

Eurasian Studies in Business and Economics 14/1

Series Editors: Mehmet Huseyin Bilgin · Hakan Danis

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Ender Demir *Editors*

Eurasian Economic Perspectives

Proceedings of the 26th and
27th Eurasia Business and Economics
Society Conferences



 Springer

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Preface

This is Volume 1—*Eurasian Economic Perspectives*—of the 14th issue of the Springer’s series *Eurasian Studies in Business and Economics*, which is the official book series of the Eurasia Business and Economics Society (EBES, www.ebesweb.org). This issue includes selected papers from two EBES conferences, namely *26th EBES Conference—Prague* and *27th EBES Conference—Bali*. In the 26th EBES Conference, 238 papers by 439 colleagues were presented and in the 27th EBES Conference, 106 papers by 208 colleagues were presented. Both theoretical and empirical papers in this volume cover diverse areas of business, economics, and finance from many different regions. Therefore, it provides a great opportunity to colleagues, professionals, and students to catch up with the most recent studies in different fields and empirical findings on many countries and regions.

Roman Mentlík from the University of Finance and Administration, Czech Republic, joined the 26th EBES Conference and **Euston Quah** from Nanyang Technological University, Singapore, and **Marco Vivarelli** from Università Cattolica del Sacro Cuore in Milano, Italy, joined the 27th EBES Conference as keynote speakers. During those two conferences, participants had many productive discussions and exchanges that contributed to the success of the conference where 344 papers were presented in total. In addition to publication opportunities in EBES journals (*Eurasian Business Review* and *Eurasian Economic Review*, which are also published by Springer), conference participants were given the opportunity to submit their full papers for this issue. Theoretical and empirical papers in the series cover diverse areas of business, economics, and finance from many different countries, providing a valuable opportunity to researchers, professionals, and students to catch up with the most recent studies in a diverse set of fields across many countries and regions.

The aim of the EBES conferences is to bring together scientists from business, finance, and economics fields, attract original research papers, and provide them with publication opportunities. Each issue of *the Eurasian Studies in Business and Economics* covers a wide variety of topics from business and economics and

provides empirical results from many different countries and regions that are less investigated in the existing literature. All accepted papers for the issue went through a peer-review process and benefited from the comments made during the conference as well. The current issue covers fields such as accounting/audit, empirical studies on emerging economies, finance, public economics, and regional studies.

Although the papers in this issue may provide empirical results for a specific county or regions, we believe that the readers would have an opportunity to catch up with the most recent studies in a diverse set of fields across many countries and regions and empirical support for the existing literature. In addition, the findings from these papers could be valid for similar economies or regions.

On behalf of the series editors, volume editors, and EBES officers, I would like to thank all the presenters, participants, board members, and keynote speakers, and we are looking forward to seeing you at the upcoming EBES conferences.

Istanbul, Turkey

Ender Demir

Eurasia Business and Economics Society (EBES)

EBES is a scholarly association for scholars involved in the practice and study of economics, finance, and business worldwide. EBES was founded in 2008 with the purpose of not only promoting academic research in the field of business and economics but also encouraging the intellectual development of scholars. In spite of the term “Eurasia,” the scope should be understood in its broadest terms as having a global emphasis.

EBES aims to bring worldwide researchers and professionals together through organizing conferences and publishing academic journals and increase economics, finance, and business knowledge through academic discussions. Any scholar or professional interested in economics, finance, and business is welcome to attend EBES conferences. Since our first conference in 2009, around *12,011* colleagues from *99* countries have joined our conferences and *6858* academic papers have been presented. ***EBES has reached 2257 members from 87 countries.***

Since 2011, EBES has been publishing two journals. One of those journals, *Eurasian Business Review (EABR)*, is in the fields of industrial organization, innovation, and management science, and the other one, *Eurasian Economic Review (EAER)*, is in the fields of applied macroeconomics and finance. Both journals are published quarterly by *Springer* and indexed in *Scopus*. In addition, EAER is indexed in the *Emerging Sources Citation Index (Clarivate Analytics)*, and EABR is indexed in the *Social Science Citation Index (SSCI)* with an impact factor of *2.143* as of 2018.

Furthermore, since 2014 Springer has started to publish a new conference proceedings series (**Eurasian Studies in Business and Economics**) which includes selected papers from the EBES conferences. The 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th (Vol. 2), and 24th EBES Conference Proceedings have already been accepted for inclusion in the *Conference Proceedings Citation Index—Social Science & Humanities (CPCI-SSH)*. Subsequent conference proceedings are in progress.

We look forward to seeing you at our forthcoming conferences. We very much welcome your comments and suggestions in order to improve our future events. Our success is only possible with your valuable feedback and support!

With my very best wishes,

Klaus F. Zimmermann
President

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Part I
Accounting/Audit

The Impact of Free Cash Flow on Firm's Performance: Evidence from Malaysia



Elaine Kok Suit Lai, Ahmed Razman Abdul Latiff, Ooi Chee Keong, and Tong Chue Qun

Abstract The objective of this chapter is to investigate the impact of free cash flow (FCF) on a firm's performance. This research is using the data from 2013 to 2017 from Malaysia and various industries as the moderating variable. Whereas, firm performance is measured by operating performance, firm value, and stock return as the dependent variables. All the explanatory variables are tested as whether they have any significant relationship on the firm's performance as the dependent variables. The firm performance is measured by the company's accounting performance, which measured by return on asset (ROA) and return on equity (ROE), firm value is measured by Tobin's Q and the stock return measure by stock price. The data collected are categorized into five different industries, which include finance, plantation, industrial products, properties, and consumer goods. This chapter utilizes panel data regression for testing the hypothesis and the results indicated that some do not support the hypothesis. The findings point out that FCF as the independent variables has a significantly negative relationship with the firm's performance, measured by ROA and Tobin Q. Besides that, there is a positively insignificant relationship between ROE and stock return on FCF.

Keywords Free cash flow · Firm performance · Return on asset · Return on equity · Firm value · Tobin's Q · Malaysia

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1 Introduction

Free cash flow (FCF) is the backbone of a firm to represent how the company performs over the year. FCF is important for a firm to where it can measure the company's profitability after all expenses and reinvestment (Jensen 1988). Referring to Jensen (1986), FCF is the net cash flow of operating cash flow less capital expenditure, inventory cost, and dividend payment. The positive, value of FCF of the firm indicates that the firm still has left the sum of money after all the expenses. Besides that FCF is a benchmark to evaluate and analyze the firm health performance. FCF may influence the firm's performance in many different ways. Many researches argue that the larger the firm performs, the higher the FCF the firms have. This study is choosing to examine the FCF toward firm performance in the sense of company operating performance, firm value, and stock return.

Nowadays, many firms are not aligning with the interests of owners and managers, therefore, agency theory occurs among them. One of the agents of shareholder is the corporate manager. The relationships among them are fraught where conflict of interest arises. One of the issues that may arise a conflict between them is the payout of cash to shareholders. The owner of the firm may have a different approach of giving out the payout compare to the shareholder interest. Referring to Easterbrook (1984) and Rozeff (1982), payout to shareholder may reduce the resources where managers have reducing the control power and incur the monitoring of the capital market, which need to firm to obtain new capital for the firm. Firm may need to financing a project internally to increase the firm capital. By having this, the companies may not have a positive value in their FCF.

Manager has the responsibility to make the firm grow beyond the optimal size with a large increment in firm profit. Manager and shareholder have their own responsibilities and duties to the firm. Meanwhile, managers nowadays are hard to differentiate their own responsibilities and task in the company. Hence, agency theory had become a common issue in a firm where both agent and principle are facing it now. Therefore, firms are suggested to improve their corporate governance and business ethics in order to reduce the self-interest motives of management that lead to agency theory and avoid management moral hazard. The risk that a party to a business has not entered into the contract in good faith or has provided misleading information about its assets, liabilities, or credit capacity is called moral hazard. Firms hope that they generate positive value in their FCF where the firm will have additional money and resources to continue their business. By having additional FCF in their business, a firm can increase the firm value and have a more sustainable brand in the customer and competitor mind.

However, many researches had been done on the agency theory issue and FCF. There are similar studies on FCF (e.g., Jensen 1986; Jensen and Meckling 1976). Thus, this study adds value by adding the different groups of data from different industries to study the relationship of FCF on firm performance in the Malaysia context. By grouping the company into different industries, the result will be more reliable and accurate to show the impact of FCF toward firm performance. Therefore,

the purpose of this study is to determine how FCF would impact on firm performance (operating performance, firm value, and stock return) by using the data of listed company in Bursa Malaysia.

The significance of this study relates to the concern arises by the shareholder on which of the FCF structure decision-making will have a significant impact on the firm performance. The FCF will affect the firm performance as the FCF represent the cash that the company is able to generate after setting out the money. Besides that, FCF could give benefit to the investor as well. A good cash flow will tend to attract more investors to invest in a particular firm hence will increase the capital of the firm. Furthermore, this particular study provided to support the manager in making FCF structure decisions will affect the firm performance. The amount of investment being made by the manager will depend heavily on the cash flow of the company. Managers have the obligation to minimize the unnecessary cash flow to enhance the firm performance and maximize the wealth of shareholders. This study could help the shareholder enhance their value by having great opportunities to develop new products or services for the company.

The remainder of this chapter is structured as follows. The next section provides the literature review and theoretical framework. The third section discusses the methodology. Findings and analysis are described in the fourth section. Finally, we present the overall conclusions in the fifth section.

2 Literature Review and Theoretical Framework

2.1 Free Cash Flow

FCF is the net cash value that the firm has after deducted the positive NPV of a project (Jensen 1986). Many researchers had defined FCF differently in many different aspects. According to Jensen (1986), the definition of FCF is the net cash flow of operating cash flow less capital expenditure, inventory cost, and dividend payment. According to Dittmar (2000), the FCF is elaborated as the net cash flow that the management's decision without affecting the operating activities.

Meanwhile, Lehn and Poulsen (1989) said that FCF is defined as the net operating income before depreciation expenses, less tax expenses, interest expenses, and stock dividend scaled by net sales. FCF is used to calculate the required fund of a project in the firm. FCF is the cash flow in excess of the necessary fund of all projects that have positive net present value when discounted at the relevant cost of capital (Jensen 1986). Positive NPV project could have from the FCF, which is the discounted value of all the net operating cash flow. In addition to this, FCF also represents the idle cash flow at the discretion of management in the accounting concept.

The free cash flow hypothesis, which is proposed by Jensen (1986) states that firm would tend to invest unnecessary where there is a negative NPV project when there are too much FCF in the firm hand. When there is a higher level of FCF, it will lead to unnecessary administrative waste and reflect to inefficiency of the firm. The free cash flow theory of capital structure helps to explain how the companies gain their

cash flow result to the effect of financial restructuring. When an organization has substantial FCF for the payout policies, conflict between shareholder and manager will arise (Jensen 1986). When too much FCF, agency costs arise as the burden of shareholder wealth due to internal insufficiency and waste of corporate resources.

2.2 *Industry*

Industry is one of the moderator's variable in this research. A moderator variable may change the strength or the direction of a relationship between two variables. For this study, the top five different industries had been used as the moderator variable between the FCF and the firm performance (operating performance, firm value, and stock return). The top five different industries are finance, plantation, industrial product, properties, and consumer products. The top five biggest industries are based on their market capitalization.

There is not much research that used industries as their moderator's variable. There is only little research that shows consumer goods industry will have a significant impact on FCF. This is because the consumer goods industry needs extra cash in hand to generate more goods in order to increase their production line. There are some industries that are not too concern about their FCF. Therefore, some industries did not show a significant impact on the FCF toward firm performance. For instance, the properties industry contributes low effort on the free FCF toward firm performance. This is because properties industries did not really take their cash in hand into the considerate. Their business still can carry on when there have negative value free cash flow. For the consumer goods industry, FCF plays an important role in this industry. As for this industry, they needed the extra money to do some research and development to enhance their product in terms of packaging and product variety.

2.3 *FCF and Operating Performance, Return on Asset*

Operating performance is measured using the ROA. ROA is one of the common accounting based performance measures that is used to evaluate a firm's performance. ROA, which computed as the ratio of net profit, divided to total assets of the firm.

Jensen (1988) stated that FCF has a negative impact on firm performance, operating performance, and ROA. The relationship is stronger for buyers with fewer growth opportunities because the operating performance changes are negatively related to the amount of free cash flow (Freund et al. 2003). In this study, there will be an expectation of a negative relationship between FCF and operating performance, ROA. This is because with the increases of FCF components will lead to a decrease in operating performance, ROE. Therefore, it is hypothesized that there is a significant negative relationship between FCF and operating performance, ROA.

2.4 FCF and Operating Performance, Return on Equity

Another operating performance is measured using the ROE. ROE is a similar accounting performance measurement where many researchers have been using it as an indicator for measuring a firm's performance. ROE is computed as the ratio of net profit divided to total equity of the firm. Jensen (1988) stated that FCF has a negative impact on firm performance, operating performance, ROE. When the company is highly profitable, the company has a lower debt level. When the company has a higher free cash flow (FCF), it will lower the efficiency of the financial performance. In this study, there will be an expectation of a negative relationship between FCF and ROE. This is because the increases of FCF components will lead to decrease in operating performance. Therefore, it is hypothesized that there is a significant negative relationship between free cash flow (FCF) and operating performance.

2.5 FCF and Operating Performance on Firm Value

Firm value is measured by Tobin's Q. Tobin's Q is often being considered as one of the significant indicators on firm's performance and most of the researchers fully utilize this proxy to measure firm's market value efficiently. Jensen (1988) stated that FCF has a negative impact on firm performance and firm value. Lang (1991) found that FCF would weaken the firm value in merger and acquisition. Many of the researches' on this particular area have similar results where there is a negative relationship between FCF and firm value. In this study, there will be an expectation of a negative relationship between FCF and firm value. This is because the increases of FCF component will lead to a decrease in firm value. Therefore, it is hypothesized that there is a significant negative relationship between FCF and firm value.

2.6 FCF and Operating Performance on Stock Return

Stock return data can be predictable through publicly available information such as time series and financial report of the company. In contrast, the findings from most of the results are quite consistent. Jensen (1988) stated that FCF has a negative impact on firm performance, stock return. According to Ferdinand and Judy, FCF firm is associated with lower firm specification stock return. This is because FCF has interest that are different from the owner where owner pursue to the profit maximizing project meanwhile FCF pursue on non-profit maximizing project. The free cash flow will have an inverse relationship with the stock return (Chung et al. 2005).

In this study, there will be an expectation of a negative relationship between FCF and stock return. This is because the increase of FCF components will lead to a decrease in stock return. Therefore, it is hypothesized that there is a significant negative relationship between free cash flow FCF and stock return.

2.7 Theoretical Framework

Prior to design the research method, it is important to understand how the relationship between the variables is assumed to behave and relate to each other. Below here is the model of theoretical framework for this study as per below (Fig. 1).

3 Methodology

3.1 Research Design

The research philosophy adopted for this study is positivism. Based on Saunders et al. (2016), positivism is a philosophical stance that studies the social reality based on observation to come out generalization conclusion. In fact, it is entirely based on the idea of carrying detaching mindset toward the study and remaining neutral and unbiased toward the collected data. Hence, it is able to yield better clarified result that is based on untainted pure data. Therefore, it is most suitable for a study that examined the relationship between financial data and stock price through a third-person point of view.

3.2 Sampling

From the discussion in the research objectives, the main objective of this chapter is to determine how FCF influences firm performance. The duration for this study will be

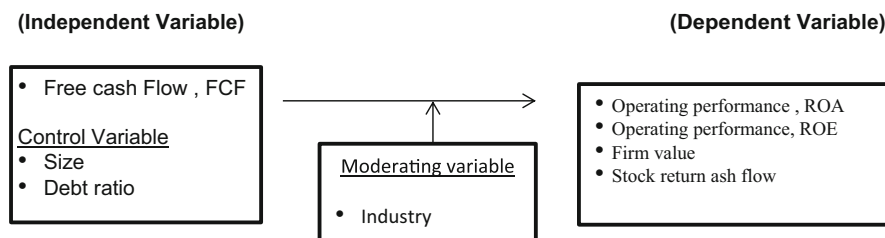


Fig. 1 Research framework and variables used. Source: Developed by the authors

taken for over 5 years period which from year 2013 to 2017. There will be a total of 75 companies listed in bursa main market, which are chosen as sample data for this study. With the total numbers, there will be 15 companies from different top five industry will be chosen. However, to be included in this study, a complete data such as their company annual reports period from year 2013 to 2017 will be needed.

As in this study, the main objective is to determine how FCF influences firm performance. Therefore, it is recommended to choose the samples that are from the homogenous groups of company to have a more accurate result. Elton and Gruber (2011) had recommended for the researchers to separate firms into similar groups within the same characteristics and behavior. In other words, it is recommended in this study as well to classify the firms into industry classification that serve as a basis for comparative analysis. Therefore, this research study uses top 5 biggest market capitalization companies from each industry. Furthermore, for this study, the financial databases that will be fully utilized are from Bloomberg.

3.3 Measurement of Variables

In this study, the dependent variables, which are the firm's performance (operating performance, firm value, and stock return), will be measured by using accounting and market measures. This study used more than one accounting basis measurement which is the ROA and ROE to measure operating performance while Tobin's Q to measure firm value and stock price to measure stock return. According to Ozkan (2001), ROA and ROE are commonly used to measure operating performance of a firm. As for the market-based measures, Tobin's Q measure has commonly used as a proxy to measured firm value (Lang et al. 1991). ROA and ROE were being chosen and utilized in this study because they are one of the most common and important accounting based measurements that been able to determine the firm's efficiency in utilizing all the assets and equities that are transformed into profits.

The independent variables for this study will be the FCF as it had been mentioned in theoretical framework. FCF could be defined as operating net income before depreciation expenses, less corporate income tax, interest expenses, and cash dividend. The FCF can indicate how much the actual cash flow is available for the firm to exercise. According to Ferdinand and Judy, FCF was scaled by the net sales under the consideration of firm size.

3.4 Control Variables

There are few control variables will be used in this study, which is the firm size and financial leverage. There were several researchers who have suggested that firm's size will have impact on firm's performance as well (Jermias 2013; Ebaid 2009). Demsetz and Lehn (1985), and Ferdinand and Judy said that a larger firm size

may lead to higher firm performance. According to Fama and French, there is a positive relationship between firm size and firm performance. As the larger firms have more well-equipped resources, enjoy more benefits than those with smaller firms, and hence affects the firm's performance. In this study, the relative size of firms will vary according to the industry to which the firms belong. Therefore, the size of the firms will be measured by using the logarithm of total assets of the firm as a control variable in the model to control the effects of firm size on dependent variables. Other than firm size, financial leverage is one of the control variables as well. According to Myers (1977) and Easterbrook (1984), financial leverage could influence firm performance where the debt ratio was included in the regression model. The financial leverage is measured by debt ratio and total debt.

3.5 Empirical Model

To test the first hypothesis where FCF has a negative impact on operating performance will be tested as following equations:

$$ROE_{it} = \alpha + \beta_1 FCF_{it} + \beta_2 Size_{it} + \beta_3 DA_{it} + Size_{it} + \xi.$$

$$ROA_{it} = \alpha + \beta_1 FCF_{it} + \beta_2 Size_{it} + \beta_3 DA_{it} + Size_{it} + \xi.$$

Meanwhile to test the second hypothesis where FCF has a negative impact on firm value will be tested as following equations:

$$\text{Tobin } q_{it} = \alpha + \beta_1 FCF_{it} + \beta_2 Size_{it} + \beta_3 DA_{it} + Size_{it} + \epsilon.$$

In order to test the third hypothesis where FCF has a negative impact on stock return will be tested as following equations:

$$Ri_{it} = \alpha + \beta_1 FCF_{it} + \beta_2 Size_{it} + \beta_3 DA_{it} + Size_{it} + \epsilon.$$

where

FCF = Free cash flow

Size I, t = Logarithm of total assets for firm 1 in year t

DA = Debt ratio

ϵ = Error term

In order to determine the relationship between the various variables correlation in this study as well as to determine the impact of FCF on firm performance, Pearson correlation models will be considered. Meanwhile, all the hypotheses are tested using the ordinary least square (OLS) regression models to have a more accurate and reliable result.

Before conducting the regression analysis, normality test is being used to determine whether a set of data are normally distributed. There are numerous ways to test the normality and for this study, skewness and kurtosis will be utilized. Thus, it is critical and vital to conduct normality test were to determine that the data are normally distributed from the reliable results of the regression analysis. From the early stage of this study, the observation data that will be chosen for this research has been clearly stated as to choose from different top five industries. Lastly, EVIEWS will be using to analyze the relation between the variables in this research.

4 Findings and Analysis

4.1 Descriptive Analysis

Table 1 shows the summary of the descriptive statistics for both independent variable and dependent variable that had been used in this research. Based on the Table 1, ROA has the lowest mean, which is 0.0607. The highest mean is the size which is the control variable has 6.6562. Mean measure the average of the data.

The mean for the dependent variables that measured firm's performance by accounting based measures, which consist of ROA and ROE, firm value measured by Tobin's Q and stock return measure by the stock price. The mean ROA, ROE, Tobin's Q, and stock return are 0.0607, 0.1383, 0.7094, and 0.1547, respectively. The mean of the independent variable is the FCF is 2.2261. Meanwhile, the control variable in this research consists of size and debt ratio. The mean size and debt ratio are 6.6562 and 0.0903, respectively.

Table 1 Descriptive statistics

Variables	ROA	ROE	Tobin Q	Stock return	FCF	Size	Debt ratio
Mean	0.0607	0.1383	0.7094	0.1547	-2.2261	6.6562	0.0903
Standard error	0.0029	0.0056	0.0146	0.0215	0.0945	0.0779	0.0055
Median	0.0516	0.1226	0.08253	0/1021	-2.3910	6/7590	0.0447
Standard deviation	0.0535	0.1042	0.2735	0.4022	1.7687	1.4578	0.1037
Sample variance	0.00209	0.0109	0.0748	0.1618	3.1284	2.1251	0.0108
Kurtosis	4.5866	10.2757	0.3177	23.6926	0.6601	-0.0094	-0.2144
Skewness	1.6766	2.5207	-1.3402	3.1062	0.1763	-0.2646	0.9685
Range	0.4324	0.8725	0.9129	4.6181	11.0153	7/9235	0.4151
Minimum	-0.0663	-0.1526	0.0747	-0.6471	-9.0073	1.7506	0.0000
Maximum	0.3361	0.7199	0.9876	3.9710	2.0079	9.6741	0.4151

Source: Own calculation

4.2 Pearson Correlation Matrix

From Table 2, it shows that the entire variables are correlated to each other where all the value of the correlation is less than 0.80. Table 2 shows that size and ROA are the most correlated where the value is the smallest among all, which is 0.08. ROE and ROA show that they are slightly correlated where the value is 0.723. This is because the ROA and ROE are almost measuring the same thing that used different variables. Both of these are an accounting measure that measures the firm performance.

4.3 Regression Analysis

Table 3 shows the coefficients table used in the regressions analysis. The t and significant value for the independent variable in which FCF is shown in Table 3 as well. In order to show the significance among the two variables, the value should be lower than 0.1 level of significance. Besides that the properties sector has been taken out as it shows the variable with a low tolerance contributes little information to this model, with reference to the column for ROA, the t value for the FCF has the negative value which reflects that there is a negative relationship between the FCF and the dependent variables, ROA. From Table 3, the value for the FCF is negative and significant. This shows that the relationship between FCF and ROA is significantly negative. From Table 3, financial leverage is significant negative relationship with ROA. Plantation, industry, and consumer product sectors show that there is a significant positive relationship with ROA. This shows that these sectors are important to the relationship between FCF and ROA. The finding is consistent with those Gregory (2005) and Chang research. Therefore, the hypothesis one that suggested that there are significant negative relationship between free cash flow (FCF) and ROA is accepted.

For H2, the significant value for the FCF with ROE is positive but insignificant. This shows that the relationship between FCF and ROE is not significantly positive.

Table 2 Pearson correlation matrix

Variables	ROA	ROE	Tobin Q	Stock return	FCF	Size	Debt ratio
ROA	1	0.723 ^a	0.194 ^a	0.119 ^b	-0.383 ^a	0.080	-0.121 ^b
ROE	0.723 ^a	1	-0.229 ^a	0.135 ^b	-0.051	0.304 ^a	-0.063
Tobin Q	0.194 ^a	-0.229 ^a	1	-0.037	-0.565 ^a	-0.386 ^a	0.148 ^a
Stock return	0.119 ^b	0.135 ^b	-0.037	1	0.043	0.021	-0.024
FCF	-0.383 ^a	-0.051	-0.565 ^a	0.043	1	0.088	-0.097
Size	0.080	0.304 ^a	-0.386 ^a	0.021	0.088	1	0.286 ^a
Debt ratio	-0.121 ^b	-0.063	-0.148 ^a	-0.024	-0.097	0.286 ^a	1

^aCorrelation is significant at 0.01 (2-tailed)

^bCorrelation is significant at 0.05 (1-tailed)

Source: Own calculation

Table 3 Linear regression analysis

Variable	Expected signs	ROA	ROE	Tobin Q	Stock return
FCF	–	–0.006*** (–3.533)	0.014 (0.534)	–0.014*** (–4.084)	0.026* (1.689)
Size	–	0.003 (1.392)	0.000** (0.112)	–0.022** (–4.802)	–0.008 (–0.414)
Debt ratio	?	–0.086*** (–3.178)	–0.060 (1.085)	0.050 (0.883)	–0.012 (0.960)
Fin	?	–0.009 (–0.844)	0.055*** (2.656)	–0.574*** (–27.182)	–0.007 (0.937)
Pla	?	0.028*** (3.501)	0.049*** (3.029)	0.044*** (2.637)	0.039 (0.541)
Ind	?	0.0025** (2.893)	0.041** (2.328)	–0.005 (0.279)	0.140* (1.805)
Cons	?	0.057*** (6.297)	0.137*** (7.340)	–0.049*** (–2.577)	0.149* (1.786)
Constant		0.015 (0.236)	0.014 (0.534)	0.937*** (35.853)	0.201* (1.763)
N		525	525	525	525
R-squared		0.336	0.514	0.889	0.021
Adjusted R-squared		0.322	0.249	0.887	0.001

Note: ROA is the return on asset (Net profit/total assets), ROE is the return on equity (Net profit/total equity), Tobin's Q = $MVA + PS + Debt/TAB$, Stock Return = $(P1 - Pt - 1)/Pt - 1$, $FCF = (OCF - Tax - IExp - CDiv - PDiv)/sales$, Size = $\ln(Sales)$, DA = Debt/Assets, Fin is the indicator variable where 1 for finance sector; 0 otherwise, Pla is the indicator variable where 1 for plantation sector; 0 otherwise, Ind is the indicator variable where 1 for industry sector; 0 otherwise and Cons is the indicator variable where 1 for finance sector; 0 otherwise. T-statistics are given in parenthesis

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Own calculation

Size has significant and positive relationship with ROE. Besides that finance, plantation, industry, and consumer products sector shows that there is significant. This shows that those sectors are important to the relationship between FCF and ROE. Therefore, the hypothesis two suggested that there is significant negative relationship between FCF and ROE is rejected.

