failing to correct known reportable conditions on a timely basis
 - Management setting unduly aggressive financial targets and expectations for operating personnel
 - Management displaying a significant disregard for regulatory authorities
 - Management continuing to employ an ineffective accounting, information technology, or internal auditing staff
- Nonfinancial management's excessive participation in, or preoccupation with, the selection of accounting principles or the determination of significant estimates
- High turnover of senior management, counsel, or board members
- Strained relationship between management and the current or predecessor auditor:
 - Specific indicators might include:
 - Frequent disputes with the current or predecessor auditor on accounting, auditing, or reporting matters

- Unreasonable demands on the auditor including unreasonable time constraints regarding the completion of the audit or the issuance of the auditor's reports
 - Formal or informal restrictions on the auditor that inappropriately limit his or her access to people or information or his or her ability to communicate effectively with the board of directors or the audit committee
 - Domineering management behavior in dealing with the auditor, especially involving attempts to influence the scope of the auditor's work
- Known history of securities law violations or claims against the entity or its senior management alleging fraud or violations of securities laws

49.13.2 Risk Factors Relating to Industry Conditions

- New accounting, statutory, or regulatory requirements that could impair the financial stability or profitability of the entity
- High degree of competition or market saturation, accompanied by declining margins
- Declining industry with increasing business failures and significant declines in customer demand
- Rapid changes in the industry, such as high vulnerability to rapidly changing technology or rapid product obsolescence

49.13.3 Risk Factors Relating to Operating Characteristics and Financial Stability

- Inability to generate cash flows from operations while reporting earnings and earnings growth
- Significant pressure to obtain additional capital necessary to stay competitive considering the financial position of the entity including need for funds to finance major research and development or capital expenditures
- Assets, liabilities, revenues, or expenses based on significant estimates that involve unusually subjective judgments or uncertainties or that are subject to potential significant change in the near term in a manner that may have a financially disruptive effect on the entity such as ultimate collectibility of receivables, timing of revenue recognition, realizability of financial instruments based on the highly subjective valuation of collateral or difficult-to-assess repayment sources, or significant deferral of costs
- Significant related party transactions not in the ordinary course of business or with related entities not audited or audited by another firm
- Significant, unusual, or highly complex transactions, especially those close to year end, that pose difficult "substance over form" questions

- Significant bank accounts or subsidiary or branch operations in tax-haven jurisdictions for which there appears to be no clear business justification
- Overly complex organizational structure involving numerous or unusual legal entities, managerial lines of authority, or contractual arrangements without apparent business purpose
- Difficulty in determining the organization or individual(s) that control(s) the entity
- Unusually rapid growth or profitability, especially compared with that of other companies in the same industry
- Especially high vulnerability to changes in interest rates
- Unusually high dependence on debt or marginal ability to meet debt repayment requirements, debt covenants that are difficult to maintain
- Unrealistically aggressive sales or profitability incentive programs
- Threat of imminent bankruptcy or foreclosure or hostile takeover
- Adverse consequences on significant pending transactions, such as a business combination or contract award, if poor financial results are reported
- Poor or deteriorating financial position when management has personally guaranteed significant debts of the entity

49.14 Risk Factors Relating to Misstatements Arising from Misappropriation of Assets

Risk factors that relate to misstatements arising from misappropriation of assets may be grouped in the two categories (AICPA, AU Sec. 316A, para. 18):

- a. Susceptibility of assets to misappropriation. These pertain to the nature of an entity's assets and the degree to which they are subject to theft.
- b. Controls. These involve the lack of controls designed to prevent or detect misappropriations of assets.

Examples (AICPA, AU Sec. 316A, para. 19)

49.14.1 Risk Factors Relating to Susceptibility of Assets to Misappropriation

- Large amounts of cash on hand or processed
- Inventory characteristics, such as small size, high value, or high demand
- Easily convertible assets, such as bearer bonds, diamonds, or computer chips
- Fixed asset characteristics, such as small size, marketability, or lack of ownership identification

49.14.2 Risk Factors Relating to Controls

- Lack of appropriate management oversight (e.g., inadequate supervision or monitoring of remote locations)
- Lack of job applicant screening procedures relating to employees with access to assets susceptible to misappropriation
- Inadequate record-keeping with respect to assets susceptible to misappropriation
- Lack of appropriate segregation of duties or independent checks
- Lack of appropriate system of authorization and approval of transactions (e.g., in purchasing)
- Poor physical safeguards over cash, investments, inventory, or fixed assets
- Lack of timely and appropriate documentation for transactions (e.g., credits for merchandise returns)
- Lack of mandatory vacations for employees performing key control functions

The assessment of the risk of material misstatement due to fraud is a cumulative process that includes a consideration of risk factors individually and in combination. In addition, fraud risk factors may be identified while performing procedures relating to acceptance or continuance of clients and engagements, during engagement planning or while obtaining an understanding of an entity's internal control, or while conducting fieldwork. Also, other conditions may be identified during fieldwork that change or support a judgment regarding the assessment—such as (AICPA, AU Sec. 316A, para. 25):

- Discrepancies in the accounting records, including:
 - Transactions not recorded in a complete or timely manner or improperly recorded as to amount, accounting period, classification, or entity policy
 - Unsupported or unauthorized balances or transactions
 - Last-minute adjustments by the entity that significantly affect financial results
- Conflicting or missing evidential matter, including:
 - Missing documents
 - Unavailability of other than photocopied documents when documents in original form are expected to exist
 - Significant unexplained items on reconciliations
 - Inconsistent, vague, or implausible responses from management or employees arising from inquiries or analytical procedures
 - Unusual discrepancies between the entity's records and confirmation replies
 - Missing inventory or physical assets of significant magnitude
- Problematic or unusual relationships between the auditor and client, including:
 - Denied access to records, facilities, certain employees, customers, vendors, or others from whom audit evidence might be sought

- Undue time pressures imposed by management to resolve complex or contentious issues
- Unusual delays by the entity in providing requested information
- Tips or complaints to the auditor about fraud

49.15 Specific Auditor's Responses: Misstatements Arising from Fraudulent Financial Reporting

Examples (AICPA, AU Sec. 316A, para. 30):

49.15.1 Revenue Recognition

If there is a risk of material misstatement due to fraud that may involve or result in improper revenue recognition, it may be appropriate to confirm with customers certain relevant contract terms and the absence of side agreements in as much as the appropriate accounting is often influenced by such terms or agreements. For example, acceptance criteria, delivery and payment terms and the absence of future or continuing vendor obligations, the right to return the product, guaranteed resale amounts, and cancellation or refund provisions often are relevant in such circumstances.

49.15.2 Inventory Quantities

If a risk of material misstatement due to fraud exists in inventory quantities, reviewing the entity's inventory records may help to identify locations, areas, or items for specific attention during or after the physical inventory count. Such a review may lead to a decision to observe inventory counts at certain locations on an unannounced basis. In addition, where the auditor has a concern about the risk of material misstatement due to fraud in the inventory area, it may be particularly important that the entity counts are conducted at all locations subject to count on the same date. Furthermore, it also may be appropriate for the auditor to apply additional procedures during the observation of the count—for example, examining more rigorously the contents of boxed items, the manner in which the goods are stacked (e.g., hollow squares) or labeled, and the quality (i.e., purity, grade, or concentration) of liquid substances such as perfumes or specialty chemicals. Finally, additional testing of count sheets, tags or other records, or the retention of copies may be warranted to minimize the risk of subsequent alteration or inappropriate compilation.

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Chapter 50

Can Internet Reporting Affect the Stock Market Listed Companies: The Case of the Greek Listed Companies

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Abstract During the last decade there has been a profound revolution in the information technology by means of the Internet, and obviously accounting has been affected by this change. The main objective of this article is to examine the use of the Internet by Greek listed companies to disclose financial and non-financial information. We also discuss about the reasons of companies to use the new technologies to communicate with external parties.

Keywords Internet reporting • Stock market listed companies

50.1 Introduction

The aim of this article is to investigate the Internet reporting by Greek listed companies. In order to evaluate company websites, a checklist of variables has been developed. First, we examined Internet reporting in the context of a European emerging market. Most of the previous studies had examined Internet reporting by large listed companies in advanced capital markets, while smaller listed companies had not been well explored. Second, this article presents the Internet as a communication tool that can be used to communicate with stakeholders. The main contribution of this article is to show how Internet reporting has evolved in an emerging European country.

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50.1.1 Background

The Internet (Web) has presented itself as the vehicle for a business and communications revolution in the twenty-first century. This can be observed with terms relevant to the Internet, such as e-commerce and e-tailing, becoming common-place over the last decade. The Internet has become an increasingly important medium for corporate communication, as there is growing evidence that the Internet has provided business with new avenues in which they can trade and communicate with external parties (Adams 1999; James 1999; Lane 1999).

In particular, the World Wide Web is changing fundamentally the reach, timing, and dissemination of financial and other corporate performance. Many companies have set up their own websites to publish financial information. When the information is electronically disseminated, it becomes immediately available to those connected to the Internet at practically no cost. In practice, it can be said that there are no additional costs for the company, and no costs for the users. The information included in the websites is the most easily available information, so when talking about financial information, it is obvious that companies can distribute their financial reports as soon as they have them, without any delay. There are no delays in printing, editing, faxing, or mailing the reports. When the company has its own website it is very easy to include any kind of information, and to update it when necessary. Furthermore, the additional cost of doing these things is practically nonexistent, and independent of the number of users of the information. Both aspects of no costs and timeliness contribute to an increase in the important use of Internet reporting.

Finally, the environment external to the firm is a significant influence on Internet reporting. Two significant environmental determinants are the level of Internet pervasiveness and the overall disclosure environment in the firm's country. For the first determinant, where general Internet usage is more prevalent in a country, users will expect more company information to be placed on the Internet. Regarding the second determinant, which is the financial reporting, the disclosure environment at the national level is likely to induce or subdue corporate disclosure. The disclosure environment includes various dimensions of national culture (Gray 1998) and the nature of financing (Ball 1995; Nobes 1998).

50.2 Literature Review

The first attempts to study accounting disclosure on the internet originated about ten years ago, in the early years of the World Wide Web, and were mostly interested in exploring the existence and use of corporate websites. Petravick and Gillett (1996) reported that 69 % of the US Fortune 150 companies had a website and 81 % of these companies with a home page made some sort of financial information available. In a later study, Petravick and Gillett (1998) examined how quickly companies posted

earnings releases on their websites. The sample consisted of US 125 Fortune 500 companies, and 79.2 % (99 of 125) of these companies made the releases available through their websites on the same day as the announcement. This is evidence that companies view the Internet as an important medium to disseminate financial information.

Professional accounting bodies are also interested in the topic of corporate online reporting. The *Canadian Institute of Chartered Accountants (CICA)* published a report in 1999 which reviewed and analyzed the existing literature and digital reporting practices of 370 companies quoted on the New York, NASDAQ, and Toronto stock exchanges. This study was carried out by Trites (1999), and it was reported that 69 % of these companies had a home page and 35 % of them included some form of financial information on their website.

Another study by a standard setting body was published by the US *Financial Accounting Standards Board (FASB 2000)*. A comprehensive list of 325 attributes was developed to examine the websites of the top 100 companies of the Fortune 500. The following results were reported: 99 % of the companies had a website, 93 % disseminated some form of investor relations or financial information on their website, and 74 % disclosed full versions of annual accounts. When compared with the results of former studies about US companies, it can be said that there has been a high and increasing use of the World Wide Web for presenting financial data.

There has also been research into this area in European Countries. Lymer and Tallberg (1997) analyzed the top 50 companies in the UK and the 72 companies listed on the Helsinki Stock Exchange. They found that the survey companies in the UK as well as Finland did not realize the potential for improving their websites, and made suggestions for how companies could raise the quality of their home pages. Internet accounting disclosure research provided a comprehensive map of website-related disclosure in Spain and Sweden in the studies of Gowthorpe and Amat (1999) and Hedlin (1999), respectively. Of the 379 companies listed on the Madrid Stock Exchange, 16 % (61 companies) had an accessible website, and of these 61 companies, only 34 (55.7 %) provided some form of financial information on their home page.

On the other hand, Hedlin explored the extent to which companies listed on the Stockholm Stock Exchange had entered the three stages of development in reporting over the Internet. The stages were: (1) establishing a Web presence; (2) using the internet to communicate financial information; and (3) taking advantage of the unique features and possibilities of the medium. The survey findings clearly showed that the companies of the Stockholm Stock Exchange were well under way to establishing a Web presence, and most companies had started utilizing the Internet to communicate with investors. However, little had been done to take advantage of the unique features of Internet technology, especially in the areas of report structuring, downloading of detailed financial information, and dynamic updates of vital financial information such as orders, sales, and financial risks. When we compare the results of studies in different countries, we can say that there are significant differences in the use of the Internet for financial disclosure

across countries. In particular, FASB (2000) found that 74 % disclosed full versions of annual reports in contrast to Gowthorpe and Amat (1999) who found that only 55.7 % provided some form of financial information.

With regard to international descriptive studies, including evidence from many countries, Deller et al. (1999) conducted a study. He compared the Internet investor relations activities of the USA, UK, and German corporations. A sample comprising the respective country's relevant stock market 100 index was used. They found that more US corporations (91 %) used the Internet for investor relations activities than UK (72 %) and German (71 %) corporations. Furthermore, US corporations used the Internet to a larger extent with respect to corporate reporting. In the USA, corporate reporting on the Internet seems to be a standard feature of investor relations strategies. In contrast, in Germany only about two-thirds of the corporations used the Internet as an alternative way to distribute accounting information.

The UK results lay in between the other two countries. The detailed findings for scope of the information provided clearly showed that UK corporations were more extensive users of the Internet as an alternative distribution channel than German corporations. One example illustrates these findings: 95 % of the US corporations had a home page, compared with 85 % of the UK companies and only 76 % of the German corporations.

Findings showed that 50 out of 106 Irish companies (47 %) provided a website which compares poorly with other countries. 32 out of those 50 (64 %) provided some financial information. Furthermore, larger listed companies with larger annual report print runs were significantly more likely to have a website. Finally companies in services and finance industry are more likely to have a website too.

A study of Debrecey and Gray (1999), which referred to 45 large and quoted companies in the UK, Germany, and France, showed that all of them, with only one exception, had a website, 82 % contained financial information, but only 23 % included the audit report (although none of them included the auditor's signature).

A working group, commissioned by the *International Accounting Standards Committee (IASC)*, carried out an investigation which was performed by Lymer et al. (1999), to analyze the use of the Web to disclose financial information by the largest 30 companies included in the Dow Jones Global Index in 22 countries. According to the results of the analysis, 86 % of the companies had a website, but the penetration ratio varied widely from 100 % in Germany, France, Sweden, Canada, and the USA, to 43 % in Malaysia, or 53 % in Chile. It is 97 % in the UK, 90 % in the Netherlands, 83 % in Italy, 80 % in Norway, and 73 % in Spain (the lowest in Europe). Of the 410 companies that included some form of financial disclosure in their websites, 80 % (327 companies) used HTML in some form. It is important to mention that there are great differences in the type of financial information provided by companies. Thus, the balance sheet was disclosed by only 59 % of companies, the profit and loss account was disclosed by 59.5 %, the cash flow statement by 46 %, the notes to the accounts by 33 %, and the audit report by 28 %. It is interesting to consider that there are no countries where all companies provide all the statements. A survey of the top 1000 European companies carried out in early 1999 by Carol, a UK investor relations company, showed that 67 % of European companies use

the Internet for financial reporting, and 80 % of these companies provide additional financial information to the annual report (Carol 1999). These studies showed that European usage of the Internet is varied.

Flynn and Gowthorpe (1997) examined the nature of voluntary financial information provision on websites established by the top 100 companies in the Fortune Global 500, in the context of a theory of company classification. They described three concepts of the corporation: the monistic, dualistic, and pluralistic concepts. The monistic outlook was oriented principally towards shareholders, and the most striking examples of companies with a monistic outlook were found in the USA. Pluralistic companies assumed a broader range of stakeholders, of which the shareholder was just one; such companies were likely to place a particular emphasis on employees; such companies are typically Japanese. Dualistic companies will tend to recognize responsibilities towards investors and lenders whilst taking into account employee interests; the classic example of a dualistic company would be a German one. Substantial differences in the nature of voluntary disclosures on the Web were found by the corporations in the different groups, with monistic and pluralistic companies disseminating the kind of information which would be expected by their stakeholder orientation.

All these similar papers took a sample of companies from different countries and counted up the number with websites and those with some financial information on the websites. The results described above give an indication of the level of corporate reporting on the Internet at the time of the survey.

50.3 Research Hypotheses

In considering the results of the surveys, two research hypotheses were tested. It was expected that the extent of financial disclosure on the Internet might be affected by certain variables. There have been many empirical studies of disclosure which explained varying levels of disclosure in terms of company-specific variables. Ahmed and Courtis (1999) and Marston and Shrivies (1996) give a review of a selection of these studies. The literature of previous research on voluntary disclosure in general and disclosure on the Internet in particular was examined to identify which company characteristics might affect the decision on whether to disseminate financial reports on the Internet. The hypotheses of this study were formulated taking into account previous research.

50.3.1 Company Size

Agency theory, signalling theory and cost-benefit analysis indicate that there may be a positive relationship between size and the extent of disclosure on the Internet. Larger companies are under pressure to provide more information as a consequence of more actual and potential investors with interests in its evolution. Also, larger

companies not only are more visible but also have higher political costs. Hossain et al. (1995) suggested that agency costs tend to increase with the size of the company. The disclosure of information can reduce the agency costs. High agency costs can be supported more easily by larger companies instead of smaller size companies. As a result, large companies disseminate information on the Internet as a way of trying to reduce their costs.

The association between company size and the extent of financial disclosure has been extensively studied. Evidence in support of this hypothesis includes that of Craven and Marston (1999), Ashbaugh et al. (1999), and Bonson and Escobar (2006), whereas, according to Marston (2003), the extent of financial disclosure did not appear to be related to size for Japanese companies.

The size of a company can be measured in a number of ways, such as turnover, capital employed, number of employees, total assets, and more. According to Marston (2003), there is no overriding thinking for selecting one rather than another. For example, Cooke (1991) selected turnover, total assets, and number of shareholders to measure the size of the company. In my study, I considered one variable, namely: market capitalization. I choose market capitalization because it represents the public consensus on the value of a company's equity. I used this variable to test the significance between the company size and the extent of financial disclosure on the Internet.

If we analyze works reviewed in the previous section about financial reporting, it seems that the more selective the sample is the higher level of disclosure provided. Therefore, we can argue that a relation between companies' size and the voluntary information provided may exist. On the other hand, the larger the company, the more need for external funds. Therefore, large companies may be able to access financial markets better if they disclose more voluntary information. Furthermore, the higher number of external information users may press the companies for voluntary information to be disclosed. Also the bigger the company is the lower, in relative terms, the costs of preparing and disclosing voluntary information for external users.

Hence, the first hypothesis is:

H1 There is an association between the company size and the extent of financial information disclosure on the Internet.

50.3.2 Industry Type

In accordance with signalling theory, similar Internet reporting practices of companies belonging to the same economic grouping could be explained as a rational response; a company that did not provide similar information might not be considered competitive or might be hiding unfavorable information. Companies from a particular sector seem to adopt similar disclosure practices, and if a company does not follow these practices, it could be interpreted by the market as a signal of "bad

news” (Giner 1997). Many empirical studies of disclosure have used an industry variable as an explanatory variable, with mixed results.

Cooke (1991) proposed that historical factors might be important in explaining differences in the level of disclosure. In addition, the existence of a dominant firm with a high level of disclosure in the particular industry may have an effect on the level of disclosure adopted by other firms in the same industry. Mitchell et al. (1995) found that the disclosure of financial information is affected by the industry to which the firm belongs. Their survey reveals that the mining and oil industries were significant explanatory variables for voluntary disclosure of segment information. However, Marston and Leow (1998) found no significant association between disclosure of financial information and industrial classification, but when the surveyed companies were categorized as disclosing either summary or detailed information on the Web; there were significant results as the company type is associated with the extent of disclosure. Brennan and Hourigan (2000) found that Internet reporting was positively related to industry type. This may be because different industries having different proprietary costs of disclosure and some may be more technologically advanced than others.

It can be claimed that companies belonging to the same industrial type have similar practices when voluntarily disclosing information. Two major factors can be identified. On the one hand, companies in a certain sector need to show a good corporate image. On the other hand, each sector has particular financial characteristics, so companies can try to reduce the cost of capital by disclosing voluntary information.

For this study, the industry type was classified into five broad headings. In order to carry out the hypothesis test, these are: banking, construction and real estate, goods and food beverage, resources and utilities, and services and travel leisure

Therefore, the second hypothesis is:

H2 There is an association between industry type and the extent of financial information disclosure on the Internet.

Hence, the current article aims to examine Greek listed companies and particularly to test these two hypotheses and to explain the association between voluntary disclosure on the internet and factors that may belong to company size and industry type. Thus, interviews were used to analyze some of the communication issues involved in setting up and developing a corporate website from the director’s perspective. Having defined the objectives of this study and the way that we are going to examine Internet reporting, we shall move to the next section which is the research methods that I have employed.

50.4 Research Methods

50.4.1 *Sample Description*

The principal sample was based on Greek listed companies quoted on the Athens Stock Exchange (ASE). The sample represents a group of 60 companies (Appendix 1) which we are going to investigate properly. The time that we spent for each company was 1 h.

This sample of sixty companies is selected randomly and based on market capitalization criteria when was selected. The first quarter has approximately less than fifty (50) million of market capitalization, the second has between 50 and 300 million (approx.) when the third quarter has more than 300 million. The amounts of market cap are increasing steadily and the sample also covers the entire size range of companies. Another criterion is the operational activities segment. We have tried to choose five of the most common and important segments like banking and food and beverage without being influenced from company size and personal knowledge.

Furthermore, we tried to categorize them in those five segments having in mind that we should examine all segments with the same way. As we already mention the sample was selected randomly without any other criterion except the market capitalization. Having or not a website is a situation that could be examined in any type of company and this is the main scope of my research, trying to examine if there is a relationship between the size/type of a company and the disclosure of financial information on the internet.

The monitoring of the corporate websites was carried out in January 2016. The 60 companies were examined to find out whether they have a website on the Internet. The websites of the listed companies were located in the Athens Stock Exchange website, which provides company profiles and stock indices information. If no website was found there, the most popular search engines, such as Google and Yahoo, were used in order to discover it.

In addition, the second research method employed was semi-structured interviews with senior corporate directors. A total of five interviews were obtained. The finance directors of those companies were contacted and interviews were requested by this method. The interviews were conducted during December 2015. For all cases the finance director was the first point of contact, but he or she was asked to pass on the request for interview to the most appropriate person in the organization. Of the five interviews, three were with the finance director and two with the head of investor relation department. The respondent companies occupy a range of industry sectors, including banking; construction and real estate; goods and food beverage; resources and utilities; and services and travel leisure. The companies also varied considerably in size.

Moreover, we have limited evidence from studies which used interviews in their samples (see Gowthorpe 2004; Xiao et al. 2004; Ettredge et al. 2001). Similar to the

approach taken by Gowthorpe (2004), the two important questions that I asked the companies during the interview were:

- (1) How does your company estimate the changing needs of your stakeholders and to what extent are you prepared to meet these needs via your website?
- (2) And (2) what are the process and mechanisms within your company that determine the extent of financial disclosed information via the Internet?

The interviews lasted for approximately one hour, and they were tape-recorded and later transcribed.¹ To protect the identity of the companies being interviewed, they have been reported anonymously. In all cases, the interviewees were encouraged to discuss any issues that they felt relevant to the general theme of the report. Thus, the intention through the interviews was to establish whether the companies see the Internet as a medium for communicating with their stakeholders.

50.4.2 *Internet Disclosure Index*

One of the purposes of this study is to examine the extent of information disclosed on the Internet. To achieve this goal, a list of variables has been developed to evaluate the 60 company websites according to the sample. These variables are based on the literature review. Many studies have used a voluntary disclosure checklist for the examination of Internet reporting (see Deller et al. 1999; Pirchegger and Wagenhofer 1999; Marston and Polei 2004; Bonson and Escobar 2006). To measure the type and amount of information disclosure on a company's website, an Internet Disclosure Index (IDI) of 40 variables was developed. I developed this checklist according to Marston and Polei (2004), Xiao et al. (2004), Spanos and Mylonakis (2006), and Bonson and Escobar (2006). My aim was to examine the amount of information that was disseminated on the Web; also, technological options were used to make the Web page user friendly. A checklist instrument categorized investors' information into four major themes: (1) accounting and financial information; (2) timeliness information; (3) contact details and other information; and (4) technological features. In order to minimize the potential overlapping of interpretations, I conducted relevant pretesting techniques. Before I used the checklist, I pilot tested it with five Greek listed companies. The complete checklist is given in Appendix 2, and discussed briefly below.

- *Accounting and financial information (23 items)*: The first group of assessment criteria measures the type of published financial information. Accounting and financial statements are at the center of Internet reporting. I investigated whether data on individual elements of financial statements, such as balance sheet, income statement, notes, and cash flow statement, were presented, or if only

¹The transcriptions are available in case someone wants to study them further even though all the interviews have been recorded in Greek.

selective accounting data were provided. Moreover, financial statement data were examined in order to find out whether data for at least two years were available online. Financial ratios, number of shares, and historical share price were also investigated by this group. Investors use financial statements for various purposes, such as management performance evaluation, and as an analytical tool.

- *Timeliness information (3 items)*: Since the Web can provide information in real time, it is important to find out the extent to which this facility is utilized. These real data include press releases, current share price, and the last update.
- *Contact details and other information (7 items)*: This group of items measured the extent to which the companies provide adequate investor relations contact details, such as e-mail, postal address, and telephone. Other convenient features such as pages with answers to frequently asked questions, site map, English version, and help site were investigated.
- *Technological features (7 items)*: The items in this category related to enhancements cannot be provided by printed reports. These criteria examined whether companies made use of advanced technological options in order to make the website user friendly. They include hyperlinks, downloading data, and sound and video files.

All the variables are equal. The use of individual weights demands the determination of the relative importance of items to different users. In order to obtain the correct weighting coefficients, it would be necessary to identify the relative importance of each information category for each particular group of users. So, to avoid the arbitrariness of this decision, and following Giner (1997), I have used an unweighted index. This kind of unweighted index has been used in previous studies to evaluate the information disclosed by companies on the Internet (Ettredge et al. 2001; Bonson and Escobar 2006). All these variables can be measured on a simple yes/no basis, encoded as 1 and 0, respectively. Consequently, the Internet Disclosure Index (IDI) that I have employed has a maximum value of 40 and a minimum value of 0.

50.4.3 Hypotheses Testing

Several methods may be used to examine the hypotheses; for the first hypothesis we used a correlation to show the significance between the size and the extent of financial information disclosed on the internet. Company size was measured by the market capitalization, and for the financial information we used the first section of the checklist with the 23 items. The second hypothesis, which refers to industry type, was categorized into five main categories. Industry was indicated by dividends. We examined each category using dummy variables (0.1) Appendix 8 to show the level of financial information disclosed on the Internet. The financial variables were the same as the first hypothesis. This empirical part of the study will try to test whether the total score achieved by a company is related to the size and industry type.

50.5 Research Results and Discussion

We divide the research results into two parts. The first part will be concerned with the screening of selected company websites to ascertain the extent of financial and non-financial information disclosed. The second part will be interviews of selected companies to document the use of the Web as part of an overall communication tool.

50.5.1 Measurement of the Variables

The aim of this article is to analyze the information currently provided on the Internet by Greek listed companies, and to find out empirically the factors that could have some influence on the amount of information disclosed. In this section, we will first describe and compare the general level of disclosure of both financial and non-financial-based items. In the second part, we will examine only the financial items, using statistical analysis which will provide support for, or rejection of, the two hypotheses.

50.5.2 Descriptive Statistics

The 60 Greek listed companies were surveyed in 2016 to gain a general overview of the use of Internet reporting. Appendix 4 shows the summarized results with respect to the publication by the Internet of the information classified according to the 40 variables. The first column “Variables” specifies the variables analyzed, and in the column “% of companies” the percentage of companies that provide the category of information is given. The last column “Ranking” shows the order of the variables according to the importance (from high to low) as a function of the number of companies that provide this information.

In respect of the dissemination of accounting and financial information, the most common items are the balance sheets of past years (95 %) followed closely by other past information such as audit report of past years 94 %, cash Flow statement of past years, income statement of past years, and Notes to financial statement of past years with 93 %. Greek companies seem to have high percentages of past financial information and this is useful for the users or analysts who wish to analyze the progress of the company. Quarterly report of current year, quarterly report of past years, and audit report of past years are found in 92 %. It is valuable to mention, however, that current information levels are high, with the exception of the annual report, because the research was conducted in January and not at the end of the current year. Share history information is given by 65 %, although only 13 % provide share price performance in relation to the stock market index.

In general, the structure of the documents is the same as that of the paper-based reports. For instance, there were few reports that had a tree structure. One possible reason for the traditional way of presenting reports may be the fact that 91.67 % of the companies use portable document format (pdf) documents, which are not particularly suited for innovative report structures.

Regarding the timeliness information, the Internet offers the opportunity to make very recent company data available. Not surprisingly, the presentation of press releases on company websites is the second most common item, with 91.67 % of the total sample. Press releases are text-only documents that can be added to the websites without changes or format adjustments. In almost all cases, the press releases are chronologically ordered in a section called "Press releases." In addition, the Web offers the ability for rapid updating facilities to enhance the provision of performance data. This was frequently supplied in the form of updates of share price with 73.33 %. This ability has been adopted by many Greek companies while it can be easily obtained from other sources. On the other hand, only 10 % of the companies have pages with the indication of the last update.

In respect of contact details, the information that we found for investor relations is limited because this profession is something new for Greece. Appendix 4 shows that 45 % of the companies provided an e-mail to their investor relations department, 48.33 % a phone number, and only 30 % offered the postal address. Moreover, the number of companies that give information in different languages is significantly high: 98.33 % of the companies in the sample do it in English. In general, corporate reporting is in the primary language of the country. Reporting in only one language is perhaps not an important issue when the target audience is predominantly local to the organization. However, we can use the website as a means to provide information to a wider set of stakeholders, particularly international stakeholders. This helps the companies to avoid problems with communications.