From the same table, the significant value for the FCF with Tobin Q is negative and significant. This shows that the relationship between FCF and Tobin Q is significant negative. Size has significant but negative relationship with Tobin Q. Besides that finance, plantation and consumer product sector shows that there is negative significant relationship with Tobin Q. This shows that those sectors are important to the relationship between FCF and Tobin Q. Therefore, the hypothesis three that suggested that there are significant negative relationship between FCF and Tobin Q is accepted.

Last but not least, the significant value for the FCF with stock return is positive and significant. This shows that the relationship between FCF and stock return is significant but positive. Besides that there the industry and consumer product sector

are significant with stock return. Therefore, the hypothesis four that suggested that there are significant negative relationship between FCF and stock return is rejected.

From the result show above it show that there are two hypotheses are accepted in this research. The previous studies from Gregory (2005) stated that all the hypothesis is accepted without the type of industry/sector variables. This study added value by categories, the public listed company in Bursa Malaysia stock exchange into the top five biggest industries. In this study, the consumer product sector is important to all firm performance (operating performance, firm value, and stock return). That means not every industry will need the extra cash in hand to run the business. The importance of FCF could lead the company to run the business operating more smoothly.

5 Conclusion and Recommendation

5.1 Conclusion

The main objective of conducting this research is to find the relationship between FCF and firm performance (operating performance, firm value, and stock return). Thus, the firm performances measured by basis accounting measurement (ROA and ROE), firm value (TobinQ), and stock return (stock price) with 375 companies listed in Bursa Malaysia stock exchange for the total of 5-year period (2013 to 2017).

From the findings in Sect. 4 show that the ROA and firm value have correlation relationship with FCF. When FCF is increased it has a direct impact on the ROA and the firm value. Besides that, plantation, industry, and consumer product sectors have significant relationship with ROA. This shows that ROA is highly important for the firm in order to generate a smooth business activity. Meanwhile, the properties industry does not give any impact to firm performance and was excluded from the regression model. In order to have a more accurate finding, 350 companies had been used insists of 375 companies that listed in Bursa Malaysia stock exchange. The result is generated using 350 companies where a company from each industry had been taken out due to the high value of ROE that the companies have. Two of my hypothesis is accepted in this study where the finding is consistent with those Gregory (2005) and Chang research. As for the ROA, FCF, debt ratio, plantation, industry, and consumer product sectors have a significant relationship on ROA. This shows that the FCF variable is found to be significantly, negatively associated with ROA. As for ROE, FCF has a positively not significant impact on ROE. This shows that the FCF variable is found to be not significant, positively associated with ROE. As for the Tobin Q, FCF has a significant negative impact on Tobin Q. This shows that FCF variable is found to be significantly, negatively associated with Tobin Q. As for stock return, FCF has a positive but not a significant impact on stock return. This shows that FCF variable is found to be not significant, positively associated with stock return.

5.2 *Limitation*

There are several limitations while doing this research. Firstly, this study is to find the impact of FCF on firm performance with the industry as the moderator. One of the sectors had been tested that there contribute a low relationship to this study. By having more time, properties sector could be replaced with other industries to have more accurate results in the finding.

Besides that, the sample size of each industry is under consideration. With the larger number size in each type of industry, the result will be more accurate where the researcher may know which type of industry is very important contribution to FCF and firm performance. Furthermore, there are lack of evidence supporting the FCF hypothesis. With more supporting evidence, FCF hypothesis could be tested by using a more different variable.

5.3 *Suggestion for Future Research*

In future research, this chapter should get more data and have FCF hypothesis to be tested the relationship between them. This can be done by including the privately held companies and not only just focusing on public listed company only. However, the availability of information should be considered when using privately held companies as the sample for the future study. Besides, the companies used in this study could be from other countries and not just only focus on Malaysian companies only. By having more different companies from more countries, the result could be better to show the relationship between FCF and firm performance (operating performance, firm value, and stock return). Lastly, the values that are needed for all the variables need to be counter checked so that all the values did not have any error in it. This could generate a more accurate and reliable result.

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The Analysis of the Appliance of Fair Value Concept in Croatian Companies from Real Sector



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Abstract The fair value concept, as a prevailing measurement base in contemporary financial reporting, is introduced by International Financial Reporting Standards (IFRSs) and is also implemented in Croatian Financial Reporting Standards (CFRSs). The basic aim of this chapter is to identify to what extent Croatian companies from real sector are using fair value concept for measuring assets and liabilities. In order to fulfill the basic goal of the chapter, the research regarding the implementation of fair value concept is conducted in Croatian companies from real sector in 2016. Research sample was constituted of 100 Croatian companies from real sector. The sample was created by random sampling and each company had the same probability of selection. The research is carried out through the analysis of companies' accounting policies disclosed in notes to the financial statements. Research results confirm that Croatian companies from real sector mostly apply cost concept in regards to fair value concept. Research results have also indicated that fair value concept is mostly applied in measuring land, properties, plant and equipment, biological assets, and financial instruments, although, its application is not widely used among Croatian companies from real sector.

Keywords Fair value · Subsequent measurement · Market prices · Real sector · IFRS · CFRS

1 Introduction

The question of assets' and liabilities' measurement is currently the most important matter in contemporary accounting theory and practice. Since the late 1990s of the twentieth century, historical cost was the dominant measurement concept.

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According to cost concept, assets and liabilities were evaluated at acquisition cost and therefore presented in financial statements. This concept can provide financial statements' users with adequate and accurate information about the value of assets and liabilities only if acquisition cost does not significantly differ from their market values at the financial reporting date. However, as the economic conditions during time have changed and market prices, as the consequence, slightly increased, historical cost concept has no longer provided financial statements' users with adequate and accurate information about the value of assets and liabilities. So, the need for new measurement concept has occurred and the solution, suggested by the stakeholders, has been given in the form of fair value concept. The appliance of fair value concept requires that certain categories of assets and liabilities are evaluated at fair value at the financial reporting date and the fair value is usually determined on (exit) market prices of corresponding assets and liabilities on active markets. If the (exit) market prices for certain asset or liability are not visible or the market is not active, then fair value must be assessed based on all relevant market information or, in the lack of market information, nonmarket parameters. The introduction of fair value concept as a concept for assets' and liabilities' subsequent measurement raised many controversies among accounting scientists and professionals. Fair value concept "works" almost perfectly well when market prices of particular asset or liability on active markets are disposable. But, when market prices on active markets are not disposable, then fair value must be assessed and this assessment can result in financial statement manipulation. This potential financial statement manipulation resulted from the implementation of fair value concept is the main argument for opponents of fair value concept who considered that this measurement concept acted as an accelerator of recent global financial crises. Regardless of all the arguments of the opponents, fair value concept "has survived" global financial crises and it has been improved by financial reporting (accounting) standard setters and today it became the prevailing concept of assets' and liabilities, subsequent measurement.

Various studies examine the fair value concept from different points of view. Some of them analyze the significance of fair value in recent financial crisis (Veron 2008; Laux and Leuz 2010; Masood and Bellalah 2014; Masoud and Daas 2014), while others are directed on the impact of fair value accounting on financial reporting and consequently on management earnings (Burghstahler et al. 2006; Cardao-Pito and Barros 2016). Also, some researchers state the arguments for the implementation of fair value accounting emphasizing its advantages and weaknesses (Kaya 2013; Palea 2014).

The key goal of this chapter is to identify to what extent Croatian companies from real sector are using the fair value concept as a concept of assets' and liabilities' subsequent measurement. The main focus of this chapter is on companies from real sector, because, according to existing accounting standards applied in Croatia, these companies can apply fair value concept, but in most cases this concept is not obligatory but voluntary. Contrary to companies from real sector, entities from financial sector are, in most cases, obliged to apply fair value concept as the subsequent measurement concept. The chapter also includes the analysis of effects on financial statements arising from the fair value implementation.

2 Literature Review

2.1 *The Comparison of Historical Cost and Fair Value Measurement Base*

There are two main concepts (or bases) for measuring economic categories in contemporary accounting literature and profession and these are historical cost and fair value measurement base. Based on these two measurement concepts, historical cost and fair value accounting are developed for financial reporting purposes. Historical cost concept assesses the value of certain economic category (primarily asset or liability) at its purchase cost, while fair value measurement base requires the assessment of market value or recoverable amount of particular assets on a regular basis (Greenberg et al. 2013). Standard setters allow the application of both concepts and accounting.

Until the late twentieth century, the cost concept was the dominant model for measuring all economic categories at its initial and subsequent measurements. In modern contemporary financial reporting systems, cost concept is still used for measuring all economic categories at their initial recognition. The crucial advantages of cost measurement base in comparison with other measurement concepts are the simplicity of its determination and the existence of appropriate accounting documents, which prove the amount of cost for measurement purposes. At initial measurement, cost of a particular asset is the sum of fair values of assets given and liabilities transferred for acquiring an asset. Historical cost of assets is reduced for amortization and impairment while historical cost of liabilities is increased if liabilities become onerous (International Accounting Standard Board 2018). The application of historical cost does not allow the adjustment of carrying amount of assets for any increases which lead to the value of assets above its initial cost.

Fair value concept was implemented in the late twentieth century and now it is the dominant concept for measuring economic categories. International Accounting Standards Board officially implemented fair value accounting in the middle of the 1970s, as an approach opposed to historical cost (Shanklin et al. 2011). The first step in fair value accounting introduction is to enable for certain types of economic categories to be evaluated at their fair values at the financial reporting date. If business entity uses fair value accounting for certain assets and liabilities, it has to readjust the value of these assets on its balance sheet at least once in a year to reflect changes in market price. Further steps in fair value introduction and application emphasize the significance of approaches and methods used to assess assets' and liabilities' fair values. The adoption of IFRS 13 Fair value measurement resulted in the systematization of approaches and methods for determining the fair value of a particular asset or liability.

Appropriateness of the implementation of fair value measurement base is a considerable issue of argument by setters of accounting standards as well as investors, academics, regulators, and others. Gulin et al. (2017) conclude that financial statements under fair value are more useful for users than those based on historical

cost. Hsu and Lin (2016) define that if it is allowed to present unrealized gains or losses into reported income, managers in companies with more level 3 financial instruments will probably more manipulate with level 3 inputs in fair value measurement and consequently with reported earnings.

2.2 *Determination of Fair Value*

The appropriate measurement of economic categories is a crucial factor in financial reporting so that financial statements fairly and confidentially show the economic activity of the business entity as well as its financial position and financial success (Prochazka 2011). Majercakova and Skoda (2015) point out that users should be provided with the cost of every particular investment along with the information of resources that have to be spent in order to assign the fair value. In other words, it is not sufficient just to apply fair value concept for measuring certain assets and liabilities, but users also have to understand the way the fair value is assessed along with the costs of assessment.

The publication of IFRS 13 Fair value measurement is one of the results of common project of accounting standards harmonization at the global level between International Accounting Standards Board and the United States Financial Accounting Standards Board. IFRS 13 includes the definition of fair value, the framework for measuring the fair value for all assets and liabilities as well as required disclosures of fair value.

According to IFRS 13, fair value presents the exit market price for selling an asset or transferring a liability under the presumptions that market participators would apply in order to determine the price of the corresponding assets or liability in contemporary market situation. Thus, fair value is a measure based on all relevant market information, and it is not a business entity-specific measure (International Accounting Standard Board 2013).

For the purpose of increasing the comparability and consistency of determined fair value measures and corresponding fair value disclosures, IFRS 13 introduced the hierarchy of fair value (Hladika et al. 2017), which categorizes inputs for measuring fair value into three levels—level 1, level 2, and level 3.

The highest priority in fair value determination is given to unadjusted market prices of identical assets and liabilities in active markets (level 1), while the least priority is given to nonmarket inputs (level 3). So, the best indicator of fair value is the quoted market price of identical asset, on identical location and in identical condition, and under identical contract characteristics. If this information is not disposable, the business entity needs to assess the fair value based on other available market information or, if market information is not disposable, under nonmarket information. Nevertheless, the goal of fair value determination is to ensure the most reliable assessment of fair value (International Accounting Standard Board 2013).

Zyla (2013) points out the question of corresponding disclosures in fair value hierarchy when the market is considered illiquid and distressed. In such

circumstances, the business entity estimates fair values on inputs from level 2 or level 3 and applies a mark-to-model approach. The disclosures of fair values based on inputs with low transparency (level 3) are less value relevant than the disclosure of fair values under transparent market inputs (level 1 and level 2) (Song et al. 2010). Determining the true fair value of an asset is sometimes arguable, especially for assets that do not have active and liquid markets (Jaijairam 2013). The appointment of fair value for liquid assets or liability is very difficult, complex, and based on more or less relevant assessments. Finally, regarding existing relevant literature, it is evident that fair value accounting is not perfect (Majercakova and Skoda 2015).

2.3 *Application of Fair Value Accounting in Measuring Assets and Liabilities*

In modern contemporary accounting systems, either national or international, there is an increasing number of international and national accounting standards which allows or require the use of fair value accounting in measuring certain economic categories for financial reporting purposes. In Croatia, micro, small and medium companies carry out financial reporting applying Croatian Financial Reporting Standards (CFRSs), while large companies and public interest entities carry out financial reporting under International Financial Reporting Standards (IFRSs). Table 1 presents the categories of assets and liabilities that are permitted or required for measuring at fair values as well as how to recognize the effects of changes in their fair values between the two reporting dates in the financial statements according to actual International and Croatian Financial Reporting Standards.

Table 1 Assets and liabilities required for measuring at fair values according to IFRS/IAS and CFRS

IAS/IFRS and CFRS	Asset/liability	Subsequent measurement	Effects of changes in fair value
IAS 41 CFRS 17	Biological assets and agricultural products at the point of harvest	Fair value less costs to sale	Profit and loss account
IFRS 9 CFRS 9	Financial assets at fair value through profit and loss	Fair value	Profit and loss account
IFRS 9	Financial assets at fair value through other comprehensive income	Fair value	Equity (other comprehensive income)
CFRS 9	Financial assets available for sale	Fair value	Equity (fair value reserves)
IFRS 9 CFRS 13	Financial liabilities at fair value through profit and loss	Fair value	Profit and loss account

Source: Authors' systematization according to the Official Journal of the European Union (2008) and Official Gazette (2015)

Table 2 Assets permitted for measuring at fair values according to IAS/IFRS and CFRS

IAS/IFRS and CFRS	Asset	Subsequent measurement	Effects of changes in fair value
IAS 16	Property, plant, and equipment	Cost model or revaluation model	Equity (other comprehensive income)
CFRS 6	Fixed assets (property, plant, and equipment)	Cost model or revaluation model	Equity (revaluation reserves)
IAS 27	Investment in subsidiaries, associates, and joint ventures	Cost or fair value or equity method	Profit and loss account or equity (other comprehensive income)
IAS 38 CFRS 5	Intangible assets	Cost model or revaluation model	Equity (other comprehensive income)
IAS 40 CFRS 7	Investment in properties	Fair value model or cost model	Profit and loss account
IFRS 6	Mineral resources	Cost model or revaluation model	Equity (other comprehensive income)

Source: Authors' systematization according to Official Journal of the European Union (2008) and Official Gazette (2015)

Assets permitted for measuring at their fair values are systemized in Table 2 along with the way the changes in their fair values are recognized in accounting records and financial statements.

In Tables 1 and 2 show how the elected accounting policies for measuring economic categories can considerably affect on financial position and financial success and also on management decisions about future companies' actions.

Many fair value accounting opponents emphasize that there is a significant possibility of manipulation with financial statements (and therefore with financial position and financial success) of business entity which apply fair value accounting. Manipulations with fair value usually occur when fair value is assessed on level 2 and, particularly level 3 inputs (Gulin and Hladika 2016). Laux and Leuz (2010) point out that the historical cost concept or accounting based on initial purchase cost or amortized cost does not provide any place for manipulation.

3 Research Methodology

The aim of the research is to determine the categories of assets and liabilities in Croatian companies from real sector that are commonly measured at their fair value. The data for the purpose of conducting the research are gathered from publically available financial statements of large entrepreneurs and medium-sized entrepreneurs from real sector in Croatia in 2016. The research sample includes business

entities that have submitted their financial statements in the Register of annual financial statements kept by the Financial Agency. Research sample is constituted of 100 Croatian companies from real sector. The sample is created by random sampling and every company had the same probability of selection. Authors have analyzed the companies' accounting policies used for measuring certain assets that are disclosed in notes to the financial statements.

Since the companies can apply fair value concept for subsequent measurement of land, properties, plant, and equipment as well as investment in properties, and considering the fact that these types of assets are the most common in companies from real sector, we assume that the majority of Croatian real sector companies use fair value concept for these types of assets. So, for the purpose of achieving the primary research goal, these three hypothesizes are set up:

1. Hypothesis 1. Fair value concept is the most commonly applied model for measuring land in large entrepreneurs and medium-sized entrepreneurs in real sector in Croatia.
2. Hypothesis 2. Fair value concept is the most commonly applied model for measuring properties, plant, and equipment in large entrepreneurs and medium-sized entrepreneurs in real sector in Croatia.
3. Hypothesis 3. Fair value concept is the most commonly applied model for measuring investment in properties in large entrepreneurs and medium-sized entrepreneurs in real sector in Croatia.

For the purpose of testing the hypothesizes of the paper, a descriptive statistical analysis is used along with the z -test for difference in proportion.

4 Research Results

Companies that constitute the research sample are analyzed according to the size and activity. The structure of the sample according to companies' size is shown in Table 3.

Furthermore, the structure of the sample according to companies' basic business activity is presented in Table 4.

As we have analyzed large- and medium-sized entrepreneurs from real sector in Croatia, large-sized entrepreneurs apply International Financial Reporting Standards (IFRS) while medium-sized entrepreneurs have to apply Croatian Financial Reporting Standards (CFRS). The results of the analysis of the notes have shown

Table 3 Companies included in the sample according to their size

The size of a company	Number of companies
Medium	50
Large	50
Total	100

Source: Authors

Table 4 Companies included in the sample according to their basic business activity

Business activity	
Production	27%
Merchandising	18%
Services	55%
Total	100%

Source: Authors

that companies relatively mostly apply fair value concept for biological asset than for land and properties, plant, and equipment. Percentage of fair value usage is calculated as percentage of the number of companies that have expressed observed type of property. Table 5 shows the appliance of fair value concept in companies based on the size of a company.

As it can be seen from Table 5 large companies mostly apply fair value concept in measuring land. Also, 38% of all observed large companies have investment in financial assets, classified as financial assets at fair value through profit or loss or financial assets available-for-sale. As in the research, we have analyzed financial statements and notes for 2016 year, companies have applied IAS 39 and that is the reason why companies had these categories of financial assets.

Medium companies mostly apply fair value concept for biological assets, what is expected because according to IAS 41, biological assets and agricultural products should be evaluated at fair value reduced by the estimated costs to sell, except if fair value cannot be certainly determined. Fair value concept is mostly applied also on properties, plant, and equipment with a share of 18% of all companies that have this type of assets. Medium-sized companies have significantly less investment in financial assets with a share of 10%.

Analyzing the appliance of fair value concept according to primary business activity, it can be concluded that mostly production and merchandising companies apply fair value. Table 6 shows the appliance of fair value concept according to primary business activity.

Analyzing production companies, it is determined that companies mostly apply fair value for biological assets, investment in properties, and land because more than 20% observed companies that have these types of assets use fair value concept. Merchandising companies used fair value concept mostly for measuring land. Service companies used the fair value concept less than others, which can be explained by the specific of the business, and because of simplifying subsequent measurement.

Descriptive analysis of the research results shows that companies are mostly applying historical cost concept, except for biological assets for which 50% of companies are using fair value concept. Although the result should be taken with caution because in sample we have only four companies that have biological assets in their financial statements.

Descriptive analysis results are tested using the z -test for difference in proportion. Hypothesis 1 claims that fair value concept is the most commonly applied model for measuring land in large entrepreneurs and medium-sized entrepreneurs in real sector

Table 5 The usage of fair value concept based on the size of companies

Companies according to size	Usage of fair value concept							
	Land	Properties, plant, and equipment	Investment in properties	Intangibles	Mineral resources	Biological assets	Financial assets	Financial liabilities
Large	22%	12%	15%	0	0	0	38%	0
Medium	16%	18%	6%	0	0	50%	10%	0

Source: Authors

Table 6 Appliace of fair value concept according to primary business activity

Companies according to primary business activity	Application of fair value concept							
	Land	Properties, plant, and equipment	Investment in properties	Intangibles	Mineral resources	Biological assets	Financial assets	Financial liabilities
Production companies	22%	15%	29%	0	0	50%	20%	0
Merchandising companies	28%	18%	13%	0	0	0	10%	0
Service companies	15%	15%	5%	0	0	0	18%	0

Source: Authors

in Croatia. For the purpose of testing this hypothesis, it is used z -test for difference in proportion, where it is assumed that more than 50% of large- and medium-sized companies from real sector applied fair value model for measuring land. The null hypothesis says that 50% or less large- and medium-sized entrepreneurs in real sector in Croatia use fair value concept in subsequent measurement of land. Based on the z -test for proportion results (z -test statistic = $-6,2$; upper critical value = 1.64485 ; p -value = 1), we can conclude that at the level of significance of 5%, the hypothesis that more than 50% of large- and medium-sized companies in Croatia mostly apply fair value in measuring land cannot be confirmed. Therefore, hypothesis 1 which refers to the fair value model as the most commonly applied model of measuring land in large and medium companies from real sector in Croatia can be rejected.

Hypothesis 2 claims that fair value concept is the most commonly applied model for measuring properties, plant, and equipment in large entrepreneurs and medium-sized entrepreneurs in real sector in Croatia. For the purpose of testing this hypothesis, it used z -test for difference in proportion, where it is assumed that more than 50% of large- and medium-sized companies from real sector applied fair value model for measuring properties, plant, and equipment. The null hypothesis says that 50% or less large- and medium-sized entrepreneurs from real sector in Croatia use fair value concept for subsequent measurement of properties, plant, and equipment. According to the z -test for proportion results (z -test statistic = -7 ; upper critical value = 1.64485 ; p -value = 1), at the level of significance of 5%, we cannot confirm that more than 50% of large- and medium-sized companies in Croatia mostly apply fair value model. Therefore, hypothesis 2 which refers to the fair value model as the most commonly applied model for measuring properties, plant, and equipment in large and medium companies from real sector in Croatia can be rejected.

Hypothesis 3 claims that fair value concept is the most commonly applied model for measuring investment in properties in large entrepreneurs and medium-sized entrepreneurs in real sector in Croatia. For the purpose of testing this hypothesis, it is used z -test for difference in proportion, where it is assumed that more than 50% of large- and medium-sized companies from real sector applied fair value model for measuring investment in properties. The null hypothesis says that 50% or less large- and medium-sized entrepreneurs from real sector in Croatia use fair value model in measuring investment in properties. z test for proportion results (z -test statistic = -4.76757 ; upper critical value = 1.64485 ; p -value = 0.99999) suggest that, at the level of significance of 5%, the hypothesis that is more than 50% of large- and medium-sized companies in Croatia mostly apply fair value model cannot be confirmed. Therefore, the hypothesis 3 about the fair value model as the most commonly applied model for measuring investment in large and medium companies from real sector in Croatia can be rejected.

Biological assets and its application of fair value concept cannot be tested by z -test because we have only four companies that have expressed this asset in its financial statements, and the sample is too small for using this test.

5 Conclusion

In a majority of today's modern financial reporting systems, fair value concept is the prevailing concept of assets' and liabilities' subsequent measurement. International Financial Reporting Standards (IFRSs) have fully implemented fair value concept in the late 1990s by developing IAS 39 Financial Instruments: Recognition and Measurement which enabled that certain categories of financial instruments (financial assets and liabilities at fair value through profit or loss and financial assets available for sale) can be measured at their fair values at the reporting date. After that initial full introduction, the model of fair value is slightly spreading to other nonfinancial assets (properties, plant and equipment, intangibles, mineral resources, biological assets, etc.) becoming the dominant concept of subsequent measurement. Fair value concept is, similarly to IFRSs, implemented in Croatian Financial Reporting Standards (CFRSs).

The initial goal of this chapter refers to the identification of the effects of the appliance of fair value model according to IFRSs and CFRSs on entity's financial situation and financial results and to identify which categories of assets and liabilities, which can be evaluated at fair value, are actually evaluated at fair value in Croatian companies from real sector. According to the analysis conducted on contemporary IFRSs and relevant literature, the following types of assets and liabilities must be subsequently evaluated at fair value: (a) financial assets at fair value through profit and loss; (b) financial assets at fair value through other comprehensive income; (c) biological assets and agricultural products at the point of harvest; and (d) financial liabilities at fair value through profit and loss. The categories of assets permitted to be evaluated at their fair values at the date of financial reporting are (a) properties, plants, and equipment; (b) intangibles; (c) mineral resources; (d) investment in properties; and (e) investment in subsidiary companies, associates, and joint ventures. The effects of applying fair value concept are recognized in net income or loss for financial assets and financial liabilities at fair value through profit or loss, biological assets, and agriculture products at the point of harvest and investment in properties while those effects are included in other comprehensive income (equity) for properties, plant and equipment, intangibles, and mineral resources.

This chapter aimed to identify to what extent the fair value concept is applied in Croatian companies from real sector. According to the research results, Croatian companies from real sector mostly apply cost concept in comparison to fair value concept. Research results have indicated that fair value concept is mostly applied in measuring land, properties, plant and equipment, biological assets, and financial instruments, although, its application is not widely used among Croatian companies from real sector.

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The Link Between Accounting Measures of Biological Assets and Financial Standing of the Agricultural Enterprises: Evidence from Lithuania



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Abstract The purpose of the research is to assess the impact of the choice of biological asset measuring method on the financial standing, overall performance, and financial attractiveness of the agricultural enterprises. The analysis of scientific research studies shows that there is no preference given for one of the methods in the measurement of biological assets—cost or fair value less estimated costs to sell. The advantages and disadvantages of both methods are disclosed in this research. The case study is based on analytical data of agricultural enterprises, which are specializing in livestock farming and applies cost method to measure biological assets. The impact of the change in the measuring method on key financial ratios was calculated. Financial performance improves when using the fair value method compared to the cost method. However, a risk of violation of the principles of prudence and neutrality was noted. For this reason, the conclusion was made that the cost method is more relevant for measuring biological assets.

Keywords Biological assets · Measurement · Cost · Fair value · Lithuania

1 Introduction

In agribusiness, many products are harvested from biological assets or biological assets are consumed as production. Therefore, biological assets and the agricultural products are the key objects of the accounting policy of agricultural enterprises. From a methodological point of view, a choice of accounting policy is based on the theories of signaling and agency and application of the main accounting principles. The accounting consistency principle states that an accounting principle or method shall be changed only if the new version aims at a true reflection of the enterprise's assets, equity, and liabilities. Pursuant to the precautionary principle, enterprises

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choose accounting methods that prevent the value of assets, equity, and liabilities from being unreasonably increased or decreased. The principle of neutrality requires that information should not be presented in a way to influence decisions of the information users and it should be free from bias toward a predetermined result.

International accounting standard (IAS) 41 Agriculture (European Commission 2019) sets out the accounting for agricultural activity, including biological assets. Furthermore, accounting policies for biological assets rely on the provisions of IAS 2 Inventories (European Commission 2019), IAS 16 Property, Plant and Equipment (European Commission 2019), International financial reporting standard (IFRS) 13 Fair Value Measurement (European Commission 2019). Lithuanian national accounting regulations for accounting of biological assets include Business Accounting Standard (BAS) 17 Biological assets (The Authority 2015), BAS 9 Inventories (The Authority 2014), BAS 12 Non-Current Tangible Assets (The Authority 2015).

An analysis of international accounting practice demonstrates that international accounting regulations, which provide that biological assets should be measured at fair value less estimated costs to sell, are not strictly observed. Traditionally, businesses measure their biological assets at cost. Lithuanian standards allow choosing between two methods for measuring biological assets: fair value less estimated costs to sale or cost. That suggests the need to analyze how the accounting for biological assets policy should be designed so that the selected biological asset measuring method will best reflect the economic benefits generated by such assets.

In light of the performed analysis of research literature in the field of the selection of a biological asset measuring method, the present case study seeks to assess the impact of the choice of a biological asset measuring method on the enterprise's financial standing and financial attractiveness. The research is a coherent extension of previous research into theoretical and analytical aspects of setting up accounting policies for biological assets (Stonciuvienė et al. 2015, 2016). The research focuses on advantages and disadvantages of measuring biological assets at fair value less estimated costs to sale. It compares changes in the value of those assets resulting from the change in the method from measuring at their cost to measuring at fair value less estimated costs to sale and analyses the effect of these changes on the key financial ratios. The methods used to analyze scientific literature include analysis, synthesis, and comparison, coupled with analytical and interpretive procedures. The methods and techniques used for empirical validation include a case study, analysis of analytical source data, and calculation and analysis of key financial ratios. The research ends with logical insights into measuring biological assets at fair value less estimated costs to sale.

2 Material and Methods

2.1 Conceptual Framework

IAS 41 (European Commission 2019) prescribes one method of measurement for biological assets—fair value less estimated costs to sell. This requirement is based on the principle that biological transformation is best reflected by fair value measurement (International Accounting Standards Board 2014). The use of this method is based on managerial assumptions concerning default, prepayment, and discount rates (Dechow et al. 2010). As stated in IAS 41 (European Commission 2019), the presumption that the fair value of biological asset can be measured reliably can be rebutted only for a biological asset, for which market values are not available and for which alternative fair value measurements are determined to be clearly unreliable. Dechow et al. (2010) claim that one of the key advantages of IAS 41 is the harmonization of the requirements for measuring all biological assets—whether they are sold or not. Herbohn and Herbohn (2006) argue that the biological asset measuring method prescribed by IAS 41 is rather academic than functional. It does not take into consideration practical possibilities of such measuring, and its requirements are neither theoretically nor practically consistent with many accounting models (Bohušová et al. 2012). Talking about specific features of biological asset measuring, Bozzolan et al. (2016), Dékán and Kiss (2015), Mates et al. (2015), Gonçalves and Lopes (2015) emphasize that this method can only be used if the fair value can be reliably measured.

The fair value less estimated costs to sell is lower than the pure fair value. Biological assets are located at the farm and they need to be delivered to the market, which means that their fair value is reduced by the costs to sell. Alexander and Fasiello (2014) argue that when the method of fair value less estimated costs to sell is used to measure biological assets, they are measured at net realizable value. That prompts a disagreement between international accounting standards: IAS 2 (European Commission 2019) prescribes the net realizable value and its application, whereas IFRS 13 (European Commission 2019) establishes a hierarchy of fair value, which is not applied to the net realizable value.

In Lithuania, BAS 17 (The Authority 2015) provides that biological assets shall be measured either at fair value less estimated costs to sell or at cost. About 34 percent of Lithuanian businesses measured biological assets at fair value less estimated costs to sell (Stonciuviene et al. 2015). But only 14 percent of accountants of agricultural enterprises indicated that they use this model to measure biological assets and agricultural products. Hinke and Stárová (2014) criticize the possibility to choose a measuring method as that complicates the comparison of information of financial statements.

In Turkey (Öztürk 2017), Czech Republic (Otavová and Gläserová 2017), Albania (Gruda, 2016), Republic of South Africa (Scott et al. 2016) biological assets and agricultural products must be accounted at fair value. In practice, however, this is not effectively implemented. Visberg and Parts (2016) conducted a research in

72 Estonian cow farms and found that 58 percent of them measure biological assets at fair value less estimated costs to sell. However, 32 percent of them not include information about the method used to measure biological assets. As describes Scott et al. (2016) the Republic of South Africa private business entities follows the requirement to measure biological assets at fair value, whereas publicly owned agricultural businesses are not willing to use this method. These organizations faced by seven challenges once they select the fair value measurement for biological assets. Those include a lack of an active market; limited technical resources for measuring the fair value; limited future benefits for the society; high costs of measuring the fair value; a lack of methodological support; inconsistency with requirements for budgetary policy.

Riccardi (2016), Cretu et al. (2014), Kurniawan et al. (2014) suggests looking at biological asset measuring in the context of the possibility to reliably measure the fair value of biological assets. Gabriel and Ștefea (2013) argue that it is extremely difficult to justify the objectivity and reliability of information on the fair value. Vazakidis et al. (2010) claim that the fair value of biological assets is relative but at the same time, it reflects the processes of biological transformation. International Accounting Standards Board also highlighted the risk of errors in managerial decisions and possible manipulation in measuring the fair value of biological assets (International Accounting Standards Board 2014). However, if an active market is available, the fair value model for measuring biological assets is certainly more appropriate than measuring at cost (Fischer and Marsh 2013), although the actual fair value measuring costs often outweigh the benefits associated with the practical application of such measuring (Elad and Herbohn 2011).

Another problem related to measuring the fair value is the existence of several established methodologies. IFRS 13 (European Commission 2019) recommends three valuation techniques: market approach, cost approach, and income approach. Different models could lead to incomparability of fair values (Gonçalves and Lopes 2015; Muhammad and Ghani 2013; Bohušová et al. 2012).

The cost model is a priority in the China (Riccardi 2016), the United States (Fischer and Marsh 2013; Bohušová et al. 2012), Latvia (Rožentāle and Ore 2013; Ore 2011), the United Kingdom, Canada, and France (Bohušová et al. 2012; Aryanto 2011). The main reasons for such choice include difficulty to measure the fair value; this model may result in biological assets valued lower than their cost.

Kurniawan et al. (2014) support the cost model. The results of an interview with agribusiness representatives led to a conclusion that the cost appropriately reflects inputs into biological assets, required for those assets to produce various benefits. Bohušová et al. (2012) argue that biological transformation is best reflected by the cost model, however, this method does not take into consideration the value added by the biological processes. Unlike the cost model, the fair value method puts the future risk into the balance sheet (Jiang and Penman 2013). Svoboda and Bohušová (2017), Bohušová and Svoboda (2017) concluded that it is not right to use the same model for all groups of biological assets. According to Damian et al. (2014), the fair value model is inappropriate for livestock held for agricultural products. Huffman

Table 1 Advantages and disadvantages of the biological assets' measurement methods

Methods	Advantages	Disadvantages
Fair value model	<p>Reflects the processes of biological transformation of biological assets.</p> <p>Revaluation of biological assets at the end of the reporting period results in more accurate and correct disclosure of their value and reflects the future risks.</p> <p>Requirements for biological asset measurement are unified, i.e., the same model is used for accounting for all biological assets—whether they are sold or not.</p> <p>Allows to calculate the result of the biological asset growth and/or use until the moment of its realization.</p> <p>Is more reliable than the cost model, provided that an active market is available.</p>	<p>It does not consider practical possibilities of this measurement.</p> <p>It is difficult to measure the fair value due to the absence of a liquid market.</p> <p>There is a high level of subjectivity and probability in measuring the fair value, particularly when the determination of the fair value is based on alternative principles.</p> <p>The data reflected in financial statements are susceptible to manipulations.</p> <p>The model of measuring at fair value less estimated costs to sell is not acceptable for tax purposes.</p>
Cost accounting	<p>This method is more pragmatic.</p> <p>Reflects inputs into biological assets made by a business entity.</p> <p>It is best reflecting on biological transformations throughout the growing period of biological assets.</p> <p>The principles of biological asset costing and presenting in the financial statements are the same as with all other assets.</p> <p>The cost model is used in tax accounting, thus, there is no need for restating information.</p>	<p>Method does not take into consideration the value added by the biological processes.</p> <p>Biological assets typically have a relatively long production cycle and therefore the cost often reflects only the actual costs of growing rather than the actual value of assets.</p> <p>It is problematic to change the cost calculation methodology as there is a risk that information comparability in different reporting periods may be impaired.</p>

Developed by the authors

(2018), Botosan and Huffman (2015) offer the same conclusion current biological assets.

Silva et al. (2012) criticize the use of the fair value model for measuring biological assets, at the same time emphasize, that the cost model is just as risky. It is important that cost elements remain the same from year to year and that this information is comparable (Ore 2011). Furthermore, the tax system in a country is of great significance for the selection of the measurement model for biological assets, when the profit or income tax is calculated based on information regarding the cost rather than the fair value of the assets. The performed analysis of research studies indicates that there is no unanimity on fair value or cost accounting for biological assets (Table 1).

In the context of choosing biological assets measuring methods the key financial indicators were selected. Analysis of previous research (Al-Ani 2013; Delen et al. 2013; Katchova and Enlow 2013) formed the opinion that it is appropriate to perform the financial analysis by calculating the indicators of liquidity, stability,

profitability, and assets' turnover. An integrated analysis of financial indicators ensures the assessment of financial attractiveness of the enterprises.

2.2 Survey Characteristics and Estimation Methods

To examine the biological asset measuring at fair value less estimated costs to sell, it was chosen to calculate the effect of this alternative on the key financial ratios, which reflect the financial attractiveness of enterprises. The research selected key indicators providing relevant information in the business management and investment decision-making process, such as solvency (liquidity and stability), and profitability and efficiency (negotiability), the changes whereof could be consequent on different measuring methods applied in measuring biological assets. The research used analytical data and information of the financial statements of three agricultural enterprises. The enterprises were chosen with a view of their different specialization. The first selected enterprise (AE1) specializes in milk production, i.e., its biological assets include dairy cows, cattle for fattening, calves, and crops. The second enterprise (AE2) is in the business of mixed agricultural production. Its business includes plant production (crops) and production and sale of biological assets: dairy cows, cattle for fattening and calves, sows, and piglets. The specialization of the third enterprise (AE3) is cattle farming for beef production. Here the reared biological assets include suckler cows, bulls for breeding, and beef calves. The income from the sales of agricultural products and biological assets of all analyzed enterprises accounts for more than 50 percent of the total sales revenue. All these enterprises measure biological assets at their cost.

As the research deals with measuring biological assets, only the change in the carrying amount was calculated in order to identify the effect of the alternative of measuring biological assets at fair value less estimated costs to sell without changing the method of measuring agricultural products obtained from biological assets, they continued to be measured at cost. For that purpose, in all three companies the transformations of biological assets over the reporting period and the opening and closing balances of biological assets were measured at fair value less estimated costs to sell. The fair value of biological assets was borne out by official statistical market information (www.produktukainos.lt; www.vic.lt). The crops are valued at their production cost.

Conducting this research, the following questions were raised:

- How do the financial standing and the overall performance of agricultural enterprises are changing due to the change in the biological assets measuring method from the cost to the fair value less estimated costs to sell model?
- What factors can be identified that are influencing the change in the biological asset value when the assets are measured at fair value less estimated costs to sell?
- How does the biological asset measuring method influence the key financial ratios, making agricultural enterprises more/less financially attractive?

3 Results

To compare the effect of biological asset measuring using different methods (at cost and at fair value less estimated costs to sell) on the performance of an enterprise, we calculated the change in the carrying amount of biological assets of each enterprise when biological assets were recognized at fair value less estimated costs to sell compared to measuring at cost. The change in the value was measured for each group of biological assets at the beginning and the end of the reporting period (Table 2).

The presented research results show that only in one of the analyzed enterprises the value of biological assets was higher with the fair value less estimated costs to sell model than with the cost model. The biggest decrease was observed in the value of dairy and suckler cows. Nevertheless, two out of three companies were earning

Table 2 Changes in biological asset values when measuring at fair value less estimated costs to sell compared to the cost model, %

Indicators	Change in the value of biological assets, AE1		Change in the value of biological assets, AE2		Change in the value of biological assets, AE3	
	Beginning of the reporting period	End of the reporting period	Beginning of the reporting period	End of the reporting period	Beginning of the reporting period	End of the reporting period
Dairy cows	-62.98	-64.90	-66.74	-66.71	x	x
Fattening cows	x	x	0	-65.37	x	x
Fattening bulls	-49.12	-51.41	-38.97	-34.41	x	x
Calves	-59.80	-58.70	-58.00	-54.65	x	x
Dairy cattle, total	-59.85	-61.17	-62.05	-61.15	x	x
Sows	x	x	-55.26	-39.90	x	x
Piglets	x	x	-13.64	+10.37	x	x
Total pigs	x	x	-26.66	-5.07	x	x
Bulls for breeding	x	x	x	X	-55.38	-60.94
Suckler cows	x	x	x	X	-67.70	-72.29
Beef calves	x	x	x	X	-62.82	-54.58
Beef cattle, total					-64.98	-65.62
Biological assets, total	-52.90	-52.44	-46.08	-40.38	-38.89	-37.65

The authors' own calculation

profit. This leads to a conclusion that fair value less estimated costs to sell measurement of biological assets no longer reflects the actual situation, i.e., companies can sell biological assets and agricultural products at a price higher than the average prices published in official information sources.

The trends of average market prices play quite an important role in the context of changes in the value of biological assets resulting from the change of the method from measuring. As stated above, official statistical information was used to determine the fair value of biological assets. In the analyzed reporting period, the trends of changes in the fair value of biological assets differed according to their groups. For instance, the average market price of dairy cows reduced by 2.5 percent, while the average market price of different groups of pigs increased by 25–50 percent. This partly explains the provided information on an increase in the fair value of piglets at the end of the reporting period. On the other hand, research into changes in the value of biological assets arising from the change in the measuring method requires a deeper analysis to determine what exercised influence over the result of measuring biological assets at fair value. We identified factors affecting the change in the value of biological assets and calculated their values (Table 3). A negative rate increases the costs of the company, whereas a positive value decreases the costs.

The result of measuring biological assets at fair value is produced by adding intermediate indicators: (1) the change in the fair value of animals for breeding and production attributable to changes in their physical characteristics and price in the reporting period; (2) the difference between the production costs of animals kept for rearing and fattening and the change in the fair value of those animals attributable to changes in their physical characteristics and price in the reporting period; and (3) the difference between the production costs of animals born on the farm and their value at initial recognition.

The change in the fair value of animals (for breeding, production, rearing, and fattening) attributable to changes in their physical characteristics and price was calculated as follows: the value of the closing balances of animals is increased by the value of sold, fallen stock, or animals transferred to other groups and decreased by the value of the opening balances of animals and animals taken into possession (acquired, born, transferred from other groups). The calculation of these indicators was based on analytical information on animal movement in the reporting period in all analyzed agricultural enterprises. Born animals were recognized at the initial fair value less estimated costs to sell. Acquired animals were valued at their cost. Sold, fallen stock, and animals transferred to other groups were carried at fair value less estimated costs to sell as at the beginning of the reporting period. The opening and closing balances of animals were measured at fair value less estimated costs to sell as on the day of the beginning or end of the period.

The presented data show that the difference between the production costs of animals kept for rearing and fattening and the change in the fair value of those animals attributable to changes in their physical characteristics and price had a major influence on the result of measuring biological assets at fair value. This factor was responsible for a major share of the result of measuring biological assets at fair value, accounting for 71–88 percent. The difference between the production costs of

Table 3 Result of measuring biological assets at fair value and driving factors

Enterprise	Biological assets	Change in the fair value of biological assets, EUR			
		Total	Including		
			Attributable to changes in the physical characteristics and price of animals for breeding and production	Attributable to the difference between the production costs of animals kept for rearing and fattening and the change in the fair value of those animals due to changes in their physical characteristics and price	Attributable to the difference between the costs of animals born on the farm and their value measured at fair value less estimated costs to sell at initial recognition
AE1	Dairy cows and cattle kept for rearing	−118784.00	−5646.00	−84557.00	−28581.00
AE2	Sows and pigs kept for rearing	−161854.00	+31414.00	−190952.00	−2316.00
	Dairy cows and cattle kept for rearing	−426379.00	−46174.00	−288564.00	−91641.00
	Total animals	−588233.00	−14760.00	−479516.00	−93957.00
AE3	Suckler cows, bulls for breeding and beef cattle kept for rearing	−173939.00	−2691.00	−153439.00	−17809.00

The authors' own calculation

animals born on the farm and their value measured at fair value less estimated costs to sell at initial recognition came to 1–21 percent within the animal groups. The change in the fair value of animals for breeding and production attributable to changes in their physical characteristics and price had the least impact, 1.5–4.75 percent. Unique data were received from AE2 engaged in pig farming. The change in the fair value of sows attributable to changes in their physical characteristics and price was positive, i.e., it decreased the costs of the company. Whereas the negative (cost increasing) values of the other two indicators showed that the costs incurred in pig rearing were higher than the change in the fair value attributable to changes in their physical characteristics and price.

The altered value of biological assets resulting from measuring at fair value less estimated costs to sell is reflected in the financial statements of the companies (Table 4). The result of fair value measurement of biological assets is presented in their profit and loss statements. Here a change in the measure of biological assets directly affects the items of the cost of goods sold resulting from changes in the value of the sold biological assets, general and administrative expenses resulting from changes in the value of fallen animals and the profit (loss) for the period. Changes in the profit (loss) lead to changes in balance sheet items—the previous and current period's retained earnings. The revaluation of the balances of biological assets has a direct effect on the amounts in the balance sheet items presenting biological assets.

The results show that at all enterprises the change in the biological asset measuring method had a significant effect not only on the value of the biological assets but also on the value of stocks and total assets. The value of biological assets reduced by 17–71 percent, the value of long-term assets decreased by 10–16 percent, the stocks decreased by 20–37 percent, and the value of total assets shrank by 10–13 percent. The balance of retained earnings at the end of previous period decreased by 37–85 percent compared with that shown in the balance sheets of the enterprises. At one of the companies, the balance of retained earnings at the end of current period decreased more than 232 times compared with that shown in the company's balance sheet.

The greatest impact is found when analyzing the profit and loss accounts. Decrease in the items of expense and their increase by the result of measuring biological assets at fair value less estimated costs to sell resulted financial results in all companies. AE2 loss shrank almost 3.5 times. AE1 and AE3 were earning profits but changes in the biological asset valuation method resulted in a 71 percent increase in AE1 profits, while the profit of AE3 swelled almost 50 times.

To assess the potential impact of a change in the biological asset valuation method on the financial attractiveness of the business concerned it was chosen to calculate and compare the key financial ratios: solvency (liquidity and stability) and profitability and efficiency (negotiability). In each group, several indicators that best reflect the impact of the said alternatives were selected (Table 5).

The analysis of the solvency ratios shows that the fair value less estimated costs to sell model for biological assets produced the reduction of the current ratio by 5–16 percent. Whereas the quick ratio of all the enterprises remained unchanged. The value of stocks and current assets in general reflected in the balance sheet changes equally and thus this change has no impact on the quick ratio.

The total debt ratio evidences a low (AE1) or medium (AE2 and AE3) risk. This indicator increases by 11–14 percent when biological assets are measured not at cost but at fair value less estimated costs to sell. That suggests that changing biological asset measuring method alone reduces stability of the enterprises and increases financial risks.

Results obtained from the analysis of the profitability rates exhibit an increase in profitability. The gross profit margin of all three companies is positive. Furthermore, it is 6–23 percent higher when biological assets are measured at fair value less estimated costs to sell than when it is measured at cost. The analysis of the indicators

Table 4 Effect of the change in the measuring method on the items of financial statements

Indicators	Indicator change, %		
	AE1	AE2	AE3
<i>Profit and loss account of the accounting year</i>			
Cost of goods sold	-19.55	-13.36	-15.58
General and administrative expenses	-2.70	-4.07	-1.56
Financial result	+70.71	+33.66	+48.5 times
Balance	Previous year	Accounting year	Previous year
Long term assets	-10.51	-10.93	-13.59
Long term biological assets	-62.89	-64.90	-66.52
Inventories	-35.55	-36.83	-21.05
Current biological assets	-57.01	-56.78	-21.05
Total assets	-13.05	-12.76	-17.00
Previous year's retained profit (loss)	-84.67	-81.12	-10.59
Profit (loss) brought forward	-81.12	-81.42	x
The authors' own calculation			-231.8 times

Table 5 Key financial ratios calculated using different biological asset measuring models

Indicators	Indicator values at the analyzed enterprises					
	AE1		AE2		AE3	
	Biological assets measured at cost	Biological assets measured at fair value less estimated costs to sell	Biological assets measured at cost	Biological assets measured at fair value less estimated costs to sell	Biological assets measured at cost	Biological assets measured at fair value less estimated costs to sell
Current ratio	38.209	31.923	3.354	3.174	2.522	2.379
Quick ratio	9.802	9.802	0.281	0.281	0.656	0.656
Total debt ratio	0.0087	0.0099	0.278	0.308	0.300	0.336
Gross profit margin, %	13.6	14.4	11.3	13.5	12.4	15.3
Net profit margin, %	-1.18	-0.35	6.88	9.20	0.06	3.12
Return on assets, %	-0.45	-0.15	4.07	6.02	0.05	2.53
Asset turnover ratio	0.381	0.437	0.591	0.654	0.726	0.812
Fixed asset turnover	0.270	0.640	1.001	1.147	1.521	1.811
Current asset turnover	1.151	1.378	1.441	1.523	1.390	1.474

The authors' own calculation

reveals that in terms of profitability the fair value less estimated costs to sell model is workable as this method improved profitability rates at all the entities concerned. That correlated with the aspects highlighted in the analysis of financial statements, i.e., the method of fair value less estimated costs to sell leads to a decrease in the cost of goods sold and the general and administrative expenses and an improvement in the overall performance in the reporting period.

The analysis of asset turnover ratios leads to similar conclusions: if biological assets are chosen to be measured at fair value less estimated costs to sell, the asset turnover ratios increase by 11–15 percent compared with the ratios when biological assets are measured at cost.

4 Discussion and Conclusions

The performed analysis of research studies indicates that there is no unanimity on the selection of fair value or cost accounting model of the measuring for biological assets. Researchers emphasize the strengths and weaknesses of the fair value less estimated costs to sell and cost models. In practice, the cost method is more likely to be used to measure biological assets (Canada, China, Germany, Latvia, Lithuania, France, and the United States). At the same time, IAS 41 (European Commission 2019) and some national standards (in Czech Republic, the Republic of South Africa, Turkey, etc.) require biological assets to be measured at fair value less estimated costs to sell. Furthermore, the importance of this research to Lithuania lies in the fact that the national standard of accounting for biological assets BAS 17 (The Authority 2015) allows to choose among one of the previously mentioned methods to measure biological assets. However, the freedom of choice complicates the comparison of financial statements.

To answer the question of what effect a change in the measuring method from cost model to fair value less estimated costs to sell model has on the financial standing and the overall performance, biological assets were revalued to fair value less estimated costs to sell. This revaluation affected the value of biological assets, stocks, total assets of the enterprises, and the balance of retained earnings. In the investigated companies, it resulted in lower values than previously recorded. The greatest impact is found when analyzing the profit and loss accounts. A decrease in the items of expense and their increase by the result of measuring biological assets at fair value less estimated costs to sell led to enhanced financial results in all companies.

When biological assets are measured at fair value less estimated costs to sell, the result of the fair value measurement of such assets is presented in the profit and loss statement. The research explored the driving factors underlying the development of this indicator. Calculations show that at the enterprises concerned, the difference between the production costs of animals kept for rearing and fattening and the change in the fair value of those animals resulting from changes in their physical characteristics and price had a major influence on the result of measuring biological assets at fair value. The change in the fair value of animals for breeding and production attributable to changes in their physical characteristics and price was found to have the least impact.

To investigate the impact of a change in the biological asset valuation method on the key financial ratios, which reflect the financial attractiveness of the business concerned, it was decided to analyze relative solvency, profitability, and asset turnover. The analysis of the indicators reveals that in terms of profitability the fair value less estimated costs to sell model is workable as this method for measuring biological assets generated improved profitability rates at all the entities concerned. That correlates with the aspects highlighted in the analysis of financial statements, i.e., the method of fair value less estimated costs to sell, when it is used to measure biological assets, leads to a decrease in the cost of goods sold and the general and

administrative expenses and an improvement in the overall performance in the reporting period. Furthermore, positive trends were observed in asset utilization ratios: the asset turnover ratio increased when biological assets were recognized at fair value less estimated costs to sell compared to measuring at cost. The fixed asset turnover ratios remained unchanged in all investigated enterprises since all of them recorded biological assets as inventories and a change in their valuation technique had no impact on the amounts in the noncurrent asset items.

The performed analysis of theoretical research and practical experience indicates that there are no significantly strong arguments in favor of one or the other biological asset valuation technique. The research revealed several issues related to biological asset measuring at fair value less estimated costs to sell. Although there is an active market for biological assets, which were measured at fair value less estimated costs to sell, it is difficult to measure this value reliably since during the analyzed period changes in the fair value of different groups of biological assets followed different trends. In this context, an increase in the value of biological assets is not determined by qualitative and quantitative transformations but rather by market conditions. The problems the authors of this research encountered when determining the fair value of biological assets reiterate the opinion expressed by Gabriel and Ștefea (2013) that it is extremely difficult to justify the objectivity and reliability of information on the fair value of a specific object. Therefore, the decision to use the fair value less estimated costs to sell method for measuring biological assets relates to the possibility of reliably measuring the fair value of biological assets.

However, it is difficult to decide which is the most appropriate market price for determining the fair value of biological assets. The research identified such problems as a lack of information on the sale prices of some animals, inconsistency of those prices with the realizable market prices for the animals, inconsistency of the animal grouping in the companies with the grouping used for the purposes of statistical information on average market prices. That correlates with the conclusion of scientific research by Bozzolan et al. (2016), Dékán and Kiss (2015), Mates et al. (2015), Gonçalves and Lopes (2015) that the method of measuring biological assets at fair value less estimated costs to sell can only be used if the fair value can be reliably measured.

The actual sale price of animals in the analyzed enterprises is higher than the average market price and that suggests a conclusion that the average market price does not reflect the real possibilities of the realization of biological assets and revenue earning and therefore measuring biological assets at fair value less estimated costs to sell fails to reflect the actual value added generated by those assets. Building on this experience, the authors of the research agree with Damian et al. (2014) that the fair value less estimated costs to sell model should be abandoned if the users of financial statements are to receive valid information.

Biological asset measurement at fair value less estimated costs to sell resulted in improved business performance of all enterprises in the accounting year compared to the result when biological assets were measured at cost, which gives rise to a presumption of the existence of a potential breach of the accounting principles of prudence and neutrality and potentially misleading information about the financial

situation of an enterprise. Choosing an accounting policy aimed at an increase in reported profits requires to ensure that the used accounting methods secure the validity of the provided information. In conclusion, the cost model is more eligible for evaluation of biological assets as it discloses biological transformation and economic benefits of discussed assets.