Regarding the technological features, we found items with high and low levels of disclosure. There is no information for hyperlinks of the total sample. The main reason for the nonexistence of hyperlinks inside the annual report is that the financial statements presented were always in a pdf format incompatible with the use of hyperlinks. In addition, one of the greatest advantages of Internet reporting is that it offers the opportunity to investors to download files that can be used as input in computer-based analysis which the investor can perform when convenient.

Almost all the companies of the sample have taken this opportunity, and offer their annual reports in a pdf format (91.67 %). Moreover, the ability to enhance the presentation of performance information with graphics is a feature made possible with the use of the Web. Some of the most common uses of graphics found in reporting websites were charts, tables, and diagrams. Good examples of the use of graphics, however, can be seen in banks where they are used effectively to support the explanation of trend data.

Once we identified the most frequent and rarely items of Internet reporting used by 60 companies, it was important to refer to the total mean and standard deviation (Table 50.1). The mean value of the Internet Disclosure Index (IDI) for

Table 50.1 Internet disclosure index (IDI) statistics

Companies	60
Mean	24.18
Standard deviation	4.53
Minimum	8
Maximum	33

Table 50.2 Internet disclosure index (IDI) statistics only with financial items

Companies	60
Mean	16.43
Standard deviation	3.67
Minimum	1
Maximum	21

the companies analyzed is not very high, despite some companies obtaining good results. The minimum score is one which means that all the companies disclose at least eight variables from the checklist, and the most included item is the English version of the home page. This indicates that communication with stakeholders plays an important role. No companies reached the maximum score of 40, but one of them achieved 33.

Overall, the findings clearly show that the companies of the Athens Stock Exchange are well under way to establishing a Web presence, and almost all the companies that i investigated use the Internet to communicate with investors. Greek companies have not only started to present on their websites information from paper-based versions of annual reports, but they have also added information about timeliness.

50.5.3 Statistical Analysis

In order to test the hypotheses that explain the extent of financial information that companies disclose on the Internet, we took into consideration the same checklist (see Appendix 2), but we focused on the first part only, which includes accounting and financial information. Appendix 5 summarizes the frequency of each financial variable. The column “Variable” shows the analyzed variables, the column “% of companies” contains the percentage of companies that supply each item and in column “Order” we have ordered the variables depending on the frequency. Fifteen variables out of twenty three are more than 80 %, which means that companies disclose financial information in their website. The new mean, standard deviation and minimum and maximum values are represented in Table 50.2.

For the first hypothesis we will examine the association between company size and the extent of financial information disclosure on the Internet. Regarding the

Table 50.3 Correlation between company size and market capitalization

	Market capitalization
Pearson correlation	0.194
Significance	0.134
N	60

second hypothesis, I will examine the industry type, which we separated it into five main categories, and the extent of financial information disclosure on the Internet.

Hypothesis 1 For this analysis, the size of a company is measured by the market capitalization, which we found on the Athens Stock Exchange on 18 February 2016. In Appendix 6, we can see the relationship between the market capitalization and the percentage of financial disclosure. To test this hypothesis, we used the Pearson correlation because it is the most commonly used measure (Eq. 50.1).

$$\text{Correl}(X, Y) = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})(y - \bar{y})^2}} \tag{50.1}$$

X = Market capitalization
 Y = Disclosure percentage

The correlation between these two variables reflects the degree to which the variable is related. In my case, Table 50.3 shows that according to the Pearson correlation, “r” is approximately 0.2. This means that there is positive correlation, because it is more than 0 but it is not significant. Because it is so close to 0, it means that the link is not very strong between the size and the extent of financial information disclosure on the Internet. Thus we can say that these two sets of data are not very closely linked. Thus, there is not a significant association between company size and the *extent* of financial information disclosure on the Internet.

To comprehend it further, the chart in Fig. 50.1 shows the scatter plot (drawn in MS Excel) of the data, indicating the association between these two variables. In the horizontal axis is the extent of financial disclosure and in the vertical axis is the market capitalization. Each point represents the company size according to market capitalization and the level of disclosure (see Appendix 6). There are in total 60 points in the total sample.

We can see that the majority of the points are close to 80% and below 2,000,000,000. Only one company differs from the others according to size: the Coca-Cola HBC which has market capitalization of more than 6,000,000,000. The following large and some medium-sized companies have market capitalization between 2,000,000,000 and 4,000,000,000. In total, only two companies out of 60 do not have plenty of financial items in their websites, and these companies belong to the category of small companies.

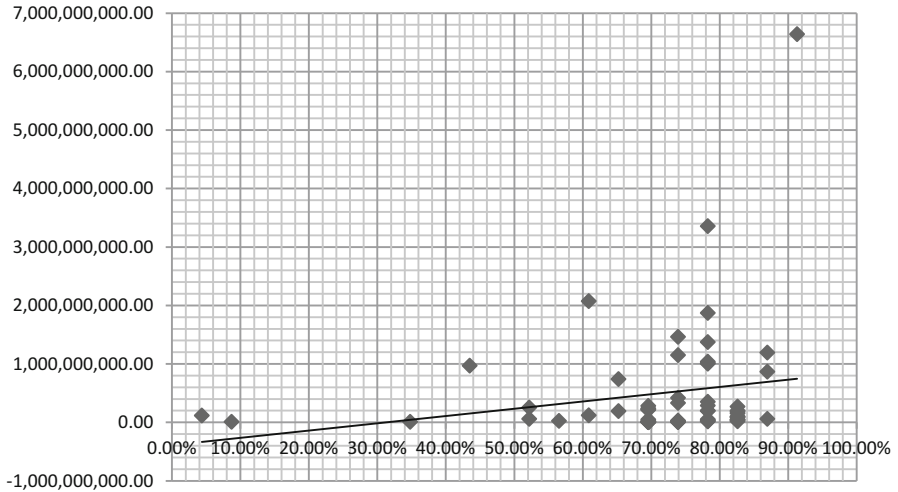


Fig. 50.1 Scatter plot of the data

What we can observe in Fig. 50.1 is that some smaller companies have bigger level of financial disclosure.

What my study suggests is what Marston found in his survey in 2003. He investigate the top 99 Japanese companies where company size was significantly positively associated with the existence of a website but the extent of financial disclosure did not appear to be related to size.

Generally, previous studies argued the fact that the relationship between the company size and the IFD is positive, like what mine suggested. Some of them are Pirchegger and Wagenhofer (1999) for Austrian companies and not for German. Craven and Marston (1999) for UK companies and regarding the companies which are based in Sri Lanka. Additionally, another study considers that not only there is a positive association but also a factor that significantly impacts the extent of IFD is the firm size.

Another different opinion regarding the association size-IFD is what Andrikopoulos and Diakidis found by examining Cyprus listed companies (2007), where the company size significantly affects the *extent* of internet disclosure.

Hypothesis 2 Our aim for setting this hypothesis is to verify whether the financial information disclosed depends on the industry type. Industry was indicated using 0, 1 dummy variables to classify companies into one of the following industries: banking; good and food/beverages; services and travel leisure; resources and utilities; and construction and real estate.

Table 50.4 shows the results from the linear regression of the industry type and the percentage of financial disclosure score. The model is estimated using linear regression and a forward selection process. The dependent variable was the dividend per share. We used dividend per share to categorize industry type, as did Watson

Table 50.4 A summary of the linear regression of industry type and the financial disclosure score

Variables	β	Significance
Disclosure	0.127	0.399
Dummy 1 (banking)	0.290	0.002
Dummy 2 (services and travel leisure)	0.063	0.362
Dummy 3 (resources and utilities)	0.146	0.098
Dummy 4 (construction and real estate)	-0.070	0.308
Constant	0.063	0.567

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0,581251182							
R Square	0,337852937							
Adjusted R Square	0,276543023							
Standard Error	0,177014657							
Observations	60							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	0,863347142	0,172669428	5,510575999	0,000360098			
Residual	54	1,692046191	0,031334189					
Total	59	2,555393333						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	0,063116511	0,109710146	0,575302404	0,567476393	-0,156839089	0,283072111	-0,156839089	0,283072111
Disclosure	0,127169893	0,149695994	0,849521021	0,399342134	-0,172952504	0,42729229	-0,172952504	0,42729229
Banking	0,290123788	0,091632954	3,16615119	0,002539809	0,106410775	0,4738368	0,106410775	0,4738368
Construction and real estate	-0,070907255	0,068985148	-1,027862616	0,308596692	-0,20921415	0,06739964	-0,20921415	0,06739964
Resources and utilities	0,14638419	0,087017544	1,682237668	0,098297407	-0,028075481	0,320843861	-0,028075481	0,320843861
Services and travel leis	-0,06334723	0,068995418	-0,918136756	0,362630105	-0,201674715	0,074980256	-0,201674715	0,074980256

Fig. 50.2 Results from linear regression

et al. (2002). The independent variables were the financial disclosure score and the dummies. Appendix 7 shows the relation between dividend per share and the financial disclosure score. What is obvious from the results in Table 50.4 is that the goods and food/beverages type is missing. That is happening, so the model will be correct. All the significance levels are positive but weak. Hence there is no significant association between the industry type and the extent of financial disclosure on the Internet.

In examining the industry hypothesis, it was suggested that these companies in more highly regulated industries would be more likely to disclose financial information, in order to reduce agency costs. However, the results from the analysis do not support this. The banking industry is an example of a highly regulated industry, yet the evidence here suggests that they are less likely to disclose financial information than companies in other sectors. The industry with the highest significance is the services and travel leisure, but this number is less than 0.5. Hence, this hypothesis cannot be accepted (Fig. 50.2).

Furthermore, Bonson and Escobar (2006) found that only in financial sectors this association is significant.

Results which are similar with those that my study suggests are what Craven and Marston (1999), Laetitia Pozniak (2013), and Marston and Polei (2004) found. Their investigations showed that a factor like “industry type” is not significantly impact the extent of financial disclosure on web.

Finally, Marston (2003) is fully consistent with my results regarding the association between industry type and IDF as she did with the association size-IDF too. More specific, she found no significant association between profitability, industry grouping, and overseas listing status with Internet disclosure.

50.5.4 Analysis of Interviews

In this second part of analysis, we want to examine if the companies make use of the Internet as a medium for communicating with their stakeholders. In general, the Internet facilitates rapid communication of information at very low cost. Many companies around the world have launched websites in order to communicate information to anyone who is interested. As we saw from the descriptive part, 59 companies disclose the English version of their home page, so communication with stakeholders plays an important role. This second stage consisted of five interviews conducted in December 2015.

At this stage, we focused on communication issues relating to voluntary Internet reporting. The purpose of these interviews is to obtain in-depth information and to develop an understanding of the important issues. A review of the existing literature that used interviews (Gowthorpe 2004; Xiao et al. 2002; Ettredge et al. 2001) resulted in the establishment of two key questions in relation to the use of the Internet as a medium for communicating with stakeholders. These questions are similar to those used by Gowthorpe (2004), and are the following:

1. How does your company estimate the changing needs of your stakeholders and to what extent are you prepared to meet these needs via your website?
2. What are the processes and mechanisms within your company that determine the extent of financial disclosed information via the internet?

According to the first question, there is a wide range of opinions regarding the potential use of the Internet as a conduit for communicating with stakeholders. One finance director views the Internet as an important information channel, citing reduced administrative costs and providing this tool for all investors as a primary advantage. This director tends to experiment actively with new technologies, such as video and audio files, and considers that through his company website, stakeholders can obtain any information they need. This company needed to market their selves as an investment to the financial community and make it easy for analysts to access information. An Investor Relation director designed the website with guidance from the Athens Stock Exchange and from the Investor Relation Society. He tried to think what people need to know in case someone wants to invest in the company’s shares. Another finance director mentioned that the information is disclosed according

to the regulations. Investors are able to obtain information via the website at the same time this information is disclosed on paper. Another finance director says that he always takes into consideration the demands of shareholders for briefing disclosed information. In collaboration with the appropriate department, he is ready to rehabilitate the company's website in order to cover the extended and evolving needs of shareholders.

The second question examined the relationship of the company with its professional advisers in respect of determining website content, in particular the level at which decisions on website content are taken. Advice on setting up a corporate website came from a range of sources, such as professional Web designers or Investor Relation specialists. For many companies, the Investor Relation director is usually the person who makes decisions concerning financial content. His decisions are generally made in consultation with the chief financial officer. A strategy from one finance director is to disclose only a minimal amount of financial information, because they do not want to give much information to competitors. Conversely, a finance director mentioned that the notes are the most important part, because from these stakeholders can not only realize the progress of the company but can also understand the company's activity. An Investor Relation director said that he posts only information on company's website that has been approved by the corporate disclosure committee and is also available through traditional channels. This method is the safest because it is possible to disclose financial information that has changed since the date it was posted.

The company websites of the interviewees had not been established very recently, but were at least five years old. All companies think that you can find very useful information if you look at Investor Relation websites. This convenient access to data makes websites attractive to investors. A corporate website leads us to expect a wide variety of financial information and presentations. It is possible, however, that a corporate website will improve over time as the new features are disclosed. As we can observe from the descriptive part, innovative features such as the use of audio and visual materials are not found in Greek listed companies. Only one company had a sound file, and we hope this will change in the future. In most cases, company directors have decided to make available information which is already in the public domain, notably annual reports and preliminary announcements. From these few cases, we can say that there is a discernible desire for Internet communication to displace other more direct communications. Finance and Investor directors clearly accept communication as one of their principal responsibilities.

Overall, most of the interviewees envisaged that information technology will become the standard method of initiating, recording, and completing the majority of business transactions. They agreed upon an increasing use of three-dimensional information, hypertext, sound and visuals, and real time reporting. The technology already exists so they have to move away from the fixed preparer model of reporting into more dynamic ways of information presentation. As one finance director said, in the future he believed that there will be a move towards the wider dissemination of information via the Internet that is usually published in annual reports and accounts. Also, an Investor Relation director mentioned that the use of

the Internet as a distributive tool will increase and the Internet itself will accelerate the expectations of those who produce, deliver, and use information via the Internet. A common belief is that the Internet will increasingly be used for shareholder services. In particular, Internet reporting expects to provide a useful additional source of information for remote and unprivileged users. Reporting companies will benefit from using the Internet as a cheaper and faster communication medium. But the extent to which the information needs of users are satisfied depends on the information provided by the reporting company. As the users become more diverse and demanding, companies are expected to change their internet reporting practices. Hence, reporting companies need to balance user information and commercial confidentiality, to decide whether to provide customized or customizable information and to maintain consistency between a dynamic Web-based version and static hard copy reporting.

50.5.5 Discussion of Results

Based on the above results, it is clear that the exploitation by companies of the new communication technology is not in its infancy in Greece. As the growth of the Internet continues, Greek companies seem to use the Internet to disclose information. In addition, as the mean of financial disclosure information is higher, we conclude that there is not a significant association with company size and industry type. Also, various views were offered by the interviewees. Some of them pay more attention to technological factors such as audio and video files, whereas others view the Internet as a medium to disclose information according to regulation.

According to the descriptive part, the total Web-based corporate reporting score ranged from 8 to 33 for the total variables and from 1 to 21 for the financial variables. This indicates that scores differ greatly across Greek companies. Moreover, we notice that the mean (median) score of the total checklist is 24.18 (60 %) and this score increased to 16.43 (71 %) when we examined only the financial variables. This shows that a large proportion of these companies to use the Internet to disseminate financial information. The results reflect the widespread use of the Internet to communicate with investors.

These results are partially consistent with those of previous studies. In particular, Ashbaugh et al. (1999) analyzed the business attributes of US companies that have a website. They concluded that size has a positive relationship with the existence of a company website. Also, in the UK, Craven and Marston (1999) showed that size is related to the existence of a website. In the Chinese market, Xiao et al. (2004) found that the extent of Web-based disclosure is positively related to firm size. Conversely, as I hypothesized earlier, the extent of financial disclosure is not related to firm size. It seems that big companies have not more expertise to adopt Internet as a medium to disseminate financial information. Thus the first hypothesis is not supported. The extent of financial information disclosed on the Internet is not associated with company size.

According to the second hypothesis, the industry type affects disclosure choices especially when the reported information is specific to the firm itself and not common to the industry (Dye and Sridhar 1995). Wallace et al. (1994) argue that large firms who are exposed to political attacks will be motivated to disclose less financial information, to reduce the likelihood of political action against them. This again may explain why the banking sector appears to be less likely to disclose financial information than other industries. The literature shows that firms from some industries disclose more information than other industries. In particular, high-tech companies have the expertise to assimilate and use the Internet more easily than companies from other industries (Brennan and Hourigan 2000; Xiao et al. 2004). In my case, in contrast to other studies I do not support this hypothesis. Similarly, as I concluded, in the UK, Craven and Marston (1999) found no significant relationship between industry type and the extent of financial disclosure on firm pages.

On the other hand, the interviewees see the Internet as a communication system and not as a data-processing system. The interview results suggest that decisions about the provision of information are generally taken from the involvement of one or more directors. The comments elicited from several interviewees indicate that the Internet is likely to access communication with external parties. The reporting companies try to attract new investors, to make it easier for users of a website to access multiple data, and to enable users to relate financial information and non-financial information. Overall, all agreed that the Internet has a significant impact on financial reporting; for example, Xiao et al. (2002) asserted that by 2010 communications with shareholders will have increased substantially.

Having discussed the results of the findings, the next step is to refer to the concluding remarks, the limitations, and the future research. While the results provide some interesting insights into users' perceptions of Internet reporting, the results must be interpreted in the light of the limitations of the study. The rise of Internet-based information has created a number of significant issues concerning provision of information disclosure via the Internet. All these issues will be discussed in the next section.

50.6 Conclusion

The Internet is providing companies with a new medium by which they can issue information voluntarily to various groups of external users. Through corporate websites, companies are providing large quantities of information, both financial and non-financial, which users can easily access. Greek companies are not an exception. From this study, first, we have analyzed the information that they are currently providing on the Internet. Second, we have tried to identify empirically the variables that could have some influence on the amount of information disclosed. Third, through the interviews, we have examined the use of the Internet as a medium for communicating with stakeholders.

The first objective of this study was to examine the variables from the checklist. We ranked the variables according to the disclosure scores. We identified the most frequent and rarest items of Internet reporting used by 60 Greek companies. This analysis found that 19 items out of 40 scored more than 80%. The most frequent variable was the English version of the home page. Conversely, 8 items were less than 10% and only 2 of them were 0% (hyperlinks, etc.). These findings clearly show that the Greek companies use the Internet to disclose information.

The second objective of this study was to test the hypotheses. According to the first hypothesis, the existing relationship between the size of the company and the financial information provided has been previously studied. Some of the previous results from the literature showed a significant relation between them. My study has not led to the same conclusion, as we found no significant association between company size and the extent of financial disclosure on the Internet. All companies, regardless of size, seem to use the Internet to disclose financial information to a wider number of users with a relatively low cost. We can assume that, when a company is not disclosing enough financial information, investors could think that the firm has poor results.

Moreover, regarding to the second hypothesis, the sector has been the variable used to explain the financial information provided by companies. Our aim was to show if there was a significant influence of the industry type upon the quantity of financial information provided on the Internet. The results we have obtained lead us to the assumption that this hypothesis cannot be accepted. Hence, we can conclude from the research results, based on the sample of 60 Greek companies, that there is no relationship between industry type and the extent of financial disclosure on the Internet. Some sectors need to disclose voluntarily some kind of information in order to improve their corporate image.

The last objective was to analyze the interviews to establish finance and investor relation perspectives about Internet reporting. All the interviewees agreed that they use websites to attract new investors and to inform the stakeholders. Corporate websites are not only the standard method to disclosure information but also a method of communicating information to anyone who is interested to learn about the company's viability.

Taken as a whole, these results suggest that Greek companies are very interested in Internet reporting by both financial and non-financial information. The use of Internet reporting allows companies to attract investors world wide and to improve relations with stakeholders. A better understanding of these findings is an important issue for further research.

Appendix 1 Companies Whose Sites Were Monitored

N/a	Description	N/a	Description
1	COCA-COLA	31	CRETE PLASTICS
2	HELLENIC TELECOM.ORG	32	FOURLIS ΣΥΜΜΕΤΟΧΩΝ
3	ALPHA BANK	33	AUTOHELLAS
4	OPAP	34	ELVAL
5	NATIONAL BANK OF GREECE S.A.	35	HERACLES AGET
6	JUMBO	36	THRACE PLASTICS
7	TITAN	37	ATHENS MEDICAL C.S.A.
8	BANK OF CYPRUS PUBLIC COMPANY LTD	38	FRIGOGLASS
9	HELLENIC PETROLEUM S.A.	39	MARFIN INVESTMENT GROUP
10	MOTOR OIL (HELLAS)	40	KORRES S.A. NATURAL PRODUCTS
11	PIRAEUS BANK S.A.	41	QUEST ΣΥΜΜΕΤΟΧΩΝ
12	FOLLI-FOLLIE	42	EUROPEAN RELIANCE
13	EFG EUROBANK ERGASIAS S.A.	43	INTRACOM HOLDINGS
14	PLAISIO	44	KLEEMAN HELLAS
15	GRIVALIA PROPERTIES	45	PETROS PETROPOULOS S.A.
16	ATHENS WATER SUPPLY & SEWAGE Co	46	ELTON
17	MYTILINEOS HOLDINGS S.A.	47	IASO GENERA;
18	METKA	48	SELONDA AQUACULTURE S.A
19	LAMDA DEVELOPMENT	49	J. & P.-ΑΒΑΞ
20	PORT OF PIRAEUS	50	REDS (KO)
21	HELLENIC EXCHANGES S.A. HOLDING CLEARING SETTLEMENT AND REGISTRY	51	ΑΤΤΙΚΕΣ ΕΚΔΟΣΕΙΣ
22	VIOHALCO SA/NV (KA)	52	CRETA FARM SA
23	GR. SARANTIS S.A.	53	KLOUKINAS-LAPPAS
24	TERNA ENERGETIC	54	ATHENS SA
25	MINOAN LINES	55	SPACE HELLAS
26	THESSALONIKI PORT AUTHORITY S.A.	56	PERSEYS
27	ΑΤΤΙΚΑ ΒΑΝΚ Α.Τ.Ε.	57	ALUMIL ALUMINIUM INDUSTRY S.A.
28	ELLACTOR	58	KTIMA LAZARIDI
29	ASTIR PALLAS	59	EKTER
30	INTRALOT	60	VIORKAPET

Appendix 2 Website Survey Checklist

(A)	Accounting and financial information
1	Balance sheet of current year
2	Balance sheets of past years (at least, the last 2 years)
3	Income statement of current year
4	Income statement of past years (at least, the last 2 years)
5	Cash flow statement of current year
6	Cash flow statement of past years (at least, the last 2 years)
7	Notes to financial statements of current year
8	Notes to financial statement of past years(at least, the last 2 years)
9	Quarterly report of current year
10	Quarterly report of past years(at least, the last 2 years)
11	Half-year report of current year
12	Half-year report of past years (at least, the last 2 years)
13	Audit report of current year
14	Audit report of past years (at least, the last 2 years)
15	Segmental reporting by line of business in current year
16	Segmental reporting by line of business in past years (at least, the last 2 years)
17	Annual report of current year
18	Annual report of past years (at least, the last 2 years)
19	Summary of financial data over a period of at least 5 years
20	Financial ratios
21	Number of shares
22	Share price history
23	Share price performance in relation to stock market index
(B)	Timeliness of information
24	Current press releases or news
25	Current share price
26	Pages indicate the latest update
(C)	Contact details and other information
27	E-mail to investor relations
28	Phone number to investor relations
29	Postal address to investor relations
30	English version of home page
31	Table of contents/site map
32	Answers to frequently asked questions
33	Help site
(D)	Technological features

(continued)

(A)	Accounting and financial information
1	Balance sheet of current year
35	Financial data in processable format
36	Annual report in pdf format
37	Annual report in html format
38	Graphic images
39	Sound files
40	Video files

Appendix 3 Industry Sector of Companies Interviewed

Company	Industry sector
A	Banking
B	Goods and food/beverages
C	Services and travel leisure
D	Resources and utilities
E	Construction and real estate

Appendix 4 Information Variables Corresponding to the Companies Analyzed

Variables	Description	Ranking	Disclosure
1	Balance sheet of current year	54	90 %
2	Balance sheets of past years (at least, the last 2 years)	57	95 %
3	Income statement of current year	52	87 %
4	Income statement of past years (at least, the last 2 years)	56	93 %
5	Cash flow statement of current year	52	87 %
6	Cash flow statement of past years (at least, the last 2 years)	56	93 %
7	Notes to financial statements of current year	52	87 %
8	Notes to financial statement of past years(at least, the last 2 years)	56	93 %
9	Quarterly report of current year	55	92 %

(continued)

Variables	Description	Ranking	Disclosure
10	Quarterly report of past years(at least, the last 2 years)	55	92 %
11	Half-year report of current year	31	52 %
12	Half-year report of past years (at least, the last 2 years)	55	92 %
13	Audit report of current year	6	10 %
14	Audit report of past years (at least, the last 2 years)	56	93 %
15	Segmental reporting by line of business in current year	45	75 %
16	Segmental reporting by line of business in past years (at least, the last 2 years)	52	87 %
17	Annual report of current year	2	3 %
18	Annual report of past years (at least, the last 2 years)	53	88 %
19	Summary of financial data over a period of at least 5 years	5	8 %
20	Financial ratios	50	83 %
21	Number of shares	39	65 %
22	Share price history	39	65 %
23	Share price performance in relation to stock market index	8	13 %
24	Current press releases or news	55	92 %
25	Current share price	44	73 %
26	Pages indicate the latest update	6	10 %
27	E-mail to investor relations	27	45 %
28	Phone number to investor relations	29	48 %
29	Postal address to investor relations	18	30 %
30	English version of home page	59	98 %
31	Table of contents/site map	46	77 %
32	Frequently asked questions	15	25 %
33	Help site	30	50 %
34	Hyperlinks inside the annual report	0	0 %
35	Financial data in processable format	0	0 %
36	Annual report in pdf format	55	92 %
37	Annual report in html format	1	2 %
38	Graphic images	52	87 %
39	Sound files	1	2 %
40	Video files	27	45 %

Appendix 5 Financial Variables Disclosed by Companies

Variables	% of companies disclosures	Order
V1	89,83 %	54
V2	94,92 %	57
V3	86,44 %	52
V4	93,22 %	56
V5	86,44 %	52
V6	93,22 %	56
V7	86,44 %	52
V8	93,22 %	56
V9	91,53 %	55
V10	91,53 %	55
V11	52,54 %	31
V12	91,53 %	55
V13	10,17 %	6
V14	94,92 %	56
V15	74,58 %	45
V16	86,44 %	52
V17	3,39 %	2
V18	89,83 %	53
V19	8,47 %	5
V20	83,05 %	50
V21	64,41 %	39
V22	64,41 %	39
V23	13,56 %	8

Appendix 6 Relationship Between the Market Capitalization and the % of Financial Disclosure Score

Companies	% of financial disclosure score	Market capitalization
1	91 %	664,126,899,788
2	78 %	335,753,016,465
3	61 %	207,478,962,000
4	78 %	187,253,000,000
5	74 %	146,354,424,432
6	78 %	137,420,356,590
7	87 %	119,448,530,400
8	74 %	115,105,984,476
9	78 %	103,915,962,900
10	78 %	101,698,775,640
11	78 %	100,431,607,720
12	43 %	97,074,904,500
13	87 %	86,784,150,971
14	74 %	93,619,200
15	65 %	74,122,320,000
16	74 %	41,961,000,000
17	78 %	35,308,590,324
18	74 %	33,300,334,600
19	78 %	28,859,282,550
20	70 %	28,300,000,000
21	83 %	27,062,585,082
22	52 %	25,414,946,414
23	70 %	23,957,206,598
24	70 %	22,518,766,400
25	70 %	21,396,010,000
26	78 %	20,260,800,000
27	83 %	20,118,439,188
28	78 %	19,470,144,430
29	65 %	19,361,700,000
30	83 %	18,121,636,194
31	83 %	15,524,006,400
32	61 %	12,136,172,636
33	4 %	11,792,775,000
34	83 %	10,409,111,520
35	83 %	8,743,172,961
36	87 %	6,042,679,080
37	52 %	6,036,824,208
38	78 %	5,362,946,192

(continued)

Companies	% of financial disclosure score	Market capitalization
39	83 %	5,260,559,282
40	70 %	4,986,245,500
41	83 %	4,438,066,353
42	78 %	3,795,507,426
43	83 %	3,538,491,494
44	74 %	3,074,331,000
45	78 %	2,481,710,400
46	70 %	2,579,463,046
47	57 %	2,604,556,496
48	83 %	1,940,234,248
49	78 %	1,739,468,640
50	74 %	1,723,046,520
51	70 %	1,305,090,000
52	35 %	1,031,800,000
53	9 %	1,033,633,903
54	74 %	552,076,906
55	83 %	645,653,000
56	70 %	741,353,368
57	70 %	565,817,625
58	70 %	355,608,000
59	70 %	448,875,000
60	70 %	484,527,300

Appendix 7 Relationship Between Dividend per Share and Financial Disclosure Score

Company name	Dividend per share	Disclosure
ALPHA BANK	0.9	0.61
NATIONAL BANK OF GREECE S.A.	0.05	0.74
BANK OF CYPRUS PUBLIC COMPANY LTD	0.15	0.74
PIRAEUS BANK S.A.	0.4	0.78
EFG EUROBANK ERGASIAS S.A.	0.32	0.87
ATTICA BANK A.T.E.	0.88	0.83
TITAN	0.12	0.87
GRIVALIA PROPERTIES	0.01	0.65
MYTILINEOS HOLDINGS S.A.	0.08	0.78
METKA	0.12	0.74
LAMDA DEVELOPMENT	0.01	0.78
PORT OF PIRAEUS	0.09	0.70
VIOHALCO SA/NV (KA)	0.15	0.52
THESSALONIKI PORT AUTHORITY S.A.	0.04	0.78
ELLACTOR	0.04	0.78
ELVAL	0.05	0.83
HERACLES AGET	0.01	0.83
FRIGOGLASS	0.12	0.78
KLEEMAN HELLAS	0.01	0.74
PETROS PETROPOULOS S.A.	0.09	0.78
J. & P.-ABA Ε	0.4	0.78
REDS (KO)	0.04	0.74
ATHENS SA	0.09	0.74
ALUMIL ALUMINIUM INDUSTRY S.A.	0.15	0.70
EKTER	0.04	0.70
COCA-COLA HBC AG	0.28	0.91
JUMBO	0.4	0.78
KLOUKINAS - LAPPAS	0.16	0.09
GR. SARANTIS S.A.	0.36	0.70
FOURLIS ΣΥΜΜΕΤΟΧΩΝ	0.03	0.61
KORRES S.A. NATURAL PRODUCTS	0.2	0.70
SELONDA AQUACULTURE S.A	0.05	0.83
CRETA FARM SA	0.04	0.35
PERSEYS	0.02	0.70
KTIMA LAZARIDI	0.01	0.70

(continued)

Company name	Dividend per share	Disclosure
VIORKAPET	0.04	0.70
PLAISIO	0.15	0.83
QUEST ΣΥΜΜΕΤΟΧΩΝ	0.75	0.83
INTRACOM HOLDINGS	0.2	0.83
SPACE HELLAS	0.3	0.74
HELLENIC PETROLEUM S.A.	0.5	0.78
MOTOR OIL (HELLAS)	0.1	0.78
FOLLI-FOLLIE	0.13	0.43
HELLENIC TELECOM.ORG	0.06	0.78
OPAP	0.11	0.78
ATHENS WATER SUPPLY & SEWAGE Co	0.3	0.74
HELLENIC EXCHANGES S.A. HOLDING CLEARING SETTLEMENT AND REGISTRY	0.6	0.83
TERNA ENERGETIC	0.01	0.70
MINOAN LINES	0.05	0.70
ASTIR PALLAS	0.01	0.65
INTRALOT	0.1	0.83
CRETE PLASTICS	0.01	0.83
AUTOHELLAS	0.05	0.04
THRACE PLASTICS	0.01	0.87
ATHENS MEDICAL C.S.A.	0.09	0.52
MARFIN INVESTMENT GROUP	0.02	0.83
EUROPEAN RELIANCE	0.05	0.78
ELTON	0.01	0.70
IASO GENERAL	0.01	0.57
ΑΤΤΙΚΕΣ ΕΚΔΟΣΕΙΣ	0.01	0.70

Appendix 8 Dummies_Extent of Financial Disclosure

N/a	Company name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	
1	COCA-COLA HBC AG	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	91%	
2	HELLENIC TELECOM.ORG	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	0	1	0	1	1	1	78%	
3	ALPHA BANK	0	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	0	0	1	1	0	61%
4	OPAP	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	0	78%
5	NATIONAL BANK OF GREECE S.A.	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	0	1	0	1	1	1	0	74%
6	JUMBO	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	0	78%
7	TITAN	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	87%
8	BANK OF CYPRUS PUBLIC COMPANY LTD	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	0	1	0	1	1	1	0	74%
9	HELLENIC PETROLEUM S.A.	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	0	78%
10	MOTOR OIL (HELLAS)	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	0	78%
11	PIRAEUS BANK S.A.	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	0	78%
12	FOLL-FOLLIE	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	43%
13	EFG EUROBANK ERGASIAS S.A.	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1	1	87%
14	PLAISIO	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	0	1	1	1	1	83%
15	GRIVALIA PROPERTIES	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	0	1	0	1	0	0	0	65%

(continued)

N/a	Company name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	
16	ATHENS WATER SUPPLY & SEWAGE Co	1	1	0	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1	1	1	74%
17	MYTILINEOS HOLDINGS S.A.	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	0	0	78%
18	METKA	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	1	0	0	0	74%
19	LAMDA DEVELOPMENT	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1	0	78%
20	PORT OF PIRAEUS	1	1	1	1	0	1	0	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1	0	70%
21	HELLENIC EXCHANGES S.A. HOLDING CLEARING SETTLEMENT AND REGISTRY	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	83%
22	VIOHALCO SA/NV (KA)	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	1	1	0	52%
23	GR. SARANTIS S.A.	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1	0	0	0	70%
24	TERNA ENERGETIC	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	0	0	0	70%
25	MINOAN LINES	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	1	0	0	0	70%
26	THESSALONIKI PORT AUTHORITY S.A.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0	0	78%
27	ATTICA BANK A.T.E.	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	0	83%

N/a	Company name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	
44	KLEEMAN HELLAS	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	0	0	74%	
45	PETROS PETROPOULOS S.A.	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	0	1	78%	
46	ELTON	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0	0	0	70%	
47	IASO GENERA	0	1	0	1	0	1	0	1	0	1	1	1	0	1	0	1	0	1	0	1	1	1	0	57%
48	SELONDA AQUACULTURE S.A.	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1	0	83%
49	J. & P.-ABAE	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	0	1	0	78%
50	REDS (KO)	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	0	1	1	1	0	74%
51	ΑΤΤΙΚΕΣ ΕΚΔΟΣΕΙΣ	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	0	1	0	1	0	70%
52	CRETA FARM SA	1	1	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	35%
53	KLOUKINAS- LAPPAS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	9%
54	ATHENS SA	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	1	0	1	1	0	0	74%

55	SPACE HELLAS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	74%						
56	PERSEYS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	70%						
57	ALUMIL ALUMINIUM INDUSTRY S.A.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	70%						
58	KTIMA LAZARIDI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	70%						
59	EKTER	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	70%						
60	VIORKAPET	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	70%						
		90%	95%	87%	93%	87%	93%	87%	93%	87%	93%	87%	93%	92%	52%	92%	52%	92%	10%	93%	75%	87%	3%	88%	8%	83%	65%	65%	13%

Appendix 9 Interviews

Questions

Chapter 1: Company's profile

- 1.1 Which is your role in the company;
.....
.....
- 1.2 What is your company's main activity? Do you have more than one activity?
.....
.....
- 1.3 How many workers employed by your company (approximately)?
- 0 – 250
- 251 – 500
- 501 –
- 1.4 Does your company is a multinational company?
- Yes No
- 1.5 How many years does your company have a website?
- Less than one
- 1 – 2 years
- 2 – 5 years
- More than 5 years
- 1.6 Does your company sell its products through internet?
- Yes No
- 1.7 Which departure is responsible to update your website?
.....
.....
- 1.8 Do you update your website with the full data of what you want to publish or you select a part of it?
- Yes No
- 1.9 How much time you need to update your website from the time you have already published?
.....
.....

Chapter 2: Website information

1= Totally disagree,

2= Disagree,

3= No opinion,

4= Agree,

5= Totally agree

2.1 How important were the below factors when you were designing your website?

	Totally disagree	Disagree	No opinion	Agree	Totally agree
Shareholders	1	2	3	4	5
Workers	1	2	3	4	5
Vendors	1	2	3	4	5
Customers	1	2	3	4	5
Social Factors	1	2	3	4	5

2.2 How important are below goals for your website development?

	Totally disagree	Disagree	No opinion	Agree	Totally agree
Company Marketing	1	2	3	4	5
Shareholder communication	1	2	3	4	5
Vendor briefing	1	2	3	4	5
Sell directly to customers	1	2	3	4	5
Customer briefing	1	2	3	4	5

Chapter 3: Questions

3.1 Do you believe your website meets the needs of your consecutive shareholders and if so to what extent you are prepared to meet these needs?

3.2 What are the processes and mechanisms within your company that determine the extent of the compulsory publication of financial information via internet

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Chapter 51

Corporate Governance: Legal, Managerial, and Auditing Dimensions

John Velentzas, Georgia Broni, and Lefteris Skalidis

Abstract Corporate governance is the relationship between the shareholders, directors, and management of a company, as defined by the corporate charter, by laws, formal policy, and internal audit; The relationship between corporate managers, directors, and the providers of equity, people, and institutions who save and invest their capital to earn a return. It ensures that the board of directors is accountable for the pursuit of corporate objectives and that the corporation itself conforms to the law and regulations. Corporate governance provides the framework for attaining a company's objectives: It encompasses practically every sphere of management, from action plans and internal controls to performance measurement and corporate disclosure.

Keywords Corporate governance

51.1 Definitions: Generalities

Corporate governance (also called corporation governance) is the framework of rules and practices by which a board of directors ensures accountability, fairness, and transparency in a company's relationship with its all stakeholders (financiers, customers, management, employees, government, and the community) (Velentzas and Broni 2013, p. 215).

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The corporate governance framework consists of (Velentzas and Broni 2010, pp. 216–217):

- (1) explicit and implicit contracts between the company and the stakeholders for distribution of responsibilities, rights, and rewards (Carroll 1996),
- (2) procedures for reconciling the sometimes conflicting interests of stakeholders in accordance with their duties, privileges, and roles, and
- (3) procedures for proper supervision, control, and information-flows to serve as a system of checks-and-balances.

Corporate governance broadly refers to the mechanisms, processes, and relations by which corporations are controlled and directed (Shailer 2004).

Governance structures and principles identify the distribution of rights and responsibilities among different participants in the corporation (Broni 2009) (such as the board of directors, managers, shareholders, creditors, auditors, regulators, and other stakeholders) and include the rules and procedures for making decisions in corporate affairs (Lin 2011).

Corporate governance includes the processes through which corporations' objectives are set and pursued in the context of the social, regulatory, and market environment (Darby 1995). Governance mechanisms include monitoring the actions, policies, practices, and decisions of corporations, their agents, and affected stakeholders (Freeman 2000).

Corporate governance practices are affected by attempts to align the interests of stakeholders (Tricker 2009).

Corporate governance has also been more narrowly defined as a system of law (Daines and Klausner 2008) and sound approaches by which corporations are directed and controlled focusing on the internal and external corporate structures with the intention of monitoring the actions of management and directors and thereby (Freeman 1984; McMahon 1994) mitigating agency risks which may stem from the misdeeds of corporate officers (Sifuna, Anazett Pacy 2012).

Corporate governance as the set of conditions that shapes the ex post bargaining over the quasi-rents generated by a firm (Zingales 2008).

The firm itself is modelled as a governance structure acting through the mechanisms of contract (Williamson 2002). Here, corporate governance may include its relation to corporate finance.

Interest in the corporate governance practices of modern corporations, particularly in relation to accountability.

Corporate scandals of various forms have maintained public and political interest in the regulation of corporate governance. In the USA, these include Enron (Dembinski et al. 2006; Elliott and Schroth 2002) and MCI Inc. (formerly WorldCom).

Similar corporate failures in other countries stimulated increased regulatory interest (e.g., Parmalat in Italy) (Velentzas et al. 2012, p. 215).

Corporate governance is a term that refers broadly to the rules, processes, or laws by which businesses are operated, regulated, and controlled (Dignam and Lowry 2006). The term can refer to internal factors defined by the officers, stockholders, or

constitution of a corporation (Easterbrook and Fischel 1991), as well as to external forces such as consumer groups, clients, and government regulations (Denis and McConnell 2003).

A well-defined and enforced corporate governance provides a structure that, at least in theory, works for the benefit of everyone concerned by ensuring that the enterprise adheres to accepted ethical standards and best practices as well as to formal laws. To that end, organizations have been formed at the regional, national, and global levels (Khalid Abu Masdoor 2011).

Corporate governance is most often viewed as both the structure and the relationships which determine corporate direction and performance (Watrick and Cochran 1985). The board of directors is typically central to corporate governance. Its relationship to the other primary participants, typically shareholders and management, is critical (Shleifer and Vishny 1997). Additional participants include employees, customers, suppliers, and creditors. The corporate governance framework also depends on the legal, regulatory, institutional, and ethical environment of the community (Wood 1991). The twentieth century might be viewed as the age of management. The early twenty-first century is predicted to be more focused on governance. Both terms address control of corporations but governance has always required an examination of underlying purpose and legitimacy (Seibert 1999).

Generally, corporate governance refers to the host of legal and non-legal principles and practices affecting control of publicly held business corporations (Phillips 2003). Most broadly, corporate governance affects not only who controls publicly traded corporations and for what purpose but also the allocation of risks and returns from the firm's activities among the various participants in the firm, including stockholders and managers as well as creditors, employees, customers, and even communities (Cyert and March 1963; Skau 1992).

“Corporate governance -the authority structure of a firm- lies at the heart of the most important issues of society” . . . such as “who has claim to the cash flow of the firm, who has a say in its strategy and its allocation of resources.” The corporate governance framework shapes corporate efficiency, employment stability, retirement security, and the endowments of orphanages, hospitals, and universities. “It creates the temptations for cheating and the rewards for honesty, inside the firm and more generally in the body politic.” It “influences social mobility, stability and fluidity . . . It is no wonder then, that corporate governance provokes conflict. Anything so important will be fought over . . . like other decisions about authority, corporate governance structures are fundamentally the result of political decisions. Shareholder value is partly about efficiency. But there are serious issues of distribution at stake – job security, income inequality, social welfare. There may be many ways to organize an efficient firm” (Gourevitch and Shinn 2005).

Corporate governance doctrine primarily describes the control rights and related responsibilities of three principal groups (OECD 1999, 2004, 2015):

- the firm's shareholders, who provide capital and must approve major firm transactions,
- the firm's board of directors, who are elected by shareholders to oversee the management of the corporation, and
- the firm's senior executives who are responsible for the day to day operations of the corporation.

Corporate governance is a field in economics that investigates how to secure/motivate efficient management of corporations by the use of incentive mechanisms, such as contracts, organizational designs, and legislation (Moebert and Tydecks 2007). This is often limited to the question of improving financial performance, for example, how the corporate owners can secure/motivate that the corporate managers will deliver a competitive rate of return.

In broad terms, corporate governance refers to the way in which a corporation is directed, administered, and controlled (Sun 2009). Corporate governance also concerns the relationships among the various internal and external stakeholders involved as well as the governance processes designed to help a corporation achieve its goals (Clarkson 1995). Of prime importance are those mechanisms and controls that are designed to reduce or eliminate the principal-agent problem.

51.2 Responsibilities of the Board of Directors

51.2.1 Managerial Responsibilities

The board is responsible for the successful perpetuation of the corporation. That responsibility cannot be relegated to management (Kroszner 2008).

A board of directors is expected to play a key role in corporate governance (Lin 2011). The board has responsibility for: CEO selection and succession; providing feedback to management on the organization's strategy; compensating senior executives; monitoring financial health, performance and risk; and ensuring accountability of the organization to its investors and authorities. Boards typically have several committees (e.g., Compensation, Nominating, and Audit) to perform their work (Fischhoff et al. 1984).

51.2.2 Financial Responsibilities

The board of directors has primary responsibility for the corporation's internal and external financial reporting functions. The Chief Executive Officer (CEO) and Chief Financial Officer (CFO) are crucial participants and boards usually have a high degree of reliance on them for the integrity and supply of accounting information. They oversee the internal accounting systems, and are dependent on the corporation's accountants and internal auditors.

Current accounting rules under International Accounting Standards and US GAAP allow managers some choice in determining the methods of measurement and criteria for recognition of various financial reporting elements (Brickley et al. 2007). The potential exercise of this choice to improve apparent performance increases the information risk for users (Kraman and Hamm 1999). Financial reporting fraud including non-disclosure and deliberate falsification of values also contributes to users' information risk. To reduce this risk and to enhance the perceived integrity of financial reports, corporation financial reports must be audited by an independent external auditor who issues a report that accompanies the financial statements (Fischoff et al. 1984).

One area of concern is whether the auditing firm acts as both the independent auditor and management consultant to the firm they are auditing (Garrett 2004; Goergen 2012). This may result in a conflict of interest which places the integrity of financial reports in doubt due to client pressure to appease management (Low 2008). The power of the corporate client to initiate and terminate management consulting services and, more fundamentally, to select and dismiss accounting firms contradicts the concept of an independent auditor (Freeman and Evan 1990).

Changes enacted in the USA in the form of the Sarbanes-Oxley Act (following numerous corporate scandals, culminating with the Enron scandal) prohibit accounting firms from providing both auditing and management consulting services (Velentzas et al. 2013, p. 226).

51.3 Stakeholder Interests

All parties to corporate governance have an interest, whether direct or indirect, in the financial performance of the corporation (Marcoux 2003). Directors, workers, and management receive salaries, benefits, and reputation, while investors expect to receive financial returns. For lenders, it is specified interest payments, while returns to equity investors arise from dividend distributions or capital gains on their stock. Customers are concerned with the certainty of the provision of goods and services of an appropriate quality; suppliers are concerned with compensation for their goods or services, and possible continued trading relationships (Denison et al. 2004). These parties provide value to the corporation in the form of financial, physical, human, and other forms of capital. Many parties may also be concerned with corporate social performance (Carroll 2000; Greening and Turban 2000; Waddock and Cochran 1985).

A key factor in a party's decision to participate in or engage with a corporation is their confidence that the corporation will deliver the party's expected outcomes (Denis and McConnell 2003). When categories of parties (stakeholders) do not have sufficient confidence that a corporation is being controlled and directed in a manner consistent with their desired outcomes, they are less likely to engage with the corporation (Boatright 1994). When this becomes an endemic system feature, the loss of confidence and participation in markets may affect many other stakeholders,

and increases the likelihood of political action (Caldwell and Karri 2005). There is substantial interest in how external systems and institutions, including markets, influence corporate governance (Arpan 2005).

In contemporary business corporations, the main external stakeholder groups are shareholders, debtholders, trade creditors and suppliers, customers, and communities affected by the corporation's activities (Claessens et al. 2000). Internal stakeholders are the board of directors, executives, and other employees.

Much of the contemporary interest in corporate governance is concerned with mitigation of the conflicts of interests between stakeholders (Goergen 2012). In large firms where there is a separation of ownership and management and no controlling shareholder, the principal-agent issue arises between upper-management (the "agent") which may have very different interests, and by definition considerably more information, than shareholders (the "principals") (Clarke and de la Rama 2006, 2008). The danger arises that, rather than overseeing management on behalf of shareholders, the board of directors may become insulated from shareholders and beholden to management (Cornuel and Kletz 2003). This aspect is particularly present in contemporary public debates and developments in regulatory policy (Clarke 2004a, b).

Ways of mitigating or preventing these conflicts of interests include the processes, customs, policies, laws, and institutions which have an impact on the way a company is controlled (Colley et al. 2004). An important theme of governance is the nature and extent of corporate accountability (Zelenyuk and Zheka 2006). A related discussion at the macro level focuses on the impact of a corporate governance system on economic efficiency (Crawford 2007), with a strong emphasis on shareholders' welfare (Hart 1989). This has resulted in a literature focussed on economic analysis (Daines and Klausner 2008).

The significance of institutional investors varies substantially across countries. In developed Anglo-American countries (Australia, Canada, New Zealand, UK, the USA), institutional investors dominate the market for stocks in larger corporations (Clarke 2007).

51.4 Principles

51.4.1 *General Principles*

Contemporary discussions of corporate governance tend to refer to principles raised in three documents released since 1990:

- The Cadbury Report (UK, 1992),
- the Principles of Corporate Governance (OECD 1999, 2004, 2015),
- the Sarbanes-Oxley Act (also called Sarbox or Sox) of 2002 (US, 2002).

The most fundamental general principles of proper corporate governance are a function of the allocation of power within a corporation between its stockholders and its board of directors:

- *Rights and equitable treatment of shareholders:* Organizations should respect the rights of shareholders and help shareholders to exercise those rights. They can help shareholders exercise their rights by openly and effectively communicating information and by encouraging shareholders to participate in general meetings.
- *Interests of other stakeholders:* Organizations should recognize that they have legal, contractual, social, and market driven obligations to non-shareholder stakeholders, including employees, investors, creditors, suppliers, local communities, customers, and policy makers.
- *Role and responsibilities of the board:* The board needs sufficient relevant skills and understanding to review and challenge management performance. It also needs adequate size and appropriate levels of independence and commitment.
- *Integrity and ethical behavior:* Integrity should be a fundamental requirement in choosing corporate officers and board members. Organizations should develop a code of conduct for their directors and executives that promotes ethical and responsible decision making.
- *Disclosure and transparency:* Organizations should clarify and make publicly known the roles and responsibilities of board and management to provide stakeholders with a level of accountability. They should also implement procedures to independently verify and safeguard the integrity of the company's financial reporting. Disclosure of material matters concerning the organization should be timely and balanced to ensure that all investors have access to clear, factual information.

51.4.2 Organisation for Economic Co-operation and Development Principles

One of the most influential guidelines on corporate governance are the G20/OECD Principles of Corporate Governance, first published as the OECD Principles in 1999, revised in 2004 and revised again, and endorsed by the G20 in 2015.

The Principles often referenced by countries developing local codes or guidelines. Building on the work of the OECD, other international organizations, private sector associations, and more than 20 national corporate governance codes formed the United Nations Intergovernmental Working Group of Experts on International Standards of Accounting and Reporting (ISAR) to produce their Guidance on Good Practices in Corporate Governance Disclosure.

This internationally agreed benchmark consists of more than 50 distinct disclosure items across five broad categories (International Standards of Accounting and Reporting, Corporate Governance Disclosure, Retrieved 2008):

- Auditing
- Board and management structure and process
- Corporate responsibility and compliance in organization
- Financial transparency and information disclosure
- Ownership structure and exercise of control rights.

The OECD Guidelines on Corporate Governance of State-Owned Enterprises are complementary to the G20/OECD Principles of Corporate Governance, providing guidance tailored to the corporate governance challenges unique to state-owned enterprises.

51.5 Legislative Framework

51.5.1 Sarbanes-Oxley Act

The Sarbanes-Oxley Act of 2002 was enacted in the wake of a series of high-profile corporate scandals. It established a series of requirements that affect corporate governance in the USA and influenced similar laws in many other countries.

The law required, along with many other elements, that (Velentzas et al. 2011, pp. 226, 306):

- The Public Company Accounting Oversight Board (PCAOB) be established to regulate the auditing profession, which had been self-regulated prior to the law. Auditors are responsible for reviewing the financial statements of corporations and issuing an opinion as to their reliability.
- The Chief Executive Officer (CEO) and Chief Financial Officer (CFO) attest to the financial statements. Prior to the law, CEO's had claimed in court they hadn't reviewed the information as part of their defense.
- Board audit committees have members that are independent and disclose whether or not at least one is a financial expert, or reasons why no such expert is on the audit committee.
- External audit firms cannot provide certain types of consulting services and must rotate their lead partner every 5 years. Further, an audit firm cannot audit a company if those in specified senior management roles worked for the auditor in the past year. Prior to the law, there was the real or perceived conflict of interest between providing an independent opinion on the accuracy and reliability of financial statements when the same firm was also providing lucrative consulting services.

51.5.2 *The OECD*

The OECD Principles of Corporate Governance describe the responsibilities of the board that are summarized below:

- Board members should be informed and act ethically and in good faith, with due diligence and care, in the best interest of the company and the shareholders.
- Review and guide corporate strategy, objective setting, major plans of action, risk policy, capital plans, and annual budgets.
- Oversee major acquisitions and divestitures.
- Select, compensate, monitor and replace key executives, and oversee succession planning.
- Align key executive and board remuneration (pay) with the longer-term interests of the company and its shareholders.
- Ensure a formal and transparent board member nomination and election process.
- Ensure the integrity of the corporations accounting and financial reporting systems, including their independent audit.
- Ensure appropriate systems of internal control are established.
- Oversee the process of disclosure and communications.
- Where committees of the board are established, their mandate, composition, and working procedures should be well-defined and disclosed.

51.5.3 *The EU Framework*

51.5.3.1 *Managerial Framework*

Directors have a crucial role in corporate governance, ensuring proper management of the company and looking after investors' interests.

Recommendation 2005/162/EC deals with the role of non-executive or supervisory directors in listed companies.

It:

- lays down rules on the independence of directors
- recommends that companies set up committees on the (supervisory) board to deal with:
 - nomination
 - remuneration
 - audit issues.

The work in this area aims to encourage and make it easier for employees to own shares of their companies or participate in their profits, and for companies to offer such schemes to their employees, including on a cross-border basis.

Remuneration for board members is a key area where managers may have a conflict of interest and account should be taken of shareholder interests.

Recommendation 2009/385/EC (FAQ Choose translations of the previous link) makes recommendations including:

- remuneration should be performance-based and promote a company's long-term sustainability
- companies should publicly disclose their remuneration policies
- the remuneration committee should be involved
- shareholders should be able to influence remuneration policy.

Proper disclosure of companies' corporate governance arrangements offers useful information to investors and reputational benefits to business.

51.5.3.2 Legal Framework

Recommendation 2014/208/EU on corporate governance reporting, especially explanations companies should provide for breaking governance codes ("comply or explain").

Directive 2013/34/EU made key changes to for EU accounting directives; established the rule of collective responsibility of the board (Article 20); introduced the obligation for EU listed companies to provide a corporate governance statement in their annual report, giving information on: governance codes, shareholder meeting and its powers, shareholders' rights, administrative, management and supervisory bodies and their committees, etc.

Directive 2013/50/EU (revised Transparency Directive) requires issuers of securities traded on EU regulated markets to ensure appropriate transparency through a regular flow of information to the markets—e.g., disclosure of major holdings of all financial instruments that could be used to acquire economic interest in listed companies.

51.5.3.3 Financial Institutions Framework

Directive 2013/36/EU (Capital Requirements Directive) lays down rules for banks and investment firms including:

- effective risk management
- board composition
- pay structure (for executives and employees considered "material risk takers")—in the form of a "bonus cap" (maximum ratio between variable and fixed compensation).

51.5.4 The Greek Law: The Legal Framework

Law 3016/2002: “On corporate governance, board remuneration and other issues” laid down fundamental corporate governance obligations and was intended to force transparency and investor’s confidence (Skalidis 2007; Velentzas and Broni 2013, p. 230).

The main requirements according to the new law are as follows (Velentzas 2008, p. 941).

51.5.4.1 Composition of Board of Directors

The number of non-executive board members should not be lower than 1/3 of the total number of board members. At least two independent non-executive directors should exist in the board of directors. Compliance with this provision is not mandatory, if representatives of the shareholders minority are appointed and participate as members in the board (Velentzas and Broni 2013, p. 236).

During their tenure, the independent non-executive board members are not allowed to own more than 0.5 % of the company’s share capital and to have a relation of dependence with the corporation or persons associated with it (Velentzas 2008, p. 947).

51.5.4.2 Non-executive Directors’ Remuneration

The remuneration and other compensation of non-executive board members are determined according to Law No. 2190/1920, as in force, and are proportional to the time they devote to the board meetings and the fulfillment of the responsibilities delegated to them according to this law (Velentzas and Broni 2013, p. 238).

The total of the remuneration and other compensation of non-executive board members should be reported in the annex of the annual financial statements (Velentzas 2008, p. 949).

51.5.4.3 Internal Auditing

The existence and operation of an audit department is a prerequisite for the approval of initial public offering of company shares or other securities (Velentzas and Broni 2013, p. 243).

Auditing is performed by the appropriate department (Velentzas 2008, p. 954).

Auditors are independent in performing their responsibilities, do not report to any other company department, and are supervised by 1–3 non-executive board members.

51.5.4.4 Share Capital Increase

In case of capital increase by means of cash injection, the board is obligated to submit a report to the shareholder meeting referring to the general directions of the investment plan of the company, as well as an assessment of the use of capital raised in the previous share capital increase, if this has taken place during the previous 3 years (Velentzas and Broni 2013, p. 243).

Any important deviations in the use of capital raised may be decided upon by the board of directors by a 3/4 majority of its members and must be approved by a general shareholder meeting (Velentzas 2008, p. 956).

51.6 Corporate Governance Controls

51.6.1 Internal Corporate Governance Controls

Internal corporate governance controls monitor activities and then take corrective action to accomplish organizational goals (Velentzas and Broni 2013, p. 218).

Examples (Epstein and Hanson 2006):

- *Monitoring by the board of directors:* The board of directors, with its legal authority to hire, fire, and compensate top management, safeguards invested capital. Regular board meetings allow potential problems to be identified, discussed, and avoided (Erturk et al. 2004). Whilst non-executive directors are thought to be more independent, they may not always result in more effective corporate governance and may not increase performance. Different board structures are optimal for different firms. Moreover, the ability of the board to monitor the firm's executives is a function of its access to information. Executive directors possess superior knowledge of the decision-making process and therefore evaluate top management on the basis of the quality of its decisions that lead to financial performance outcomes, ex ante. It could be argued, therefore, that executive directors look beyond the financial criteria.
- *Internal control procedures and internal auditors:* Internal control procedures are policies implemented by an entity's board of directors, audit committee, management, and other personnel to provide reasonable assurance of the entity achieving its objectives related to reliable financial reporting, operating efficiency, and compliance with laws and regulations. Internal auditors are personnel within an organization who test the design and implementation of the entity's internal control procedures and the reliability of its financial reporting.
- *Balance of power:* The simplest balance of power is very common; require that the President be a different person from the Treasurer. This application of separation of power is further developed in companies where separate divisions check and balance each other's actions. One group may propose company-wide

administrative changes, another group review and can veto the changes, and a third group check that the interests of people (customers, shareholders, and employees) outside the three groups are being met.

- *Remuneration*: Performance-based remuneration is designed to relate some proportion of salary to individual performance. It may be in the form of cash or non-cash payments such as shares and share options, superannuation, or other benefits. Such incentive schemes, however, are reactive in the sense that they provide no mechanism for preventing mistakes or opportunistic behavior, and can elicit myopic behavior.
- *Monitoring by large shareholders and/or monitoring by banks and other large creditors*: Given their large investment in the firm, these stakeholders have the incentives, combined with the right degree of control and power, to monitor the management (Goergen 2012).

In modern corporations, boards of directors are largely chosen by the President/CEO and the President/CEO often takes the Chair of the Board position for him/herself (which makes it much more difficult for the institutional owners to “fire” him/her). The practice of the CEO also being the Chair of the Board is fairly common in large American corporations (Lin 2011).