On the other hand, the research revealed that enterprises using different biological asset measuring methods will present incomparable information in their financial statements. Thus, we must share the view of Hinke and Stárová (2014) that alternative options of measuring methods for biological assets complicate the comparison of information included in the financial statements of agricultural enterprises.

The issues revealed by the research lead to a conclusion that the research can be further continued in two directions: analysis and comparison of the applicability of different fair value measurement methods and a more in-depth analysis of biological asset measurement at cost.

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The Impact of Fair Value Concept Appliance on Corporate Profit Tax: Case of Croatian Companies from Real Sector



Danimir Gulin, Hrvoje Perčević, and Marina Ercegović

Abstract The application of fair value concepts in measuring company's assets and liabilities results in corresponding accounting and tax effects. The main objective of this chapter is to analyze the interdependence between the accounting effects of the fair value concept application and the corporate profit tax on the case of Croatian companies from real sector for the period from 2010 to 2016. The research was carried out of 96 large-sized companies, and 369 medium-sized companies, which make a total of 465 companies. The data needed to achieve the purpose of the chapter are collected from publicly available financial statements of Croatian companies from real sector in the period from 2010 to 2016. The interdependence between accounting effects of the fair value concept application and corporate profit tax liability are analyzed by regression analyses. According to the research results, descriptive and inferential statistics, it can be concluded that fair value concept is not widely used in Croatian company's from the real sector for the period observed. Therefore, the accounting effects of the fair value concept cannot have high impact on corporate profit tax liability. According to the regression analysis, only the model for the deferred tax liability is good with one significant variable.

Keywords Fair value concept · Corporate profit tax · Croatian real sector · Financial position · Financial performance

1 Introduction

The concept of fair value is prevailing modern concept of subsequent measurement of assets and liabilities in financial statements. The main objective of fair value concept is to enable the assets and liabilities to be measured and presented in balance

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sheet at their “true” or market values. Therefore, fair value is linked to market values of assets and liabilities on active markets. The problems with fair values appear when there are no available market prices or there is no active market of asset or liability which fair value is determining. In these cases, fair value is assessed on the basis of available data and with the application of certain valuation methods (for example discounting cash flow method).

The application of fair value concept results in certain accounting and tax effects. Accounting effects refer to the recognition and recording the difference between fair value of asset or liability at the reporting date and its carrying amount. This difference can be recognized in (a) profit or loss or (b) in other comprehensive income (equity). Tax effects of fair value concept depend on accounting effects and its tax treatment according to the national tax regulations.

The basic purpose of this chapter is to explore and analyze the interdependence between the accounting effects of the fair value concept application and the corporate profit tax liability on the case of Croatian companies from real sector. In the Republic of Croatia micro, small, and medium companies (which are not public interest entities) must apply Croatian Financial Reporting Standards (CFRSs), while large companies and entities of public interest must apply International Financial Reporting Standards (IFRSs). Since CFRSs are mainly based on IFRSs, the accounting effects of fair value concept application are the same when IFRSs and CFRSs are implemented. The chapter aims to determine whether there is a connection between the fair value concept application and corporate profit tax liability in the Croatian companies from the real sector in the period from 2010 to 2016. The previous researches regarding the fair value concept did not focus on tax effects arising from fair value concept application. This paper explores the effects of fair value concept application on corporate profit tax obligation on the case of Croatian companies from real sector in the period from 2010 to 2016.

2 Theoretical Framework and Literature Review

2.1 The Effects of Fair Value Concept Application on Company's Financial Position and Performance

The fair value concept as a global modern concept of subsequent measurement of assets and liabilities in financial statements is introduced through existing International Financial Reporting Standards (IFRSs) which are widely accepted financial reporting standards for companies listed on financial markets. The application of fair values requires that a certain asset or liability should be measured at its fair value on the reporting date. According to International Financial Reporting Standard 13 Fair Value Measurements, fair value is defined as an exit market price that would be obtained to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (International Accounting

Standard Board 2011; Gulin and Perčević 2013:77). This definition of fair value indicates the connection of fair value concept with existing market prices and other market conditions. But when there is no active market or there are no available market prices of an asset or a liability for which the fair value is determining, the fair value should be assessed using adequate valuation techniques based on other relevant market parameters (such as market value of similar asset or liability) or other nonmarket parameters.

IFRSs, as global financial reporting standards, define which assets and liabilities must be or can be subsequently measured at their fair value at the reporting date. According to the existing IFRSs, the following categories of assets and liabilities must be subsequently measured at their fair values at the reporting date, regardless of economic conditions: (a) financial assets at fair value through profit or loss; (b) financial assets at fair value through other comprehensive income; (c) biological assets (but only if fair value can be reliably assessed, otherwise, biological assets are measured at cost); and (d) financial liabilities at fair value through profit or loss. IFRSs also permit that following categories of assets and liabilities can be subsequently measured at fair value at the reporting date, although that measurement is not obligatory, but disposable: (a) intangibles; (b) properties, plant and equipment; (c) investment property; (d) right of use assets; (e) mineral resources; and (f) investment in subsidiaries, associates, and joint ventures.

When fair value concept is applied, the key issue from the accounting perspective is the recording and recognition of differences between fair value of asset or liability at the reporting date and its carrying amount (recognition of fair value measurement effects). Generally, fair value measurement effects can be recognized in accounting records and financial statements in two ways: (a) fair value measurement effects can be recognized in profit or loss or (b) fair value measurement effects can be recognized in other comprehensive income. Table 1 summarizes the recognition of fair value measurement effects for each category of assets and liabilities that must be or can be subsequently measured at fair value according to existing IFRSs.

As it can be seen in Table 1, fair value measurement effects of financial assets and financial liabilities at fair value through profit or loss, investment properties, and biological assets are recognized in profit or loss of current accounting period, while fair value measurement effects of financial assets at fair value through comprehensive income are recognized in other comprehensive income (equity). When it comes to intangibles, properties, plant and equipment, right of use assets and mineral resources, the increase in fair value of these assets between two reporting dates is recognized in other comprehensive income (equity) unless there was a decrease in fair value in past periods which was recognized in profit or loss. If there was a decrease in fair value in past periods which was recognized in profit or loss, then the increase in fair value of intangibles, properties, plant and equipment, right of use assets and mineral resources in current period is recognized in profit or loss also, but only to the amount of fair value decrease previously recognized in profit or loss in past periods. On the other hand, the decrease in fair value of intangibles, properties, plant and equipment, right of use assets, and mineral resources between two reporting dates is recognized in profit or loss, unless there was an increase in fair

Table 1 Recognition of fair value measurement effects in financial statements according to IFRSs

Asset or liability	Subsequent fair value measurement	Recognition of fair value measurement effects
Financial asset at fair value through profit or loss	Obligatory	Profit or loss
Financial asset at fair value through other comprehensive income	Obligatory	Other comprehensive income/equity
Financial liabilities at fair value through profit or loss	Obligatory	Profit or loss
Intangibles	Disposable	Increase in fair value is recognized in other comprehensive income/equity ^a Decrease in fair value is recognized in profit or loss ^b
Properties, plant, and equipment	Disposable	Increase in fair value is recognized in other comprehensive income/equity ^a Decrease in fair value is recognized in profit or loss ^b
Investment properties	Disposable	Profit or loss
Right of use assets	Disposable	Increase in fair value is recognized in other comprehensive income/equity ^a Decrease in fair value is recognized in profit or loss ^b
Biological assets	Obligatory ^c	Profit or loss
Mineral resources	Disposable	Increase in fair value is recognized in other comprehensive income/equity ^a Decrease in fair value is recognized in profit or loss ^b
Investment in subsidiaries, associates and joint ventures	Disposable	Profit or loss or other comprehensive income

Source: Authors' systematization according to International Accounting Standard Board (2018)

^aAlternatively, the increase in fair value is recognized in profit or loss if the fair value decrease was recognized in profit or loss in past periods

^bAlternatively, the decrease in fair value is recognized in other comprehensive income (equity) if the fair value increase was recognized in other comprehensive income (equity) in past periods

^cBiological assets are subsequently measured at fair value less cost of sales, only if fair value can be reliably assessed. Otherwise, biological assets are measured at cost

value in past periods which was recognized in other comprehensive income (equity). If there was an increase in fair value in past periods, which was recognized in other comprehensive income (equity), then the decrease in fair value of intangibles, properties, plant and equipment, right of use assets and mineral resources in current period is recognized in other comprehensive income (equity) also, but only to the amount of fair value increase previously recognized in other comprehensive income (equity) in past periods. Fair value measurement effects of investments in subsidiaries, associates, and joint ventures can be recognized in either profit or loss or other

comprehensive income, depending on the company's classification of these investments.

According to existing Accounting Law in Croatia, large companies and public interest entities (financial institutions, companies publically listed on Zagreb Stock Exchange, and other defined entities) must apply IFRSs when preparing their financial statements (Accounting Law 2016). All other micro, small, and medium companies that are not defined as public interest entities prepare their financial statements according to Croatian Financial Reporting Standards (CFRSs). Since CFRSs are mainly based on IFRSs, there are no significant differences in the application of fair value concept at assets' and liabilities, subsequent measurement and the recognition of fair value measurement effects in financial statements. In comparison with IFRSs, CFRSs do not permit subsequent measurement of investments in subsidiaries, associates, and joint ventures at fair value, but at cost (Croatian Financial Reporting Standards 2015).

2.2 Tax Effects of Fair Value Concept Application in Companies from Real Sector in Croatia

The significance of fair value measurement effects on company's corporate profit tax base and liability depends on their tax treatment in national tax regulations regarding the corporate profit tax. National tax regulations regarding the corporate profit tax prescribe which fair value measurement effects are recognized for tax purposes and how they effect on corporate profit tax base and liability. Fair value measurement effects that are recognized in profit and loss and not recognized for tax purpose result in corporate profit tax base increase and therefore, corporate profit tax liability increase since these effects are excluded from the corporate profit tax base. On the other hand, fair value measurement effects that are recognized in profit or loss and are recognized for tax purposes in the same accounting period are included in corporate profit tax base and thus directly affect corporate profit tax liability of the actual accounting period. If fair value measurement effects that are recognized in profit or loss are recognized for tax purpose but not in the same accounting period in which they are recognized in financial statements, then these effects cause temporary differences between accounting profit or loss and corporate profit tax base which tax effects are recognized in financial statements as deferred tax liability or deferred tax assets according to International Accounting Standard 12 Income Taxes (International Accounting Standard Board 2016). Also, fair value measurement effects that are recognized in other comprehensive income and are recognized for tax purposes cause temporary differences between accounting profit or loss and corporate profit tax base which tax effects are recognized in financial statements as deferred tax liability or deferred tax assets according to International Accounting Standard 12 Income Taxes (International Accounting Standard Board 2016). So, there are three basic tax effects arising from the fair value concept application: (a) deferred tax

assets which refer to the accounting effects (expenses from the fair value decrease) that are recognized in profit and loss but not included in corporate tax base in the same period or that are recognized in other comprehensive income; (b) accounting effects included in corporate tax base in the same period as in profit and loss; and (c) deferred tax liabilities which refer to the accounting effects (revenues from the fair value increase) that are recognized in other comprehensive income or in profit or loss and will be included in the corporate profit tax base in future period (s) (International Accounting Standard Board 2016).

Corporate Profit Tax Act and Corporate Profit Tax Ordinance in Croatia prescribe corporate profit tax treatment of fair value measurement effects. The impact of fair value measurement effects on corporate profit tax base and liability in companies from the real sector in Croatia is systematized in Table 2 (Corporate Profit Tax Law 2016; Corporate Profit Tax Ordinance 2018).

As it can be seen in Table 2, the increase in fair value of financial assets through profit or loss, investment properties and biological assets between two reporting dates that are recognized as a revenue in profit or loss of the accounting period, it is also included in corporate profit tax base in the same accounting period affecting the increase of corporate profit tax liability of the accounting period (Corporate Profit Tax Law 2016). But, on the other hand, the decrease in fair value of these assets between two reporting dates that is recognized as an expense in profit or loss of the accounting period is not included in corporate tax profit base of the same accounting period but in corporate profit tax base of the accounting period in which the assets will be realized. Since this expense is not recognized for tax purposes in the accounting period in which it is recognized in accounting profit or loss, it causes deductible temporary difference whose tax effect is recognized in financial statements as deferred tax assets (International Accounting Standard Board 2016). Deferred tax assets are derecognized in the accounting period in which the expense from the fair value decrease is included in corporate profit tax base.

When it comes to intangibles, properties, plant and equipment, right of use assets and mineral resources, the increase in fair value of these assets between two reporting dates that are recognized in other comprehensive income (equity) of the accounting period is not included in corporate profit tax base in the same accounting period but in corporate profit tax base of the accounting period in which the assets will be realized. Therefore, this increase in fair value represents taxable temporary difference whose tax effect is recognized in financial statements as a deferred tax liability. On the other hand, the decrease in fair value of these assets that are recognized as an expense in profit or loss of the accounting period, can be included in corporate profit tax base of the same accounting period if the amount of recognized expense is below the amount prescribed by the corporate profit tax regulations in Croatia (Corporate Profit Tax Law 2016; Corporate Profit Tax Ordinance 2018). Otherwise, this expense represents a deductible temporary difference whose tax effect is recognized as deferred tax assets in financial statements (International Accounting Standard Board 2016).

Since the changes in fair value of financial assets at fair value through other comprehensive income is recognized in other comprehensive income, the increase in

Table 2 The impact of fair value measurement effects on corporate profit tax base and liability in Croatia

Asset/liability	Recognition of fair value measurement effects in financial statements	Effect on corporate profit tax base	Tax effect
Financial assets at fair value through profit or loss Investment properties Biological assets	Increase in fair value recognized as a revenue	Included in tax base of current period	Increase in tax liability of current period
	Decrease in fair value recognized as an expense	Not included in corporate tax base of current period, but will be in the period in which the assets will be realized	Deferred tax assets
Intangibles Properties, plant, and equipment Right of use assets Mineral resources	Increase in fair value recognized in other comprehensive income (equity)	Not included in tax base of current period but will be in the period in which the assets will be realized Generally not included, but may be included in tax base of current period up to the prescribed amount	Deferred tax liability Deferred tax assets or increase in tax liability of current period if recognized for tax purpose
	Decrease in fair value recognized as an expense		
Financial assets at fair value through other comprehensive income	Increase in fair value recognized in other comprehensive income (equity)	Not included in tax base of current period, but in the period in which assets will be realized	Deferred tax liability
	Decrease in fair value recognized in other comprehensive income (equity)	Not included in tax base of current period, but in the period in which assets will be realized	Deferred tax assets
Financial liabilities at fair value through profit or loss	Increase in fair value recognized as an expense	Not included in tax base of current period but in the period in which liability is settled or transferred	Deferred tax assets
	Decrease in fair value recognized as a revenue	Included in tax base of current period	Increase in tax liability of current period

Source: Authors' systematization according to Corporate Profit Tax Law (2016) and Corporate Profit Tax Ordinance (2018) in Croatia

fair value causes taxable temporary difference whose tax effect is recognized as a deferred tax liability in financial statements, while the decrease in fair value causes deductible temporary difference whose tax effect is recognized as deferred tax assets in financial statements.

The increase in fair value of financial liabilities at fair value through profit or loss between two reporting dates that is recognized as an expense in profit or loss of the accounting period is not included in corporate profit tax base of the same accounting

period but in the accounting period in which the liability is settled or transferred. Therefore, this expense causes deductible temporary difference whose tax effect is recognized as deferred tax assets in financial statements. On the other hand, the decrease in fair value of financial liabilities at fair value through profit or loss that is recognized as revenue in profit or loss of the accounting period is included in corporate profit tax base of the same accounting period affecting the increase in corporate profit tax liability.

On the basis of the above presented matters, it can be concluded that the application of fair value concept can have a significant impact on company's corporate profit tax base and liability.

2.3 Results of the Previous Researches Regarding the Fair Value Concept

Since its implementation fair value is a matter of many researches as well as conflicts between accounting academics and professionals. There are many proponents as well as opponents of the fair value concept appliance in financial reporting. Therefore, researches regarding the appliance of the fair value concept can be, generally, divided on those that are in favor of the fair value concept and those that criticize the fair value concept.

Barth and Landsman (1995) analyze the fundamentals relating to the implementation of fair value concept for the purpose of financial reporting. They conclude that in the circumstances of the existence of perfect and complete markets, the application of fair value concept in financial reporting enables that all relevant information regarding the value of assets and liabilities are reflected in balance sheet, the income statement is excessive, the realization of income is not appropriate to valuation, and any intangible asset relating to management skill, asset synergies, or options is reflected fully in the balance sheet, while "in settings in which the market assumptions are more realistic, fair value is not well-defined, giving rise to three value constructs, entry value, exit value, and value-in-use" and "implementation of fair value accounting requires their estimation, thereby introducing the potential for estimation error" (Barth and Landsman 1995).

Enria et al. (2004) analyze the potential implications of fair value accounting on financial stability of the European banking sector. Results of their research confirm that wider application of fair value concept results in the increase of banks' balance sheet volatility and also reduces banks' capability to respond to adverse shocks (Enria et al. 2004). They also conclude that the introduction of fair value concept standards has no significant impact on volatility of share prices (Enria et al. 2004).

Penman (2007) argues when is fair value appropriate and when is not as a valuation model for financial reporting. In his analysis, he states the "pluses" and "minuses" of fair value accounting at every level of fair value inputs. He concludes that fair value is appropriate for valuation and stewardship in investment funds

(where shareholders trade in and out of the fund at net asset value), but not in companies that hold net assets whose value is realized on the basis of execution of the business plan, not from fluctuations in market prices, even when exit market prices for those assets are available in active markets (Penman 2007).

Freedman (2008) analyses the linkage between the rules producing tax accounts and those used for financial reporting purposes in the United Kingdom. She concludes that clear relationship between the regulations and the enhanced accounting disclosure requests can be more important than harmonization and that can be achieved with less modification to either tax accounting or financial accounting (Freedman 2008).

Gassen and Schwedler (2008) conduct a comprehensive survey regarding the attitudes of European professional investors and their advisors toward the usefulness of fair value and other measurement concepts on decision-making. The results of their survey indicate that historical cost accounting and mark-to-market accounting are much more known to investors than other concepts of measurement such as lower of cost or market value, value in use or mark-to-model accounting (Gassen and Schwedler 2008). According to the survey results, European professional investors consider mark-to-market fair value as the most decision-useful measurement concept for liquid and nonoperating assets, while “for non-liquid and operating assets, historical cost and market-based fair value are not regarded as being significantly different in respect to decision-usefulness.” European investors consider that mark-to-model fair values are significantly less useful for the purpose of decision-making than market-based fair values and historical cost for almost all assets and liabilities, except for financial instruments (Gassen and Schwedler 2008).

Christensen and Nikolaev (2009) examine the usage of fair value accounting for nonfinancial assets after IFRS adoption in the United States. The results of their research indicate that with the exception of investment properties, historical cost dominates fair value in practice as a measurement concept for plant, equipment, and intangible assets (Christensen and Nikolaev 2009). They also find out that “companies using fair value accounting rely more on debt financing than companies that use historical cost” (Christensen and Nikolaev 2009).

Bonaci et al. (2010) also consider that fair value concept cannot be the main cause of financial crises, but only a messenger of it. They state that the purpose of fair value concept is to enable the valuation of assets and liabilities at their fair values at the reporting date, which are close to real values and this could be realized through a correct implementation and a greater transparency if it is used in appropriate way (Bonaci et al. 2010).

Cascini and DelFavero (2011) illustrate the benefits and pitfalls of fair value and the corresponding effects on various stakeholders in the United States. They also consider that fair value accounting is proper for level one and level two assets/liabilities, when current market information is available but not for level three inputs which include unobservable nonmarket information. The assessment of fair value on the basis of level three inputs makes significant complexities to valuation process and many companies fail to appropriately apply fair value in inactive markets and as a consequence losses escalate (Cascini and DelFavero 2011). Parbonetti et al. (2011)

examine the influence of fair value reporting on the quality of information used by financial analysts on the basis of US commercial banks in the period from 1996 to 2009. Results of their research indicate that the more the fair value concept is used for bank's assets' and liabilities' valuation, the more spreader is analysts' earnings forecasts (Parbonetti et al. 2011). They also conclude that the more assets and liabilities are measured at fair value, the quality of analysts' forecasts and corresponding public or private information is less desirable and precise (Parbonetti et al. 2011).

Bischof et al. (2014) examine the way the financial analysts use information regarding the fair value in their valuation process on a base of a sample of conference calls and research reports of analysts from international banks. They find out that most of the questions from conference calls and references in research reports refer to reclassifications of fair value and changes in fair value of liabilities that arise from banks' own credit risk. They also conclude that the use of information regarding the fair value varies significantly among different analysts and among different instruments (Bischof et al. 2014).

Cannon and Bedart (2017) consider effective auditing of fair value measurements and provided an audit engagement analysis regarding the challenges of fair value measurements that auditors are faced during their audit engagement on the basis of quantitative and qualitative data on audit phases from risk assessment to recording adjustments. They conclude that fair value assessment includes high level of estimation uncertainty, high subjectivity, considerable and complicated assumptions, and multiple valuation techniques (Cannon and Bedart 2017). Cannon and Bedart (2017) state that estimation uncertainty regarding the fair value is linked with higher inherent risk assessment and, both, estimation of uncertainty and high inherent risk are indicators of client problems that are identified during the audit engagement. In these circumstances, auditors should use a valuation specialist, because procedures provided by specialists are the most appropriate and crucial in identifying client problems (Cannon and Bedart 2017).

3 Research Methodology and Results

3.1 Research Objectives and Methodology

The main objective of this chapter is to determine the interdependence between the accounting effects of the fair value concept application and corporate profit tax in the Croatian companies from the real sector. The data needed to achieve the purpose of the paper are collected from publicly available financial statements of Croatian companies from real sector in the period from 2010 to 2016.

Target sample consists of 500 companies which include 100 large- and 400 medium-sized companies. While selecting top 100 large-sized companies, and top 400 medium-sized companies, two criteria were used, first one wash the net profit after tax, and the second one the number of total assets. The research was

conducted only on the basis of data from those companies for which all the necessary data were available throughout the whole observed period and which belonged to the real sector. After the elimination of companies that are not adequate for analysis, the research was carried out of 96 large-sized companies, and 369 medium-sized companies, which make total of 465 companies.

Since the main objective of the chapter is to analyze interdependence between the accounting effects of the fair value concept application and corporate profit tax, variables from the publicly available financial statements were chosen to reflect those effects on deferred tax assets, deferred tax liability, and corporate profit tax. Variables are as follows:

- Deferred tax assets (DTA)
- Deferred tax liability (DTL)
- Value adjustment of long-term assets except financial asset (VALTA)
- Value adjustment of short-term assets except financial asset (VASTA)
- Unrealized gains (revenues) of financial asset (UGFA)
- Unrealized losses (expense) of financial asset (ULFA)
- Changes in revaluation reserves from longer term and tangible and intangible assets (OCI) (RRLTA)
- Profit or loss on the basis of subsequent valuation of financial assets available for sale (OCI) (PLFAAFS)
- Corporate profit tax liability of current period (CPTL)

The interdependence between accounting effects of the fair value concept application and corporate profit tax liability are analyzed by regression analyses. For the multiple regression analysis, data are summed up for all companies for 1 year. Three equations of multiple regressions are set:

$$DTA = \beta_0 + \beta_1 VALTA(X_1) + \beta_2 VASTA(X_2) + \beta_3 UGFA(X_3) + \epsilon$$

$$DTL = \beta_0 + \beta_1 RRLTA(X_1) + \beta_2 PLFAAFS(X_2) + \epsilon$$

$$CPTL = \beta_0 + \beta_1 DTA(X_1) + \beta_2 DTL(X_2) + \beta_3 VALTA(X_3) + \beta_4 VASTA(X_4) + \beta_5 UGFA(X_5) + \epsilon$$

3.2 *Research Results*

Since the 465 companies were included in analysis for the period of 7 years (from 2010 to 2016), there were 3255 company year observations. Firstly, there will be presented a descriptive analysis to describe the data that is further analyzed.

A large standard deviation indicates wide date dispersion. For the variables that are analyzed, it is possible to determine that 25th and 75th percentiles, as well as the median, are mostly zero, with the exception of two variables (Value adjustment of

short-term assets except financial asset and Corporate profit tax liability of current period). These results of descriptive statistical analysis indicate that the other variables are not largely reflected in the financial statements of the companies concerned, suggesting that the application of the concept of fair value in the analyzed companies is poor. Consequently, it is not expected that the application of the fair value concept will affect profit tax as well as deferred tax assets and deferred tax liabilities (Table 3).

R Square as a coefficient of a multiple determination shows the proportion of the dependent variable dispersion that can be explained by the independent variable. It has a high value, which means that 93.20% variance of the dependent variable can be explained by the independent variables. Durbin-Watson statistic is 3.128 which indicate that there is negative autocorrelation, which is the main limitation of this model. p value is less than 0.05, which means that model is significant. As for model coefficients, for “value adjustment of long-term assets except financial asset” and “value adjustment of short-term assets except financial asset” p value is less than 0.05 which indicate that those independent variables are significant in this model. For the third variable, “unrealized losses (expense) of financial asset”, p value is higher than 0.05 which indicate that this variable is not significant in this model. Coefficients for all independent variables should be positive, which means that usage of fair value concept which results in an increase in these types of expenses, affects the creation of deferred tax assets. In this case, coefficients are only positive for the “value adjustment of long-term assets except financial asset” (Table 4).

High value of R Square, which means that 75% variance of the dependent variable can be explained by the independent variables, indicated that this is a good model. Durbin-Watson statistic is near 2 (1.781), and value of 2 indicates that there is no autocorrelation. But, p value is higher than 0.05 which means that this model is not significant at the level of significance 5%. When the coefficient significance of an independent variable is observed, p value for both of them, “changes in revaluation reserves from longer term and tangible and intangible assets” and “profit or loss on the basis of subsequent valuation of financial assets available for sale” is higher than 0.05 which indicate that this variable is not significant in this model. Coefficients for all independent variables should be positive, which means that usage of fair value concept which results in an increase in these two variables, affects the creation of deferred tax liability. In this case, coefficient is positive for “changes in revaluation reserves from longer term and tangible and intangible assets,” but is not positive for profit or loss on the basis of subsequent valuation of financial assets available for sale. If the level of significance is 10%, both model and coefficient “changes in revaluation reserves from longer term and tangible and intangible assets” are significant. In that case, it is appropriate that increase in variable Changes in revaluation reserves from longer term and tangible and intangible assets will lead to increase in deferred tax liability (Table 5).

The third model, with corporate profit tax liability as dependent and deferred tax assets, deferred tax liability, value adjustment of long-term assets except financial assets, value adjustment of short-term assets except financial assets and unrealized gains of financial assets as independent variables, is not significant since p value of model is 0.162 and p value for all independent variables is higher than 0.10.