51.6.2 External Corporate Governance Controls

External corporate governance controls encompass the controls external stakeholders exercise over the organization (Velentzas et al. 2013, p. 153).

Examples:

- competition
- debt covenants
- demand for and assessment of performance information (especially financial statements)
- government regulations
- managerial labor market
- media pressure
- takeovers
- proxy firms.

51.7 Epilogue

Corporate governance is the system by which companies are directed, administered, managed, and controlled. It influences how the objectives of the company are set and achieved, how risk is monitored and assessed, and how performance is optimized.

Good corporate governance structures encourage companies to create value (through entrepreneurship, innovation, development, and exploration) and provide accountability and control systems commensurate with the risks involved.

Corporate governance is not just a set of ideas or value statements. There are a significant number of very technical legal requirements that companies must follow in order to demonstrate that they have good corporate governance.

Corporate governance is concerned with holding the balance between economic and social goals and between individual and communal goals. The corporate governance framework is there to encourage the efficient use of resources and equally to require accountability for the stewardship of those resources. The aim is to align as nearly as possible the interests of individuals, corporations, and society.

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Chapter 52

Importance of Productivity in Non-Optimal Currency Areas

Carlos Encinas-Ferrer

Abstract The devaluation tool has, in an open optimal currency area with monetary sovereignty, a very high weight in determining economic policies to adjust relative costs and interest rates to the situation faced by a country to economic shocks either asymmetric or generalized. The devaluation risk is caused not only by domestic inflation, but by imported inflation as well. If inflation of a nation is greater than the average one of its trading partners and the gap between them is not adjusted by the depreciation of its currency, it will start the process of overvaluation. This overvaluation ends manifesting in a growing lack of competitiveness in its foreign trade with a growing trade deficit, reduced gross domestic product, rising unemployment, and falling wages.

Keywords Productivity • Non-optimal currency areas

52.1 Introduction

It has been assumed incorrectly that in a group of economies with a single currency such as the Euro Zone, the devaluation risk would not exist and would not affect, therefore interest rates. Why I use the term “incorrectly”? Because the European experience in recent years has shown us that this assumption only happens in optimal currency areas and such areas only exist if they have:

- (a) Free movement of labor (Mundell 1961),
- (b) High trade integration (McKinnon 1963),
- (c) Common fiscal budget (Kenen 1969), and
- (d) Banking Union.

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A non-optimal monetary area in which circulates a common currency has among its main features the lack of a fiscal and banking union between the countries that comprise it. As a result of the lack of banking union there is no central bank or it lacks the function of lender of last resort. All this is reflected in the inflation differentials among members of the currency area that rather than converging over time, tend to diverge.

As the Euro Area lacks of a common fiscal budget and banking union and the European Central Bank (ECB) lacks of the lender of last resort function, today we know that it is a non-optimal currency area (Encinas et al. 2015).

The dispersion of inflation rates in the Eurozone means that some member states are losing competitiveness in their trade with their partners while the common currency deprives them from the instrument of devaluation.

However, in a group of economies with a single currency such as the Euro Zone it has been considered widely that the estimates of overvaluation through time of one currency against another, using, for example, the method of Purchasing Parity Power (PPP), gives unreliable information and that there are other elements that diminish the validity of the information gathered.

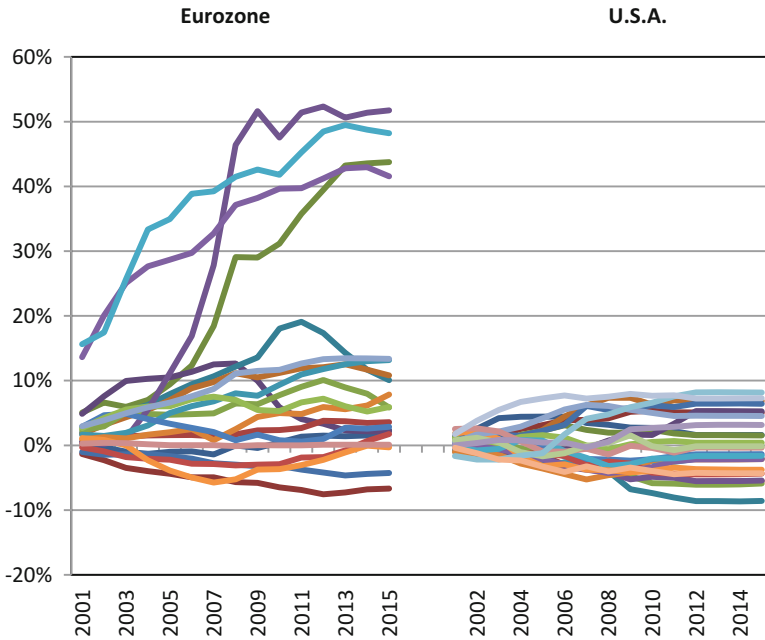
Among the latter we should take into consideration the weight that the evolution of the productivity of labor has in altering the relative parity. Those who think so assume that the overvaluation is less than that indicated by the calculation of the PPP, which would imply that the relative productivity improvement for the nation with weak currencies will reduce the overvaluation problem. But you might ask yourself several questions: What if the situation is reversed? What if also productivity is declining? Will the overvaluation be aggravated by a permanent relative decline in productivity? (Figs. 52.1 and 52.2).

It is true that overvaluation may decrease if it is compensated by an increase on the productivity of labor, but it is obvious, too, that risk devaluation that accompanies overvaluation will be enhanced by a prolonged reduction in that relative productivity. Interestingly, the latter has been ignored by our science and by politicians who have followed blindly the unscientific recommendations of neoliberals.

Interested for a long time on these issues and knowing it would be important for my studies to have a historical series of the evolution of productivity, I decided to approach it in this article and in performing this analysis I found that productivity of labor of European countries with financial problems, compared with that of Germany, has consistently fallen since 2008, when initiating the world financial crisis and exacerbated by the crisis of the euro in 2011.

52.2 Results

I have taken the data from Eurostat: Gross domestic product (GDP) at market prices, million euros; total economically active population (EAP) from 15 to 64 years.



Source: Own elaboration based on data from Eurostat and the US Bureau of Labor Statistics

Fig. 52.1 Accumulated inflation (average = 0). Source: Own elaboration based on data from eurostat and the US bureau of labor statistics

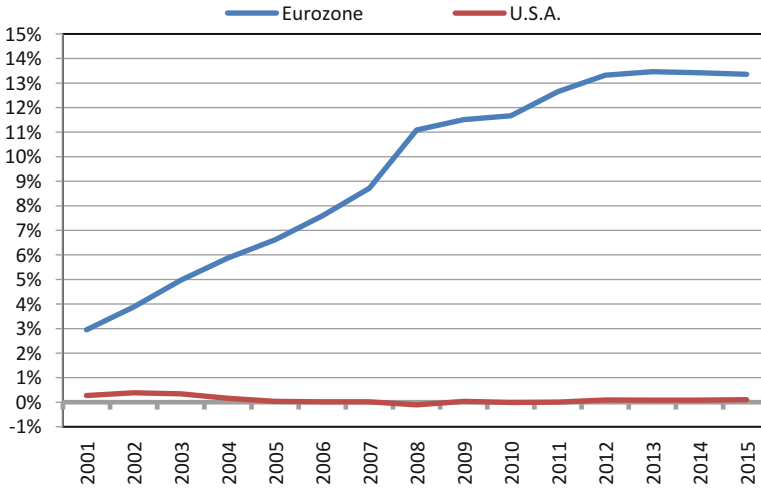
First we present Table 52.1 with the productivity data from Germany, Ireland, Greece, Spain, France, and Italy, dividing the gross domestic product among the economically active population (EAP) such as they appear in Eurostat. I have chosen Germany as the leading country in industrial productivity and the other seven countries because they presented the biggest problems in the financial crisis of the euro in 2011.

In Fig. 52.3 we see how productivity has performed in Germany from 2000 to 2015. This is important as we will compare the productivity of each one of the chosen countries with this leading economy.

We see in the chart above that Germany has presented a sustained productivity growth, interrupted only in 2008 and 2009 because of the great recession but of which quickly recovers to return to its previous trend.

Let’s look at the graphs for each country with the evolution of the coefficients country/Germany (Figs. 52.4, 52.5, 52.6, 52.7, 52.8, and 52.9).

In the previous graphs we see that all the countries studied show in the first years of this century a growth in productivity per worker in relation to Germany. From the eve of the Great Recession this trend drops sharply but unlike Germany this fall continues to the present day and only in the case of Ireland shows a marked recovery from 2014.



Source: Own elaboration based on data from Figure 1.

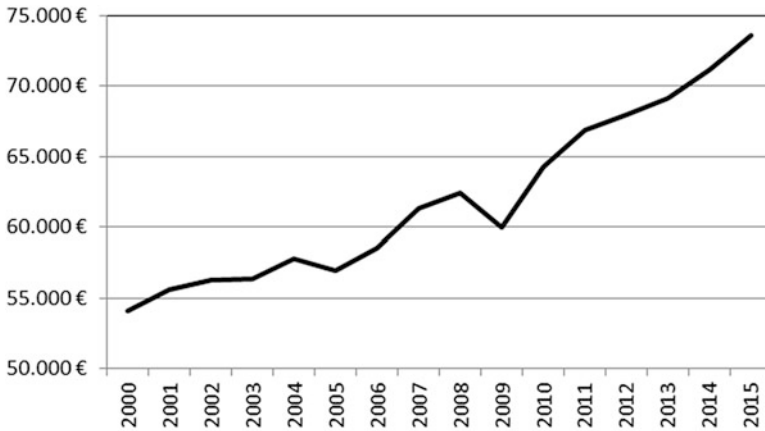
Fig. 52.2 Accumulated inflation dispersion (regional average = 0). Source: Own elaboration based on data from Fig. 52.1

Table 52.1 Evolution of the average productivity (economically active population/GDP) current prices, million euros (2000–2015)

Year	Germany	Ireland	Greece	Spain	France	Italy	Portugal
2000	60.329	72.181	41.991	48.760	69.044	67.176	34.085
2001	61.157	74.597	42.770	50.650	68.247	67.923	34.184
2002	61.146	76.762	44.033	49.489	68.322	67.199	33.802
2003	60.427	78.132	46.005	49.077	67.217	66.628	33.335
2004	61.342	79.595	47.237	49.062	68.721	67.413	34.012
2005	60.046	79.740	47.351	48.832	69.038	68.103	33.976
2006	61.563	80.927	49.673	49.383	70.162	69.168	34.272
2007	63.388	81.354	51.235	49.749	71.256	70.310	34.957
2008	64.010	78.776	50.892	48.926	70.921	68.541	34.978
2009	60.418	75.770	48.279	46.773	68.244	65.130	34.212
2010	64.215	77.665	45.713	46.571	69.331	66.294	34.830
2011	66.139	80.416	42.271	45.966	70.836	66.486	34.377
2012	66.242	81.088	39.432	44.759	70.525	63.154	33.326
2013	65.990	82.099	38.525	44.466	70.680	62.091	33.457
2014	66.759	86.813	39.079	45.525	70.765	61.326	33.988
2015	67.675	93.442	39.063	47.084	71.596	61.897	34.671

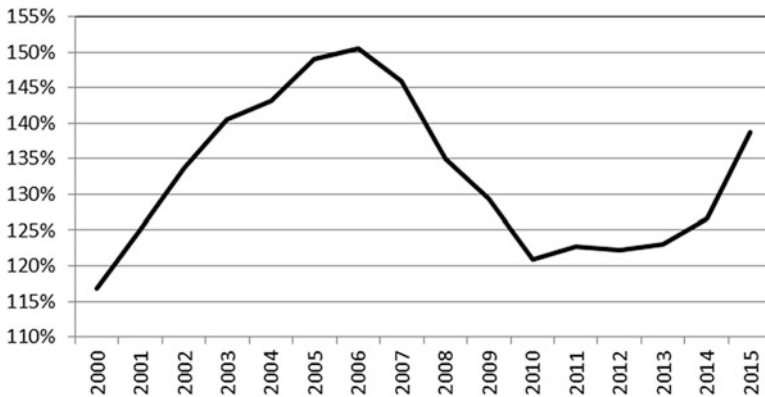
Source: Own elaboration based on data from eurostat

Portugal returns to the productivity levels it had before the Euro Zone was established and maintains them during the last 4 years but due to the austerity policy imposed from Brussels this recovery fails to restore economic growth.



Source: own elaboration with data from Table 1.

Fig. 52.3 Germany: evolution of productivity EAP/GDP (current prices). Source: Own elaboration with data from Table 52.1



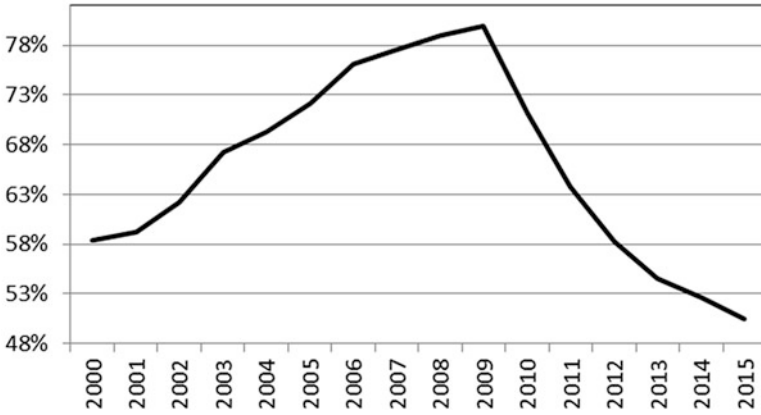
Source: own elaboration with data from Table 2.

Fig. 52.4 Ireland/Germany: evolution of the productivity ratio (2000–2015). Source: Own elaboration with data from Table 52.2

Italy reaches productivity levels 10 % higher than Germany before 2009 but falls and loses 20 % of that productivity to stand today 10 % below the German average.

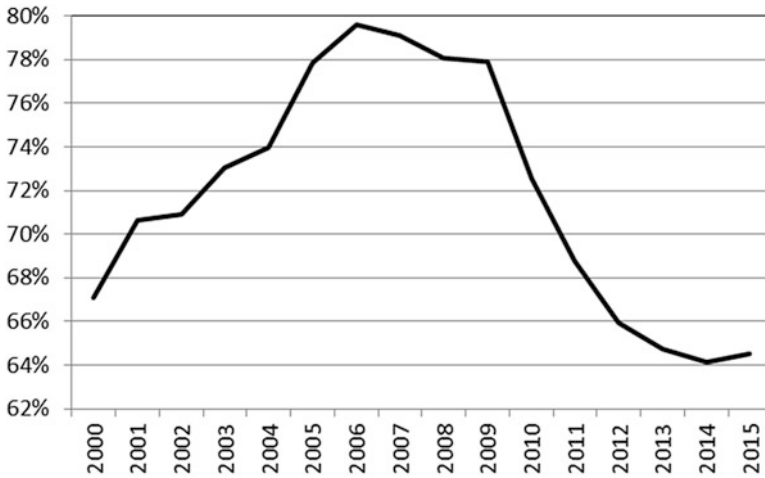
Meanwhile France for several years reaches productivity 12 % higher than Germany but a permanent hang of it has led to productivity only 2 % higher than Germany and lower than it was at the beginning of the century.

Spain reached in 2006 a productivity level equal to 80 % of the German. It slightly reduces in 2007 and 2008, but from 2009 falls to stay in the last 2 years at a level equivalent to 64 % of that of Germany, also lower than the one it had in 2000.



Source: own elaboration with data from Table 2.

Fig. 52.5 Greece/Germany: evolution of the productivity coefficient (2000–2015). Source: Own elaboration with data from Table 52.2



Source: own elaboration with data from Table 2.

Fig. 52.6 Spain/Germany: evolution of the productivity coefficient (2000–2015). Source: Own elaboration with data from Table 52.2

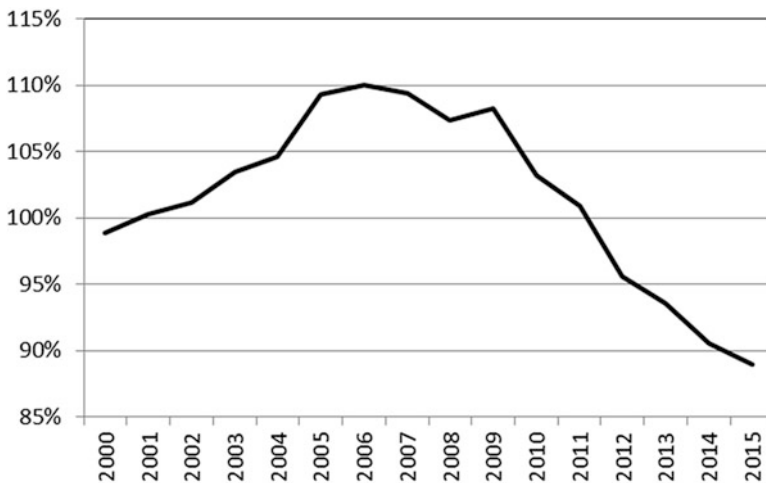
Greece shows a high growth in productivity until 2009, going from 58 to 80 % of our ratio. The fall from that year is impressive and today is equivalent to 50 % of that of Germany and still falling.

Ireland is a special case in this research. Productivity begins to fall in 2006, 3 years before the fall of the Great Recession impact over the Euro Zone. Since 2002 the trade balance surplus drops sharply and does not return to previous levels until 2012. Public debt soars from 27 % equivalency of GDP in 2007 to 130 %



Source: own elaboration with data from Table 2.

Fig. 52.7 France/Germany: evolution of the productivity coefficient (2000–2015). Source: Own elaboration with data from Table 52.2

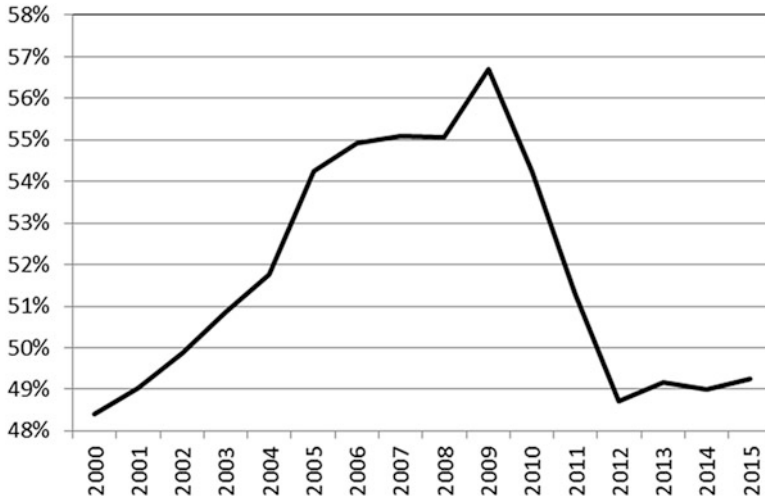


Source: own elaboration with data from Table 2.

Fig. 52.8 Italy/Germany: evolution of the productivity coefficient (2000–2015). Source: Own elaboration with data from Table 52.2

in 2012. However, the level of unemployment only goes from 4 to 14 % in the recession and now is below 12 %. A very different situation to that of the other countries studied.

Inflation levels achieved by countries in the Euro Zone, as we see in Fig. 52.1, far from converging at the time of economic growth, diverged markedly and the



Source: own elaboration with data from Table 2.

Fig. 52.9 Portugal/Germany: evolution of the productivity coefficient (2000–2015). Source: Own elaboration with data from Table 52.2

Table 52.2 Productivity ratio (Country/Germany) (2000–2015)

Year	Germany	Ireland	Greece	Spain	France	Italy	Portugal
2000	1.0000	1.1689	0.5840	0.6707	1.0693	0.9886	0.4839
2001	1.0000	1.2506	0.5923	0.7063	1.0500	1.0027	0.4903
2002	1.0000	1.3371	0.6219	0.7090	1.0589	1.0118	0.4986
2003	1.0000	1.4051	0.6721	0.7306	1.0611	1.0350	0.5085
2004	1.0000	1.4312	0.6930	0.7396	1.0745	1.0461	0.5177
2005	1.0000	1.4900	0.7211	0.7783	1.1172	1.0932	0.5425
2006	1.0000	1.5048	0.7613	0.7959	1.1279	1.1002	0.5491
2007	1.0000	1.4586	0.7756	0.7912	1.1220	1.0940	0.5508
2008	1.0000	1.3493	0.7894	0.7804	1.1227	1.0733	0.5506
2009	1.0000	1.2936	0.7997	0.7788	1.1259	1.0827	0.5669
2010	1.0000	1.2095	0.7119	0.7252	1.0797	1.0324	0.5424
2011	1.0000	1.2276	0.6374	0.6878	1.0697	1.0092	0.5129
2012	1.0000	1.2221	0.5827	0.6592	1.0597	0.9560	0.4871
2013	1.0000	1.2310	0.5456	0.6475	1.0522	0.9355	0.4918
2014	1.0000	1.2665	0.5258	0.6416	1.0294	0.9050	0.4900
2015	1.0000	1.3876	0.5048	0.6453	1.0191	0.8895	0.4925

Source: Own elaboration based on data from Table 52.1

impossibility of depreciating the currency resulted in the overvaluation of the economy of those countries that today have financial problems. This meant higher costs affecting the trade balance and forcing to seek credit financing.

The results of these years of forced austerity cannot be worse and is amazing the stubbornness of their maintenance.

52.3 Conclusion

The increases in the productivity of the countries studied didn't help them to reduce the overvaluation of their economies and rapidly were lost in the years that follow. Currency risk became country risk regardless of whether these countries were issuing debt in euros. The international financial capital realized that this debt would not be backed by the ECB or by Brussels.

The experience gained in all these years of studying the characteristics of non-optimal currency areas show me clearly that the key element to make the decision to merge onto a monetary union of these characteristics depend primarily on having a traditional surplus in the trade balance. Otherwise, the nation will be a growing net debtor.

The nation will accumulate a growing debt that in an environment of financial crisis like 2011 will become unsustainable. It is surprising that given the known equality $NX = NCO$ (Net exports = Net capital outflow) countries that for decades have had a trade surplus with the indebted countries like Germany and Netherlands, now labeled them as irresponsible by its growing fiscal debt.

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Chapter 53

Greek Brain Drainers in Europe: An Empirical Study

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Abstract The young people's migration that is high qualified and over skilled is one of the major issues in Greece during this crisis because it deducts from the economy a highly productive part of its labor force. The analysis of this issue, the reasons why the young scientists leave the country, and the adoption of economic policy measures that will deal with the roots of the problem are the biggest challenges. The purpose of this article is to describe this phenomenon and to highlight the most important factors that affect it. Firstly, some quantitative data are presented about the size of the phenomenon, secondly it is presented a bibliography review relevant to the topic, and finally it presents the empirical results of a survey on a sample of 379 people who have already emigrated and work abroad so as to become aware of the important factors that influenced their decision to emigrate abroad. With this in mind, the data analysis was examined by using the Microsoft Office Excel and the SPSS statistical package. After that, it was held a Descriptive Statistical Analysis, a Factor Analysis, a Variance Analysis, and a Reliability Analysis of the data of the research. The factor analysis uses mathematical procedures to simplify interrelated measures so as to be discovered patterns in a set of variables. Large data sets that consist of several variables can reduce their number by observing variable groups (factors). The Principal Component Analysis was used in order to export the factors of the factor analysis with Orthogonal rotation axes with the Varimax method, which is considered as one of the most reliable and popular methods. The suitability of the factor analysis was examined with the Bartlett's Sphericity statistical test and the Kaiser-Meyer-Olkin statistic test. The factor analysis drew on sixteen (16) factors.

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Afterwards, an analysis of variance was carried out so as to be determined the accuracy of the research model and to be examined the research hypotheses credibility of the research. For the reliability of the results beyond the level of importance it was checked and the reliability indicator of Cronbach's Alpha for each research hypothesis. Finally, the reliability of the variables was proved by repeating the statistical measure Cronbach's Alpha, for all the variables of the research.

Keywords Economic migrants • “Brain drain” • Migration Greeks • Greek immigrants • Immigration • Economic crisis • Europe

53.1 Literature Review

53.1.1 *Quantitative and Qualitative Data*

The fact is that from 1990s and on the research interest has focused mainly on the question why people move in Greece based on the fact that the country has received major migration flows. However, in recent years, more and more scientists examine the phenomenon of vanishing Greeks to more developed countries in the Western world. Although the immigration started before the crisis of the Greek economy, the fact is that it ballooned during this and it is characterized mainly by skilled employees who are high qualified.

EU estimates the number of Greeks who immigrated during the crisis in an amount of 224,000 people (Labrianidis and Pratsinakis 2015b). A research that was conducted so as to identify the quality characteristics of people who immigrated (Labrianidis and Pratsinakis 2015a) shows that 80 % of immigrants directed at European destinations and even 50 % of them have immigrated either in England or in Germany. A large part of this potential are graduates of the third stage of education, that half of the migrants who left Greece from 2010 and on were unemployed in Greece before their departure. Most of them are young, and in each case in a productive age group. The majority of the people that immigrated work in equivalent jobs for their skills and finally the basic reason of immigrating was the difficult financial situation for both the employees and the country.

Immigration is the result of the interaction of several factors that motivate and guide the individual's decision to immigrate (Kline 2003; Baral and Sapkota 2015). The main reason that pushes young Greeks to seek work abroad is the high level of unemployment combined with low wages. However, another important factor is the lack of access to the labor market and the negative economic environment, bureaucracy, disorganization of the public sector, and a general climate that devalues young scientists of the country (Tsilimigra 2012; Tsachakis and Arimaki 2012; Stamelos 2012).

An interesting study of the phenomenon of Brain-Drain (Labrianidis 2011) highlights as main factors of movement of the Greeks the following in order of priority: better career prospects, interesting work related to their studies, acquire

more contemporary knowledge on the object of study, an adequate level pay, unable to find work in Greece proportional to the field of study, work experience in another country, political corruption, acquaintance with other cultures—gain experience of living in another country, recognition of their qualifications abroad.

53.1.2 The Consequences of the Phenomenon of Brain–Drain

When considering the consequences for the countries of origin, the bibliography supports the point of view that the immigration is clearly detrimental to the economies of the countries people come from (Johnson 1967; Bhagwati and Hamada 1974; Kwok and Leland 1982). This is the case if the contribution of immigrants to the economy is bigger than their marginal product, or if the education of those skilled immigrants was partially funded by taxes the citizens pay. The negative impact of brain drain on countries of origin is based on the obstacles and difficulties that cause the phenomenon in conditions endogenous development of the country (Miyagiwa 1991; Haque and Kim 1995; Wong and Yip 1999).

The conditions that are created by immigration in the creation of human capital are the focus of many studies which show that these outlooks may in long term situations to promote human capital and development to the countries they come from (Mountford 1997; Stark et al. 1997; Vidal 1998; Beine et al. 2001).

Along with the incentive to acquire education other ways have also been proposed through which the brain drain can positively influence the economy of the sending country. These include a set of “feedback factors” such as the remittances (Cinar and Docquier 2004), the return of the immigrants after additional knowledge and skills that have been acquired abroad (Domingues Dos Santos and Postel-Vinay 2003), and the creation of business and commercial networks (Dustmann and Kirchkamp 2002; Mesnard and Ravallion 2001).

In contrast to this view, studies that were developed after the 1970s prove that migration of skilled employees generates adverse consequences for the countries from which these flows come, deprive the country of essential productive forces, and weaken the level and quality characteristics of human capital (Commander et al. 2004).

Finally, the third generation of the studies is based on endogenous growth theory, according to which the technology and knowledge are endogenous variables that determine the productivity functions and the development as a consequence. In particular, human capital is a factor that determines the possibility of obtaining an advantage over the competition (Haque and Kim 1995; Mountford 1997; Beine et al. 2001; Schiff 2006).

53.2 Research Methodology

53.2.1 *The Purpose of the Research*

The purpose of this research is to examine and come up with clear and substantiated conclusions about the factors or the situations happening in Greece that lead the educated young people with skills and qualifications to immigration in foreign countries so as to find a proper job. The phenomenon of the vanishing of the new skilled generation has become a concern in Greece over the recent years, and as it is found in the bibliography review many other countries have faced the same major economic problems.

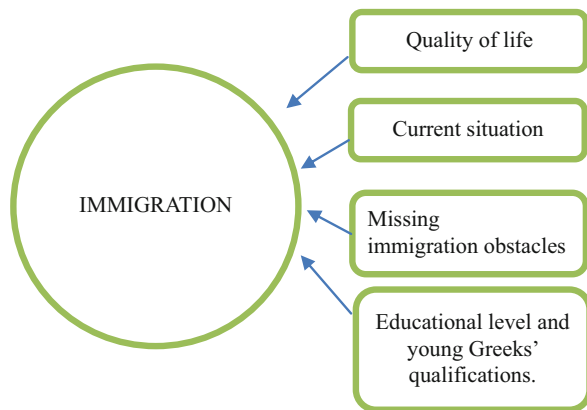
53.2.2 *The Stages and the Process of the Research*

The bibliography review was the basis for the creation of the questionnaire that it was used during the data collection process. The emergence of these factors that created the conditions for the immigration was the basic framework in which the research aimed at.

53.2.3 *The Model of the Research*

The research model was based on the four (4) research hypotheses that were set to be examined (Fig. 53.1).

Fig. 53.1 Research hypotheses



53.2.4 Research Sample

The sample is presented in Fig. 53.2.

53.2.5 Reliability of Data

In any kind of research should be checked some factors which prove both the reliability and validity of the results. Same procedure was followed in this study. It was checked the validity of the content of the questionnaire via the detailed literature review so as to ensure that all aspects of the phenomenon were taken into account.

The checking of the validity of the research variables was performed by using Exploratory Factor Analysis, Principal Component Analysis with rectangularity rotation axes with the Varimax method, which is regarded as one of the most reliable and popular methods. The suitability of the factor analysis was examined by the statistical test of Bartlett's Sphericity and the statistical test of Kaiser-Meyer-Olkin.

To determine the ideal number of the exported factors, it was used the criterion of the eigenvalue. After that, analysis of variance was made so as to determine the accuracy of the research model. For the reliability of the results, beyond the materiality level, it was checked and the KMO and the Cronbach's Alpha reliability index for each research hypothesis. Finally, the reliability of the variables was proved by repeating the statistical measure Cronbach's Alpha, for all surveyed variables. Table 53.1 shows that the survey data is very reliable because the index values and the reliability measures are high compared to the normal acceptable levels.

53.3 Results of the Research

53.3.1 Descriptive Statistical Analysis

After the implementation of the descriptive statistical analysis it was found that the participants have chosen different countries to immigrate so as to find proper jobs based on their qualifications and extend their professional status. The countries with most participants are Great Britain, Holland, Switzerland, Denmark, and Germany. Other countries were Sweden, Italy, France, Belgium, Spain, Luxembourg, Scotland, Russia, Iceland, Finland, Ireland, and Malta. As it is figured out new migrants mainly choose countries that are developed one, with fair taxation laws, high quality working environment and excellent cost levels, and quality of life.

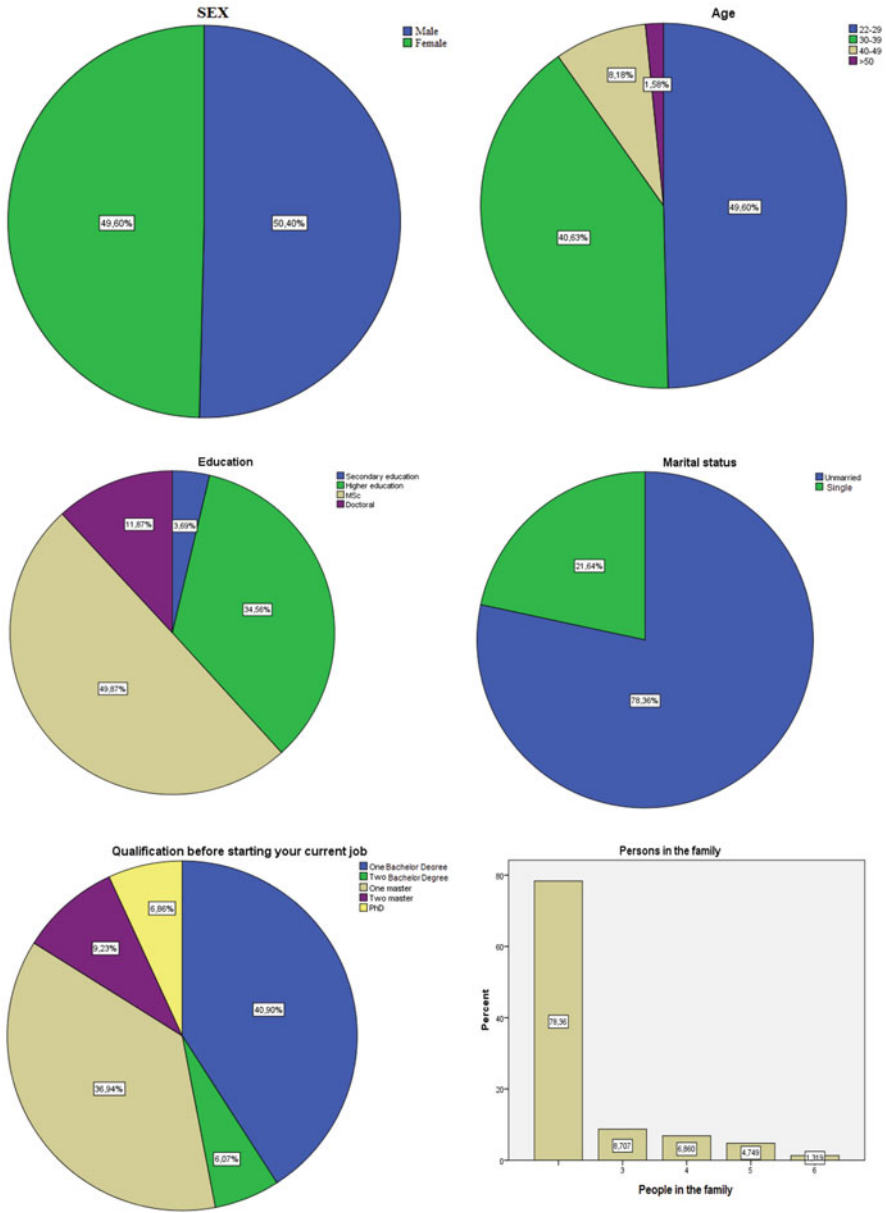


Fig. 53.2 Sample

Table 53.1 Reliability of the survey

Cronbach's Alpha	KMO	Bartlett's test of sphericity <i>Sig. level</i>
0.00<0.784<1.000	0.000<0.833<1.00	0.000<0.005

The research participants were not satisfied in Greece regarding lifestyle although they say that they were quite optimistic about the future. The answers to these questions vary despite the diversity of the mean value that it was determined. The most probable reason is that although there was no satisfaction for the economic situation of Greece, young people felt confident about their qualification that's why they planned their immigration.

Young people agree that the decision to leave Greece was due to the fact that they considered that they had to make decisions regarding their future while it seems to have doubts about how and whether their objectives and plans could be implemented in Greece. Based on the current situation, participants feel that based on their income today they live the life they wish abroad while at the same time they agree with the point of view that in the future, their income will be increased. The neutral point of view of the participants is that it is wrong that the citizens burden themselves with the results of the crisis and leave the country, adding with more emphasis that if they had the chance they would have never left Greece. Unfortunately, the majority agrees on the fact that the future of young Greeks is mortgaged.

Moreover, participants agree with a strong emphasis that their future in Greece is not guaranteed and they have neutral view on the fact that immigration harms the Greek economy. Another important fact is that the majority of the participants disagree with the point of view "I would not immigrate abroad, if I had found a proper job, even if it was for a short time" while they also gave a neutral answer to the question "I feel like my home the country that I can work and live gracefully."

The participants of the research are neutral with the fact that in Greece a scientist cannot become prominent and they will move everywhere so as to find a job. They are neutral as well as to the question "I will earn what I do really deserve abroad" and the point of view that Greece cannot help its educated citizens. In the same way participants answer the questions "If there was no crisis I would not have left the country," "I no longer feel confident in Greece," and "If I had stayed in my country I would have traded off my studies."

According to the questions about their intention to immigrate, they keep a particular attitude not only of regarding the decision to leave Greece but also the thought of migration, and there is a disagreement about the fact that they did not want to leave Greece.

According to the participants' answers their personal qualifications and skills, their work experience, their professional perspectives, their language skills, and their willingness to work are some immigration obstacles which dealt with neutrality, too. Their personal life is not an obstacle while the economic situation is an obstacle but not a powerful one.

The participants were asked about the reasons of immigration of Greeks. According to their responses to the main and most important causes were the lack of appropriate higher education, political conflicts, that universities do not produce innovations, the disorganization of the public sector, which previously absorbed a big number of graduates, lack of training and education opportunities, the Greek indicator of innovation is very low, the education system has not been updated to meet the needs of the private sector in Greece, companies do not cooperate with universities so as to educate students, and the personal ambitions.

But even more important reasons are the rate of the economic growth, the macroeconomic instability, the job dissatisfaction, the fact that abroad it is easier to get the necessary means so as to survive, that Greece cannot utilize productively the human resources, that Greece devalues young scientists, that abroad the employees' value are not only recognized but also rewarded and that there is a potential mismatch between labor supply and demand, due to the system's inability to absorb the production of a good trainee human resource.

Additionally, other important reasons of immigrating are the inability of the economy to absorb new workers in the labor market, that the financial rewards are higher abroad, that there are more opportunities for employment related to the areas of their studies, the Greek low wages, the economic factors, the high level of unemployment, the lack of access to the labor market, the depressing economic environment, and the lack of job positions and the career opportunities in Greece.

The participants consider that it is very important to promote people on merit, to be paid more desirable salaries for the young talented people and experience and to be provided better employment opportunities, irrespective of caste, religion, race, or nationality. Also participants consider as an important factor to put into place the employment for 1 year after the completion of their internship in the same company, to improve the quality of the universities so as to become equivalent with the European and American universities, the institutionalization of talent certificates so as to be easier the staff selection, and to set the pace of career days on a more frequent basis.

53.3.2 Factor Analysis

In the present research it was conducted a factor analysis since the prices of KMO (p value $0 < 0.845 < 1$) and the Bartlett's Test (Sig. $0.000 < 0.05$) were within acceptable levels for the implementation of factor analysis. Thus, the factor analysis may be performed based on data. The factor analysis drew sixteen (16) factors.

Current Situation and Reasons of Leaving This factor represents primarily the macroeconomic instability, the pace of the economic growth, the ability of the economy to absorb new workers in the labor market, and that there is a potential mismatch between labor supply and demand, due to the lack of the system to absorb the production a good trainee human resource. This factor contains the

variables which are referred to concepts such as the future of young Greeks that it is considered as mortgaged; that Greece cannot assure their future that in Greece a scientist cannot become prominent while abroad there is such an opportunity, which indicates loss of trust to the state. The new immigrants are dissatisfied with their jobs (low salaries, lack of access to the labor market, depressing economic environment, obsolescence of young people, inability of the economy to absorb new workers, mismatch between labor supply and demand), and they believe that innovation in Greece ranges in very low levels.

VARIABLES: 20 % FLUCTUATION: 16.541, % explained by the FACTOR: 16.541.

Immigration Barriers Immigration barriers related to the personal qualifications and skills, work experience, professional prospects, personal life, financial situation, knowledge of foreign languages, and the willingness to work. This factor represents situations that should be satisfied in order not to be obstacles.

VARIABLES: 7 % FLUCTUATION: 8.169, % explained by the FACTOR: 24.709.

The Immigration Because of the Greek Reality This factor refers to the participants' statements such as "If I had the chance I would have never left Greece," "If there was no crisis I would not have left the country," "I did not want to leave, but I had no other solution," and "The universities do not produce any innovations."

VARIABLES: 4 % FLUCTUATION: 5.702, % explained by the FACTOR: 30.412.

Current Situation and Factors That Will Contribute to Reducing the Phenomenon of Migration The variables that are represented by the factor are the professional opportunities, the job prospects, the employment opportunities, the meritocracy, the providing of more desirable salaries for young people with high qualifications and experience, the recognition of educated young people, and their exploitation through special structures that promote their qualifications.

VARIABLES: 8 % FLUCTUATION: 4.593 % explained by the FACTOR: 35.005.

Questioning and Minimizing the Immigration Phenomenon This factor refers to the variable "I would have never immigrated abroad, if I had found a proper job, even if it was for a short period of time," their personal qualifications and skills, the work experience, the professional prospects, the financial condition, the high level of unemployment, the quality improvement of the universities, to put into place the employment for 1 year after the completion of their internship in the same company, the institutionalization of talent certificates so as to be easier the staff selection and to set the pace of career days on a more frequent basis.

VARIABLES: 10 % FLUCTUATION: 4.049, % explained by the FACTOR: 39.053.

Factors of "Bad" Employment in Greece The variables that form that factor is "Based on my income now," I have the life I wished to have abroad "In the future,

I believe that my income will be increased,” and “I will earn what I do really deserve abroad.” Specifically that factor combines the standard of living with the working conditions in Greece.

VARIABLES: 3 % FLUCTUATION: 3.395, % explained by the FACTOR: 42.448.

Immigration Reasons The factor consists of variables that indicate the young Greeks’ immigration reasons. The reasons for their immigration are the macroeconomic instability, the GDP growth rate, the ability of the economy to absorb new workers in the labor market, there is a potential mismatch between labor supply and demand, due to the system’s inability to absorb the production of a good trained human resource, that abroad there are more opportunities for employment related to the areas of their studies, the employees’ value is not only recognized but also rewarded and it is easier to get the necessary means so as to survive.

VARIABLES: 7 % FLUCTUATION: 2.601, % explained by the FACTOR: 45.049.

Decisions Making That Determines the Young Greeks’ Future This factor represents the young people’s attitude that has to make decisions about their future via access to better employment opportunities and their promotion on the merit.

VARIABLES: 4 % FLUCTUATION: 2.406, % explained by the FACTOR: 47.455.

Quality of Life in Greece Today and the Competitive Offer from the Labor Sector Abroad This factor represents the trend of satisfaction with the way of life in Greece and the opportunities abroad. The variables of the factor concerning comparative salaries, the recognition, the reward, the merit, and the income in Greece and abroad.

VARIABLES: 16 % FLUCTUATION: 2.367, % explained by the FACTOR: 49.822.

Thinking About the Best Possible Professional Rehabilitation This factor represents the variable “I was thinking the possibility of leaving Greece,” “Dissatisfied because of the job,” “Political conflicts,” and “job placement in Greece similar with abroad.”

VARIABLES: 4 % FLUCTUATION: 2.169, % explained by the FACTOR: 51.991.

Limited Opportunities and Recognition of Talented Young People This factor refers to the burden of the citizens because of the crisis, the need for a higher income, the belief that “If I lived in my country I would had traded off my studies for free.” in the young peoples’ minds. They leave in order to have greater opportunities so as to become prominent with the special structure help in positions that promote both their qualifications and skills.

VARIABLES: 7 % FLUCTUATION: 2.018, % explained by the FACTOR: 54.009.

Non-Recognition and Specialization of Talented Young People This factor represents the variable “I left because I was of the opinion that there would be no future for employment in Greece,” “In Greece a scientist cannot become prominent,” “Greece cannot assure out future,” “Lack of training opportunities and education in Greece,” “the lack of jobs and chances of having a career in Greece,” and “the system in Greece devalues the young scientists of the country.”

VARIABLES: 6 % FLUCTUATION: 1.935, % explained by the FACTOR: 55.94.

Current Situation and Its Consequences This factor represents the views that immigration harms the Greek economy although those who have left feel that they earn what they really deserve. Unlike in Greece, the existing situation is the lack of training and educational opportunities, lack of jobs, and career opportunities. The personal ambitions, the low wages, the disorganization of the public sector, which previously absorbed a large number of graduates, and the employment in a family business based on the field of their studies are the impact of the current situation.

VARIABLES: 8 % FLUCTUATION: 1.853, % explained by the FACTOR: 57.797.

Ambitions and Immigration Prospects or Staying in Greece This factor represents the young Greeks’ attitude that despite the economic crisis they were optimistic about their future. They are ready to move wherever there is a possibility of finding a job work and that they no longer feel confident in Greece. Also it represents the personal ambitions and the employment in a family business based on the field of their studies.

VARIABLES: 5 % FLUCTUATION: 1.721, % explained by the FACTOR: 59.517.

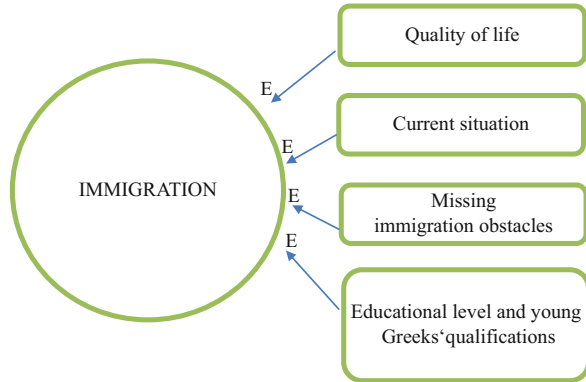
Pathogenic of the Greek Economy and the Lack of Meritocracy This factor involves many variables which are “Despite the fact of the economic crisis, I was optimistic for my future,” “I felt that I had to make decisions regarding my future,” “It is unfair that the citizens burden themselves with the results of the crisis and left the country,” “The young Greeks’ future is mortgaged,” “migration damages the Greek economy,” “I will go wherever there is available job for me,” “If I had stayed in my country I would have traded off my studies,” “It is necessary to be provided better employment opportunities, irrespective of caste, religion, race or nationality,” “institutionalizing talent certificates so as to be easier the staff selection,” and “Reducing the meritocracy and the mindsets should change.”

VARIABLES: 9 % FLUCTUATION: 1.634, % explained by the FACTOR: 61.151.

Personal Ambitions Are Not Recognized in Greece That’s Why There Is the Current Immigration Flow This factor represents the belief that Greece cannot help the young people, the intention of leaving, the personal ambitions, and that they cannot find a job in Greece with a competitive European salary.

VARIABLES: 4 % FLUCTUATION: 1.521, % explained by the FACTOR: 62.672.

Fig. 53.3 Formulation of the research model



53.3.3 Variation Analysis

As part of the statistical analysis of the participants' responses to the research, it was necessary to examine the accuracy of the research model. A closer look at the existence of positive or negative relations was conducted by the variation analysis that the divergence rates between the variables were examined. As it was found after variation analysis all the research hypotheses are confirmed and therefore it is valid that the quality of life leads people in leaving the country (Sig. Level: 0.000|KMO: 0.836 (0.000) Cronbach's Alpha: 0.535). Also it was found that the current situation in Greece leads young people in leaving the country (Sig. Level: 0.000|KMO: 0.836 (0.000) Cronbach's Alpha: 0.808) and that the deficient obstacles of immigration facilitate the decision of immigration (Sig. Level: 0.002|KMO: 0.844 (0.000) Cronbach's Alpha: 0.860). Finally *t* it is valid that the educational level and the young Greeks' qualifications facilitate the decision to immigrate (Sig. Level: 0.000|KMO: 0.635 (0.000) Cronbach's Alpha: 0.823). Therefore, the research model is formed as follows (Fig. 53.3).

53.4 Conclusions

The purpose of this research is not only to examine but also to come to an end with clear and substantiated conclusions about the factors or the situations in Greece that lead the educated young people who are high qualified and over skilled to immigrate in foreign countries for vocational rehabilitation. It was found that the participants have left Greece and live in other countries because they think about the situation in Greece and they have been affected by the Greek reality, as well. The descriptive analysis highlighted the problems that do exist in Greece but at the same time it confirmed the findings of the literature review while the descriptive analysis that was based on the sex showed neither eminent nor appreciable differences.

Afterwards, the factor analysis that was held revealed some specific problems that forced the participants to leave the country. The factors that emerged were the current situation and the reasons that forced them to leave the country, the deficient migration obstacles, their decision to leave Greece because of the Greek reality, the current situation and factors that will contribute in the reduction of the immigration phenomenon as well as the concerns, and the minimization of the immigration phenomenon.

We continued by examining the factors of “bad” work in Greece, with the reasons why Greeks immigrate that the decision-making procedure define the young Greeks’ future, the quality of life in Greece nowadays and the competitive offer from the labor sector abroad, a reflection of the best possible vocational rehabilitation, the limited opportunities, and the lack of new talents recognition. Moreover the lack of recognition, as well as, the lack of specialization to the talented young, the current situation and its impacts, the aspirations and the prospect between the immigration or staying in Greece, the pathogenic of the Greek economy and the dearth of meritocracy, the personal ambitions that are not recognized in Greece have as a result the creation of an immigration flow are factors that were emerged because of the analysis. Eventually, the analysis of the research model demonstrated that the research hypotheses are confirmed and therefore valid.

As a result, the research confirms that the quality of life leads people to the immigration, the current situation in Greece leads the young to the immigration, the lack of vanishing barriers facilitate the young people’s decision to immigrate and that the educational level and the qualifications of young Greek facilitate the decision to immigrate. Those assumptions clearly highlight the pathogenic and the problems of both the Greek society and the state. The results that are reported are reliable because of the indicators reliability measurements, the global view of the research, and the adequacy measurements range at very efficient levels, not only for the research model but also for all the variables of the research.

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Chapter 54

Failures in Elements and Processes of Quality Management Systems in Companies and Their Potential Solutions

Ivan Litvaj, Oľga Poniščiaková, and Emese Tokarčíková

Abstract Our article deals with quality, and is focused on the quality of products and provided services and primarily on the quality management systems in companies. We consequently identify certain failures in the quality management in companies, suggest and discuss potential solutions to the failures.

Keywords Quality • Customer • Quality management system

54.1 Introduction

The market, as a whole, can be characterised nowadays, as well as in the long term, by, e.g., constant increase in competition, fluctuating demand, pressure on quality improvement of provided services. These given issues put greater and greater pressure on a company management in order to keep and improve its competitive market position. For this reason the management has to try to reduce costs, increase earnings by improving the quality of products and provided services for customers. According to Tokarčíková (2011) “All kinds of advantages which increase a company’s competitiveness and profit levels are welcomed by most subjects in business environments”. Quality is one of the basic pillars of company’s competitiveness.

As for the general definition of quality, the following is true:

The quality is defined by the customer!

Self-control—the quality must be in people’s heads and actions.

Non-quality—the later we find it the more it costs.

Only the priority enforced by the top management can be put effectively into practice, this is also true in the quality management.

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In the following Table 54.1 we focused on the description of failures which occur during the quality management in companies. Furthermore, we briefly provide appropriate remedial measures to the particular failures.

54.2 Failures and Remedial Measures in Quality Management Systems in Companies

54.3 Quality Management in a Company and Its Significance

Despite the fact that competent managers and other employees at all management levels in companies try in practice to really understand the role and significance of service quality, despite the fact that we have reworked planning, assuring, management and improvement quality norms at our disposal, despite the fact that we have at our disposal effective concepts and methods of how to achieve quality, still each of us daily encounters non-quality of products and provided services.

It is apparent that customers are the motive force of success of a company's business activities. Customers impose requirements on the quality of the provided services. Customers are not dependent upon a company, and a company is dependent upon customers. If the question of how we can gain customers arises it is necessary to meet customers' needs better than the competition.

Identify and meet customers' needs in a much better way. The fact that the greatest emphasis has to be put on customers is definitely true, due to the fact that in the future, as well as once the crisis is over, most customers will look for the most advantageous offer for services which they simply need.

Besides customers, requirements on products and services are also imposed by legislation. It imposes requirements in terms of health, environmental protection, safety, etc.

54.4 Quality Management System in a Company

By establishing and implementing the quality management system in a company we provide conditions to manage, monitor, analyse and improve all the processes with respect to their quality. We assure their evaluation, on the basis of which impulses for the improvement of all the processes in a company arise. The decision and motivation for the implementation of the quality management systems in a company are as follows: the quality assurance in companies and the development of the quality management system fall under strategic decisions of a company management. This decision is the reaction of the company management to the constantly growing market demand.

Table 54.1 Failures and remedial measures in quality management systems in companies

Elements and processes	Failure	Remedial measures
Quality manual	It is far too lengthy.	To simplify, to include only the necessary documentation, to devise a commercial manual in order to promote a company.
Documentation	Complex, lengthy.	To make the documentation appropriate and suitable. To introduce the electronic form of documentation as well as documentation protection.
Quality objectives	They are only formal, are not met, and there are too many of them.	Concurrence in opinions of a company management on a lower number of objectives. To elaborate these objectives through a tree diagram for all the management levels, as far as the personal objectives of the staff. The management's condition—the objectives must be met.
Internal communication about quality	Low quality awareness; lack of interest in planning, assuring, managing and improving the quality, or only a formal approach of both the management and employees to this particular issue.	Building up the company culture whose part is also the quality culture, the visualisation responsibility, information sharing, an active and exemplary approach of the management to this issue. Only the priority enforced by the top management of a company can be put effectively into practice.
Resource assurance	A company lacks in resources of finance; it insufficiently finances the quality costs.	To monitor at least the non-quality costs, the so-called costs of complaint handling.
Human resources	Problems related to the human resources selection, human resources quality, human resources training and approach of human resources to customers.	Evaluation of the trainings and education effectiveness; motivation of human resources; regular evaluation of all human resources, taking appropriate measures based on the evaluation.

(continued)

Table 54.1 (continued)

Elements and processes	Failure	Remedial measures
Infrastructure— equipment	Low level of infrastructure, lack of interest in equipment and its maintenance.	To pay more attention to the machine maintenance as well as to the usage of adequate information technologies; motivation and training of the employees to take care of the used machinery, equipment and infrastructure.
Quality planning	Quality planning does not exist, the quality is managed solely operatively.	To elaborate a directive; to devise quality plans.
Innovation and labour productivity	A company has low productivity, it does not enforce any measures in order to increase it; the innovation activity is also too low, or insufficient.	To set up working teams and increase their activity; the management has to pay more attention to the mentioned areas, take part in trainings in the given areas, take advantage of external advisers and motivate the employees.
Internal audits	The formality of audits, internal auditors do not meet the expectations.	To engage auditors more effectively into process improvements, to evaluate auditors' outcomes, to motivate them appropriately, to accept fully their outcomes in a company, and take responsibility in removing the failures found during internal audits.
Statistical methods	Ignorance, non-use or very poor use.	Trainings of both the middle management and auditors; appropriately to the needs form a group of employees for the trainings; to choose appropriate statistical methods for implementation in a company.
Preventive activity	Little preventive activity, no interest in preventive measures, failure to perform preventive measures.	Appropriate motivation of both managers and employees in order to perform preventive activities.

(continued)

Table 54.1 (continued)

Elements and processes	Failure	Remedial measures
Remedial activity	Minimum remedial activity, remedial measures are not implemented into practice of a company, belated reaction to the found failures.	To dissociate from preventive activity, to distinguish between remedy and remedial activity, to motivate both managers and employees in order to perform remedial activities.
Product improvement, process improvement and system improvement	Minimum improvement, no interest in process and activity improvements in a company; company culture does not support and motivate employees actively enough to perform improvements, ignorance of improvement methods and tools.	Improvement as a process with a procedure for which the process owners are liable; training and motivation of employees in order to improve all processes and activities in a company; to make use of quality improvement methods.
Self-evaluation	Self-evaluation is not performed, self-evaluation is formal and insufficient.	To use, e.g., Benchmarking, SWOT analysis, ISO 9004, Model EFQM.

Source: author

The staff management in companies is essential in the quality management. It is a key factor which decides either the success or failure of a company in providing the services quality. The quality depends largely on the staff quality since the staff has to understand how significant the quality is for the existence of a company. Managers have to be role models for them in the issues of quality planning, assuring and improving.

The quality management is a proven managerial strategy whose fulfilment is a precondition of a company’s success in the competitive struggle. First of all, the company managers have to be fully convinced of this fact and then they have to convince the staff. And not only convince, but also at the same time motivate and educate the staff adequately to improve the quality of work.

54.5 A Model to Monitor the Public Transport Quality

With respect to the correct forming of a model design to monitor the quality of products and services it is necessary to approach the quality from several points of view. The most important one is the standpoint of customers who judge the quality on the basis of service quality expectation and perception. Customers judge

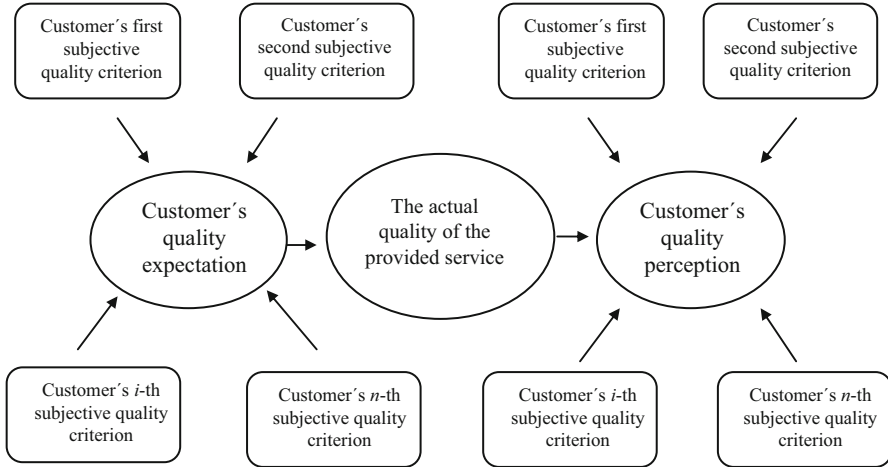


Fig. 54.1 Customer's quality expectation and perception. Source: http://www.pernerscontacts.upce.cz/31_2013/Nedeliakova.pdf

the quality in accordance with their own quality criteria which they find the most important. The service quality expectation and perception are shown in Fig. 54.1.

Another view of the quality is the one of the services providers. They perceive the quality as the target and provided quality. They perceive the target quality as the quality level which they try to offer to the customer. It is influenced by the quality level which is sought by customers, by external and internal restrictions, market restrictions and the level of quality provided by the competition. The provided quality is the very level of the service provided by the provider for the customer, which means that it is the common state of quality which is provided every day by the provider within the framework of the usual operation.

We can obtain the objective point of view from the mutual comparison of these four quality levels—the quality expected and perceived by the customer, the target quality and the provided quality offered by the provider. It's caused by the formality and low efficiency of the quality management systems in companies, which is caused by not fulfilling, or only partial fulfilling of the basic system principles of the implementation and functionality of the quality management systems in these. Here are several negative factors having an influence on the quality in practice: Nowadays there are lots of companies with built-up and certified quality management systems, however, these systems are solely formal and thus not much efficient.

The managements of many companies have had their quality management systems certified primarily on the business grounds so that company can display the certificate during presentations of the company; many companies have acquired quality management system certificates solely for the sake of image, just because their competitors have it too, and so on; but they have not understood their true significance. However, the staff of companies is to blame as well. This issue does not involve only the top management; it involves all the employees of a company.

Nevertheless, the following has to be emphasised—what really matters is the attitude of the top management towards all the quality issues in a company. The fact that companies first focused primarily on the quality of the provided services, and later on, not concurrently, they focused on the process quality, poses a serious problem and is also a cause of problems related to the quality of products and provided services. They do not understand that quality is the result of processes in a company. Deming's principle (85/15) demonstrates that 85 % of problems are related to the system of work performance (to the process) and hence in the hands of the management. Only 15 % of problems are caused by failures of individuals, failures of employees. It is the people who are the most important issue in a company, thus the human resources quality in a company as well as interpersonal relationships, work environment and company culture have a great influence on the quality of products and provided services of each company. What is very often underlined and emphasised is the fact that if you want to manage a company successfully now and in the future you need to change the company culture. Nowadays, lots of employees in companies are not motivated, and neither can they identify themselves with their company, its vision and management methods. They are not to blame, the company's managers are to blame as well, since they are not able to convince the staff that the path company follows is the right one. And what happens quite often is that managers do not set a good example for the staff in a company, rather the contrary.