Table 3 Descriptive statistics for the variables analyzed (in Croatian Kunas—HRK)

	Mean	Median	Std. deviation	Minimum	Maximum	Percentiles		
						25	50	75
Deferred tax assets	5,989,892	–	67,760,402	–	1,994,694,297	–	–	–
Deferred tax liability	2,051,009	–	30,397,690	–	803,933,732	–	–	–
Value adjustment of long-term assets except financial asset	3,288,229	–	62,391,374	–	2,458,560,228	–	–	–
Value adjustment of short-term assets except financial asset	4,578,988	126,060	53,450,583	–7,219,746	2,273,595,843	–	126,060	1,243,206
Unrealized gains (revenues) of fin. Property	509,243	–	10,381,606	–	393,280,981	–	–	–
Unrealized losses (expense) of fin. Property	1,243,063	–	23,144,225	–	808,814,289	–	–	–
Changes in revaluation reserves from longer term and tangible and intangible assets (OCI)	362,278	–	18,352,612	–202,912,492	1,016,416,775	–	–	–
Profit or loss on the basis of subsequent valuation of financial assets available for sale (OCI)	192,714	–	3,994,566	–38,789,284	114,954,654	–	–	–
Corporate profit tax liability of current period	3,952,867	678,552	29,425,714	–480,963,585	598,184,181	28,728	678,552	2,304,267

Source: Authors

Table 4 Regression results from the deferred tax assets equation

Dependent variable: deferred tax assets	Multiple regression
Value adjustment of long-term assets except financial assets	1.351** (0.012)
Value adjustment of short-term assets except financial assets	-1.781** (0.014)
Unrealized gains of financial asset	-0.275 (0.702)
Number of observations	3255
Number of companies	465
<i>R</i>	0.966
Durbin-Watson	3.128
Sig.	0.029**

p-values in brackets

***, **, and * indicate the statistical significance at the 1, 5, and 10%, respectively

Source: Authors

Table 5 Regression results from the deferred tax liability equation

Dependent variable: deferred tax liability	Multiple regression
Changes in revaluation reserves from longer term and tangible and intangible assets	0.09* (0.072)
Profit or loss on the basis of subsequent valuation of financial assets available for sale	-0.10 (0.461)
Unrealized gains of financial asset	-0.275 (0.702)
Number of observations	3255
Number of companies	465
<i>R</i>	0.866
Durbin-Watson	1.781
Sig.	0.062*

p-values in brackets

***, **, and * indicate the statistical significance at the 1, 5, and 10%, respectively

Source: Authors

Therefore, these independent variables are not adequate to predict corporate profit tax liability in this model. This can be explained that the amount of the corporate profit tax is to a large extent affected by income and expenses that are not related to the changes in fair value.

4 Conclusion

The application of fair value concept when measuring the company's assets and liabilities will result in corresponding accounting and tax effects in financial statements. Accounting effects will be expressed as a difference between fair value of the measured asset or liability at the reporting date and its carrying value. That difference will affect the number of total assets or liabilities being measured, but also the profit (loss of enterprise) or other comprehensive income of the company. In other words, it will affect financial position, such as financial performance. Tax effects as a result of a fair value concept application will have an impact on deferred tax assets, corporate profit tax, and deferred tax liability.

In Croatian companies from real sector, according to the research sample, it could be concluded that fair value concept is not widely used, since the 25th, 50th, and 75th percentiles are mainly zero for the variables that express changes in fair value compared to carrying amount. Application of fair value concept will also have an impact on deferred tax assets and deferred tax liability, but those companies mainly does not express those, only corporate profit tax. That means that corporate profit tax in the current year is mainly based on revenues and expenses arising from the current period, irrespective of the change in fair value of assets and liabilities.

Multiple regression analysis with dependent variables in the form of deferred tax assets, deferred tax liabilities, and corporate profit tax have been conducted. With the significance of 5%, model for deferred tax assets is good, and statistically significant with two significant independent variables, but it is important to point out that model contains negative autocorrelation, which means that it is not adequate. The second model is significant with one significant independent variable, but at the significance level of 10%. Third model is not good, even though the *R Squared* is high, since it is not significant and all of the independent variables are not significant. Altogether, according to the research results, descriptive and inferential statistics, it can be concluded that fair value concept is not widely used in Croatian company's from the real sector for the period observed. Therefore, the accounting effects of the fair value concept cannot have high impact on corporate profit tax liability. According to the regression analysis, only the model for the deferred tax liability is good with one significant variable.

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Part II
Empirical Studies on Emerging Economies

Effect of the Time to Maturity on the Risk of the Covered Call Strategy



Ewa Dziawgo

Abstract This chapter illustrates the selected issues connected with the covered call strategy: the strategy design, the impact of certain variables (the price of the underlying asset and time to expiration (maturity) on the performance of the values of the ratios delta, gamma, vega, theta, and rho. These ratios are the risk measures and are very important in risk management of the option transactions. They determine the influence of changes in the risk factor on the price of the option. The aim of this study is to present an analysis of the effect of the time to expiration on the value and the risk of the covered call strategy. The chapter uses the methods of mathematical analysis. The empirical illustration shown in the chapter is presented based on the currency options (on EUR/USD) pricing simulation. The simulation was carried out for the period 02.01.2019–15.03.2019. The results indicate that all measures values of the risk of covered call strategy are significantly volatile over time.

Keywords Risk management · Measures of risk · Financial instruments

1 Introduction

In the conditions of growth turmoil in the financial markets, developing and professional implementation of new methods that enable more effective risk management is growing in importance (Andersen 2006; Allayannis and Eli 2001; Carr and Madan 2001; Xing et al. 2010; Ofek et al. 2004; Loder and Picher 2000).

There is an increase in the diversity of derivatives in contemporary financial market. Derivatives are characterized by certain flexibility due to the fact that they can be applied for hedging and speculative purposes as well as in arbitrage transaction. Options are the asymmetry instruments in the class of derivatives (Black and

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Scholes 1973; Hull 2009; Dziawgo 2019). The buyer of the option has the right but not the obligation to fulfill the contract. On the other hand, the option writer is obligated to execute the contract if the option is to be realized. In the case of options, the risk measures analysis is very important. They show the impact of the changes in the value of the risk factor on the shaping of the option's price. The measures of options risk include the following ratios: delta, gamma, theta, vega, and rho (Hull 2009; Dziawgo 2010; Musiela and Rutkowski 2010; Wilmott 1998; Chang et al. 2012).

The covered call strategy is created by the simultaneous taking of a long position in the underlying asset and short position in the call option on the same underlying asset.

The writer of the call option is obligated to sell the underlying asset (at the strike price and at a certain time) to the buyer, if the option is exercised. The primary focus of this chapter remains on covered call strategy that consists of the different types of call options. The analysis of in-the-money, at-the-money, and out-of-the-money options is carried out. In the situation, when the current price of the underlying asset is the higher/lower than the strike price, the call option is in-the-money/out-of-the-money. The option is called at-the-money, if the current price of the underlying asset is equal to the strike price.

The objective of this chapter is the presentation and analysis of the effect of the time to expiration (maturity) on the risk of the covered call strategy. In this chapter, the impact of certain factors on shaping the risk measures was shown and the sensitivity of the value of the strategy for different types of options was compared. The empirical data and illustration of the sensitivity of the covered call strategy are presented based on a simulation of the price of the call option on EUR/USD.

The study is structured as follows. Sections 2, 3, 4, and 5 describe the properties of the delta, gamma, vega, theta, and rho ratio of the covered strategy, respectively. These sections include the discussion on empirical results. Finally, Section 6 concludes the chapter.

The issue of the measures risk of the covered call strategy is analyzed only fragmentarily in the subject literature. This chapter can provide additional insights into the methods of the risk management.

2 Delta Risk of the Covered Call Strategy

The delta ratio shows by how much the option's price will change, when the underlying asset price changes by one unit (Hull 2009; Wilmott 1998; Bakshi and Kapadia 2003; Tsanakas and Desli 2005). The delta ratio is an important risk measure of the option price. The positive value of the delta indicates that the growth/decline in the price of the underlying asset influences the increase/decrease in the price of the option. When the delta ratio is negative, then the rise/fall in the price of the underlying asset impacts the decrease/increase in the price of the option.

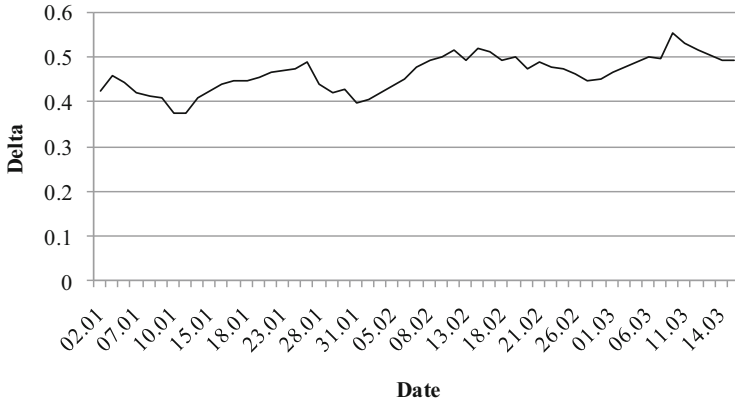


Fig. 1 Variation of the value of the delta for the considered covered call strategy. Source: Author’s elaboration

Table 1 Influence of the price of underlying asset and the time to expiration on the delta of the covered call

Price of underlying asset [USD]	Delta of the covered call with time to expiration 2 months	Delta of the covered call with time to expiration 4 months	Delta of the covered call with time to expiration 6 months
1.1295	0.6076	0.5430	0.5054
1.1345	0.5571	0.5036	0.4776
1.1395	0.5058	0.4720	0.4503
1.1445	0.4582	0.4366	0.4230
1.1495	0.4072	0.4107	0.4122
1.1545	0.3578	0.3675	0.3759
1.1595	0.3107	0.3342	0.3365

Source: Author’s elaboration

The considerations are focused on the impact of the price of the underlying asset and the time to expiration on the delta-risk of the covered call strategy. In this strategy can be used the option on EUR/USD. The time to expiry of the option is 4 months. The option strike amounts to 1.1445 USD. The simulation is concerned with the period of January 02, 2019–March 15, 2019. Figure 1 depicts the performance of the value of the delta ratio for the discussed covered call strategy. Table 1 illustrates the impact of the time to expiration and the price of the underlying asset on the changes in the delta ratio for discussed covered call strategy.

The values of the delta ratio of the covered call strategy are positive. Therefore, the increase/decrease in the price of the underlying asset influences the rise/fall in the value of the covered strategy. The increase/decrease in the current price of the underlying asset contributes to the decrease/increase in the value of the delta ratio. A significant decrease in the price of the underlying asset in relation to the strike price affects the growth in the value of the delta ratio and thus increases covered strategy sensitivity to changes in the price of the underlying asset.

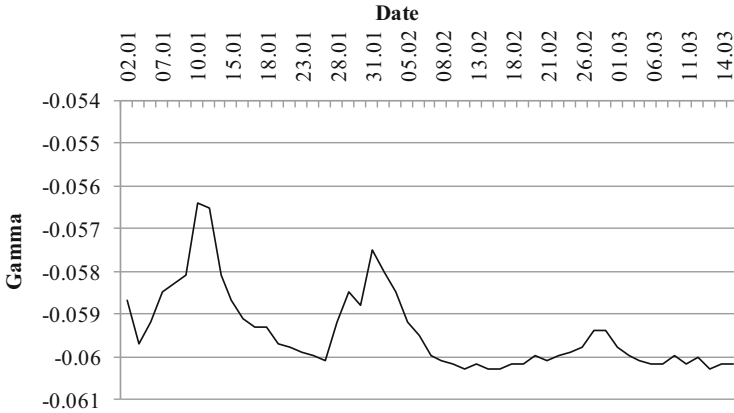


Fig. 2 Variation of the value of the gamma for the considered covered call strategy. Source: Author’s elaboration

Table 2 Influence of the price of the underlying asset and the time to expiration on the gamma of the covered call

Price of underlying asset [USD]	Gamma of the covered call with time to expiration 2 months	Gamma of the covered call with time to expiration 4 months	Gamma of the covered call with time to expiration 6 months
1.1295	-0.1004	-0.0728	-0.0503
1.1345	-0.1028	-0.0735	-0.0544
1.1395	-0.1035	-0.0749	-0.0584
1.1445	-0.1043	-0.0754	-0.0598
1.1495	-0.1025	-0.0722	-0.0572
1.1545	-0.0998	-0.0704	-0.0557
1.1595	-0.0955	-0.0683	-0.0539

Source: Author’s elaboration

If the option is out-the-money and at-the-money then the increase in the expiration time impacts the decrease in the value of the delta ratio. Then the covered call strategy is less sensitive to the change in the price of the underlying asset. However, when the option is in-the-money the longer time to expiration results in the value of the delta increase. In this case, the covered call strategy is more sensitive to the change in the underlying asset’s price.

Figure 2 shows the performance of the gamma ratio of the covered call strategy. Table 2 presents the impact of the time to expiration and the underlying asset’s price on the changes in the gamma ratio for discussed covered call strategy. The gamma ratio indicates show the value of the coefficient delta will change relative to price change in the underlying asset. The positive value of the gamma ratio determines than the increase/decrease in the underlying asset’s price influences the rise/fall in the value of the delta ratio. In the situation, when the value of the gamma ratio is negative, then the increase/decrease in the underlying asset’s price impacts the decrease/increase in the value of the delta ratio.

The gamma ratio for the covered call strategy takes negative values. This means that the increase/decrease in the price of the underlying asset influences the decline/growth in the value of the delta ratio. The highest absolute value of the gamma ratio occurs when the option is at-the-money and option characterized by a shorter time to expiration. In this cause, the value of delta of the covered call strategy is more sensitive to the change in the underlying asset’s price.

3 Vega Risk of the Covered Call Strategy

The vega ratio measures how much the option price will change when the volatility of the underlying asset’s price changes by one unit. If the vega ratio takes negative values, then the growth/decline in the volatility price of the underlying asset impacts the fall/rise in the price of the option. On the other hand, when the values of the vega ratio are positive, then the increase/decrease in the volatility price of the underlying asset influences the growth/decline in the price of the option. Higher absolute values of the vega ratio indicate the greater sensitivity of the price of the option to fluctuations in the price volatility of the underlying asset. Figure 3 depicts the performance of the value of the vega ratio for the covered call strategy. Table 3 illustrates the effect of the price of underlying asset and time to expiration on the value of the vega ratio for the analyzed covered call strategy.

The vega ratio of the covered call strategy is negative. This means that the increase/decrease in the volatility price of the underlying asset impacts the decrease/increase in the value of the covered call strategy. The longer time to expiration influences the growth in the absolute value of the vega ratio of the covered call strategy. Therefore, the covered call strategy with a longer time to expiration is more sensitive to changes in the price volatility of the underlying instrument. For

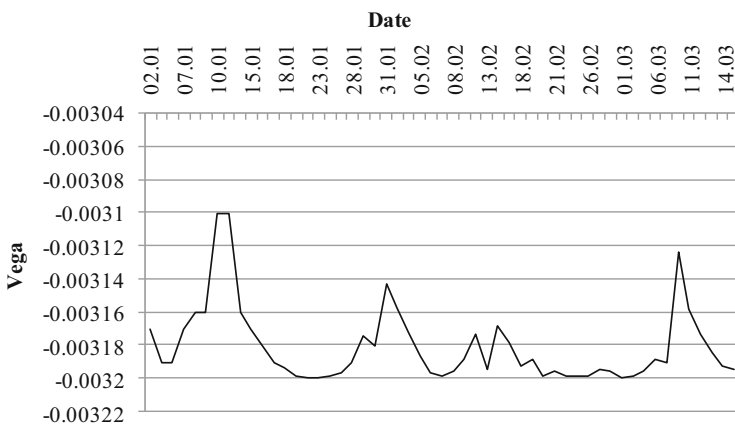


Fig. 3 Variation of the value of the vega for the considered covered call strategy. Source: Author’s elaboration

Table 3 Influence of the price of underlying asset and the time to expiration on the vega of the covered call strategy

Price of underlying asset [USD]	Vega of the covered call with time to expiration 2 months	Vega of the covered call with time to expiration 4 months	Vega of the covered call with time to expiration 6 months
1.1295	-0.001768	-0.002583	-0.003176
1.1345	-0.001827	-0.002612	-0.003185
1.1395	-0.001855	-0.002620	-0.003193
1.1445	-0.001868	-0.002634	-0.003198
1.1495	-0.001820	-0.002612	-0.003171
1.1545	-0.001758	-0.002569	-0.003154
1.1595	-0.001671	-0.002513	-0.003132

Source: Author’s elaboration

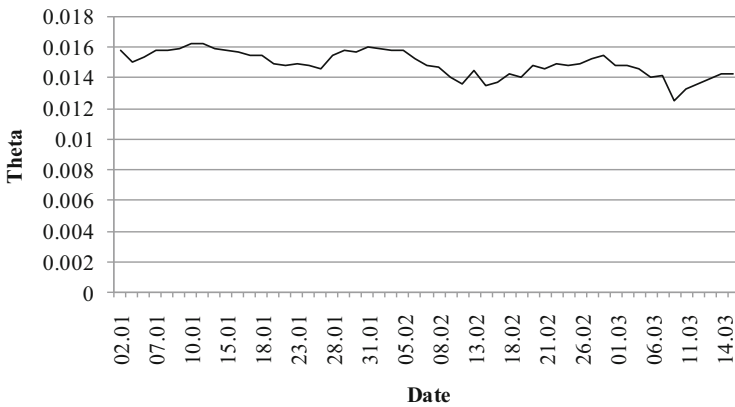


Fig. 4 Variation of the value of the theta for the considered covered call strategy. Source: Author’s elaboration

each time to expiration, the highest absolute value of the vega ratio is observed when the currency price of the underlying asset equals the strike price.

4 Theta Risk of the Covered Call Strategy

Theta ratio is another measure of the option risk. This ratio shows the change in the option price as time elapses. Figure 4 demonstrates the changes in the value of the theta ratio of the covered call strategy. Table 4 indicates the impact of the price of underlying asset and the time to expiration on the formation of the value of the theta ratio for discussed covered call strategy.

The theta ratio of the covered call strategy takes positive values. This determines that the approach of the expiration date has increased the value of this strategy. A high value of the theta ratio demonstrates a significant influence of length of the time

Table 4 Influence of the price of underlying asset and the time to expiration on the theta of the covered call strategy

Price of underlying asset [USD]	Theta of the covered call with time to expiration 2 months	Theta of the covered call with time to expiration 4 months	Theta of the covered call with time to expiration 6 months
1.1295	0.02997	0.01910	0.01402
1.1345	0.03256	0.02037	0.01498
1.1395	0.03444	0.02120	0.01559
1.1445	0.03576	0.02183	0.01643
1.1495	0.03546	0.02112	0.01604
1.1545	0.03537	0.02095	0.01588
1.1595	0.03428	0.02030	0.01521

Source: Author’s elaboration

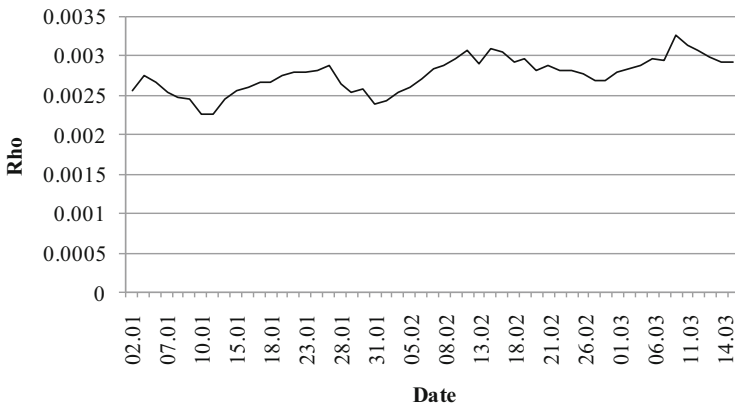


Fig. 5 Variation of the value of the rho for the considered covered call strategy. Source: Author’s elaboration

to expiry on the option price. Highest value of the theta ratio is for options that are at-the-money and characterized by the shorter time to expiration. The longer time to expiration influences the fall in the value of the theta ratio and there is also the decrease in the sensitivity of the covered call strategy to a change in the time to maturity.

5 Rho Risk of the Covered Call Strategy

The rho ratio measures the change in the option’s price, if the interest rate of risk-free assets changes by one unit. Figure 5 presents the formation of the value of the rho for the discussed covered call strategy. Table 5 shows the impact of the price of underlying asset and the time to expiration on the formation of the value of the rho ratio for covered call strategy.

Table 5 Influence of the price of underlying asset and the time to expiration on the rho of the covered call strategy

Price of underlying asset [USD]	Rho of covered call with time to expiration 2 months	Rho of the covered call with time to expiration 4 months	Rho of the covered call with time to expiration 6 months
1.1295	0.001177	0.002133	0.00299
1.1345	0.001082	0.001984	0.00282
1.1395	0.000984	0.001864	0.00266
1.1445	0.000894	0.001730	0.00250
1.1495	0.000798	0.001596	0.00233
1.1545	0.000702	0.001465	0.00218
1.1595	0.000611	0.001337	0.00202

Source: Author's elaboration

The rho ratio for the covered call strategy takes positive values. It means, that the rise/fall in the interest rate influences the growth/decline in the value of the strategy. The increase/decrease in the price of the underlying asset impacts the fall/rise in the value of the rho ratio. Highest value of the rho ratio reflects the greater sensitivity of the value of the covered call strategy to the change in the interest rate. The value of the rho ratio of the covered call strategy with the longer expiration date is greater. Then the covered call strategy with the longer expiration date is more sensitive to the interest rate fluctuations.

6 Conclusion

The covered call strategy is a popular option strategy that can generate additional income, in the form of premium (the amount that the purchaser of the call option must pay to the writer). All values of measures of the covered call strategy risk are considerable volatile over time. This indicates a significant sensitivity of the value covered call strategy to a change in the price of the underlying asset, the passage of time, the volatility of the underlying asset price, and interest rate changes. Considerable fluctuations in the values of the delta, gamma, vega, theta, and rho ratio are the cause of the popularity of covered call strategy in speculation transactions. So, the risk analysis of used covered call strategy is very important.

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In Search for a Connection of Selected Variables on the Formation of Tax Gap in Personal Income Tax: The Example of Poland



Alina Klonowska

Abstract The subject of the study is the income tax gap paid by natural persons in Poland. The study was conducted to determine the impact on the tax gap of changes in the number of income tax payers, the number of enterprises with foreign branches, and the number of enterprises employing up to 9 people. The study hypothesized that changes in the number of income tax payers, as well as the number of enterprises have a significant impact on changes in the level of tax gap. To test this hypothesis the Pearson correlation coefficient was applied in the study. The study period covers the years 2008–2015. Studies have shown that changes in the number of taxpayers such as entrepreneurs or persons employed on the basis of an employment relationship indicate a tendency to change in the scope of the tax gap. No significant relationship was found between the parameters concerning enterprises and the size of the tax gap. The research is unique for being the first empirical study of its type in Poland.

Keywords Gross tax gap · Net tax gap · Tax

1 Introduction

The stability of public finances is the most desirable feature of modern economies. Fiscal authorities take a lot of effort to preserve it. In the era of globalization, the high probability of tax risk materialization leading to tax evasion significantly hampers this objective. It is therefore necessary to monitor the phenomenon of tax evasion and the factors determining it. Nowadays, EU countries and not only them, implement tax risk management policy. The measure widely used as part of the tax risk

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management policy is the tax gap, which treats the phenomenon of tax evasion in a uniform manner.

The subject of the study is the income tax gap paid by natural persons in Poland and its determinants. The study was conducted to determine the impact on the level of tax gap in terms of the number of income tax payers, the number of enterprises with foreign branches and the number of enterprises employing up to 9 people (96% of the total population of nonfinancial enterprises in Poland constitute the smallest entities). The study hypothesized that changes in the number of income tax payers, as well as the number of enterprises have a significant impact on changes in the level of tax gap. In order to conduct the study, information from the reports on the implementation of the external risk management strategy, data resulting from information on the annual settlement of income tax payers paid by natural persons and information from national accounts were used. The study period covers the years 2008–2015.

The originality of the study lies in the fact that so far no research has been conducted in the field of determinants of the tax gap in income tax paid by individuals in Poland. In addition, global research on the tax gap in income tax is very modest. This is the first attempt to make an initial assessment of the impact of selected factors on the size of the PIT gap.

The study has shown a tendency that with the increase in the number of PIT taxpayers, the tax gap is decreasing, while the tax gap is growing along with the increase in other variables. In particular with the increase in the number of enterprises. However, there is no significant relationship between the small entities and the amount of tax gap.

In the first chapter, on the basis of literature review, the essence of the tax gap was defined and its types were presented. Next, the methods of measuring the tax gap as well as the tax gap in the income tax paid by natural persons in Poland were described. The next chapter contains a description of the method used in the study, as well as the outcomes resulting from the conducted study.

2 Tax Gap: Literature Review

It is difficult to indicate the exact time when the concept of tax gap was applied for the first time. Most probably, these were the early 1980s. Some sources state that its first estimates were prepared by the Tax Office in the United States in 1973 (United States General Accounting Office 1995). OECD (2010) data shows that almost half of the countries belonging to this organization estimate the tax gap. On the other hand, relatively few tax authorities in the countries belonging to the European Union carry out such estimates (11 countries, they are required among 9). In addition, 9 OECD countries publicize the results, of which 5 countries belong to the European Community (Novysedlák and Palkovičová 2012). Nevertheless, to take action to assess the degree of tax discipline based on estimates of the tax gap, countries are encouraged by international institutions, i.e., the World Bank, the OECD, and the

International Monetary Fund, as well as The Intra-European Organisation of Tax Administration (Almunia and Lopez-Rodriguez 2015).

A review of the literature on the subject indicates that the tax gap is variously defined. The discussed category is treated as an important measure of the effectiveness of tax administration. Brown and Mazur (2003) claim that the tax gap is similar to the measurement of net profits in the private sector, which is necessary to obtain a full picture of the organization activities. The situation is similar in the case of fiscal authorities, which may have a distorted picture of their actions, if information on the level of tax discipline was not obtained on an ongoing basis. This category, therefore, can be used to assess the level of tax discipline. Most often, however, the tax gap is defined as the difference between the amount of taxes that should be paid to the state budget account and the amount actually received. This discrepancy comes down to the difference between taxable revenues that can be obtained and those that have in fact increased public revenues. Another interpretation indicates that this is the difference between a tax that would be determined if all taxpayers correctly and fully declared their activity and completed transactions and between a tax established in reality (Swedish National Tax Agency 2008). As Malamud and Parry (2008) indicate, in 1988, two components related to the tax gap were identified: the tax liability reporting gap and the tax remittance gap. Similarly, the Swedish solutions show that there is a significant difference between the responsibility for declaring the tax and the responsibility for paying it. It is important to distinguish between the gap that arises as a result of determining the tax (tax gap, also known as tax error) and the gap that arises in connection with the payment of tax at a reduced amount (determining the loss in the collection, in other words tax losses). Tax error and loss in the collection lead to a total tax gap or so-called total tax loss (Swedish National Tax Agency 2008). Silviani and Baer (1997) to amounts of potentially received taxes include those that have not been paid due to tax evasion, tax arrears, and other shortages due to misinterpretation of the regulations. They also include unregulated tax amounts due to noncompliance with tax regulations. In literature known as noncompliance (Andreoni et al. 1998). The non-adaptation of taxpayers to the applicable rules resulting from the provisions of tax law is one of the taxpayer's tax life cycle. Therefore, the tax gap should not be equated with illegal tax evasion. Phua (2009) assumes that noncompliance with tax regulations is a wider measure of the tax gap. Noncompliance and avoidance or evasion are terms often used in this context. This measure consists of three types of compliance (*compliance*) OECD (2008):

1. Payment compliance (payment compliance).
2. Compliance in completing tax declaration (filing compliance).
3. Compliance of the application (reporting compliance).

Similarly, Dubin (2012), who claims that the tax gap reflects the types and scale of inappropriate behavior of taxpayers in three areas: payment, tax declaration, and application for taxation. The lack of compliance in all these areas determines the gross tax gap (*gross tax gap*). This is the difference between the tax that should be paid and the one paid voluntarily and on time (Toder 2007). Whereas, the net tax gap

(*net tax gap*) is understood as the difference between the estimated gross tax gap and the tax gap eliminated by control activities, as a result of which tax liabilities were determined and collected. According to the American solutions, the net tax gap is the gross tax gap reduced not only by taxes enforced as a result of the inspections carried out, but also those that were overdue and paid voluntarily (Dubin 2012).

3 Measurement and Development of Tax Gap in Poland

Measuring the tax gap is a relatively difficult task. This is due to the complexity of the tax evasion phenomenon proved by researchers (Elgin and Erturk 2019). The methodology of measuring the tax gap also varies depending on the type of tax, the nature of the sector, the type of tax evasion, the group of taxpayers, or the quality of the information obtained. One of the concepts is based on methods that directly measure this phenomenon using data from national accounts, controls carried out, or household budget surveys. Most likely, this is the most commonly used method of assessing the extent of tax evasion. The second concept assumes the use of data that indirectly determines the scale of tax evasion and is largely related to the estimates of the gray economy (Tanzi and Shome 1993). According to the literature, the methods used for this purpose can be divided into two main groups (Fuest and Riedel 2009):

1. A macro-method, referred to as a top-down method (*top-down method*) or an indirect estimation method.
2. A micro-method or bottom-up method (*bottom-up method*), referred to as a direct estimation method.

When calculating the amount of the tax gap according to the first approach, the starting point is to determine the amount of taxes that should affect the state budget accounts. For this purpose, macroeconomic indicators and information from national financial statements that may disclose unannounced or unobserved economic activity by the tax authorities are used. Then, the results are compared to the paid tax amounts. In this way, this model creates an absolute limit for the tax gap to which different types of errors can be assigned. In this case, the differences in macroeconomic data are often used, e.g., data from National and Financial Accounts, on the basis of which the proportion can be determined how much of the business activity escapes before taxation (Swedish National Tax Agency 2008). An unquestionable advantage of this approach is to find the answer to the question what is the size of the area or activity “escaping” from taxation. In addition, the data necessary to carry out the estimates are generally available, although they are characterized by low credibility and low informative value. Fuest and Riedel (2009) emphasize the unreliability of macro-methods, hence they propose a micro approach, which lists methods based on controls of entities and surveys or interviews. The macro-methods of estimating the tax gap, proposed by the European Commission (2006), are divided into indirect and direct methods. They include:

Table 1 Tax gap in personal income tax and its components, 2008–2015 (PLN million)

Year	Net tax gap	Tax arrears in PIT	Amounts enforced	Gross tax gap
2008	9541.00	3285.00	388	13214.00
2009	8018.00	3722.00	503	12243.00
2010	8008.00	4072.00	614	12694.00
2011	13133.00	4530.00	691	18354.00
2012	5582.00	5309.00	752	11643.00
2013	49010.00	6003.00	780	11684.00
2014	10971.00	6426.00	702	18099.00
2015	6679.00	6777.00	693	14149.00

Source: Author's own research. Statistics Poland (2018)

(a) Indirect methods:

- Disposable income method.
- GDP method.
- Unexplained difference in the Financial Accounts.
- VAT discrepancy.
- Monetary methods.

(b) Direct methods:

- Surveys.
- Audits.

Data regarding the development of the tax gap are presented in Table 1. The tax gap in PIT was estimated based on the disposable income method (Klonowska 2017).

The available estimates show that in 2008–2015 the tax gap in Personal Income Tax (PIT) in gross terms was on average over PLN 14 billion a year. In relation to PIT revenues, the tax gap accounted for 35% of the funds due on average in a year. About 14% of the amount not paid to the state budget accounts were tax arrears and amounts that were finally enforced. The remaining, the largest part of the tax gap is hidden funds before tax, undeclared, and not paid by taxpayers. In contrast to the tax gap in gross terms, the amount of the net tax gap was at the level of over PLN 8 billion on average in a year. It is characteristic, however, that the rate of its average annual growth, which was at the level of 15%, significantly exceeds the growth rate of the gap in gross terms (8%). In the years 2008–2015, the tax gap in PIT was subject to fluctuations. Its highest level, both in gross and net terms, occurred in two periods: in 2011 and in 2014. At that time, the rate of economic growth in Poland was relatively higher than in the remaining years of the analyzed period and fluctuated around 3–5%. It can, therefore, be assumed that changes in the economic situation could have influenced the changes in the amount of the tax gap. Further, changes in the number of PIT taxpayers and the number of entrepreneurs may be a derivative of the economic situation, and therefore also determine changes in the tax gap.

4 Methodology of Research and Empirical Results

The study assumes that changes in the number of business entities, but also the number of income tax payers paid by natural persons may determine changes in the level of tax gap. Therefore, a study was carried out, which should lead to an answer to the question of how important the changes in the mentioned categories are to the tax gap. Due to the lack of statistical data and limited work volume, the study covered only the income tax paid by natural persons. The study period covers the years 2008–2015. This choice was dictated by the availability of data. The Pearson's linear correlation coefficient was used in the study.

In the beginning, the relationship between tax arrears in PIT and the tax gap in this tax was examined. Next, it was examined whether the features selected for the study, i.e., the number of taxpayers of personal income tax, the number of enterprises employing up to 9 people, as well as the number of enterprises and the number of foreign units, are related to the tax gap and determine its amount (Table 2).

On the basis of the conducted analysis, no significant relationship was found between the size of tax arrears and the size of the tax gap. A tendency was observed that with the increase of tax arrears the size of the tax gap is growing. Similarly, no significant relationship was found between the parameters concerning enterprises and the size of the tax gap. However, a tendency was observed that with the increase in the number of PIT taxpayers, the tax gap is decreasing, while the tax gap is growing along with the increase in other variables. The increase in the number of PIT taxpayers negatively correlated with the size of the tax gap may result from the fact that income tax payers paid by natural persons are to a significant extent persons who do not run a business activity and are employed. Hence the possibility of committing fraudulent practices is limited. This would confirm Alm's opinion (2017), who, referring to globalization, states that "globalization has generated a workforce dynamic in which taxpayers generally are employed by large business enterprises (where individual tax compliance is fairly high) rather than in traditional mom-and-

Table 2 The development of categories used in research, 2008–2015 (in thous. PLN)

Year	Number of personal income tax payers	Number of entities employing up to 9 people	Number of enterprises in Poland	Number of foreign entities
2008	25,325	1780	1106	2541
2009	25,820	1666	1313	2747
2010	26,167	1717	1380	2853
2011	26,138	1711	1438	3060
2012	26,624	1783	1373	3084
2013	26,375	1754	1520	3252
2014	26,056	1826	1562	3532
2015	26,466	1905	1667	3890

Source: Ministry of Finance (2018)

Table 3 Impact of selected categories on the gap in PIT—research results

Specification	Tax arrears	Number of PIT taxpayers	Number of entities employing up to 9 people	Number of enterprises	Number of foreign entities
Gross tax gap	0.233	-0.105	0.170	0.325	0.334
	$p = 0.578$	$p = 0.804$	$p = 0.687$	$p = 0.432$	$p = 0.419$

Source: Author's own research

pop businesses (where individual tax compliance is typically low).” The results of the tests are presented in Table 3.

In summary, however, it should be emphasized that due to the small number of observations, despite a fairly high correlation between some variables, it turned out to be statistically insignificant. A small number of observations may also give the direction of dependence opposite to the predicted one.

5 Conclusion

The accession of Poland to the EU in 2004 promised many positive changes and opportunities for faster growth and economic development. In the same year, the authorities decided to initiate a tax risk management policy by adopting the concept proposed by the European Commission. By assumption, the actions taken were to contribute to minimizing tax risk, which meant reducing the scale of tax evasion. There was an increase in the amount of unpaid taxes on time, as well as the first serious cases of VAT fraud in intra-Community transactions. Finally, Poland as other EU countries experienced the problem of escaping the tax when the internal borders were opened. This is evidenced by inter alia an upward trend in the level of tax arrears and changes within the amount of the tax gap in personal income tax. However, the assessment cannot be clear because the PIT gap was characterized by fluctuation. The factors determining the creation of the tax gap are a wide range of entities' activities. They may take a different form, however, they start with the dishonesty of entities settling accounts with tax authorities.

Studies have shown that changes in the number of taxpayers such as entrepreneurs or persons employed on the basis of an employment relationship indicate a tendency to change in the scope of the tax gap. Furthermore, no significant relationship was found between the parameters concerning enterprises and the size of the tax gap. A tendency was observed that with the increase in the number of PIT taxpayers, the tax gap is decreasing, while the tax gap is growing along with the increase in other variables. In particular with the increase in the number of enterprises. However, there is no significant relationship between the small entities and the amount of tax gap.

Villios (2012) argues that the tax gap is an important measure with many benefits. It is a way to determine the types and level of so-called noncompliance of taxpayers

with the applicable rules that contributes to its creation. In many countries, the tax gap is treated as one of the means to assess the effectiveness of the tax authority's activities, as well as to study long-term changes in the behavior of taxpayers (Internal Revenue Service 2018). Measuring the tax gap is also important from the point of view of the fiscal policy pursued because the analysis of historical data allows for the preparation of better forecasts regarding future tax revenues. In connection with the above, an important element of the body that prepares the state budget should be the assessment of the amount of taxes not flowing into the state budget. By entering into the Europe-wide trend of actions taken to combat tax fraud, the Polish fiscal authorities should adopt the concept of systematic monitoring of the size of the tax gap. This will support tax risk management by identifying the causes of noncompliance.

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Penalised Quantile Regression Analysis of the Land Price in Japan by Using GIS Data



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Abstract Land price analysis remains one of the active research fields where new methods, in order to quantify the effect of economic and noneconomic characteristics, continually push knowledge frontiers up. Nevertheless, so far, most of the research focus on measuring the causal effect to the mean value of land price by ordinary least squares (OLS) method, despite the possibility that covariates might affect the land price differently at each quantile, that is, causal effects might depend on the quantile of the land price distribution. Furthermore, most of the literature highlights the effect of a few accessibilities, building characteristics, and amenities over the land price by using limited survey data even though the development of geographic information systems (GIS) improves accessibility information to various facilities by positioning properties on the map in terms of their geographic coordinates and provides larger dataset. To identify the heterogeneous causal effects on the land price, the chapter applies the Quantile Regression (QR) method to the land prices function, using GIS data in Japan including micro-level characteristics in 2017. As the number of covariates is large, penalized QR method by regularization helps us to obtain more accurate results in variable selection. We find that QR with GIS data is crucial to obtain detailed relationships between micro-level covariates and land price since GIS data explains that non-macroeconomic variables cause the land price heterogeneously at each quantile. For example, the distance from a medical facility causes a negative effect on the land price; furthermore, this effect is magnified for upper quantiles.

Keywords GIS · Quantile regression · Land price · Japan

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1 Introduction

The land price in a country is influenced by several factors. Considering all the factors that influence the land price, those can be classified into two main categories, macroeconomic and microeconomic variables. The macroeconomic variables include all factors related to the economic situation of the country that might affect the land price within a certain homogeneity level, e.g. inflation, population, and political issues. Those factors are also known as structural factors. On the other hand, the microeconomic variables refer to all the factors that might affect the land price in a heterogeneous way, e.g. location, amenities, housing, and road conditions. These factors are also known as non-structural factors.

The analysis of land prices from a structural factor viewpoint is standard in the literature; however, the non-structural perspective requires a large quantity of data and more sophisticated models. This research contributes to the literature on land price analysis in several ways. First, we provide a non-linear analysis with non-structural factors by using geographic information system (GIS), which allow us to access to substantial data points for the land price in Japan for 2017. Second, the analysis is made with quantile regression models to consider the effect which depends on a quantile of the distribution of the land price in Japan. Finally, not like Liao and Wang (2012), which examine the implicit prices of housing characteristics across conditional distribution of land prices by using CQR without any variable selection, we apply penalized QR method by regularization (least absolute shrinkage and selection operator—lasso—and elastic net—EN) to GIS land price data of Japan for the purpose of investigating heterogeneous effects of the covariates on the different point of land price distribution with the robust variable selection.

It is interesting to note that Japan had structural changes since the post-war. The land price rapidly increased until it sets higher than other countries in accordance with the economic and population growth the country had in the recovery periods. Nevertheless, the bubble economy in the eighties and the low population growth rates in the late seventies modified the evolution and behaviour of the land price profoundly. The land price started to decrease or remain stable for the last decades; additionally, the poor economic performance of the macroeconomic variables (e.g. GDP growth rates and inflation) makes the microeconomic (non-fundamental) effects more relevant in order to detect the variability of the land price inside the country. It means, the evolution of the land price is potentially affected by the macroeconomic conditions along with the country; however, once those variables tend to remain stable or reduce their significance, the heterogeneity across land price within Japan depends on the non-fundamental factors. The land price thus could differ from each other according to their non-fundamental factors, including the location, access to facilities, building structures, and so forth.

The estimated results of this study support the relationship between the non-fundamental factors and the land price for the case of Japan. They are significant and statistically robust results to explain the land price and the heterogeneous effects of covariates. Additionally, the results imply the importance of using detailed data

and the power of GIS as a tool by including non-fundamental characteristics on the analysis.

The remainder of the chapter is structured as follows. Section 2 reviews the main literature of the hedonic price analysis and related topics for international cases and Japan. Section 3 presents the methodology to investigate the heterogeneity in the hedonic price in Japan. Section 4 describes the detail of dataset for the empirical analysis and its empirical facts. Section 5 proposes the result of the main result of the empirical analysis. The final section gives concluding remarks.

2 Literature Review

Rosen (1974) is one of the seminal papers in the field to analyze the land price systematically. This research proposes a hedonic price model where the land price is an equilibrium between consumers and producers. They make their decisions based on spatial land characteristics. In other words, the land price is a result of the interaction between the land characteristics and economic agents' preferences. In the same decade, King (1977) introduces a spatial general equilibrium model in order to determinate the land price values in function of the location and the dynamics with surrounding characteristics, e.g. amenities, workplaces, and housing prices. In its application, the author argues that equilibrium is conditional to a certain set of spatial characteristics that reflect the consumers' preferences for the land.

From a similar viewpoint, Gronberg and Meyer (1982) proposed a spatial equilibrium model with location elements to analyze the effect of firms over their market area. The results support the idea of a differentiated scheme of prices for firms, consumers, and landowners. They identify the marginal effect on agents due to legal enforcement of mill uniform delivered pricing policies. Stutz and Kartman (1982) make a housing affordability analysis in the United States in the 1970s. They conclude that loan rates and construction costs are not the main drivers of land price fluctuation. On the other hand, the weather and per capita income influence the demand side while local-level land policies, regulations, and taxes influence the supply to constitute the main drivers of land price fluctuations.

Based on data from two British towns and under a hedonic price model, Cheshire and Sheppard (1995) find that the proper specification of the hedonic model by incorporating housing characteristics is crucial. Specifically, the amenities have a significant effect on land prices. In summary, the market price of land reflects the combined effect of land as space but also the net value of neighbourhood characteristics of houses. From a similar perspective, Anselin (1998), which constitutes one of the pioneers to use GIS information to analyze the land prices and include the possible influence of the space into it, highlights the effect of the distance and location as covariates. Allen et al. (1999) analyzed the relationship between the location and the land usage by a logistic regression model for the South Carolina tourist area in the United States from 1982 to 1996. They sustain that the area changed to be residential rather than a commercial in the recent years with the

significant difference in spatial preferences for the land usage distributed over the primary roads.

In the 2000s, Himmelberg et al. (2005) suggest that the land price trend of the United States does not show evidence of a bubble since the late eighties until 2004. Nevertheless, its existence cannot be rejected in previous years since certainly, the prices are not as higher as in previous years. Additionally, they suggest that fundamentals, macroeconomic variables are essential to determinate the trend of land price; however, the evolution of the land price is also a local phenomenon that it must be taken into account. Saiz (2010), by using satellite-generated data for metropolitan areas in the United States shows evidence that metropolitan areas have more expensive housing and enjoy higher amenities or productivity. He also demonstrates that land constraints decrease housing supply elasticities.

As for the case of Japan, Kanemoto (1988) by using a cross-sectional land rent differentials model in benefit estimation, finds that hedonic prices used in equations to estimate the amenities investment benefits tend to overestimate them and results in overinvestment in the land. In general, the hedonic price estimation can be used as upper bound under the assumptions of free and costless migration across regions otherwise the capitalization is likely to be less than perfect and the results imprecise at the end. Noguchi (1994), on the other hand, analyze housing and land prices in Japan during the post-war. He points out the problem of land price focusing on the housing problem in Japan. He considers the problem of land price is equivalent to the housing problem in big cities. In the analysis, the fundamentals turn to be significant once the bubble effect is included. In a similar viewpoint, Saita (2003) estimates hedonic prices for Tokyo metropolitan area during the period from 1992 to 2002 for lands sold by auction. The results show that since the bubble burst, the land prices have been declining except in 1997 and have been likely to be more volatile than official land price index published by the government.

Shimizu and Nishimura (2007) estimate the hedonic price of Japanese land prices for the Tokyo area divided by commercial and residential use for 25 years, and additionally, they include possible structural changes. The authors argue that there exists a difference in the price structure across locations and confirm the presence of the effect of the bubble over the land price. Finally, Kamada et al. (2007) make a similar analysis for 23 wards in Tokyo and the 47 prefectures of Japan incorporating the spatial econometric methods into the analysis. The evidence shows strong spatial autocorrelation between the land price for neighbour areas even at the municipality analysis level. However, the spatial effect and autocorrelation cannot be confirmed for the prefectural level for commercial use of the land.

From a different viewpoint, some researches go deep into the relationship between land prices and land characteristics. They look for the heterogeneous impact of microeconomic characteristics of land over the land price itself. In this sense, Limsombunchai et al. (2004) compare the predictive power of the hedonic model by using an artificial neural network model in New Zealand. They prove a nonlinear relationship between covariates and land prices. For the Chinese land price market, Xu (2008) incorporates buyer's characteristics to analyze socio-economic and location heterogeneities in housing prices. They find that the marginal effects of housing

attributes are not constant but vary with respect to the location and areas profile by including the binary dummies and interaction terms. Liao and Wang (2012) build a micro-dataset for the Chinese land market in order to examine the implicit prices of housing characteristics across the conditional distribution of land prices. By performing the conditional quantile regression, they find a significant and robust effect of land characteristics over the lower and upper parts of the land price distribution, but unclear effects at the median. Those effects are also shown to be heterogeneous across different points of the land price distribution; even some effects have opposite signs for the lower and upper part of the distribution. Finally, Worku (2017) analyses house price drivers in Dubai by pointing the heterogeneous and nonlinear effects of covariates with Box-Cox quantile regression. The author finds evidence of non-linearity and heterogeneity in the estimation results which address a better explanation of land prices evolution.

These studies give us the following two suggestions. Firstly, the land price can be driven by implicit prices of housing characteristics such as non-fundamental factors like amenities and surroundings. Secondly, the non-fundamental characteristics can have heterogeneous effects on the different points of the land price distribution. These suggestions motivate us to investigate the hedonic price by incorporating the non-fundamental characteristics into our model and stimulate us to clarify the heterogeneity of hedonic prices, which stands for the different effect of housing characteristics for the different quantile of the land price distribution, by completing the picture of the hedonic price using the quantile regression.

3 Methodology

To analyze which factor affects the land price in Japan using GIS data, we first develop a multiple linear regression model. The baseline model for $i = 1, \dots, N$ is described as:

$$y_i = \mathbf{x}'_i \boldsymbol{\beta} + \varepsilon_i, \tag{1}$$

where the y_i is the dependent variable, the \mathbf{x}'_i is the K -dimensional vector of the covariates, the $\boldsymbol{\beta}$ is the K -dimensional vector of the unknown parameter, and the ε_i is the disturbance term. The coefficients of Eq. (1) can be estimated by the estimator using a squared loss function defined as:

$$\hat{\boldsymbol{\beta}} = \arg \min_{\boldsymbol{\beta}} \sum_{i=1}^N (y_i - \mathbf{x}'_i \boldsymbol{\beta})^2.$$

The most of research analyzing the land price using hedonic price approach depends on OLS, even though the estimated coefficients by it only can be interpreted as the effect of the central position of the land price distribution, i.e. the estimated

effect of OLS is on the mean of the response variable. It is, however, natural to consider the existence of heterogeneity in the effect of characteristics of the land on a different point of distribution of the land price. We take the difference in the effect among the distribution of the land price into account using the method of quantile regression.

The quantile regression (QR) (Koenker and Bassett 1978) controls the heterogeneous effect of covariates on specific quantile of response distribution conditional on covariates by incorporating the concept of conditional quantile function (CQF) (Angrist and Pischke 2008; Porter 2015). We consider the linearly additive CQF in our analysis as:

$$Q_Y(\tau|X = \mathbf{x}) = \mathbf{x}'\boldsymbol{\beta}(\tau), \quad (2)$$

where $Q_Y(\tau|X = x) \equiv F_Y^{-1}(\tau|X = x) = \inf \{y : F_{Y|X=x} \geq \tau\}$ is the CQF, τ is the prespecified quantile index, and $\boldsymbol{\beta}(\tau)$ is the unknown parameter depending on. Following, the estimator of Koenker and Bassett (1978) the coefficients of QR in Eq. (2) can be written in:

$$\hat{\boldsymbol{\beta}}(\tau) = \underset{\boldsymbol{\beta}(\tau)}{\operatorname{argmin}} \rho_\tau(y_i - \mathbf{x}'_i\boldsymbol{\beta}(\tau)), \quad (3)$$

where $\rho_\tau(\cdot)$ is an asymmetric absolute loss function defined as $\rho_\tau(u) \equiv [\tau - \mathbf{1}\{u < 0\}]u$. The estimated parameter of Eq. (3) can measure the different effects depending on the specific quantile of the response variable. As in the conventional linear regression, it is not desirable to keep inappropriate explanatory variables in the model, especially in the case of the large dimension of the design matrix. This is because inappropriate predictor makes it difficult to interpret the model and its predictive ability worse. This issue called the variable selection problem can also be a problem in the quantile regression (Belloni et al. 2017; Wu and Liu 2009). To cope with this issue, this chapter applies two regularization methods to our quantile hedonic price model; the first one is the least absolute shrinkage and selection operator (lasso) (Tibshirani 1996) and the second one is the elastic net (EN) (Zou and Hastie 2005). Based on the linear CQF in Eq. (2), the estimator of the coefficient of the lasso with quantile loss function (hereinafter lasso-QR) is defined as the lasso version of the minimization problem of Eq. (3):

$$\hat{\boldsymbol{\beta}}(\tau)_{\text{lasso}} = \underset{\boldsymbol{\beta}(\tau)}{\operatorname{argmin}} \rho_\tau(y_i - \mathbf{x}'_i\boldsymbol{\beta}(\tau)) + \lambda \sum_{j=1}^k |\beta_j(\tau)|, \quad (4)$$

where $\beta_j(\tau)$ is the j th element of the K -dimensional vector of unknown parameter $\boldsymbol{\beta}(\tau)$. Tuning parameter λ , chosen by the cross-validation, determines how much shrinkage is done on the coefficients of predictors. The second term in Eq. (4), the penalty term enables us to provide simultaneous shrinkage and model selection.

Even though we can investigate the heterogeneity of the effect of the target explanatory variables on the land price distribution with the model selection by the lasso with a quantile loss function, there is the problem that the lasso is not robust to high correlations among predictors, i.e. multicollinearity (Oyeyemi et al. 2015). EN (Zou and Hastie 2005), which compromises between the ridge regression penalty (l_2 -penalty) and the lasso penalty (l_1 -penalty), is useful in a situation where there are many correlated predictor variables (Friedman et al. 2010). As well as the lasso QR, based on the linear CQF in Eq. (2), the estimator of the coefficient of the EN with quantile loss function (Yi and Huang 2017) (hereinafter EN-QR) is defined as the EN version of the minimization problem of Eq. (3):

$$\widehat{\boldsymbol{\beta}}(\tau)_{\text{EN}} = \arg \min_{\boldsymbol{\beta}(\tau)} \rho_{\tau}(y_i - \mathbf{x}'_i \boldsymbol{\beta}(\tau)) + \lambda P_{\alpha}(\boldsymbol{\beta}(\tau)),$$

where λ is the tuning parameter and $P_{\alpha}(\boldsymbol{\beta}(\tau))$ is the elastic net penalty.

$$P_{\alpha}(\boldsymbol{\beta}(\tau)) \equiv \alpha \|\boldsymbol{\beta}(\tau)\|_{l_1} + (1 - \alpha) \frac{1}{2} \|\boldsymbol{\beta}(\tau)\|_b^2 = \sum_{j=1}^K \left[\alpha |\beta_j(\tau)| + \frac{1}{2} (1 - \alpha) \beta_j(\tau)^2 \right],$$

which is a convex combination of the lasso in the case of $\alpha = 1$, whereas the ridge penalty if $\alpha = 0$. Same as in the lasso, tuning parameters λ and α can be chosen by the cross-validation.

We estimate the effect of the hedonic variables based on four estimation methods, OLS, QR, lasso-QR, and EN-QR. To check whether the hedonic factors affect the land price differently, we focus on the effect of explanatory variables on the five quantiles of the land price distribution, which are the tenth percentile, the first quartile (25th percentile), the median (50th percentile), the third quartile (75th percentile), and the 90th percentile.

4 Data

To analyze which factor affects the land price in Japan using GIS data, we first develop a multiple linear. We use a GIS dataset retrieved from the Publication of Land Price data of Japan in 2017, published by the National Land Information Division, National Spatial Planning and Regional Policy Bureau, the Ministry of Land, Infrastructure, Transport, and Tourism, Japan (hereinafter MLIT). GIS data enable researchers to exploit the benefit of the large-size sample rather than using survey data. This data consists of 21,288 residential land prices with their various non-fundamental characteristics.

The dependent variable of our hedonic model is the *land_price* of the standard point, which is evaluated by the Japanese Yen (JPY) per square metres. We use the natural logarithmic version of the *land_price*, *log_land_price* in the analyses. The

land price information of this GIS data is based on the estimation regarding actual market transaction prices of standard lands (Suzaki and Ohta 1994). We thus use this data as proportional to actual market transaction prices for the analysis.

As well as the non-fundamental characteristics of a standard land, our GIS dataset contains their geographic coordinates which are not available in survey data generally. Using this information, this chapter calculates the distance variables from the evaluation point of the land price to various facilities except for the distance from the nearest station which is contained initially in the dataset. Thus, we additionally incorporate them into the hedonic price model as the non-fundamental characteristic.