54.6 Conclusion

Nowadays the quality of products and services is the basic condition of company's business success on the market. Competent managers at all management levels in these companies, as well as all the other employees, try to fully understand the role and importance of the quality of products and provided services for the existence of their companies. Despite elaborated strategic, tactical and operational processes, and the methods of quality planning, quality assurance, quality management and quality improvement, every day each of us, as a customer, encounters the non-quality of products and provided services.

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Chapter 55

Controlling as a Tool for Decision Support

Oľga Poniščiaková, Ivan Litvaj, and Emese Tokarčíková

Abstract In terms of the increasing complexity of enterprise systems a system that integrates not only processes of information processing but of making plans as well as analysis and control is essential. The possibility to make correct and prompt decisions is very important and thereby reducing likelihood of potential risks and hazards to a minimum. The main role of controlling is just in that place, therefore constantly observing of the company and its competitors would overburden management capacity and slow the implementation of other important tasks. The paper analyses the controlling potential and potential of its tools in terms of specific companies, with an emphasis on reporting as a tool for optimizing management. Suspensions of motor vehicle carry out a set of functions, which defines key ride parameters of the vehicle. Those can be grouped into such major groups as steering and traction functions, machine stability ensuring function under the effect of various external loads, ride comfort ensuring function.

Keywords Management • Controlling • Reporting • Costs

55.1 Introduction

The development of conditions, in which companies fulfill their mission, is being evolved and improved intensively not only in terms of developing determined factors but also impacts on internal environment of companies. “All kind of advantages, which increase an enterprise’s competitiveness and profit levels, are welcomes by mostly subjects in business environments” (Tokarčíková 2011). The business environment today is characterized by globalization and internationalization. These effects extend to all segments of society constant change. Change is some variation, excitement, irregularity, surprise, something with which to count.

In the context of dynamic globalization and its consequences it is irrelevant whether the companies produce goods, or provide service. Changes in external

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environment evoke a need of reaction—changes in internal environment. That is active in a lot of functional areas which are more or less under the influence and manageable (Ďurišová and Kucharčíková 2014). Managerial work becomes more challenging in the current period; to the modern equipment of managers belong knowledge of change management (Šukalová 2012). It is necessary to innovate the scope of the value-forming area which produces consumption paradigmatically and consequently value-added. In each company creating the value-added is difficult and in companies it is even more difficult. The reason for that is the product itself and its specific characteristics which considering the nature of services restricts a great deal of production rules, and as well decreases attractiveness of a product in consumers' eyes who are influenced by globalization. Issues of the present-day controlling of companies are characteristic with a limited scale of managerial instruments for value-added controlling. Profitability without any negative impacts on those, at whom the transferred product is aimed, is the fact which makes the management of companies look for new alternative methods with regard to the strategic position in future. Besides that an ongoing use of the so-called traditional instruments of controlling the value-added variables (for example, financial accounting) in the form of elementary records of expenses and a costing system, as an instrument for controlling based on traditional costing methods, evokes the need to innovate managing. It is necessary to take into account that “Financial accounting deals with issues of managing neither the accounting units as a whole nor their lower organizational units, and does not solve the issue how to achieve facts about the amount and price of made but unissued inventories (production in progress, semi-finished goods and products), which the company made. Financial accounting does not provide these facts. That is why it is necessary to keep accounting records of economy inside the accounting unit” (Boyd 2013). One of the ways how to optimize the managing of companies means that a company should implement the functional system of controlling which enables to find potential risks, define decision alternatives and inform the management about achievements. The company is willing to achieve that by means of various instruments, especially reporting. Reporting forms an important part of the controlling system and is able to transform of information from traditional instruments of managing into new operative reports, accounts or statistics. The aim of reporting is to provide the management with quality portfolio of information needed for controlling and strategically deciding (Lazar 2012). The theme of this article is an analysis of important indicators in controlling under the conditions of companies.

55.2 Fluidic Muscle Parameters Research

A modification of indicators managed in a traditional way is an important condition for fulfilling the role of controlling reporting. They also include financial and economic analysis. It is one of the most useful methods because of its potential to find answers referring to financial health of any company. Generally, the results of the financial analysis are valuable, because they represent the company and its

business success to business partners (existing as well potential) and they, following the appropriate financial data, perceive the company, evaluate it and determine the business conditions for the future (Achimská and Kramárová 2011). Another possibility is financial accounting. It uses the potential of financial accounting on the basis of legislative register of costs and revenues for the past financial year. The fact, that “the standard reporting is significantly wide-spread”, is another issue “although the quality of reporting systems and the results of reporting methods show that the development is not complete” (Eschenbach 2004).

Costs are very important for economic controlling. “Costs in aggregate form reflect the quality of enterprise activity. Management of each enterprise pays them an increased attention” (Ďurišová and Kucharčíková 2014). Their amount influences the profit and their structure is presented in account classification, in which all types of costs are arranged in account class 5. The costs are put into classes and each class has its own name. Within a time period the types of costs (as well as revenues) are changing. We are able to record these changes by means of accounting documents (e.g. invoices) on appropriate accounts in terms of financial accounting. In fact, the document with regard to a cost movement accounts for credit or debit. The allocation of costs to the classes is carried out under accounting regulations and is related closely to formation of profit and loss. With respect to controlling characteristics, it is necessary to concentrate on the following issues.

Allocating costs to classes (as they are formed in accounting) may cause non-transparency, which slows down the decision taking. Therefore the company’s management must improve the classification if it wants to keep principles of controlling. That results in taking in the costs classes and forming such classes which are most important in terms of controlling. The theory recommends monitoring of ten types of costs and forming one item (named other costs) for the rest of costs.

Besides this issue we should consider the amount of information we obtain from the costs classification. The number of information is not sufficient for internal controlling. The controlling by “profit” divides costs according to their relation to company performance which is not recorded in accounting. Therefore the costs, which are directly relevant to production, are mixed up with operating costs, which are not directly relevant to performance. We can eliminate this negative feature by classifying the costs into dependent costs—performance costs, and independent costs—operating costs.

The selection of 10 costs types is carried out on the basis of certain criteria. And also another dividing the costs (as mentioned above) is dependent on several rules. They are the reasons for costs arise, and one of the most important aspects of internal controlling. Its attempt is to keep the principle of causality, which enables to disclosure dependences on development in a company, unlike the managing by means of clarity and clearing documents based on principles of financial accounting. The controlling orientates itself towards the following costs classification.

Performance costs which are also called direct because they are caused by the performance. They enter the performance (a product, service) directly and form calculation base for computing a minimum price. Wages, material and others belong here.

Operating costs which do not relate to the performance directly so they do not enter the product or service directly? Their role is to serve as operational costs and advertising costs, office space costs belong here. Theoretically these costs are the biggest risk of loss because if the company did not produce anything, so the recorded loss would be as high as these costs. They can be divided into:

Operating costs I are dependent on each development in a company (products, services and customers), to which they are assigned. Assignment does not need a use of specific key (postage costs, telephoning and office needs costs).

Operating costs II are dependent on company's development as well but they cannot be assigned without the use of specific key or a method (representation expenses, contributions and taxes). I would like to mention criteria of costs selection which eliminate ten costs types from costs records.

- The sequence of costs importance relates to their significance. It is expressed as percentage of company's costs out of the whole company yield, which represents 100 %.
- The costs order can be identified from the balance, especially from the account class 5.
- Another step shows if this formed costs order corresponds with the costs order in a company formed by their significance. It may happen that some of the costs, which have a higher percentage, are not so important for the company in terms of controlling. It is necessary to consider this situation and form a new hierarchy of costs.
- The costs order can also be formed by grouping the costs of close character into one common class. For example, office space costs will include costs of repair, costs of rent, as well as costs of energy, heating, cleaning and so on.

In companies, where we have several specific costs types, the plan of costs types has the above-mentioned form (Table 55.1). The plan of costs types creates a part of reporting which controlling uses. Though following the costs differentiation in the chart of accounts, the plan itself would not be of a great use. It forms a part of creating the reporting which serves to manage values-formed variables.

It is important to remember that the nature of controlling is the managing with profit. So we must consider the profit rise and it is not correct to think that we could perform the managing with profit by monitoring this variable. The managing with profit means managing the variables which form profit. So firstly, we must consider the costs and revenues which create the biggest part in company's economy.

Both the profit, and costs and revenues are not basic but formed variables, and therefore we need to continue to think analytically. These variables must be divided into items which provide the managing with profit. For this purpose the internal tool in the company is a payment benefit, also called as a covering benefit. This benefit represents the amount which groups of operations and costs are covered

Table 55.1 The plan of costs types in a company

Number	Plan of costs types		Performance costs	Operating costs I	Operating costs II
	Account number	Account name			
a	b	c	d	e	
01		Direct material	*		
02		Personal costs	*		
03		Depreciation charge	*		
04		Costs of repair			
		Other operating costs	*		
05		Operating on costs		*	
06		Administration on costs			*

Source: author

from planned or achieved results. By calculating the payment benefit we follow these steps:

- Gross turnover (earnings, selling price or revenues)
- Value-added tax
- Items decreasing earnings

net turnover, then:

payment benefit = net turnover surplus (selling prices, or revenues—in) to direct costs (performance or variable) (Fig. 55.1).

Annual representation of the payment benefit is expressed as a percentage rate of turnover which we must achieve to be finally profitable. So a function of the payment benefit is to cover the operating costs (which are above-mentioned and represent the risk of loss) and to achieve the profit. Each performance rise always causes performance costs rise and payment benefit rise, but not operating costs and profit. The necessity to examine items, which are important for profit and contribute to its formation, results in recording net turnover, direct performance costs, operating costs and final profit (Kerzner 2013).

The reasons of costs rise with their direct or indirect relation to performance are reflected in classifying into performance costs and operating costs, which can be divided into operating I and operating costs II. The aforementioned principle is described in Table 55.2 which serves for finding out the result.

55.3 Defining the Second Level of Reporting

In the company the second level of reporting is formed by keeping several principles that relate to existent arrangement of internal items and respect of controlling principles. In fact, during the first steps of implementation it is necessary to decrease requirements and take into account the most important classification. It is expected

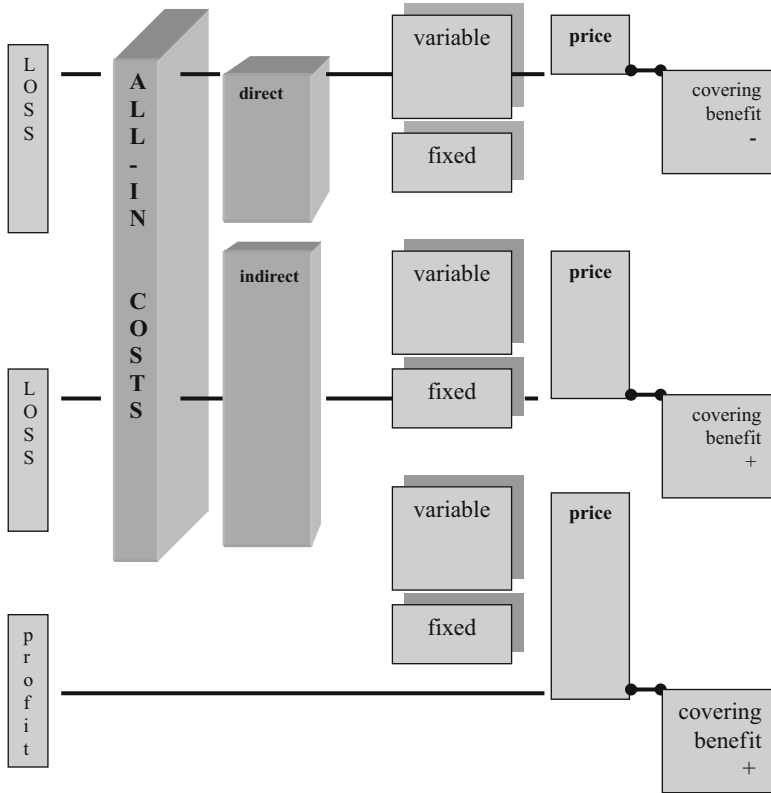


Fig. 55.1 Classification of covering benefit. Source: author

to choose a maximum of 5 items to which we can assign a carrier of responsibility provided that we choose one of the following principles.

According to services it is possible to form clearing departments when we are able to fix raw materials, production methods, a costs structure, calculating methods for each product or group.

Circles of responsibility are appropriate for departments with clearly defined functional circles and with distributed responsibility, or even if there are different divisions or different sales organizations.

Classifying with regard to customers is suitable to be used when the company has different sales journeys or groups of customers (in terms of their size). In the company above-mentioned classifying can be interpreted according to aims of customers' journeys.

They are the source for the formation of an organizational company's scheme. Apart from that, it is necessary to take into account the existence of costs department which includes all functions serving to the company identified as a central internal unit (central IU).

Table 55.2 Controlling reporting in a company

Line	Date	Function	Performance	Value	Period	Indicator
00		Revenues from ^a				
01		Other revenues from				
02		Decreasing of revenues				
03		Revenues from other operations				
04		Consumption of material and raw material				
05		Net revenues				
06		Wages				
07		Other direct costs				
08		Performance costs lines 06 + 07 + 08				
09		Payment benefit I				
10		Operating oncosts				
11		Administration oncosts				
12		Costs of other operations				
13		Operating costs I				
14		Payment benefit II				
15		Operating costs II				
16		Payment benefit III				
17		Transfer bridge				
18		Profit/loss				

Source: author

^aIn bus transport the revenues are from fare sales. They are influenced by regulated prices of fare, and therefore the relation between the offer and inquiry is not flexible, and they influence net profit

The function of the transport company means that it provides possibilities of transfer—to different places in a town, in its surroundings, in a state or outside its frontiers [5]. The groups of customers are formed according to a service they are interested in, so we should consider the classification with regard to customers—Fig. 55.2.

55.4 Conclusions

In terms of the above-mentioned rules in implementation of controlling reporting the company will avoid various obstacles and form a base which could be developed in other spheres. It is the true, that: modern innovations from new technologies, methods and opportunities can be very important benefit for an enterprise. We should determine the relation between the managing and controlling so that there will be harmony in traditional managing and controlling and they would not compete with each other. The fact is that the management makes decisions and carries responsibility, and controlling expresses its inspiration, evaluation, analyses and checks to support the management. Controlling makes recommendations. The

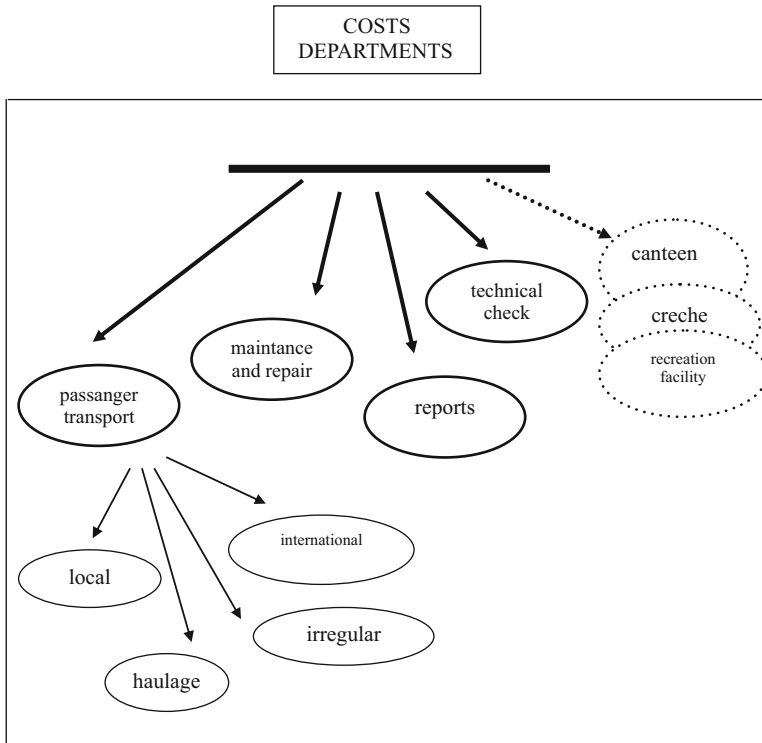


Fig. 55.2 Scheme of costs departments in the company. Source: author

controlling instruments must be set properly so that the recommendations will be usable for management and it also applies for reporting in companies.

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Chapter 56

Gastronomy Tourism: An Examination of the “Greek Breakfast Initiative” Potential

Aikaterini Stavrianea, Christos Dipidis, and George Siomkos

Abstract Gastronomy tourism can be considered as an important tool for the marketing, diversification and development of destinations. Gastronomy is recognized to contribute to a destination’s development and to the creation and reinforcement of a destination’s identity. This paper examines the potential of gastronomic tourism in Greece by looking closely at the initiative taken by the Hellenic Chamber of Hotels, the “Greek Breakfast” project that operates since 2010. The present study aims to empirically explore possible reasons that might have an effect on hotels’ reluctance to participate in the project, primarily the awareness and the effectiveness of different communications sources that promote the program. The empirical findings provide useful insight for decision makers and managers in charge of planning and executing gastronomic tourism programs.

Keywords Gastronomy • Tourism • Greek Breakfast Initiative • Destinations Marketing

56.1 Introduction

In the last few years, food tourism has grown considerably and has become one of the most dynamic and creative segments of tourism. Both destinations and tourism companies understand the essentiality of gastronomy as a tool of diversification in tourism and its ability to stimulate local, regional and national economic development. In addition, food tourism brings to light ethical and sustainable values

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based on the territory, the landscape, the sea, local culture and products, authenticity, following the modern trends of cultural consumption (World Tourism Organization UNWTO 2016). Gastronomy tourism has the ability to advance a local economy in a sustainable way (Rand et al. 2003). Gastronomy is also recognized to add to the creation and reinforcement of a place's identity and authenticity. The development of alternative types of tourism like gastronomy tourism in Greece, going further than mass tourism products, can add to the destination significant value in the competitive tourism arena.

In this context, we examine in this paper, an initiative taken by the Hellenic Chamber of Hotels, the "Greek Breakfast" project that operates since 2010. One of the aims of the present study is to explore possible reasons that might have an effect on hotel's reluctance to participate to the project. Of primary interest to the research are therefore, the degree of familiarity and knowledge they have about the program and its possible contributions, and also, the effectiveness of different communications sources and vehicles that promote the program, in an attempt to understand how this initiative could be improved.

This paper is organized as follows. First, we have a review of the literature about gastronomy and tourism, as well as the economic aspect of tourism in general and more specifically gastronomy tourism. Second, we present the methodology and the empirical results of the study and third, we conclude with the discussion and possible implications.

56.2 Gastronomy and Tourism

Gastronomy nowadays is an essential part of tourism travel and it grows constantly (del Pilar Leal Londono 2015, p. 74). The term gastronomy tourism describes the activity in which good food and drink can be enjoyed while on holiday (del Pilar Leal Londono 2015, p. 74). The significant effects of tourist food consumption on destinations all around the world have recently been pointed out. Research has acknowledged and associated the potential that gastronomy has, as far as local growth is concerned (Du Rand et al. 2003). Studies have found that local food is essential to the experience tourists have with a destination, can evoke memorable emotional responses and serves as a significant attraction point for the tourists (Björk and Kauppinen-Räsänen 2014), as a pull factor and a strong marketing tool that can be operational all year long (Sahin 2015).

Indeed, gastronomy tourism can be considered as an important tool for the marketing and promotion of destinations, can be recognized as a primary tourism attraction and acts as a strong motivation to modern tourists who constantly seek for new experiences. Gastronomy is also recognized to add to the creation and reinforcement of a destination's identity and authenticity. A unique gastronomic identity can be formed (Sahin 2015) and gastronomy, therefore, is essential for reinforcing the brand of a destination (Lin et al. 2011) offering at the same time a strong competitive advantage. In addition, gastronomy has the ability to bring

together and enhance the communication between different cultures, facilitating in that way multiculturalism, in a process that is called “gastrodiplomacy” (World Tourism Organization UNWTO 2016).

Even more, one can argue that gastronomy is closely connected to the culture of a place. The cultural heritage of a place also incorporates the food culture of everyday life with the main products, traditional food and local cuisine that also identify the specific cultural identity of each place (Moirá et al. 2015, p. 137). In the postmodern societies gastronomy is an important element that creates and reinforces the cultural identity of a place (Sahin 2015). Travellers enjoy consuming the local culture and a basic constituent of this culture is without any doubt the local food (Björk and Kauppinen-Räsänen 2014).

56.3 The Economic Aspect of Gastronomy Tourism

The tourism sector experienced a constant growth over the decades and has become one of the most rapidly developing sectors in the world (UNWTO 2016). International tourism generated US\$ 1.5 trillion in export earnings in 2014. International tourist arrivals grew by 4.4 % in 2015 to reach a total of 1.184 million in 2015. 50 million more tourists travelled to international destinations around the world during the year 2015, compared to 2014. In Europe, both Greece and Spain gained four million international arrivals in 2014. Arrivals to Greece grew by an exceptional 23 % to reach 22 million (UNWTO Tourism Highlights 2015). This expansion of course led to a parallel increase in the competition among different destinations. In an effort to diversify from each other destinations heavily rely on their effort of creating gastronomical brands that characterize a place destination. Food is integral to the marketing of a destination since it offers a sense of place to visitors, allowing them to get acquainted with the local culture and, furthermore, understand the origin of local products and dishes and develop a connection with the landscape (Richards 2015; Cavicchi and Ciampi Stancova 2016).

Gastronomy is an important aspect of tourism as it can contribute to the creation and reinforcement of a strong and distinct destination image (Sahin 2015). Gastronomy can play an integral part in ameliorating a destination’s attractiveness and, also, form a unique advantage, setting a destination apart from competition (Sahin 2015). Local gastronomy is more and more taking the place of geographical location as brand destination (Williams et al. 2014) and, additionally is becoming an essential constituent of the motivation someone has when choosing a destination (Hall et al. 2003).

According to Hall (2012, p. 50) “food consumption is integral to tourism and its economic impact can be very important not only for immediate businesses that directly provide food for tourists (such as hotels, restaurants and attractions), it can also have significant economic impact throughout the food supply chain”. Moreover, the growth of gastronomy tourism in a country can uphold and even give life again

to local producers, regions and communities, promote in that way the development of places in a sustainable way (du Rand and Heath 2006; Velissariou and Vasilaki 2014). The use of gastronomy and local food can directly or indirectly affect the local economy in various ways, e.g., by job creation or the encouragement of entrepreneurship in the communities. Areas and especially those that are based on agriculture that are sometimes affected the most by economic changes are offered another, significant choice: the development, or even the revival of local food products (Du Rand et al. 2003; Hall 2012).

Food is essential for the development of a tourism product, since it can reach up to 30 % or more of the tourist expenditure. Plus, these amounts spent for food go directly in local business (The Organization for Economic Co-operation and Development, OECD 2012). Gastronomy-oriented tourists are considered segments that can bring significant profits for a destination (Hall 2012). Hall (2012) also argues that gastronomy can be linked and be combined with other tourism products and also be closely associated with the natural and cultural high points and attractions of a destination, providing in that way a more complete and attractive offer.

56.4 The Greek Breakfast Initiative

Gastronomy tourism is an essential constituent of tourism marketing and it can contribute significantly to the tourism of Greece. In order for this goal to be achieved a strong collaboration between all relevant stakeholders, e.g., national or local authorities, hotels, local producers, etc., is required. An example of a novel project in this area, that would help promote the Greek gastronomy and Greece as a destination in various ways, is the “Greek Breakfast Project”. This initiative was taken by the Hellenic Chamber of Hotels following the philosophy of connecting the Greek cultural and gastronomic wealth with the Greek hotel business. The program runs since 2010, aiming to enable tourists to discover Greek gastronomy at their hotel’s breakfast. The scope of the program is to enrich the breakfast that hotels offer with local and traditional Greek products and dishes from different Greek regions, accenting in that way the richness of Greek gastronomy and the gastronomic treasures of these regions (Hellenic Chamber of Hotels 2016a).

With emphasis given to the gastronomic diversity of each region the “Greek Breakfast project” aims to contribute to the formation of the cultural identity and tourist profile of each place, giving in this way guests the chance to get to know and taste at breakfast the wealth of the Greek gastronomic tradition, which can differ greatly in the different parts of the country. A very distinct example is the Cretan cuisine, the Macedonian, the Aegean islands cuisine (Hellenic Chamber of Hotels 2016a). The Hellenic Chamber Initiative aims to create and reinforce the cultural bond with the place through the experience of the local taste and food. Apart from making tourists familiar with the wealth, variety and taste of Greek dishes the particular project was designed with the intention to reinforce the collaboration

between hotelier, producers and visitors. The initiative aims to create a link and connect producers and consumers as well as tourists who will get in that way acquainted not only with the products themselves, but also with the production process and the local landscape and environment in which these products are produced. All these aim to contribute to the promotion of the destination (Hellenic Chamber of Hotels 2016a; Moira et al. 2015).

A key element of the Greek breakfast is that it is in the heart of the highly recognized and appreciated Mediterranean Diet. The dishes and the main products that are offered at the Greek breakfast such as bread, rusks, olive oil and olives, yoghurt, honey, cheese products, cured meats, fresh vegetables and legumes, pies, sweets and fresh fruit reflect highly this type of nutrition which is not only a global trend towards a healthier lifestyle but also, according to UNESCO, Mediterranean diet is the “intangible cultural heritage of mankind” (Unesco 2013). The variety of pure Greek products and dishes that are included in the Greek Breakfast such as “liopsomo” (bread with olives), the Cretan “dakos”, famous local cheeses, sweets such as “galaktoboureko” and one of the healthiest Greek snacks of high nutritional value “pasteli” a sweet made with honey, almonds and sesame that is even mentioned in the times of Homer (Hellenic Chamber of Hotels 2016a) are representative of different regions of Greece promoting in that way not only the national gastronomy and gastronomic heritage, but also the differences and the richness among different areas of the country.

The program was adequately communicated through publications on national and regional media, exhibitions and numerous events in different Greek regions. By January 2016, 588 hotels from all Greek regions participated in the Greek Breakfast Initiative. Given the total number of 10,000 units in the country (Hellenic Chamber of Hotels 2016b), one of the aims of the present study is to examine and further explore the reasons that hotel managers may be reluctant to participate in this initiative. Of primary interest to the research is the degree of familiarity and knowledge they have about the program and the effectiveness of various communication efforts.

56.5 Methodology

In order to examine the perceptions and get a better understanding of hotel managers who do not participate in the Greek breakfast project, a quantitative approach based on a structured questionnaire was chosen. During a month period from January to February 2016, 101 questionnaires were electronically collected using quota sampling method, in order to reflect all geographical prefectures of the country. Part of the questions given to the interviewees included awareness or not of the program, ways of getting informed about the program like the Internet, competition participation, information by local and official authorities, the provider of the program (Hellenic Chamber of Hotels), television, print media. Questions examined the importance of obtaining an official certification of gastronomic interest in adding hotel value and general questions included the category of the hotel, percentage of international and local tourists.

56.6 Results

Data analysis used descriptive statistics with the use of SPSS. The interviewees that participated in the study covered the different categories of Greek hotels (see Table 56.1). The first thing someone who wants to advance the Greek breakfast project would like to understand is the degree of familiarity that hotel managers who do not participate in the project have. Results showed that an unexpectedly high percentage of the interviewees (36.63 %) were unaware of the initiative.

Amongst the respondents who were familiar with the project as far as their relevant sources of information, results showed that the source of information they used more to get informed about the initiative was the internet (54 % argued that they got relevant information from the internet very much and extremely much). More specifically, when asked about the competition's participation as a source of information about the program 11.88 % of the respondents answered that got no information about the program, 28.72 % got little information, 50.49 % were informed in an adequate level from competition's inclusion to the program, 6.93 % got much information and 1.98 % got a great deal of information from this source. Television—e.g., gastronomy shows—seems to be an important medium for getting informed about the program since 28.72 % of the respondents answered that got no information at all about the program, 42.57 % got little information, 23.76 % were informed in an adequate level and 4.95 % got much information about the program.

As far as print media, newspapers and magazines 9.9 % of the respondents answered that they got no information at all about the program from this source, 40.60 % got little information, 30.69 % were informed in an adequate level, 13.86 % got much information and 4.95 % got a great deal of information from this source. As far as the Internet as a source of information about the project, 2.97 % answered that they received no information or 18.81 % very little, 24.75 % received adequate information, 35.65 % much information and 17.82 % received a great deal of information about the program. As far as Hellenic Chamber of Hotels' invitations as a source of information, 38.63 % answered that they received no or very little (41.58 %) information, 13.86 % received adequate information, 4.95 % much information and 0.99 % received a great deal of information about the program.

Table 56.1 Interviewees by type of hotel

Unit category	Frequency	Percentage
5*	9	8.91 %
4*	17	16.83 %
3*	44	43.56 %
2*	18	17.82 %
1*	2	1.98 %
Traditional lounge	11	10.90 %

* denotes the number of stars for classification purposes

Finally, as far as local authorities as source of information, 21.78 % of the respondents answered that they received none or very little (27.72 %) information, 26.73 % received adequate information, 16.83 % received much information and 6.94 % received a great deal of information about the program.

When asked if they agree that having an official certification of gastronomic interest would add value to their business, 8.91 % of the respondents answered they totally disagree, 15.84 % answered that they disagree, 55.45 % were undecided, 14.85 % agreed and 4.95 % totally agreed that this would add value to the hotel.

56.7 Conclusion

Local gastronomy is essential to a tourism destination from many different aspects. As national and local authorities and marketing destination organizations embrace programs that can help the destinations to differentiate and compete in a highly competitive environment, they should take into consideration the gastronomy when developing their marketing strategies (Rand et al. 2003). This study provides useful insight for a significant element of Greek gastronomy, the breakfast. By empirically examining for the first time, one of the first centrally organized efforts for the promotion of Greek gastronomy through the Greek breakfast initiative, and the way the program was perceived and run by the point of view of hotels who do not participate in the program, the study provides important information for those in charge of deciding policies and strategies that can reinforce gastronomy tourism and take full advantage of the significant benefits it has to offer to Greece.