As a summary, we incorporate the following non-fundamental explanatory variables retrieved from National Land Numerical Information of MLIT into our design matrix:

- *log_acreage*: Natural logarithm of *acreage*, the size of the land pf standard point in square metres (continuous).
- *wooden*: 1 if the building is wooden in the land and 0 otherwise (binary).
- *gas*: 1 if the gas is supplied and 0 otherwise (binary).
- *coverage*: Coverage ratio of a building defined by the size of the building in the land divided by the size of the land (continuous).
- *bc_dist_st*: Box-Cox transformed version of *dist_st*, geodesic distance from the nearest station in kilometres (continuous).
- *bc_dist_med*: Box-Cox transformed version of *dist_med*, geodesic distance from the nearest medical facility in kilometres (continuous).
- *bc_dist_sch*: Box-Cox transformed version of *dist_sch*, geodesic distance from the nearest public school (continuous) in kilometres.
- *bc_dist_her*: Box-Cox transformed version of *dist_her*, geodesic distance from the nearest heritage site which is registered as one of the World Heritage Sites by United Nations Educational, Scientific and Cultural Organization; UNESCO (continuous) in kilometres.
- *floors*: The number of floors of the building located in evaluated point (continuous).
- *underg*: The number of undergrounds of the building located in evaluated point (continuous).
- *national_r*: 1 if the frontal road of the land is a national road of Japan and 0 otherwise (binary).
- *r_width*: The width of the frontal road of the land in metres (continuous).

The distance variables are measured by the geodesic distance in kilometres between the nearest facilities and the evaluation point of the land using the coordinates information. To obtain the geographic coordinates of the facilities, we retrieve the data from National Land Numerical Information: Medical Organization Data (MLIT) for the *dist_med*, National Land Numerical Information: School (MLIT) for the *dist_sch*, and National Land Numerical Information: World Cultural Heritage Data (MLIT) for the *dist_her*. This chapter identifies the nearest facilities from the evaluated point by the *k*-nearest neighbour searching algorithm.

For the purpose to increase the prediction accuracy and to incorporate the non-linear effect, this chapter additionally considers the non-linear effects and interactive effects of the explanatory variables by including their quadratic terms (e.g. *coverage_2*) except for dichotomic variables and the interaction terms (e.g. *gas_coverage*).

Table 1 summarizes the variables in our empirical hedonic price model. The mean value of the land price is about 200,000 JPY whereas the median of it is 73,200 JPY. The average land in our GIS dataset is 959 m² in size. About 60% of the building in the sample of the land are wooden, and 65% of the land in the sample is supplied with the city gas. The average land in the sample has about 60% of coverage of the building, 2.5 stories buildings with almost 0 underground floors, and the frontal road which is 9 metres in width. The distances from the average land to the facilities are 2 kilometres, 3.6 kilometres, 4.2 kilometres, and 80 kilometres for the nearest station, the nearest medical facility, the nearest public school, and the nearest heritage site, respectively. About 5% of the sample of the land of Japan evaluated in 2017 has a national road in front.

Figure 1 depicts the empirical density of the land price of our GIS dataset. The upper panel shows the empirical density of the residential land price of Japan evaluated in 2017 while the bottom panel shows the empirical density without outliers defined as the land prices greater than the 90th percentile of their distribution. Even after excluding outliers, the bottom panel shows that the empirical density of the land price of our dataset is highly right-skewed. This could be one of our motivations to investigate the heterogeneity of the effect of the non-fundamental characteristics on the skewed land price distribution of Japan by QR rather than the mean-effect of predictors by OLS.

5 Result

Table 2 presents the first estimation by using OLS for the endogenous variable, the natural logarithm of the land price. The first column shows the estimation of the baseline linear model with the set of covariates listed on the table. The second column controls the model by the quadratic terms for the covariates except for the binary variables like *wooden*, *gas*, and *national_r*. The third column presents the results after adding the interaction terms of the covariates, which can be done by incorporating the terms of pairwise multiplication of each covariate including binary variables into the model. Finally, the fourth column, estimated by the full model, shows the estimation results taking the nonlinear effect of both quadratic and interaction terms of covariates into account, and as same as in the second column, the quadratic terms of the binary variables are omitted.

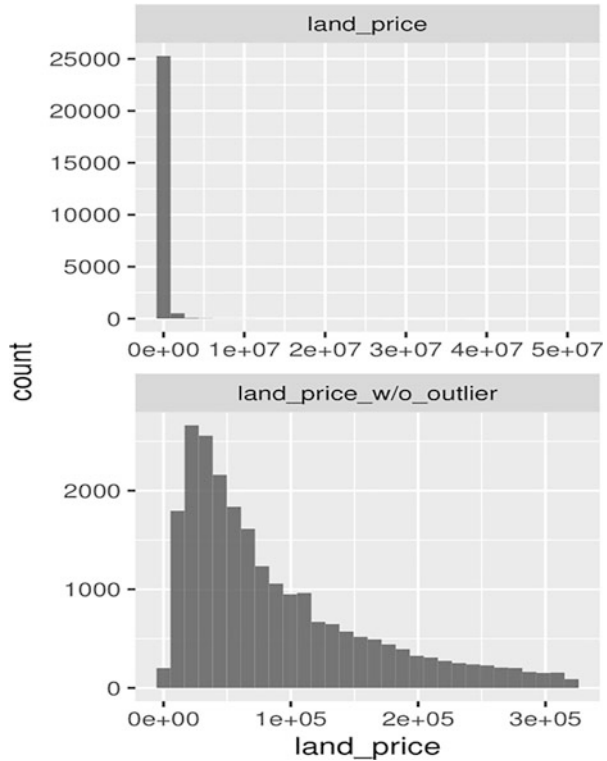
In Table 2, roughly speaking, we observe two types of estimated coefficients: stable and unstable ones. As for the stable coefficients, *acreage*, *gas*, *bc_dist_st*, *bc_dist_sch*, *floors*, and *underg*, these do not change their sign or significance level across models. Regarding the interpretation of the coefficients, we have that higher the size of the land (*acreage*) lower the land price due to the scale effect. Also, it is

Table 1 Descriptive statistics of the GIS data of Japan in 2017

Variable	min	q25	median	q75	max	mean	sd
<i>land_price</i>	510.000	35500.000	73200.000	161000.000	50,500,000	201411.249	978310.211
<i>log_land_price</i>	6.234	10.477	11.201	11.989	17.737	11.263	1.171
<i>acreage</i>	43.000	162.000	214.000	334.000	1,117,453	958.589	11509.948
<i>log_acreage</i>	3.761	5.088	5.366	5.811	13.927	5.590	0.906
<i>wooden</i>	0.000	0.000	1.000	1.000	1.000	0.604	0.489
<i>gas</i>	0.000	0.000	1.000	1.000	1.000	0.659	0.474
<i>coverage</i>	0.000	60.000	60.000	70.000	80.000	62.009	11.404
<i>dist_sf</i>	0.001	0.568	1.101	2.201	99.001	2.059	3.811
<i>bc_dist_sf</i>	-3.940	-0.537	0.097	0.848	7.171	0.188	1.225
<i>dist_med</i>	0.058	1.403	2.553	4.515	706.078	3.626	8.474
<i>bc_dist_med</i>	-2.547	0.343	0.973	1.601	8.591	0.964	0.946
<i>dist_sch</i>	0.020	0.996	1.964	4.079	903.900	4.183	12.415
<i>bc_dist_sch</i>	-4.461	-0.004	0.661	1.345	5.535	0.673	1.057
<i>dist_her</i>	0.087	29.637	62.918	91.641	933.098	79.292	90.032
<i>bc_dist_her</i>	-1.889	5.045	6.777	7.757	15.987	6.450	2.478
<i>floors</i>	0.000	2.000	2.000	2.000	52.000	2.449	1.832
<i>underg</i>	0.000	0.000	0.000	0.000	6.000	0.046	0.257
<i>national_r</i>	0.000	0.000	0.000	0.000	1.000	0.056	0.229
<i>r_width</i>	0.000	5.000	6.000	9.300	112.000	8.953	7.556

Notes: min, q25, q75, max, and sd stand for the minimum, the 25th percentile, the 75th percentile, the maximum, and the standard deviation, respectively
 Source: The Publication of Land Price data of Japan of MLIT and authors' calculation

Fig. 1 Histograms for the land_price of the GIS dataset of Japan in 2017. Notes: The upper panel (*land_price*) shows the histogram of the data of land price retrieved from the Publication of Land Price data of Japan, while the bottom panel (*land_price_w/o_outlier*) shows the histogram of the data without outliers defined as the sample of *land_price* which is greater than 90th percentile of its distribution. Source: Authors' own calculations



observed that land areas that include the city gas supply increase their value as the results showed. Additionally, when the distance from the evaluation point of the land to the nearest public schools (*bc_dist_sch*) or the nearest stations (*bc_dist_st*) increases, the corresponding land price decreases. Finally, land locations with the presence of one or more stories (*floors*) and underground floors (*underg*) increase their prices significantly.

On the other hand, the unstable coefficients, which are whose signs or significance level change across models, are *wooden*, *coverage*, *bc_dist_med*, *bc_dist_her*, *national_r*, and *r_width*. The main source of the instability of these coefficients is the nonlinearity incorporated as control variables under two ways: quadratic terms and interaction terms. These results encourage us to explore nonlinear models to estimate the effect of covariates in more detail. Regarding this suggestion, precisely speaking, the variable *wooden* has a high level of significance across models; however, its sign changes once the interaction terms are included. This is because we do not include any quadratic terms for binary covariates and the source of nonlinearity could be the interaction terms. Similarly, the coefficient of the variable *bc_dist_her*, which measures the distance of the land location respect to the nearest heritage site, changes its sign once the nonlinear terms are included but keeps its significance level across models. It means, for the heritage distance covariate (*bc_dist_her*) has a nonlinear effect over the land price.

Table 2 Hedonic prices estimated by the OLS

	Dependent variable							
	<i>log_land_price</i>							
	(1)		(2)		(3)		(4)	
<i>log_acreage</i>	-0.225	***	-0.728	***	-0.512	***	-0.528	***
	(0.005)		(0.029)		(0.036)		(0.060)	
<i>wooden</i>	-0.27	***	-0.252	***	2.354	***	2.057	***
	(0.011)		(0.010)		(0.108)		(0.118)	
<i>gas</i>	0.679	***	0.612	***	0.601	***	0.568	***
	(0.011)		(0.010)		(0.101)		(0.098)	
<i>coverage</i>	-0.003	***	0.035	***	-0.04	***	-0.018	***
	(0.001)		(0.002)		(0.004)		(0.005)	
<i>bc_dist_st</i>	-0.191	***	-0.198	***	-0.268	***	-0.185	***
	(0.004)		(0.004)		(0.041)		(0.041)	
<i>bc_dist_med</i>	-0.058	***	-0.013	*	-0.123	**	-0.01	
	(0.005)		(0.007)		(0.053)		(0.052)	
<i>bc_dist_sch</i>	-0.296	***	-0.266	***	-0.194	***	-0.298	***
	(0.005)		(0.005)		(0.053)		(0.052)	
<i>bc_dist_her</i>	-0.041	***	0.159	***	0.109	***	0.257	***
	(0.002)		(0.005)		(0.019)		(0.019)	
<i>floors</i>	0.129	***	0.177	***	0.679	***	0.634	***
	(0.003)		(0.005)		(0.037)		(0.040)	
<i>underg</i>	0.562	***	0.602	***	0.654	**	0.555	**
	(0.019)		(0.030)		(0.257)		(0.264)	
<i>national_r</i>	0.023		0.022		-0.147		-0.346	
	(0.020)		(0.019)		(0.250)		(0.242)	
<i>r_width</i>	0.011	***	0.03	***	-0.01		-0.019	**
	(0.001)		(0.001)		(0.009)		(0.009)	
Constant	12.539	***	12.46	***	13.182	***	12.377	***
	(0.049)		(0.116)		(0.261)		(0.342)	
Observations	25,988		25,988		25,988		25,988	
Quadratic terms	No		Yes		No		Yes	
Interaction terms	No		No		Yes		Yes	
R^2	0.674		0.708		0.724		0.741	
Adjusted R^2	0.674		0.707		0.723		0.74	
F -statistic	4478.127	***	2993.407	***	905.152	***	882.989	***

Notes: Numbers in parentheses stand for standard errors. *, **, *** indicate statistical significance at 10%, 5%, 1%, respectively. The first column is the estimation result of the baseline model, the second column is with the quadratic terms, the third column is with the interaction terms, and the fourth column shows the full model incorporating both the quadratic terms and the interaction terms
 Source: Authors' own calculations

More volatile results we observe for the estimated coefficient of coverage, which is the ratio between the area of the building over the area of the land, where higher the ratio of building area lower the land price, due to some positive effects of green

areas over land price (Tokuda 2009). These results are stable even after controlling the nonlinearity; however, it shows a positive effect when the nonlinearity control is only done by quadratic terms, and it makes the interpretation unprecise until a proper non-linear model is estimated. For the case of the distance with respect to the nearest medical facility (*bc_dist_med*), the estimated coefficient is negative and significant across model except for the full model where we include both quadratic terms and interaction terms. It means, further the distance lower the land price as it is expected; these results remain even after controlling the non-linearity. However, its significance level is lost in the full model because the quadratic and interaction terms would take away all the main effects of the distance with respect to the linear covariate. The binary dummy variable for the national road, *national_r*, does not have any effect on the land price even after taking the nonlinear effects into account. Finally, the variable *r_width*, which measures the width of the frontal road in metres, shows unstable estimated coefficient where the sign and the significance level change across models. The original effect under the linear model is positive on the land price, i.e. wider the frontal road, higher the price of the land. This result is kept stable after we control the non-linearity by quadratic terms, but it changes negative and shows no statistical significance in the case of adding only the interaction terms. It appears again to be significant but negative once both the interaction and the quadratic terms are included.

Comparing with previous literature which conducts the hedonic price analysis for the land price in Japan, in Shimizu and Nishimura (2007), which estimate the hedonic price of residential site for the Tokyo metropolitan area, the size of land area and the distance to the nearest station has the significantly negative effect on the land price as well as in Table 2. However, the coefficient of the road width of this paper is significantly positive. On the other hand, Saita (2003), which estimates hedonic prices for lands (in Tokyo metropolitan area) sold by auction, shows significant positive effect of the land size and the coverage ratio of its building on the land price although it presents the significantly negative effect of the accessibility to the nearest station (time to the nearest station). In both papers, estimated effects are limited only on the land price of a specific part of Japan (Tokyo metropolitan area) and assume the homogeneous effects of non-fundamental factors on the different part of the land price distribution since they implement OLS for the estimation of hedonic prices.

Regarding the goodness of fit of the estimated models, we observe that the full model, which controls the nonlinear effects by quadratic and interaction terms, has the highest R^2 and adjusted R^2 . Nevertheless, the instability of some estimated coefficients in the results of Table 2 would be caused by the OLS which can explain only the effect of the explanatory variables on the mean value of the response variable. In order to take the existence of the heterogeneity in the effect of the non-fundamental variable on the land price distribution into account for the more robust inference, i.e. to investigate whether the hedonic price depends on a quantile of the land price distribution of Japan, we perform the quantile regression analyses of the full model using the same dataset.

Table 3 Goodness-of-fit $R^1(\tau)$ of the quantile regressions

τ	QR	lasso	EN
0.100	0.458	0.457	0.598
0.250	0.457	0.457	0.705
0.500	0.473	0.473	0.838
0.750	0.492	0.491	0.726
0.900	0.521	0.520	0.646

Notes: Each column shows the $R^1(\tau)$ goodness-of-fit criterion (Koenker and Machado 1999), where $R^1(\tau) \in [0, 1]$. QR is calculated by quantile regression for the full model, while lasso is done by lasso-QR, and EN is calculated by EN-QR.

Source: Authors' own calculations

Table 4 Chosen λ and α , and empirical shrinkage ratio

τ	λ	α	Shrinkage
0.100	0.001	0.823	0.284
0.250	0.003	0.917	0.330
0.500	0.004	0.932	0.341
0.750	0.004	0.801	0.284
0.900	0.002	0.853	0.295

Notes: Each column shows the optimal shrinkage parameter λ for the elastic penalty, the optimal parameter α for the l_1 -norm and the l_2 -norm, and shrinkage for the empirical shrinkage ratio for each quantile index τ defined as the ratio of the number of shrinkage to the total number of explanatory variables

Source: Authors' own calculations

Table 3 displays the $R^1(\tau)$ goodness of fit criterion (Koenker and Machado 1999) for the quantile regressions, which are QR, lasso-QR, and EN-QR. All of the estimation methods are for the full model, which consists of the original predictors, the quadratic terms, and the interaction terms of covariates. $R^1(\tau) \in [0, 1]$ measures the relative success of the corresponding QR models at a specific quantile in terms of an appropriately weighted sum of absolute residuals. Unlike R^2 , which measures the global goodness of fit over the entire conditional distribution based on the mean-regression, $R^1(\tau)$ measures the local goodness of fit as a function of τ . Table 3 presents evidence that the EN-QR marks the highest $R^1(\tau)$ for every prespecified quantile index, by virtue of its robust variable selection, especially in the case where there are many correlated predictor variables (Friedman et al. 2010) and when the sample size is large (Oyeyemi et al. 2015). This fact thus motivates us to focus on the estimation result of the coefficient by applying the EN-QR method to the GIS dataset of Japan.

In Table 4, we confirm how the shrinkage of the elastic-net penalty is applied to the coefficients of the predictors over GIS data in the penalized quantile regressions. The λ s and α s in Table 4 are chosen by ten-fold cross-validation. Unlike the ridge-regression by the l_2 -norm penalty, the EN, which is the compromised version between the l_1 -norm penalty and the l_2 -norm penalty enables us to shrink the coefficients of the inappropriate predictors to exactly zero (Zou and Hastie 2005).

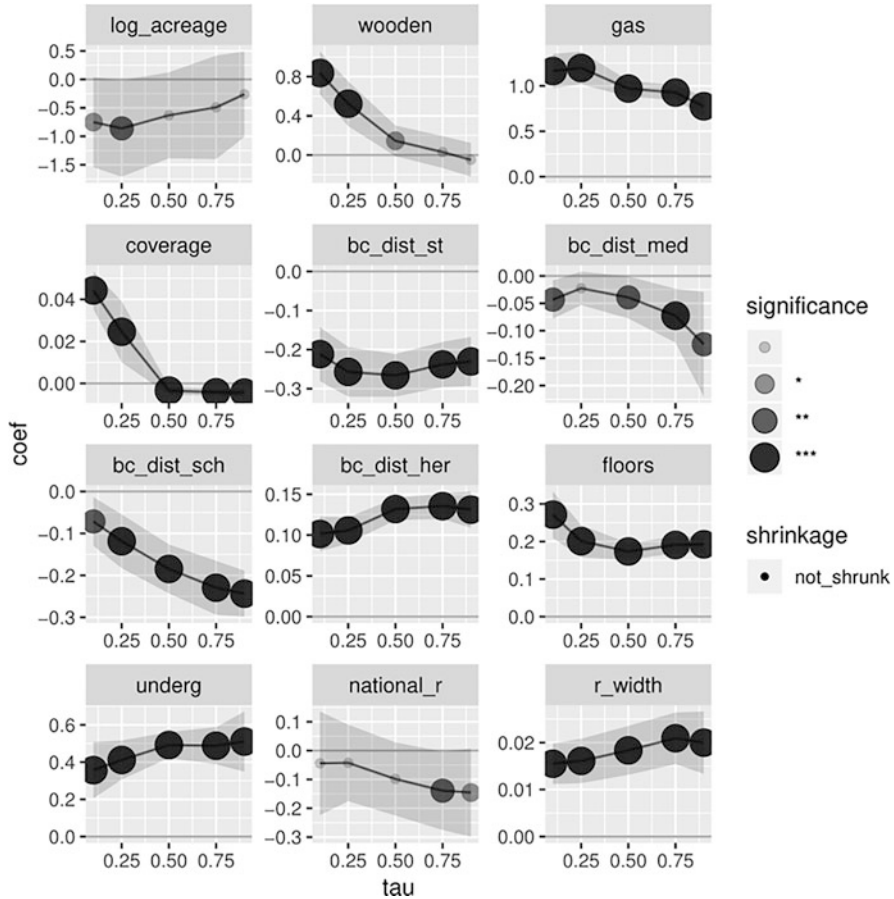


Fig. 2 Quantile process of the original covariates estimated by applying EN-QR to the GIS dataset of Japan in 2017. Notes: Each panel shows the quantile process estimated by EN-QR for the effect of the original explanatory variable on the conditional quantile of the land price distribution corresponding to the quantile indices $\tau = 0.1, 0.25, 0.5, 0.75, 0.9$. Shaded areas indicate 95% confidence interval based on the computation through bootstrapping with 100 repetitions. Size and thickness of the circles correspond to none of *, *, **, ***, which indicate the estimated coefficient is not statistically significant, and statistically significant at 10%, 5%, 1%, respectively. Source: Authors' own calculations

The fourth column of Table 4 demonstrates that around 30% of the coefficients are shrunk to zero by the EN penalization to achieve higher prediction accuracy as it is given in Table 4.

Figure 2 presents the coefficients of the original covariates estimated by EN-QR for the full model. Its shaded areas stand for the 95% confidence intervals for the parameters using the bootstrapped standard error with 100 iterations. Unlike the conventional linear regression by OLS shown in Table 2, the EN-QR reveals the heterogeneity of the causal effect of covariates, i.e. the effect of explanatory

variables depends on the conditional quantile of the land price distribution. *Acreage* has a significantly negative effect only on the sample whose land price is less than the 25th percentile of the conditional distribution of the land price, that is the size of the land does not have any effect over the land price for values greater than the first quartile conditional on other covariates. *Wooden* does not affect the 75th percentiles or higher values of land price. Interestingly, *coverage*, which shows the unstable effect on the land price estimated by the OLS, illustrates the significantly positive causal effect on the left tail of the conditional land price distribution whereas it represents the significant and negative effect on the other parts. These facts are not obvious in the results of OLS presented in Table 2. Other estimates seem to be in line with the result of the OLS in Table 2 in terms of their signs and significance, except for *national_r*, and *r_width*. The binary dummy variable for the frontal national road, *national_r* which shows no statistical significance in all of the models estimated by OLS, has a significant and negative effect only on the right part of the land price distribution and does not have a significant effect on the remaining parts. *r_width* influence significantly and positively upon all parts of the conditional land price distribution, although it does not have a positive effect in the case of the full model by OLS.

For some part of the explanation for the non-linearity of the predictors' effect, Fig. 3 displays the estimated coefficients for the quadratic terms of the full model. It is evident that some of the quadratic terms significantly control the non-linear effect of the explanatory variables, especially the distance variables, except for the quadratic term of the nearest station distance, which is even exactly shrunk to zero in most of the cases. Similarly, *underg_2* and *r_width_2* are estimated as zero, which is shrunk by the l_1 -norm of the EN penalty term. Through Fig. 3, one can confirm the existence of heterogeneous non-linear effects of the covariates as well as in Fig. 2. For example, the quadratic term of *coverage*, *coverage_2* can capture the non-linear effect only on the left part of the land price distribution (the tenth percentile and the first quartile) whereas it cannot do on the right part of the land price distribution (over the median).

6 Conclusion

This research finds strong evidence that non-fundamental variables such as building coverage ratio and distance from the nearest station are significant to explain the land price behaviour. Additionally, the GIS database seems to be useful as a source of information for hedonic price analysis. It generally has a larger dimension than survey data, and it enables researchers to create distance variables.

The estimation results show the presence of the significant non-linear effect of covariates over the land price. The first evidence of nonlinearity is displayed on the OLS results (see Table 2) here some variables seem to be unstable across the models. The second evidence that helps us to discard the instability in favour of non-linearity, which is shown in Figs. 2 and 3 where the effect of explanatory variables varies

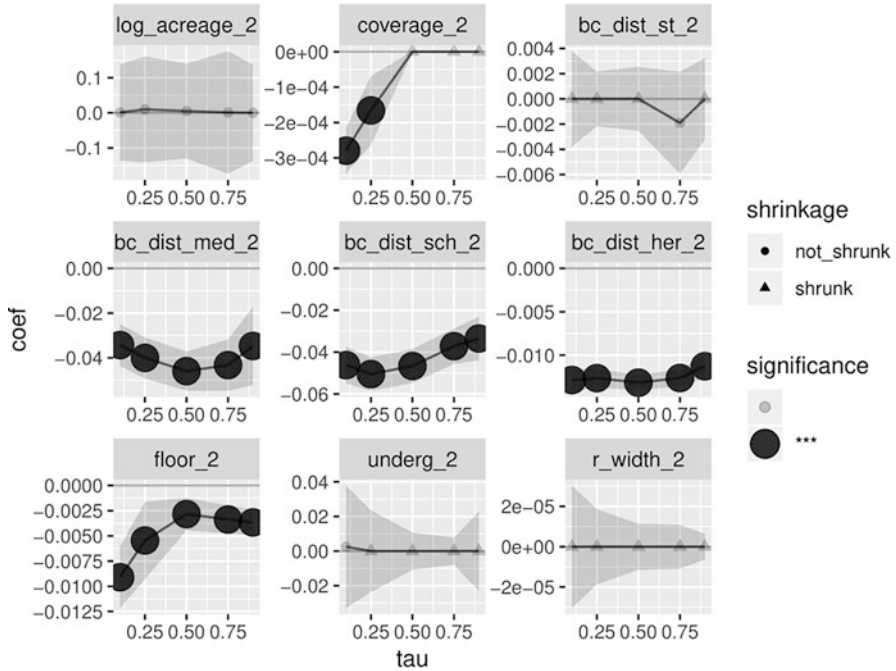


Fig. 3 Quantile process of the quadratic terms estimated by applying EN-QR to the GIS dataset of Japan in 2017. Notes: Each panel shows the quantile process estimated by EN-QR for the effect of the quadratic explanatory variable on the conditional quantile of the land price distribution corresponding to the quantile indices $\tau = 0.1, 0.25, 0.5, 0.75, 0.9$. Shaded areas indicate 95% confidence interval based on the computation through bootstrapping with 100 repetitions. Size and thickness of the circles correspond to none of *, ***, which indicates the estimated coefficient is not statistically significant, and statistically significant at 1%, respectively. Source: Authors' own calculations

across the quantiles. Another important finding of this chapter is the utility of the penalized quantile regressions in order to shrink estimated coefficients for the purpose to obtain a more parsimonious model and higher prediction accuracy. Finally, with the objective of choosing the most robust model, the statistic of the goodness of fit $R^1(\tau)$ suggests us to use EN-QR instead of other estimation methods since in the case of large dimension of the data and many multicollinear predictors in design matrix EN-QR is more robust than lasso-QR.

Although the estimation result of Fig. 2 indicates the existence of heterogeneity of the effect of predictors which depends on the quantiles of the land price distribution, it remains difficult to interpret the coefficients since these are estimated by the conditional quantile regression, i.e. the estimated effect depicted by Fig. 2 is on the quantile within groups defined by other covariates. Therefore, future work can consider the application of the unconditional quantile regression proposed by Firpo et al. (2009), which allows researchers to estimate the effect of the predictors on the unconditional quantile of the response variable distribution and provide ease of the interpretation.