The study presented some basic elements on the insights of hotel managers who do not embrace the specific program, they are, nevertheless, important stakeholders in this project. Especially, we wanted to understand the degree of familiarity they have with the program and its benefits, as well as, how they got informed about the initiative, possible difficulties or lack of communication they might have faced. We also attempted to highlight the capability of gastronomy and more specifically of the Greek Breakfast initiative as a contributor to the local, regional and national touristic growth. In this research we focused on understanding in particular some aspects of a major group of key players in this project, namely hotel managers who do not participate in the program. The need for a more integrated and effective communication effort as far as the program is concerned is apparent. Future research can contribute by examining the perceptions of tourists about the Greek breakfast project. What is clear though, is the fact that in order for such initiatives to succeed and for a destination to achieve the goal of being more competitive, all stakeholders should collaborate harmonically. Both the public sector, authorities and organizations, and the private businesses, hotels and local producers, local inhabitants as well, could help in order to enrich their gastronomic tourism offer and reinforce a unique and attractive destination image.

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Chapter 57

Greek Wineries on Facebook Wall

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Abstract The objective of this study is to provide an empirical analysis of the role of social media and especially Facebook, within marketing and communication strategies in case of Greek wineries. We use first the suggested by the literature metrics, to evaluate the wineries' efforts and to measure their engagement, and second a content analysis is conducted, in order to explore how wineries use their Profile on Facebook to support their marketing and communication strategies. In order to achieve the above research aims, we use data from Facebook pages of 40 Greek wine firms, over a whole year 2015 period. According to our results, majority of the examined Greek wineries are not currently utilizing social media to their full effectiveness, when it comes to the ability to interact and engage with consumers, and could benefit from becoming even more innovative and creative when it comes to their social media strategies, in order to fully differentiate these efforts from traditional marketing methods.

Keywords Greek wineries • Marketing • Facebook

57.1 Introduction

Within the last decades, the use of social media for commercial networking purposes has increased (Griffiths et al. 2010) and many wine firms have attempted to be re-invented in order to introduce alternative customer experiences. In terms of winery marketing, survival in this competitive arena requires not only the right product

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decisions but also an effective communications policy (Colbert 2007). In this era of the Internet (and especially social media), word of mouth (WOM) is gaining in effectiveness as a mean of referral in applications such as Facebook, making it possible to reach an unlimited number of people (Riegner 2007; Trusov et al. 2009; Miller and Lammas 2010). It is surprising that in the literature on winery marketing research, eWOM is not mentioned at all, although surveys conducted in wineries have repeatedly shown that third-party recommendation is one of the main reasons for buying (Willems and Lewalter 2007; Vlachvei 2011).

Many researchers have suggested that social media can enhance the power of viral marketing (Subramani and Rajagopalan 2003; Leskovec et al. 2007) and increase the speed at which consumers share experiences and opinions with progressively larger audiences (Thackeray et al. 2008). According to Hausmann (2012), the low-cost opportunities that social media provides for enhancing the two-way communication with the audiences, coupled with the crucial importance of being present and active in these media (Kelly 2013), make it an affordable and promising resource for building strong relationships with winery audiences.

From a management point of view, “understanding” social media is the key for properly managing these channels. Wineries are increasingly feeling the pressure to respond to the new opportunities offered by social media for connecting with active audience. It is therefore crucial for managers and researchers to comprehend how marketing input interacts with social media to produce desired marketing outcomes (Peters et al. 2013). The implications for corporations using several social media platforms as part of their overall marketing strategy are extremely interesting and empirical investigation on the subject has not been discussed enough in the literature.

The purpose of this paper is after reviewing the academic literature pertaining to social media strategies, in case of wineries, to provide an empirical analysis of the role of social media within marketing and communication strategies in case of Greek wineries. We use two approaches: first, using the suggested by the literature metrics, we try to evaluate the Greek wineries’ efforts and to measure the stakeholder engagement, while second we conduct a content analysis in order to explore how wineries use their Profile on Facebook to support their marketing and communication strategies: promotion and communication, stimulation of word of mouth, market research and innovation as well as reputation management.

57.2 Literature Review

There is a rich empirical literature about the goals of the use of social media by firms. For example, Parise and Guinan (2008) conducted an interview survey of 30 marketing managers and senior executives and concluded that there were four principles which guided managers’ marketing actions using Web 2.0: (1) facilitate users in generating content, (2) focus on building a community, (3) ensure authenticity of the message, and (4) look for marketing opportunities through experimentation. Also, Jansen et al. (2009) found micro-blogging (Twitter) to be an effective online

tool for customer word of mouth communications, and discuss the implications for corporations using micro-blogging as part of their overall marketing strategy.

There is a rich literature also about model formation with key business process steps and guidelines for effective social media program design and implementation. In particular, social media platforms have been studied because of their implications for global commerce (Piskorski and McCall 2010; Van der Lans et al. 2010). Much literature exists, for example, in the usage of Web 2.0 and SM platforms in the marketing areas of electronic word of mouth advertising (Parise and Guinan 2008; Jalilvand et al. 2011) and viral marketing (Leskovec et al. 2007; Hartline et al. 2008). Constantinides and Fountain (2008), as well as Jobs (2011), and Gilfoil and Jobs (2011) have further studied the use of social media platforms for global buy and sell activities and have provided evidence of effective corporate use of SM platforms to engage user communities, prospects, and end customers in both active and passive ways.

According to Kelly (2009), social media “provide new ways to learn about audiences through interacting with them directly.” In this way, “audiences can invest in and contribute their ideas, with the subsequent interactions informing and shaping their experiences.” They found social media to be “an easy and efficient way to elicit feedback and dialogue at no actual cost.” Multiple projects and studies have demonstrated that is not just enough for wineries to have a social media presence it is what you do that matters (e.g., Holdgaard and Simonsen 2011; Russo and Peacock 2009).

The marketing of wine is considered to be information-intensive (Stricker et al. 2007). The development of e-commerce and e-marketing technologies coupled with the global consumption of wines, creates not only local or regional, but also international opportunities for the wineries which decide to use direct marketing channels, such as social media. The rapid advancement of social media has allowed small firms to change their marketing approach, taking advantage of the global reach and the interactivity of online channels. The potential of Internet applications to enhance the effectiveness of wine marketing operations was identified and discussed by many authors. According to the literature (Hausmann and Poellmann 2013; Hausmann 2012; Trusov et al. 2009) social media can support marketing of wine firms in four main dimensions: (a) promotion and communication, (b) word of mouth, (c) market research and innovation management, and (d) reputation management. Social media have added three elements that are key to successful strategic communication efforts: first dynamic messages, with significant reach to large number of audiences with much less cost, second, variety of shared multimedia, and third creation of formal and informal social networks that can be used to grow a community of supporters. Also word of mouth can be initiated effectively through social media, since the message on Facebook can be spread to an unrestricted, most probably right targeted audience, at extreme speed. Besides, word of mouth via social media has high credibility as the sender and the recipient know each other personally. Therefore it is advisable for wineries to actively support word of mouth through either exclusive information, stories with a “buzz factor” and applications that facilitate the passing on of content (Schulz et al. 2008; Hausmann and Poellmann 2013). Regarding market research and innovation, in depth analysis of comments, complaints, recommendations can facilitate market research and can

improve the service chain of wineries and generate new ideas for either product development or service enhancement.

Regarding Greek data, there is a limited number of studies that present the use and effectiveness of social media mainly either in the area of tourism and hospitality, or in the area of e-government and political campaigns (Sigala et al. 2012; Sigala 2011; Afouxenidis 2014), while Vlachvei et al. (2014) and Vlachvei and Notta (2015) compare social media strategies as a part of e-marketing strategies between Greek and Italian wine firms, and measure the Greek food firms' social media efforts.

57.3 Wineries' Social Media Efforts: Data, Methodology, and Results

The present research aims to answer the question: "How wine firms use their Profile on Facebook to support their marketing and communication strategies as they are described above." We use first the suggested by the literature metrics, to evaluate the wineries' efforts and to measure the stakeholder engagement, and second a content analysis is conducted, in order to explore how wineries use their Profile on Facebook to support their marketing and communication strategies: promotion and communication, stimulation of word of mouth, market research and innovation as well as reputation management.

We collected detailed information on all activities (posts, comments, and Likes) from 40 Greek wineries' official Facebook pages over a whole year period (January 2015–December 2015). Facebook data were collected by Next Analytics program (Nextanalytics.com). Specifically, we collected all available data through the Facebook for each wine firm. We collected data for number of friends/fans, likes, comments, and shares for each post. Posts are grouped under four categories: links, photos, texts, and videos. The most common measures for evaluating Facebook pages are the following (Coleman and Herriot 2014; Vlachvei and Notta 2015):

- (a) *Number of posts on wall*. Usually it is calculated as posts per day. These posts are used to promote event and exhibitions, to give background information and to encourage interaction with fans.
- (b) *Number of likes*. Like-ratio is calculated as percentage of the post likes from the total reach. Usually according to Bonson and Ratkai (2013) "likes" on Facebook measure the **popularity** of a page or a post.
- (c) *Number of comments*. Comments actually may prove the **commitment**. It is calculated as total comments that a page post has received. Comment-ratio is calculated as a percentage of the comments of the post from the total reach of the post.
- (d) *Number of shares*. Shares are appearing less frequently than likes and comments. Number of shares is the total amount of shares that a post has received. The share-ratio is calculated as percentage of the total number of shares of the

post from the total reach of the post. Through “shares” the winery spreads the information and encourages word of mouth. According to the taxonomy selected by Bonson and Ratkai (2013), “shares” on Facebook proves the *vitality* of the post.

- (e) *Post nature*. The most common posts are: a status update, a photo, a link (to a URL), and a video status (downloaded video or from youtube.com or vimeo.com).
- (f) *Engagement*. Facebook defines engagement as: “*Engaged Users is the number of people who have clicked anywhere on your post,*” which consists of liking, commenting, and sharing and people who have viewed your video, clicked on your links and photos. Engagement-ratio is calculated as percentage of the engagement from the total reach.

Weber (2011) classifies the most important social media metrics into the areas that analyze reach, engagement, and business (ROI). In case of Facebook communities, the interest is on reach and engagement metrics. Specifically, in order to examine the differential effects involving the different dimensions of wine firm’ social media efforts, four dimensions of a winery’s efforts on a social media site have been identified:

- (1) The *Intensity* of the winery’s efforts (i.e., the volume of posts and comments posted by the wine firm). Higher intensity is expected to give more opportunities to customers and fans to see and act, which may increase the engagement of customers and to influence winery’s market value. We use two measures of wineries’ Facebook activities: the number of postings and the number of comments. We then scaled it by the network size.
- (2) The *Richness* of the winery’s efforts (i.e., the information richness of messages posted by the winery); Messages delivered through different media—texts, pictures, or videos—have varying abilities to deliver information, and accordingly, we can determine the richness of these various types of media (Daft and Lengel 1986). Richer messages are more likely to be noticed by consumers because they are more engaging and informative. Research suggests that messages delivered and using pictures are richer than text and video is superior to static pictures because it is more explicit and easier to understand (Larkin and Simon 1987; Emerson 2012; Vlachvei and Notta 2015). The *richness* of a winery’s Facebook efforts is measured as the ratio of the number of the winery’s enriched postings (flash, videos, and photos) to the total number of the winery’s postings. A larger value of this measure reflects the winery’s greater efforts spent on Facebook in terms of the richness of information provided to public.
- (3) The *Responsiveness* of the winery’s efforts (the extent to which a wine firm responds to consumers’ messages). By providing informative contents, by responding to user queries, or complaints and giving feedback in a constructive manner, winery is possible to monitor its online reputation, to built trust, and to avert negative publicity that can easily spread through internet (Luo and Zhang 2013; Hausmann and Poellmann 2013). Responsiveness index is measured

Table 57.1 Descriptive data

	Average	Max	Average for Greek food firms (Vlachvei and Notta 2014)
Posts/day	0.34	2.29	0.81
Likes/post	32.6	160.5	63.8
Comments/post	7.53	15.64	6.7
Shares/post	3.29	18.35	4.25
Number of fans	7736	129,334	–

by the ratio of the number of the winery's comments to the total number of comments made by both the winery and its fans.

- (4) The **Engagement index**. The engagement according to Buhalis and Mamalakis (2015) is the most important element of the non-financial ROI. The total engagement rate can be calculated based on Smitha's (2013) formula as total engagement (the sum of likes and comments and shares) over total number of fans. Concerning engagement index, Leander (2013) and Lee (2013) after an extended research of Facebook pages below 10,000 fans support different satisfying engagement rate (around 1 % and from 1.7 % to 6.1 %, respectively).

Table 57.1 presents the descriptive data of our sample compared with the data of Vlachvei and Notta (2014) for the Greek food firms. Wine firms seem to be less active than the average Greek food firms, with less than half posts per day and likes per post, while comments and shares are almost the same with the whole sample. It is interesting to note that according to Fig. 57.1, wineries are more active during March, May, June, and October. Most of the posts are in March which can be attributed to the large number of wine exhibitions and contests that take place, in Greece and abroad. During these exhibitions wineries announce their participation and keep their audience informed about the contests and their possible awards. Also, in May the large number of posts can be attributed to the event of "Open Doors" that takes place in almost all Greek wineries in May. Through Facebook wineries invite their friends to their vineyards, wineries, wine festivals, and wine shows. According to the literature (O'Neil et al. 2002) for the wine producer, visits to the cellar door offer three benefits: (a) distribution at a low marginal cost; (b) the development of brand equity and a chance to add value, and (c) If wine tourism is available in the region, the cellar door effectively gives the small winery of the ideal avenue to create a niche brand (Bruwer 2004; Jarvis and Goodman 2005). As a consequence, through Facebook wineries give all the information needed to schedule a visitation, like availability of wine tour, cellar door hours, the existence of restaurant in the winery estate for wine tasting and other traditional food products, the existence of museum or gift shop, or organized tour in the area and links to local attractions, lodging, and restaurants (Table 57.2).

Greek wine firms are not very active in average. Facebook is a very powerful tool with which to monitor customer-to-customer communication and intervene when necessary. Customers learn about other customers' experiences, and firms

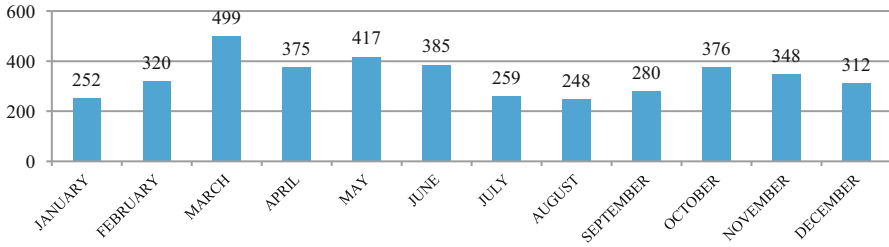


Fig. 57.1 Posts’ intensity per month

Table 57.2 Intensity, richness, and engagement

	Average	Max	Min
Intensity	0.12	1.48	0.0
Richness	0.73	1	0.73
Engagement	1.22	6.77	0.02

Source: Authors’ calculations

learn about customer feelings toward their products. Social media are therefore a significant driver to eliminate market inefficiencies and improve the competitive environment, as they help to weed out poor quality products over time. The success of a community building can be measured by FB friends, Recommendations, Respond to criticism, Shares, Call to action. A low intensity rate proves that Greek wine firms don’t give to their friends the opportunity to be informed, to react, to suggest, to share, to recommend, or to participate to a research.

However, 73 % of their posts are enriched, which make their messages more explicit, easier to understand and furthermore, the everyday use of smartphones with high quality built-in cameras has led to an increase in cellar visitors’ use of these devices to document and share their cellar experiences. Greek wineries’ engagement rate can be considered according to Leander (2013) as accepted although Facebook seems to be used more as an instrument of traditional communication rather than of user engagement. Generally, wineries use Facebook by implementing traditional marketing strategies and methods.

We conducted a content analysis of each winery’s posts, in order to evaluate how wineries used their official Facebook pages to support their marketing and communication strategies. Content analysis of postings of wineries revealed indirectly the main reason as to why each winery created a profile to a social medium. We categorize 3152 posts from wineries with more than 100 posts per year, according to the content of the post in six categories:

General wishing: posts that include wishes, greetings, national celebrations

Informative: posts that included firm’s news, innovative actions, or any other information material or other news of the world

Invitations/Events: posts that invite fans in the winery or provide information for wine events

Awards: with information about firm’s latest awards

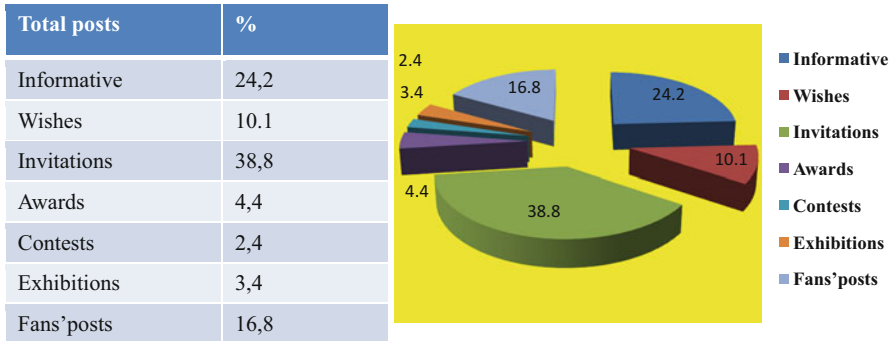


Fig. 57.2 Facebook posts

Contest: posts that are drawing prizes according to user correspondence

International fair/exhibitions: stands for posts that aimed to advertise the wine events.

It is surprising that although it was expected that promotional communication, stimulation of word of mouth, market research, and innovation as well as reputation management would be the most important findings of this work, our results prove that actually Greek wineries use Facebook only as a one way communication. Most of the posts are invitations (38.8%) and sharing general information about the firm or the area (24.2%), while awards promotion, contests, and participation in international exhibition cover only about 10% of the posts (Fig. 57.2). They just inform their friends about their products, their awards, their participation in international exhibitions, without any attempt of connecting with their audience, without starting conversations with their friends, without collaborating with customers for future ideas and products, without measuring attitudes and behaviors toward their brand. It seems that they haven't understood the power of the two-way communication with their audience and they use Facebook in the way they use traditional marketing strategies and techniques.

From the managerial point of view, we consider these results extremely important since first they prove that majority of the examined Greek wineries are not currently utilizing social media to their full effectiveness when it comes to the ability to interact and engage with consumers. Secondly, Greek wineries could benefit from becoming even more innovative and creative when it comes to their social media strategies, in order to fully differentiate these efforts from traditional marketing methods. Finally, wineries should pay attention to the interaction (e.g., through competitions, polls, questions, and rewards) on their profile in order to motivate and involve fans and followers, for a reach dialogue and meaningful participation. Motivation of fans to suggest good ideas can also be stimulated through rewards and public recognition.

57.4 Conclusions

Shaping the outline of the results that emerged from the research on Greek wineries, it is obvious that social media can support the marketing strategies of wineries, especially regarding promotion and communication, word of mouth, innovation and reputation management. Although there are some unexpected results regarding their involvement in Facebook, either on the way they use the opportunities of Facebook or on their engagement with their fans and followers, wineries have a unique opportunity through social media to deliver powerful experiences that not only inspire and teach but also interact with society and guide audience, and that is why the results of this work are very important.

Three key findings emerge from this research:

- Firstly, the majority of the examined Greek wineries are not currently utilizing social media to their full effectiveness when it comes to the ability to interact and engage with consumers.
- Secondly, Greek wineries could benefit from becoming even more innovative and creative when it comes to their social media strategies, in order to fully differentiate these efforts from traditional marketing methods.
- Finally, wineries should pay attention to the interaction (e.g., through competitions, polls, questions, and rewards) on their profile in order to motivate and involve fans and followers, for a reach dialogue and meaningful participation. Motivation of fans to suggest good ideas can also be stimulated through rewards and public recognition.

However, the findings of this work cannot be generalized, since a main limitation that must be acknowledged is that our investigation represents 40 Greek wineries. Further research is necessary to compare the results of our empirical study with similar wineries in Greece or in other countries.

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Chapter 58

Short- and Long-Run Determinants of Tourist Flows: The Case of South Korea

George Agiomirgianakis, Dimitrios Serenis, and Nicholas Tsounis

Abstract This paper examines the effect of Exchange Rate Volatility for South Korea, on tourist arrivals exports during the period of first quarter of 1990 to fourth quarter of 2015. It is claimed by some researchers that high fluctuations of exchange rates cause a reduction on tourist arrivals. Empirical researchers often utilize the standard deviation of the moving average of the logarithm of the exchange rate as a measure of exchange rate fluctuation. In this study, a new measure for measuring volatility is proposed. The empirical methodology used relies upon the theory of cointegration, error correction representation of the exchange rate volatility measures using the Autoregressive Distributed Lags modeling to cointegration. Overall, our findings suggest that there is a negative effect of volatility to tourist arrivals for Korea.

Keywords Exchange rate volatility • South Korea • Tourism • ARDL

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58.1 Introduction

Over the past years many researchers have studied the relationship between exchange rate fluctuation and its potential effects to international tourist arrivals. Some theoretical models suggest a negative relationship to tourist flows from exchange rate fluctuation. The reasoning behind their claim is that high exchange rate fluctuation can effect tour operations causing them to shift their business from a country with high exchange fluctuation to a country with low exchange rate fluctuation.

This paper aims to model tourist arrivals for South Korea and estimate the potential effects of exchange rate volatility measured using two different measures. Although empirical researches commonly recognize that exchange rate is an important factor which could deter tourists from traveling to a holiday destination, however, little attention has been paid to exchange rate volatility as well as different measures of it. High exchange rate fluctuation causes an environment of uncertainty which in turn causes tourists to switch their travels from destinations with high exchange rate volatility to destinations with lower exchange rate volatility. This action in turn causes a reduction to tourist arrivals to countries with high exchange rate volatility.

The structure of the paper is as follows: Sect. 58.2 provides an overview of the relevant literature, Sect. 58.3 justifies the choice of the specific model and the choice of the variables. In Sect. 58.4, data description and methodology issues are analysed and our results are presented. Finally, Sect. 58.5 contains concluding remarks and analyses the policy implications of our findings.

58.2 Literature Review

There are many determinants of tourist arrivals. Our review of the literature has uncovered the following most important variables: (a) the real effective exchange rate; (b) the relative prices between destination and origin and (c) the income, approximated by the GDP in pps of a set or major visiting countries.

One of the most important variables that empirical studies have utilized is exchange rates. As a result from the early 1990s researchers have been expanding tourism models to incorporate exchange rates. The reason for this is that exchange rate changes provoke responses not only by individual tourists but also by risk-averse tour operators, who, in turn, may decide to switch their business operations towards other countries where the exchange rate is more stable (Crouch 1993). In addition some empirical researchers have suggested that exchange rate devaluation at the origin country does attract trust flows however, a revaluation does reduce tourist arrivals (see, e.g., among others Agiomirgianakis and Sfakianakis 2012; Garin-Munoz and Amaral 2000; Patsouratis et al. 2005). Artus (1970) has suggested, namely, that travelers are more aware of exchange rates that they use and they are using them as proxy for the cost of living abroad.

Furthermore, researchers often suggest that the origin country income affects positively the inclination of people to travel. The reasoning for that statement is that as the country's income improves so as its welfare which in turn will have a positive inclination on travel.

One other important determinant is the relative cost of living. It is possible that the relative prices can affect the cost of travel and reduce tourist flows. As a result consumer prices do effect negatively tourism inflows as suggested by some empirical researchers (see, among others, Dwyer et al. 2010, pp. 63–64).

In addition to the different range of variables researchers often utilize a variety of estimation methods. These methods consist of the estimation of mainly a single estimation model. As new econometric methodologies began to emerge researchers start to investigate for statistical properties of their sample such as unit root and cointegration and account for them using Error Correction Models (ECM) or even Vector Auto Regressive models (VAR). The VAR models allow for the utilization of time varying measures of exchange rate volatility variables as well as (Song and Witt 2000). In addition the previous methods researchers are now being utilizing more recent econometric approaches such as Auto Regressive Distributed Lag (ARDL) models and AIDS. The advantage of these methods is that they provide more accurate estimations. The ARDL methodology does allow to provide a more accurate relationship by estimating both short-run and log-run models by incorporating different lags of independent variables. On the other hand, the AIDS estimation method has been developed by Deaton and Muellbauer (1980) and can be modified in a variety of ways to provide more accurate estimations. Some of these modifications include linear AIDS (LAIDS) model, to provide more accurate results (Li et al. 2008). Lastly a small number of researchers utilize panel data estimation methods such as PMG. Panel data methods allow for different estimations among countries (e.g. Ledesma-Rodríguez et al. (2001) which mainly concentrated on tourism flows for Tenerife).

58.3 The Model

The model we will utilize a reduced form equation similar to that employed in our previous empirical work Serenis and Tsounis (2014a, b). The equation is estimated using the ARDL methodology and will account seasonality effects. The ARDL estimation method will allow us to account for both short-run and long-run effects as well as different measures of exchange rate volatility.

The long-run equilibrium equation is based on the following equation:

$$\ln X_t = \lambda_0 + \lambda_1 \ln \left(\frac{P_X}{P_w} \right)_t + \lambda_2 \ln \text{GDP}_t + \lambda_3 V_t + \lambda_4 D_1 + \lambda_5 D_3 + \lambda_6 D_4 + \lambda_7 T + \omega_t \quad (58.1)$$

where tourist flows X is the number of tourist arrivals, P_X/P_w represents the consumer price index of Korea to the world CPI, GDP is an index composed of

per-capita GDP of the major origin countries of tourists, V represents the two different measures of volatility, D_1, D_3, D_4 are seasonal dummies, T is a time trend and ω is an error term.

The number of tourist arrivals consists of all the individuals arriving at Korea with the sole purpose of tourism and excludes any individuals which are permanent residents to the country and simply returning back to their residence. The relative prices as stated above are derived from the ratio between Korea's CPI to the world CPI. The next variable consists of GDP. GDP is comprised by weighting the GDP per capita in pps for the main countries from which tourist arrive to Korea. Finally, volatility is composed by using the real effective exchange rate and is composed of two separate measures. The first measure is composed of the simple standard deviation of the moving average of the logarithm of the real effective exchange rate. While the second is comprised of a dummy variable capturing high and low values of the real effective exchange rate. Both of these two measures will be discussed in great detail in the next section.

One of the most important and perhaps controversial variables is the exchange rate volatility variable. ERV is a measure that is not directly observable; thus, there is no clear, right, or wrong measure of volatility. This is not often recognized by empirical researchers. The resulting consequence is that most empirical studies to utilize the standard deviation of the moving average of the logarithm of the exchange rate:

$$V_{t+m} = \left(\frac{1}{m} \sum_{i=1}^m (R_{t+i-1} - R_{t+i-2})^2 \right)^{\frac{1}{2}} \quad (58.2)$$

where R is the logarithm of the nominal or real effective exchange rate, m is the number of periods, usually ranging between 4 and 12.

Even though this measure is quite popular among empirical researchers and has considerable advantages it can also be associated with considerable pitfalls. The main and most important disadvantage consists of the fact that the previous measure calculates a moving average overlooking high and low volatility values. These high and low values are attributed by some empirical researchers to unforeseen or unexpected events which cannot be accounted and therefore cannot be hedged. Therefore these events play the most important role in effecting tourist behaviour as well as tour operators. A moving average measure has the ability to smooth out possible high and low values therefore reducing the overall actual effect of volatility.

In order to account for the pratfall that a moving average has we examine two sets of estimated equations. The first contains the standard deviation of the moving average of the logarithm of the real effective exchange rate as a measure of ERV (V1) and the second contains a variable capturing the high and low values of the exchange rate (V2).

For the second measure (V2) a dummy variable is constructed. That variable will capture the exchange rate values by which the exchange rate moves above and below 6–8 % of its average value. As we can't fully know what is perceived as a

high (or low) value since the perception of what is a high (or low) value might differ from country to country we will begin our estimation from 6 % and report only the first significant case. If there is no significant case for volatility at 6 % we will continue until we reach the threshold of 8 % reporting only the first statistically significant values that we obtain.

58.4 Data, Estimating Methodology, and Results

This study examines the effects of ERV for Korea. All the data are derived from Eurostat with the exception of the real effective exchange rate figures which are derived from IFS. Data is used from 1990q1 to 2014q4.

Before we proceed deeper in the analysis, we first test for the degree of integration among each one of the variables. The well-known Phillips–Perron (P–P) unit root test is utilized in our analysis and its results are presented in Table 58.1.

For each variable the null hypothesis (H_0) of a unit root (non-stationarity) is tested against the alternative using the Bartlett Kernel estimation method. The null hypothesis is not rejected for: $\ln X$, $\ln GDP$, $\ln P$ and $V2$ meaning that they are $I(1)$ with the exception of $V1$ which is $I(0)$ as it is already differenced.

The ARDL method can only be applied when there are variables which do not exceed $I(1)$ of integration (Pesaran et al. 1999, 2001), the ARDL method can be applied irrespective of whether the variables are $I(0)$ or $I(1)$ (Pesaran and Persaran 1997). In the event, however, that the variables are $I(2)$ than the ARDL method would produce spurious results (Oteng-Abayie and Frimpong 2006) and therefore cannot be applied. As a result it is important to verify that the order of integration

Table 58.1 Phillips–Peron unit root test results

Series	Level	First difference	Second difference
$\ln X$	−3.184217	−17.14828	−8.262587
$\ln GDP$	−1.838184	−17.14828	−4.956205
$V2$	−3.425771	−6.036519	−8.194009
$\ln P$	−2.364370	−6.359723	−6.178854
$V1$	−8.717854	−6.667485	−8.862620

Note: All tests are performed using the 5 % level of significance; $\ln X$ is the logarithm of tourist arrivals, $\ln GDP$ represents the logarithm of a weighted index composed of the major countries of arrival GDP in pps, $V1$ is volatility measured as the moving average of the standard deviation of the exchange rate, $V2$ is composed of a dummy variable capturing the values for which the real effective exchange rate moves above or below 6 % of its average value and $\ln P$ is the logarithm of an index capturing the country's CPI to world's CPI. All tests are performed to a maximum of three lags. The null hypothesis of a unit root is tested against the alternative. The asterisk denotes significance at least at 5 % level

Source: authors' calculations

does not exceed more than $I(1)$ (say $I(2)$). As it can be seen from the above table, the variables are either stationary on their level or at their first difference.

Following Pesaran et al. (1999, 2001) the ARDL representation of Eq. (58.1) is:

$$\Delta \ln X_t = a_0 + \vartheta \ln X_{t-1} + \sum_{i=1}^{\mu} \theta_i G_{i,t-1} + \sum_{j=1}^p \alpha_j \Delta \ln X_{t-j} + \sum_{i=1}^{\mu} \sum_{j=0}^p \beta_{ij} \Delta G_{i,t-j} + \tau T + \delta_1 D_1 + \delta_3 D_3 + \delta_4 D_4 + \omega_t \tag{58.3}$$

where Δ is the first-difference operator, X is the exports of tourist services, P is the relative prices, GDP weighted average real domestic per-capita GDP in PP's, $V1$ and $V2$ represent the first and second measure of exchange rate volatility, D_1, D_3, D_4 are seasonal dummies, T is the time trend, ω is a white noise error term, $\mu = 3$ is the number of explanatory variable, ϑ, θ_i are the coefficients that represent the long-run relationship, α_j, β_{ij} are the coefficients that represent the short-run dynamics of the model and p is the number of lag length. The ARDL method to cointegration requires: first, Eq. (58.3) is estimated and the lag order of the ARDL is determined using the AIC¹ lag selection criterion. Second, the Lagrange Multiplier (LM) test was used to test the null hypothesis that the errors in Eq. (58.3) are serially independent. Then, the model is tested for stationarity (i.e. dynamic stability) by examining whether the inverse roots of the AR polynomials lie strictly inside the unit circle. In our case, the plot of the inverse roots of the AR polynomial was made. Fourth, from Eq. (58.3) a test for the existence of long-run relationship was made. This is called the ‘bounds testing’ approach to cointegration and it is associated with the hypothesis testing $H_0 : \vartheta = \theta_1 = \dots = \theta_i = 0$; i.e., the long-run relationship does not exist against the alternative $H_1 : \vartheta \neq \theta_1 \neq \dots \neq \theta_i \neq 0$ that the long-run relationship exists. Fifth, in the event than a cointegrating relationship exists we then continue by testing the coefficient of the Error Correction Term (ECT) in order to establish that it is statistically significant.

As expected the error correction term e must be negative and statistically significant. Furthermore, the value of coefficient shows the percentage change of any disequilibrium between the dependent and the explanatory variables is corrected within one period (one quarter).

Finally, the long-run impact of the explanatory variables to the dependent variable is calculated using the expression (Bardsen 1989):

$$\widehat{\gamma}_i = -\frac{\widehat{\theta}_i}{\widehat{\vartheta}} \tag{58.4}$$

¹Akaike Information Criterion.

where $\hat{\theta}_i$ and $\hat{\vartheta}$ are the estimated long-run coefficients in Eq (58.3). The $\hat{\gamma}_i$ s show how the dependent variable, in our case the logarithm of tourist flows measured by tourist arrivals, responds in the long-run to any change in the explanatory variables. However, the $\hat{\gamma}_i$ s provide a single value to quantify the long-run effect and they do not provide any information about the degree of variability associated with them (Gonzalez-Gomez et al. 2011). As a result the confidence intervals for each coefficient do not follow the normal distribution since they are calculated as the division of two normally distributed variables. Following Efron and Tibshirani (1998) the bootstrap method, which is a non-parametric method, can be used in order to calculate empirically confidence intervals without assuming a specific distribution of the γ_i . In our case this was made for 95% level of statistical significance.

58.5 The Results

As suggested before our estimation consists of two equations. One containing the moving average V1 and a second equation in which a measure capturing only high and low variables of volatility is used V2. The resulting lag order of the ARDL model is: (1,1,1,1), for volatility measure 1 and (1,4,1,1) for measure 2. The first number represents the distributed lags of $\ln X$, the second the distributed lags of $\ln P$, the third the distributed lags of $\ln GDP$ and the fourth the distributed lags of V1 or $\ln V2$. As expected all of the necessary diagnostic tests such as the dynamic stability, the LM test and heteroscedasticity have been performed and the results of these tests are presented in the Appendix. The long-run estimation of the model is presented in Table 58.2 and the results of the estimation are discussed.

The Lagrange Multiplier (LM) test is used to examine test the null hypothesis that the errors in Eq. (58.3) are serially independent against the alternative of no-serial independence among the errors. The estimated F -statistics of the LM are of the value of 0.251480 using measure 1 and 1.166954 using measure 2 and are both not statistically significant indicating the null hypothesis of no-serial correlation is not rejected.

Consistent with the ARDL methodology we have also performed the Breusch–Pagan–Godfrey heteroskedasticity test (column 6 of the table in the Appendix); the calculated values are 1.227201, for measure 1; 1.212667 for measure 2. Both these values were not statistically significant indicating that the null hypothesis of homoscedasticity has failed to be rejected.

Table 58.2 Wald 'bounds test' and long-run impact of exchange rate volatility on tourist flows

	ARDL order	<i>F</i> -statistic, wald bound test	Critical values for the <i>F</i> -statistic, lower and upper bound (from Pesaran et al. 2001)	$\hat{\epsilon}$	$\hat{\gamma}_i$	Confidence intervals for $\hat{\gamma}_i$
Volatility measure 1	(1,1,1,1)	4.764341	4.066 –5.119	–0.7535	ln <i>P</i> : –2.744312 lnGDP: –0.4333 V1: –3.346	[–5.699033 0.2104079] [–0.6246235 –0.2420528] [–7.791828 1.099582]
Volatility measure 2	(1,4,1,1)	4.9872	4.066 –5.119	–0.291167	ln <i>P</i> : –1.3007 lnGDP: –0.2750 V2: –0.00127	[–3.979202 1.377644] [–0.4276523 –0.122453] [–0.0021383 –0.0004055]

Notes: ln*P* represents the long-run value of the ratio of the relative CPIs, lnGDP represents the logarithm of a weighted index composed of the sums of each country's real gross domestic per-capita product in PPP multiplied by the equivalent percentage of tourist arrivals of each country to South Korea, V1 represents the long-run value of volatility measured as a moving average and V2 is the volatility capturing values above and below 6% of the average value of the moving average and *P* is the logarithm of the country's CPI to world's CPI; the asterisk indicates statistical significant coefficients at 5% level of statistical significance, the relevant confidence intervals are indicated in bold

Note: All tests are performed using the 5% level of significance

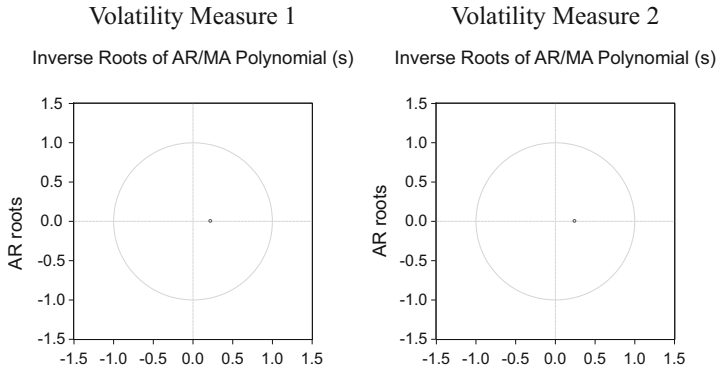


Fig. 58.1 Dynamic stability test

58.5.1 Dynamic Stability

The next step was to establish the dynamic stability of the model. The model is terms are stable when the AR polynomials lie strictly outside the unit circle or the inverse roots of the AR polynomials lie strictly inside the unit circle. In our case, the plot of the inverse roots of the AR polynomials was made and it is seen in Fig. 58.1.

All the inverse roots of the AR polynomials lie strictly inside the unit circle therefore, the model is dynamically stable (stationary).

58.5.2 Long-Run Relationship

We continue by testing for the existence of a long-run relationship between the dependent and explanatory variables. We therefore have computed the F -statistic of the Walid bound test which is described in the fourth step above, and its results are reported in Table 58.2. According to the computed F -statistic of the critical value (column 4 of Table 58.2), the null hypothesis of no-cointegration is rejected and the alternative is adopted and it is concluded that there is a long-run relationship between the variables. In other words, the computed F -statistic values using measure 1 is 4.764341 and using measure 2 is 4.9872.

Following the results of the Wald test which have suggested a cointegrating relationship we report the coefficient of the estimated Error Correction Term (ECT) as well as its statistical significance in Table 58.2. As suggested the error correction term ECT, *e-hat*, should be negative and statistically significant. The estimated value of the ECM coefficient ranges from -0.7535 for volatility measure 1 to -0.291167 for volatility measure 2. The value of the coefficient shows the percentage change of any disequilibrium between the dependent and the explanatory variables that it is corrected within one period (one quarter).

Lastly, we have calculated the long-run impact of each explanatory variable to the dependent variable. The calculation has been performed using the expression given in (5) and the results are presented in Table 58.2. The results indicate that the dependent variable, in our case the logarithm of tourist arrivals, does respond to any change in the explanatory variables, i.e., the logarithm of per-capita GDP of the countries of tourists origin, the logarithm of relative prices and the logarithm of the measure of exchange rate volatility. The results of the previously mentioned calculation for volatility indicate a strong negative relationship for both measures (measure 1 and 2) estimated here. As discussed previously measure 2 is composed of a dummy variable that captures high and low fluctuation of more than 6% above and below the moving average of the exchange rate. Even though the calculated impact for volatility measure 2 appears to have a smaller magnitude its significance level is considerably increased when compared to the moving average measure indicating a more significant statistical relationship.

The relative price variable as expected is negative and significant for both cases examined here (with volatility measure 1 and measure 2). The per-capita GDP variable was included as a factor which could determine the foreigners desire to travel or engage in the tourism sector (for tour operators). The GDP coefficient has proven to be statistically significant in both cases examined here.

58.6 Conclusions

It had been long argued by researchers that exchange rate volatility can be detrimental for many areas of a nation. However, empirical research with regard to its potential effects on tourist arrival is both limited and ambiguous. In this study we have modeled tourist arrivals for South Korea, a country in which empirical research is limited with regard to potential effects of volatility to tourism flows. Furthermore we have also addressed an important issue which is often overlooked by empirical researchers. This issue relates to the volatility measure. In addition to using the simple standard deviation of the exchange rate as a volatility measure we have also applied a new measure of volatility. This measure was designed to capture the high and low values of the exchange rate in order to determine whether such variables do provide any significant effects to tourist arrivals. Furthermore, our empirical methodology relies upon the theory of cointegration, error correction representation of the cointegrated variables and different volatility measurements of the exchange rate. Over all our results suggest that there is a negative and statistically significant relationship from exchange rate volatility to exports in both the cases where a moving average and a variable capturing high and low measures of exchange rate to tourist arrivals. In addition our results suggest a stronger statistical relationship when such measure is applied to the model.

All the remaining independent variables have for the most part presented a statistically significant relationship indicating a strong effect to tourist arrivals (from GDP and relative prices). Overall our results have one important implication. This

is that exchange rate volatility is a contributing factor to tourist arrivals. Both the moving average and the high and low measures of volatility have proven to have a significant effect to tourist arrivals. As a result researchers but most importantly policy makers should pay close attention to exchange rates when implementing policy designed to stimulate tourism. As different aspects of the exchange rate might effect tourism in different ways empirical researchers should utilize new measures which will allow them to isolate and examine additional effects of exchange rate to tourism.

A.1 Appendix: ARDL Regression Results (Depended Variable ΔX_t)

	ARDL order	Regressor, coefficient	F-statistic, LM test	Dynamic stability	Heteroskedasticity test, F-statistic
Volatility measure 1	(1,1,1,1)	$\ln X(-1)^*$: -0.720441 $\ln P(-1)^{**}$: -1.977116 $\ln GDP(-1)^*$: -0.312195 $\ln V1(-1)^{**}$: -2.410691 $\Delta(\ln X(-1))$: 0.138392 $\Delta(\ln(GDP))$: 0.249527 $\Delta(\ln(P))^*$: -5.285637 $\Delta(V1)^{**}$: -1.545	0.251480	Yes	1.227201
Volatility measure 2	(1,4,1,1)	$\ln X(-1)^*$: -0.683850 $\ln P(-1)$: -0.889539 $\ln GDP(-1)^*$: -0.188095 $\ln V1(-1)^*$: -0.000870 $\Delta(\ln(P))^*$: -5.402823 $\Delta(\ln(P(-1)))^*$: -0.385368 $\Delta(\ln(P(-2)))$: -0.462843 $\Delta(\ln(P(-3)))$: 1.458656 $\Delta(\ln(P(-4)))^{**}$: -2.431769 $\Delta(\ln(GDP))^*$: 0.561055 $\Delta(V2)^{**}$: -0.000490 $\Delta(\ln(X(-1)))$: 0.096478	1.166954	Yes	1.212667

Notes: X represents the number of tourist arrivals, P represents the ratio of the relative CPIs, $\ln GDP$ represents the logarithm of a weighted index composed of the sums of each countries real domestic product in PPP multiplied by the equivalent percentage of tourist arrivals of each country to South Korea. $V1$ represents volatility measured as a moving average and $V2$ is volatility depicting values above and below 5 % of the average value of the moving average. $V1, V2$ is in logarithmic

form, as it can be seen from (2). The single asterisk denotes up to 6 % and the double asterisk denotes up to 10 % level of statistical significance. The plot of the inverse roots of the AR polynomials for examining the dynamic stability of the model is presented in Fig. 58.1.

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Chapter 59

Assessing the Impact of Economic Crisis on Food Firms Performance

Ourania Notta and Aspasia Vlachvei

Abstract The objective of this study is to draw conclusions about the changes in business strategies and changes in the factors affecting the competitiveness of food and beverages companies during economic downturn. The real impact of 2009 crisis in Greece on firm-level performance is investigated through two surveys. The study provides valuable insights and implications about how to facilitate the marketing strategies and practices during periods of debt crises. According to the results of the analysis, there are significant performance changes over the crisis period.

Keywords Economic crisis • Food firms

59.1 Introduction

The purpose of this paper is first to review both the academic and industry literature pertaining to the effects of financial and economic crisis on firm performance; second to improve our understanding about the performance of Greek food manufacturing firms before and during economic crisis, and third to draw conclusions about the changes in business strategies and changes in the factors affecting the competitiveness of food and beverages companies during economic downturn.

In recent literature much research has been focused on the macroeconomic effects of crises, and how these effects spread to different countries through contagion channels. The earliest papers argued that trade linkages (either through bilateral trade or competition in third markets) were important transmission channels through crises spread internationally (Eichengreen et al. 1996; Glick and Rose 1999). In the latter half of the 1990s, researchers have argued that financial linkages

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through bank lending or portfolio investment are more important than trade channels (Van Rijckeghem and Weder 2001; Kaminsky et al. 2001). Other studies (Baig and Goldfajn 1999; Mitton 2002; Johnson et al. 2000) provide evidence on the importance of country similarity and how a crisis in one country causes investors to wake up and reassess the risks in similar countries. What about the microeconomic repercussions of these crises? The recession has been described as a “structural break” or a “phase shift”—terms denoting a qualitative change in economic trends and relationships (Rumelt 2009; Allen and Snyder 2009). Some authors claim that turbulent times bring with them opportunities as well as threats (Sull 2009; Rhodes and Slater 2009; Deans et al. 2009). During expansions, businesses often continue with existing routines; only during the downturn many firms consider new ways of doing business in order to exploit market opportunities (Jacobides 2009; Quelch and Jocz 2009; Burgers 2009; Jan-Benedict et al. 2009).

Many studies propose to invest in marketing in order to understand consumers’ changing behavior during recession, to maintain brand equity, and to win new customers. Also, propose to invest in new product development and to adapt new supply chains in order to deliver better value to a range of customers. Investments on advertising, human resources, and employee benefits and on communications with investors and employees lead to retain commitment during recession (Frey and Callahan 2008; Makioka et al. 2009; Dhar and Sundararajan 2009; Sodhi and Tang 2009; Gratton 2009; Brenner 2009; Argenti 2009). Only firms that possess flexibility are able to sustain competitive advantage after an economic crisis (Lee et al. 2008; Sanchez 1995).

Johnson et al. (2000), Mitton (2002), and Lemmon and Lins (2003) use the East Asian financial crisis to examine the attributes of corporate governance and their influence on the stock price performance of firms during the crisis. Fadzman and Habibullah (2010) have assessed the impact of financial crisis on bank performance taking into account Indonesian banks’ profitability during the period of 1990–2005. Their empirical findings indicate that income diversification and capitalization were positively related to bank profitability, while size and overhead costs exerted negative impacts. Aldamen et al. (2011) have investigated whether better corporate governance impacts the performance of family versus non-family firms during the crisis in a sample of 2000 firms listed in the Australian Stock Exchange. Authors found that better governance, irrespective of whether the firm is family or non-family, is associated with better accounting and market performance during the crisis. Bricongne et al. (2012) have tested how the crisis affected exports of French firms. Their analysis showed that while all firms have been affected by the crisis, the effect on large firms has been mainly at the intensive margin and has resulted in a smaller portfolio of products being offered to export destinations. Minai and Lucky (2012) conducted a cross-sectional study using a questionnaire survey research design and studied the effect of individual determinant, external factor, and firm characteristics on small firm performance during economic downturn. Appendini and Montoriol-Garriga (2012) prove that firms with high pre-crisis liquidity levels experienced higher performance as compared to ex-ante cash-poor firms.

The Greek economy remains in a deep recession for the seventh consecutive year, due to the rapid worsening of its fiscal situation after the global financial crisis, and to the Greek government commitment to lower its fiscal deficit after the agreement between the Greek government and the International Monetary Fund, the European Central Bank, and the European Commission, for a three-year, €110 billion adjustment loan. The implementation of this strict austerity programme caused a substantial decrease in demand for goods and services pushing the Greek firms to a deep recession. There is a limited number of works that investigate the changes in business strategies and changes in the factors affecting the competitiveness of Greek food and beverages companies during economic downturn (Notta and Vlachvei 2014, 2015a, b, c; Lemonakis et al. 2013; Agiomirgianakis et al. 2013) for food firms and tourism sector. Notta and Vlachvei (2014, 2015a) proved in a sample of food and beverage firms, that there is an actual structural break between the two periods before and after crisis in the estimation of profitability model. According to the results of Lemonakis et al. (2013), the majority of Greek exporting agri-firms were widely influenced by the economic crisis and the lack of sufficient liquidity and financing, while Agiomirgianakis et al. (2013) prove that the age of a firm (credibility effect), firm's size, and low cost access to bank financing are the main factors that may influence positively and substantially the profitability of a firm operating in the tourism sector.

The empirical model of this paper develops further the papers of Notta and Vlachvei (2015a, c), taking into account the changes and the adaptations made by firms in business strategies and the changes in the factors affecting the competitiveness of Greek food and beverages firms due to financial and economic downturn.

59.2 Empirical Research and Results

We chose food manufacturing firms because the Food and Beverage industry continues to hold, in the difficult economic period we are going through, the fundamental role of the Greek economy and the Greek manufacturing industry in general, providing all the conditions in order to remain the country's main engine for growth. The domestic food industry covers almost 1/5 (21.2%) of all manufacturing businesses and employs 25.2% (2012) of the total employees in secondary sector. The sector ranked first in the share of total manufacturing value added in 2012, contributing 24.4% to the total manufacturing and ranked second in terms of production value and turnover in 2012 covering 19.8% and 19.7% of the total production value and turnover of the manufacturing sector, respectively (IOBE 2015). In 2009, when started the recessionary course in the domestic economy, the industry received strong blow in terms of all sizes, recording a substantial drop in these sizes.

In order to improve our understanding about the performance of Greek food manufacturing firms before and during economic crisis we present two surveys. First, case studies of 161 established Greek entrepreneurs involved in food industry

were developed in order to study the changes in business strategies and their impact on the profitability of firms by economic crisis (Notta and Vlachvei 2015c). Second, panel data for the 331 food and beverage manufacturing firms, obtained from the published database of ICAP and HELLASTAT for the period 2005–2012, were used to investigate the role of the financial variables on the profitability of food and beverage manufacturing firms for two different periods, one before and one after the outburst of the economic crisis in Greece (Notta and Vlachvei 2015a).

In the first survey, face-to face semi-structured interviews were conducted with managers at their place of business. The first part of the questionnaire contained questions to collect descriptive data relating to the companies. In the second part, managers were asked to select how much their firms changed the marketing strategies due to the economic crisis after 2010. The final measure included 22 items all assessed on a five-point Likert scale with the anchors 1 = very much decreased, 5 = very much increased. They were asked about: (a) changes in product strategy, (b) changes in pricing strategies, (c) changes in promotion strategy, (d) changes in distribution networks, and (e) changes in other marketing strategies. The survey was conducted in January–September 2014 in firms from 12 different food and beverage industries (Notta and Vlachvei 2015c).

Through the analysis of the principal component method seven factors have been identified explaining together 68.2 % of the variance in the items. The analysis of these coefficients explains the presence of seven leading profiles in the sample survey. They are: (1) promotional oriented (25.46 % of the explained variance); (2) new product oriented (10.84 %); (3) seller oriented (10.12 %), (4) advertising oriented (6.05 %), (5) cost-price oriented (5.77 %); (6) discounts oriented (5.13 %), and (7) B2B markets oriented (4.83 %) (Notta and Vlachvei 2015c).

Based on the seven factor scores associated with each firm a k-means cluster analysis has been conducted and a three group solution has been chosen after the comparison of Euclidean distances among different groups of alternatives (Table 59.1).

Table 59.1 Cluster centers^a

Factor	Cluster		
	1	2	3
Promotional oriented	−0.12749	0.69517	−0.27847
New product oriented	−0.02055	0.78582	−0.37355
Seller oriented	0.32179	−0.13698	−0.08623
Advertising oriented	0.33325	−0.13601	−0.09215
Cost-price oriented	−0.56556	−0.41692	0.47237
Discount oriented	0.68215	−0.67932	0.00694
B2B oriented	0.90883	−0.26346	−0.30373
Number of firms	39	40	82

^aNotta and Vlachvei (2015c)

Thirty nine (39) firms included in the Cluster 1 (about 25 % of the sample). These firms put emphasis on B2B markets, on variation on their pricing methods and on providing discounts to both consumers and intermediates during economic downturn.

In Cluster 2, we meet forty (40) firms (25 % of the sample). These firms are specific target market oriented and they try to provide a more complex and satisfying consumer experience through developing new customized differentiated products and targeting to niche markets of high income, and differentiated preferences (organic, PDO, PGI, etc.). In this group, there is a significant effort to give emphasis on high quality and customized products and to target on very specific and demanding global markets. In order to deliver this differentiation advantage they try to develop new promotional methods focusing on promotional efforts to both consumers and intermediates.

Cluster 3 is the largest cluster and includes 82 firms (50 % of the sample), that due to the economic downturn their main focus is product price. Firms in this group give great emphasis on reducing or at least eliminating production and input cost, in order to maintain their customers and to meet consumers demand so the ability to manage pricing effectively during recession is therefore their main marketing effort.

In the second survey, we collected annual financial data from balance sheets and income statements of 331 food and beverage firms with size greater than 10 employees and active presence through the whole period 2005–2012 (ICAP HELLAS, 2005-2008, HELLASTAT 2008-2012). Firms are derived from ten (10) food and beverage industries: meat, poultry and sausages, preserving of fruits and vegetables, oils and fats, dairy products, wine industry, alcoholic beverages, brewery, water and soft drinks and miscellaneous products (bread, cakes, chocolate and sugar confectionery, tea and coffee, prepared meals, etc.).

To develop this study the following model has been formulated to identify and quantify the factors that explain profitability of food and beverage manufacturing firms operating in Greece, by using panel data analysis over the period of 2005–2012:

$$\text{PROF} = a_0 + a_1\text{MS} + a_2\text{KS} + a_3\text{LIQ} + a_4\text{LEV} + a_5\text{NWFA} + a_6\text{LAGE}$$

PROF is the depended variables and is measured as the ratio of gross profits over turnover while MS is the annual ratio of the firm's sales over the industry sales. The effect of the size variable is expected to show the superior performance of the large firms. KS is the ratio of total assets over sales and it is expected that higher the capital intensity the higher the profitability, as the higher the ratio of capital to sales, the more efficient the use of the capital by the management of the firm. LIQ is given by the ratio of current assets to current liabilities and the ability of firms to convert assets into cash may also impact on performance as resources can quickly be used to respond to profit opportunities. LEV is the ratio of total liabilities to total assets and the higher the leverage ratio, the greater the risks associated with the probability of default by the firm, while lower leverage generally indicates greater financial security. If the ratio of net worth to fixed assets (NWFA) is high, the

Table 59.2 Profitability and financial variables per year, 2005–2012^a

Year	Gross profits/sales	Total assets/sales	Liquidity index	Leverage index	Net worth/fixed assets
2005	0.307	1.487	1.057	0.497	0.808
2006	0.317	1.440	1.161	0.485	0.837
2007	0.319	1.376	1.062	0.498	0.819
2008	0.311	1.386	1.044	0.504	0.778
2009	0.325	1.360	1.115	0.536	0.754
2010	0.302	1.358	1.114	0.524	0.791
2011	0.270	1.352	1.134	0.555	0.758
2012	0.267	1.338	0.895	0.496	0.743

^aNotta and Vlachvei (2015a)

firm can cover its long-term investment requirements from its own capital. Since this capability minimizes the risk of losing capital assets, its consequence is easier funding to achieve a further increase in sales. Thus we expect the impact of this index on profitability to be positive. LAGE is the logarithm of the years a firm is operating in an industry.

According to Table 59.2, profitability increases from 2005 until 2009 and then decreases substantially from 32.5 % in 2009 to 26.7 % in 2012. In order to test whether significant profitability differences between pre-crisis and during crisis exists in the case of Greek food firms we estimated the same model for pre-crisis group (2005–2008) and during crisis (2009–2012), separately. Then we applied Chow-test to examine whether the respective coefficients obtained from the two samples are statistically different. The estimated value for the Chow-test is found $F^* = 5.20$ while the theoretical value of F for $\nu_1 = 7$ and $\nu_2 = 2148 - (2 \times 7) = 2136$ degrees of freedom is 2.90. Thus, $F^* > F.01$ shows that, the coefficients of the variables are different in the two groups and we do have a structural break in the data (Table 59.3).

The results of the econometric analysis suggest that during economic crisis market share, liquidity, leverage, and age have significant effect on profitability and explain profits differences among the firms. The coefficients of market share and liquidity are positive and significant while the coefficients of leverage and age are negative and significant.

These results show that, during crisis, the large and young food firms with adequacy liquidity and low borrowing levels are more profitable than the other firms.

59.3 Conclusions

This paper tries to assess the effect of the economic crisis on firm performance in Greek food and beverage firms. The paper tries to improve our understanding about the performance of Greek food manufacturing firms before and during economic

Table 59.3 Determinants of profitability in Greek food and beverage firms, 2005–2008 and 2009–2012^a

Variables	2005–2008	2009–2012
	Fixed effects estimates of profitability	
MS	−0.28 (−0.48) ^b	1.67 (4.14)**
KS	−0.001 (−3.64)**	0.47 (1.19)
LIQ	0.002 (0.82)	0.002 (2.16)*
LEV	−0.0003 (−0.12)	−0.21 (−3.64)**
NWFA	0.001 (0.47)	−0.61 (−0.04)
LAGE	0.06 (1.94)*	−0.18 (−2.85)**
SSR	49.84536	463.2622
<i>F</i> * test (Chow-test)	5.20	
Hausman test	38.65 6df (0.00)	81.93 6df (0.00)
<i>R</i> ²	0.63	0.95
Adj. <i>R</i> ²	0.476	0.92
Number of observation	1030	1117

^aNotta and Vlachvei (2015a)^b*t*-ratios in parentheses

* and ** denote statistical significance at 5 % and 1 % level, respectively

crisis and to draw conclusions about the changes in business strategies and changes in the factors affecting the competitiveness of food and beverages companies during economic downturn.

In order to accomplish the above, two surveys were presented. In the first survey, case studies of 161 established Greek entrepreneurs involved in food industry were developed (Notta and Vlachvei 2015c). This study provides valuable insights and implications about how to facilitate the marketing strategies and practices during periods of debt crises. More specifically, the majority of firms (50 % of the sample) try to succeed a cost leadership advantage by focusing on the way they handle changes in production and input cost and by reducing or at least maintaining in the same level their product price, in order to meet consumers demand. The second group of firms (25 % of the sample) focuses their efforts to deliver a differentiation advantage by developing high quality and customized products and targeting on very specific and demanding global markets in order to overcome the consequences of crisis inside Greece. Additionally they develop new promotional methods focusing on promotional efforts to both consumers and intermediates. Finally, there is a third group that includes firms which are trying to surpass the economic crisis by developing activities on B2B markets and by providing discounts to both consumers and intermediates.

In the second survey, panel data for the 331 food and beverage manufacturing firms, obtained from the published database of ICAP and HELLASTAT for the period of 2005–2012, were used to investigate the role of the financial variables on the profitability of food and beverage manufacturing firms for two different periods,

one before and one after the outburst of the economic crisis in Greece (Notta and Vlachvei 2015a). According to Chow-test results the coefficients of the variables are different in the two groups which show the existence of a structural break in the data. According to the results of the analysis, there are significant performance changes over the crisis period. The study suggests that during the period of crisis, the large, young, and competitive firms with adequacy liquidity and low borrowing levels are more profitable than the other firms. So, firms should focus on their competitive advantages and keep reasonable levels of debt and sufficient liquidity to service their operations during economic recession.

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