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The Effect of Fixed Investments on Lithuanian Economy



Lina Martirosian

Abstract Aim of the research is to provide the theoretical backgrounds for significance of fixed investments, to estimate the changes of fixed investment growth and structure and to explore the efficiency of fixed investments and its impact on Lithuania economy. The research shows that the level of investments in Lithuania was 21–29% from GDP in 2001–2008. Over the last 7 years (2011–2017), investments amounted to 19% of GDP on average. The growth of investments after the financial crisis is especially high in the equipment sector. It is noticeable that many Lithuanian businesses still hesitate when it comes to making important investment decisions. Firstly, uncertainty in the market causes troubles in evaluating future changes of products and services demand. Secondly, companies seek to accumulate own funds to implement investment projects in order to avoid credit liabilities.

Keywords Fixed investments · Expenditure · Correlation analysis · Consumption · Economy

1 Introduction

World economy is going through its most successful development stages after the global financial crisis. One of its most significant features is that the economy development is quite evenly distributed in the whole world and increasing receptivity of technological progress towards the capital promotes business to make new investments. Investments are essential for a sustainable economic growth of industrial companies. Recently since the occurrence of the new wave of digitalization (Industry 4.0) huge investments in fixed assets have to be considered.

Increase of fixed investments allows modernizing production and service infrastructures, and improving technologies and products. Increasing investments is one

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of the most important factors influencing company's financial status, business continuity, development and competitiveness. In order to correctly choose and implement fixed investments every company must identify and evaluate investment options from the future point of view because present investment expenditures will provide economic benefits and financial income for the company in the future.

Brandstaetter and Wilfinger (2018) state that: (1) Production facilities and logistic systems communicate and organize themselves without human intervention; (2) The ability for a fast and flexible reaction on customer requirements and a rising number of variants with a low patch size in a context of an economically production is going to increase, and in fact the competitiveness, too. In order to catch up with these developments, huge investments, especially in fixed assets, are necessary.

It is noted that many Lithuanian businesses still hesitate when it comes to making important investment decisions. Firstly, uncertainty in the market causes troubles in evaluating future changes of products and services demand. Secondly, companies seek to accumulate own funds to implement investment projects in order to avoid credit liabilities. However, the axiom says that you must spend money to make money.

Goal of the research—to provide the theoretical backgrounds for significance of fixed investments and explore the impact of fixed investment on Lithuania economy. In order to reach the goal, the following tasks will be conducted: (1) analysis of significance of fixed investments; (2) to estimate the changes of fixed investment growth and structure; (3) to explore the efficiency of fixed investments and its impact on Lithuanian economy. The research object—fixed investments.

The research methods: (1) after exploring the changes of trends and structure of fixed investments the analysis of fixed investment dynamics and structure was conducted, (2) in order to evaluate the effectiveness of fixed investments relative indicators—Gross fixed capital formation and Gross domestic product ratio; Gross fixed capital formation and Gross value added ratio; Gross fixed capital formation and Consumption expenditure ratio—were calculated, and (3) in order to determine the correlation between fixed investments and country's economy growth the analysis has used the results of correlation and regression. This analysis shows the intensity of reliance of variables and empowers to check is the correlation is statistically significant. The research period is 2001–2017.

2 Significance of Fixed Investment

Investments made in various business and social spheres are different in content, purpose and scope. Therefore the investments are classified in the literature (Tvaronavicius 2011). Depending on the object of investment, all investments are divided into capital investments and finance investments (Tomasevic and Mackevicius 2010). In this legal act capital investment is identified as investments in the creation, acquisition or increase of value of tangible and intangible fixed assets. Thus, in scientific literature such classification is usually supplemented by

dividing capital investments into fixed investments and intangible investments. According to Tomasevic and Mackevicius (2010), fixed investments are investments in tangible assets (land, buildings, equipment, machinery, vehicles, appliances, construction in progress, etc.), thus intangible investment—an investment in intangible assets (development work, goodwill, patents, licenses, software, etc.). Other authors describe material investment as investment focused on fixed assets and working capital formation or an increase in the expectation of a certain period to make a profit (Tomasevic and Mackevicius 2010).

De Long and Summers (1991) indicate several reasons why fixed (capital) investments may bring higher social benefits comparing to other investment forms. Firstly, historically richest countries are those who have most technological know-how, pioneered in inventing and applying technologies, especially in machinery and equipment areas. Secondly, new growth theory states that country economy growth is by big part influenced by impact of external economies that can positively affect the growth. And thirdly, the government can make industrialization process faster than private sector by transforming economic structure (De Long and Summers 1991; Tvaronavicius 2011). Capital investment rate increases and, as productivity rises, capital price is decreasing. Therefore if country invests more and have lower capital prices this should lead to faster economy growth.

The literature broadly explores fixed investment emphasizing its impact to country's economy growth (Tvaronavicius and Tvaronaviciene 2008; Tomasevic and Mackevicius 2010; Karagöz 2010; Safdari et al. 2011). After reviewing the results of scientific research Namiotko (2018) states that most often the investments are beneficial for both separate companies, and on country's economy scale. Although, in the opinion of some authors, increase of investments does not necessarily create positive effects and too big investments often produce adverse effect (Czyzewski and Smedzik-Ambrozy 2017). With help of regression methods Sass (2017) defines the impact of selected elements of the production potential of farms on the value of investment expenditures. The author also states that a particular high drop in the investment's efficiency occurred at farms investing the most in machines and equipment, because it reduces capabilities of the company to quickly react to the processes in the market.

In their developed economic cycle interpretations, Schumpeter (1961) and Freeman (1982) mention that innovations and new technologies influence economic growth. National innovation system is described as a network of public and private institutions which act and interact creating, changing, importing and dispersing new technologies (Freeman 1982). However, potential Gross Domestic Product (GDP) should be evaluated and compared with actual GDP. The gap between potential and actual GDP occurs due to market factors fluctuations and economic imbalances, such as growing inflation, increased unemployment rate and similar factors by which the market is characterized (Streimikienė and Barakauskaite-Jakubauskiene 2011).

Both in theoretical (Clark, Cobb-Douglas, Harod-Domar) and in empirical models, there has been approved that the rapid economic growth is not possible without significant investments (Jēkabsone and Skribane 2016). Investments are contribution in non-financial assets and, as productive capacity makers, investments

increase production capacity by promoting productivity levels and growth (Jēkabsone and Skribane 2018).

Investments and innovations are especially important to development and growth of the economy, they create additional investment possibilities, but it also should be noted that after the most effective investment options are exploited, further additional investments provide smaller additional outcome of the production every time. Constant additional investments lead to decreasing effectiveness of marginal capital, i.e. smaller ratio between annual production outcome and/or increased revenue and the amount of investments in that particular year (Moskaliova 2009). Despite the fact that economic development creates additional investment options, economic growth, as well as investment options, cannot grow constantly. As the economy is characterized by cyclic recurrences and it begins to decrease after it reaches the point of saturation, the effectiveness of marginal fixed investments, after reaching its saturation point, begins to decrease as well, i.e. in reality product cannot grow at the same rate all the time as the growth is limited by external and internal factors (Girdzijauskas and Mackevicius 2009). In order to evaluate this pattern—limited growth—logistic functions may be applied. Biological populations can be characterized by logistic or marginal growth. Moreover, if they growth proportionally comparing to its size, especially with growing investments and capital in the economy, their growth can be explained by logistics principle. Therefore if the capital is not growing in the economy, it in turn limits the growth of the economy itself (Streimikiene and Barakauskaite-Jakubauskiene 2011).

This naturally raises a question in which stage of economy cycle fixed investments must be made? Similar question was raised by Ardanaz and Izquierdo (2017) as they analyzed if current and capital expenditures depend on business cycle in their research of fiscal policy procyclicality. The authors conclude that in most developing countries economic growth is associated with increase of spending, meanwhile economic downswing is related with reduced level of public investment. Meanwhile Carneiro and Garrido (2015) analyzed average effect of GDP variations to fiscal policy without taking into account economy upswings or downswings. Nevertheless, Balassone and Kumar (2007) argue that it is important to determine asymmetrical fiscal responses, because in some cases investments can grow in both good and bad times, which shows the fiscal sustainability.

Recently, increasing attention is being paid to government policy and its effect on capital investments. Fiscal policy goals is a crucial factor determining the scale of government investments. Countercyclical fiscal policy may negatively affect both economic growth, and private investments (Sineviciene 2014). However, while solving business problems the significance of fixed investments is described using the following statements: investments are the main source of creating production potential; important mechanism for implementing strategic economic and development goals; main factor influencing the creation of long-term capital structure; the most important condition ensuring the growth of company market value; main measure to restore long-term material and intangible assets; one of the most effective instruments to manage the risk of country and company activities (Norvaisiene 2005).

3 Research Results and Discussion

Global economy is going through its most successful development periods after the global financial crisis, there are almost no separate regions or countries which would undergo a recession. Main indicator reflecting the change of economy cycle is indicator showing the total amount of goods and services created in a country—Gross Domestic Product. Changes of Gross Domestic Product is an important indicator defining if country’s economy is growing or moving into economy shrinking stage (Fig. 1).

As Fig. 1 illustrates the change of GDP in Lithuania in 2017 was smaller compared to Latvia or Estonia and, also, was different in its branch structure. Exceptional feature characterizing Lithuania is its quite well balanced development in absolutely most of economy sectors, however, from the other side it lacks obvious leading sectors which could be considered as driving forces of long-term economy progress (SEB bank 2018).

Relatively low level of investments in 2009–2010 is related with substantial decrease of private investments during that period and slow increase of economy after the crisis (Fig. 2). As it can be seen from Fig. 2 trends of fixed investments growth can be clearly divided into several periods for analysis purposes. Fixed investments increased 3 times, i.e. from 2.8 to 8.5 billion euro in 2001–2008, and they increased by 67%, i.e. from 4.7 to 7.9 billion euro in 2010–2017. The biggest part (approx. 83%) of all fixed investments during the analyzed period belongs to private business sector. The share of fixed investments of private sector was smaller only during the financial crisis period (2009–2011) when it amounted less than 75% of all investments of the country.

Fixed investments in the public sector were quite stable in 2010–2017, i.e. in average 1.3 billion euro annually. However, the situation in the investment sector is far from good. The amount of investments into active capital reached the level of 2007 only in 2017 and it is a modest achievement, keeping in mind growing receptivity of technological progress towards the capital.

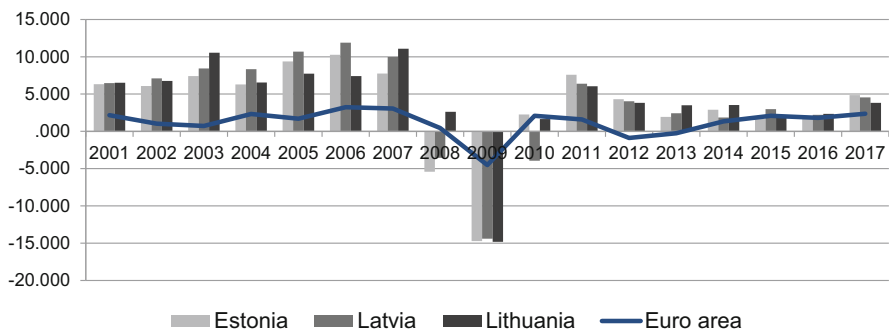


Fig. 1 GDP growth (annual %). Source: Author own study, based on data from European Commission (2018)

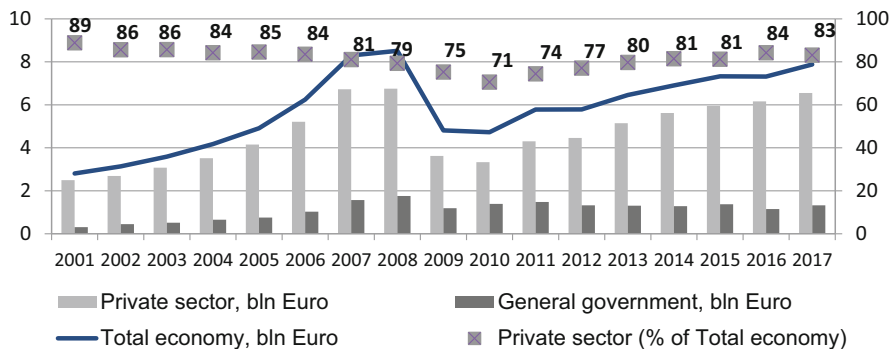


Fig. 2 Gross fixed capital formations at current prices in Lithuania (billion euro). Source: Author own study, based on data from European Commission (2018)

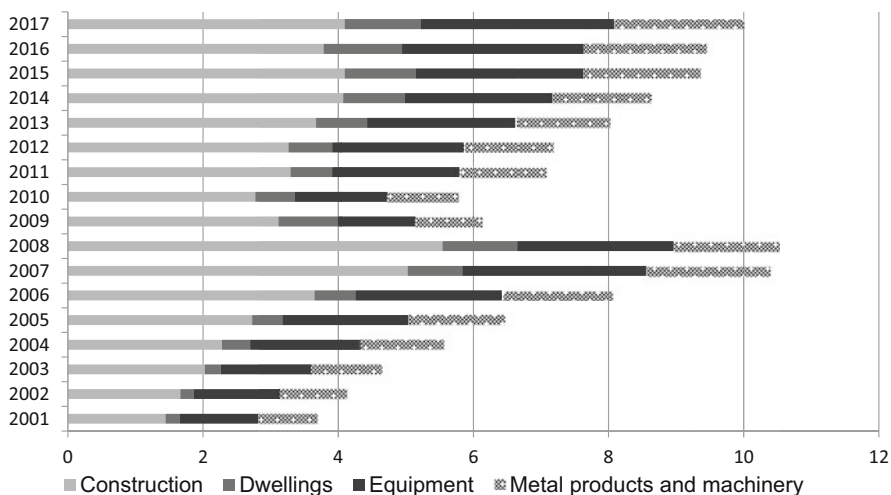


Fig. 3 Fixed investments by purpose (billion euro). Source: Author own study, based on data from European Commission (2018)

The analysis of fixed investments by purpose of investment shows that biggest investments were made in construction sector during all the analyzed period (Fig. 3).

Average growth rate of construction sector was 21.6% in 2001–2008. Unfortunately it is a sector which experienced one of the biggest decreases (minus 44%) until 2009. While analyzing the trend of 2010–2017 only 6.1% average annual growth can be noticed. Equipment sector can also be distinguished as it exceeded the level of 2008 by 23.8% in 2017 and, if we compare this number to 2001, the investments are 5.2 times higher. Even bigger growth can be noticed in dwellings sector in 2017 which reached the level of 2008 and invested 5.2 times more than in 2001.

The structure of investments was quite stable during the analyzed period (Fig. 4).

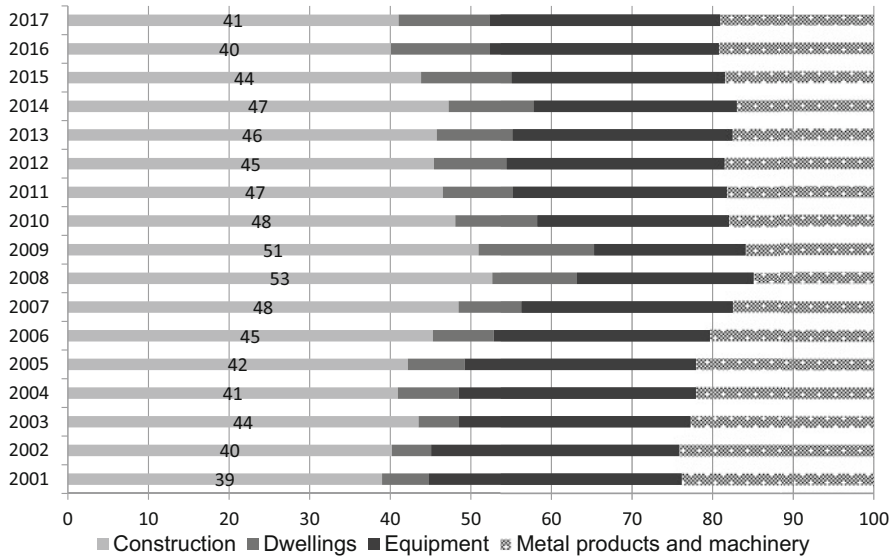


Fig. 4 Fixed investments structure (perc.). Source: Author own study, based on data from European Commission (2018)

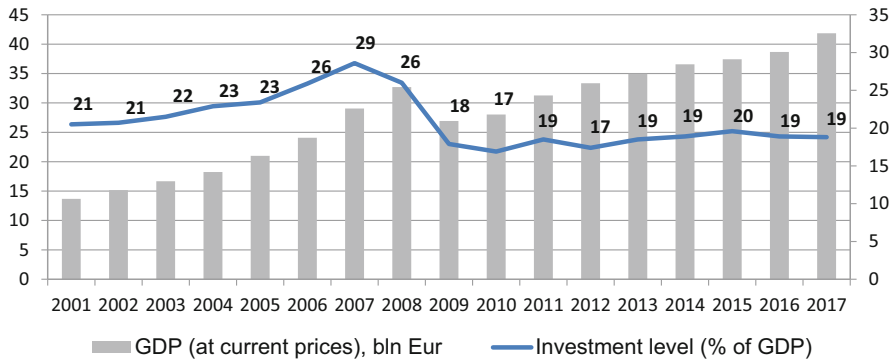


Fig. 5 Investment level in Lithuania (% of GDP). Source: Author own study, based on data from European Commission (2018)

Most investments in 2001–2017 (39–53%) were made in construction sector. Investments in equipment sector amounted about 19–31%. Investment share of those two sectors decreased while the investments in dwellings sector grew. Similarly, the share of fixed investments in metal products and machinery sectors also decreased (from 24 to 19%). Relationship between fixed capital formation shares of GDP to conclude that the rate of capital formation, determines the rate of a country’s economic growth. Investment level amounted from 21 to 29% of GDP in 2001–2008 (Fig. 5).

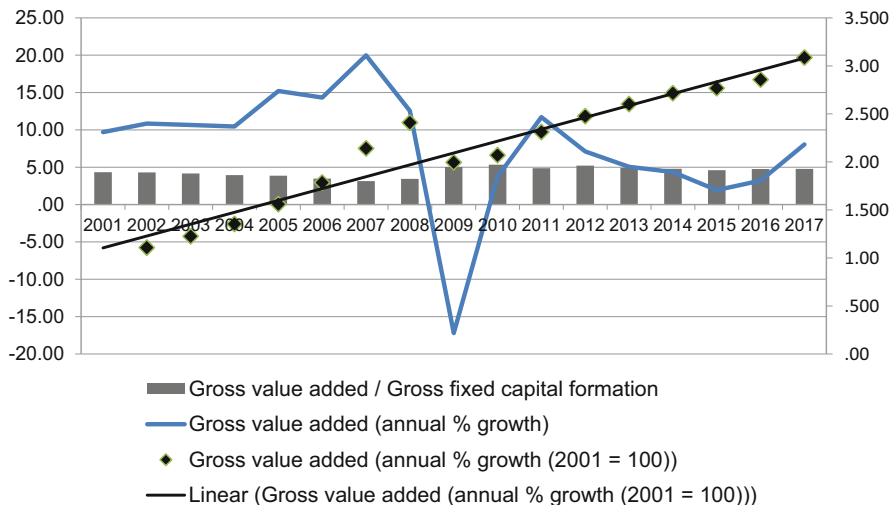


Fig. 6 Gross value added and Gross fixed capital formation ratio. Source: Author own study, based on data from European Commission (2018)

Over the last 7 years (2011–2017), investments amounted to 19% of GDP on average, which is almost by 4–5 percentage points less than in the period from 2001 to 2008. Similar conclusions about investment level were provided by Jēkabsone and Skribane (2018) after evaluating investments in Latvia. Research of those authors in 2000–2016 reveal that overall total activity of investors after the global financial crisis has been low and contribution of investments to the increasing GDP fell short of pre-crisis level contribution of investments to the increasing GDP fell short of pre-crisis level.

The scientific literature provides many definition of the term of effectiveness. Effectiveness is a ratio between created products and consumed complex resources (Mackevicius and Daujotaite 2011). Saruliene and Vilkas (2011) define effectiveness as a capability to act purposefully, as a utility level of using resources while obtaining specific goal. It is noted that effective activities do not always increase business value. As Ribaconka and Burgis (2011) state main goal of effective organization is to create more value using as little resources as possible and this goal can be reached while implementing new resource saving technologies and applying modern management methods.

While analyzing the effectiveness of fixed investments Gross value added and Gross fixed capital formation ratios are calculated (Fig. 6).

While evaluating the return of fixed investment—created added value—in 2001–2017 it can be noticed that its lowest level was in 2007–2008 when the highest level of investments was reached. In 2007 one invested euro generated 3.1 euro of added value. In 2009–2010 the return of investments was the highest (5.1–5.3 euro). Over the last 5 years (2013–2017) average growth rates of both fixed investments

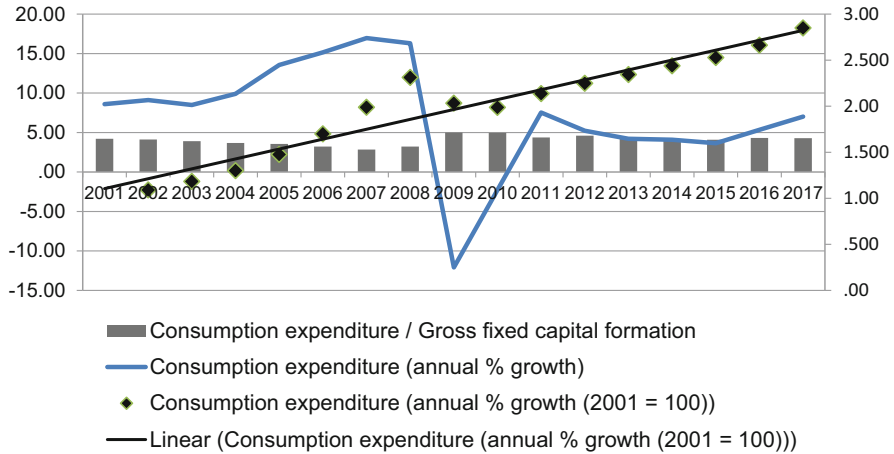


Fig. 7 Consumption expenditure and Gross fixed capital formation ratio. Source: Author own study, based on data from European Commission (2018)

and created added value were similar (approx. 5%) therefore Gross value added and Gross Fixed Capital Formation Ratio remained stable (approx. 4.8).

Consumption expenditure and Gross fixed capital formation ratio chosen in this research allows to evaluate the trends of consumption expenditures in various stages of economy cycle and to measure how much of consumption expenditure can be attributed to one euro of fixed investments (Fig. 7). Analyzing the pre-crisis period (2001–2008) it can be noted that average annual growth rate of consumption expenditure was 12.8%, meanwhile in 2009 they decreased by 12% and later grew by 5.3% in average in 2011–2017. Consumption expenditure and Gross fixed capital formation ratio show that the smallest amount of consumption expenditure was attributed to one euro of fixed investments in 2007–2008.

However it is wrong to assume that there was the smallest amount of consumption expenditure during this period. It is explained by the fact that absolute values of both analyzed indicators were the highest during that period (pre-crisis). Over the last 5 years (2013–2017), average rate of annual growth of consumption expenditure and gross fixed capital formation were similar (approx. 5%) therefore the ratio remained quite stable (approx. 4.3%).

According to the literature, fixed investments are one of the main factors stimulating economic growth of the country (Tvaronavicius 2011). Although the role of fixed investments in nowadays Lithuania economy cannot be doubted, so the next stage in this article aims to verify this relationship in conditions of this research (Table 1). Due to substantial deviations of economy cycle the analyzed period was divided into three periods: all analyzed period of 2001–2017, pre-crisis period of 2001–2007 and post-crisis period of 2009–2017. Interrelationship was account between Fixed Investments (Gross fixed capital formation) and GDP, Gross value added, Consumption expenditure.

Table 1 Results of correlation analysis between gross fixed capital formation and gross domestic product

Period	Pearson corr.	R square	Adj. R square
Between gross fixed capital formation and gross domestic product			
2001–2017	0.8449	0.7139	0.6949
2001–2008	0.9919	0.9839	0.9812
2009–2017	0.9855	0.9712	0.9671
Between gross fixed capital formation and gross value added			
2001–2017	0.8434	0.7113	0.6921
2001–2008	0.9916	0.9833	0.9805
2009–2017	0.9851	0.9703	0.9661
Between gross fixed capital formation and consumption expenditure			
2001–2017	0.8428	0.7104	0.6911
2001–2008	0.9862	0.9726	0.9680
2009–2017	0.9712	0.9432	0.9350

Source: Author own study, based on data from European Commission (2018)

Results of correlative analysis show that the relationship between Gross fixed capital formation and GDP is very strong, which can be noticed while analyzing separate (pre-crisis and post-crisis) periods. The correlative analysis of the whole period show strong correlation. Similar results were obtained while analyzing the correlations between Gross fixed capital formation and Gross value added and Consumption expenditure. It can be stated that there is a slightly weaker correlation between Gross fixed capital formation and Consumption expenditure.

Similarly, strong linear correlation of analyzed data was reflected by the results of regression model as well. R Square shows how a change in one part of one feature explains the value changes of another feature. The analysis has shown that while analyzing separate periods more than 90% of variable dispersion can be explained (R Square deviates from 0.943 to 0.984), and more than 70% in case of analysis of total analyzed period (R Square $-0.710 - 0.714$). Applying the rule of ANOVA, since F-ratio calculated was greater than F-ratio critical ($\alpha = 0.05$), we conclude that fixed investment have a significant relationship with GDP, Gross value added and Consumption expenditure.

Conducted analysis shows very strong correlation of fixed investments during the short term but it is important to mention that current investment decisions impact the process of long-term growth of the economy. Countries can advance to achieve high growth only through the invention and implementation of new technologies and then fixed investments (technological innovation) become the critical factors for growth. All economic growth and development theories designate the dependence of innovations to fixed investments and show their undoubted relationship. This research designate that fixed investments are one of the main factors stimulating economic growth of the country.

4 Conclusion

As a result of systematical analysis of literature sources it was determined that there is no doubt that investments are crucial for economy growth and economy development creates additional investment possibilities. The scientific literature broadly explores fixed investments, however, different opinions on its impact on country's economy growth can be found. In the opinion of some authors, increase of investments in both private sector and on country scale creates positive effects. Meanwhile other authors state that too big investments, especially to machinery and equipment, may reduce company's capabilities to quickly react to technological processes in the market.

The scientists reasonably raise doubts about the effectiveness of marginal capital investments which becomes even smaller once the point of saturation is reached. It raises question in which particular economy cycle the fixed investments should be made. Despite of that while analyzing the significance of fixed investments scientists agree that those investments are main source of creating production potential, important measure of implementing strategic goals of economy development and main factor influencing the formation of long-term capital structure.

After evaluating the changes of fixed investment growth and structure and analyzing the effectiveness and impact of fixed investments to Lithuanian economy, following conclusions can be made:

- Lithuanian economy has undergone global financial crisis during the analyzed period when its GDP decreased by 14.8% in 2009. This decrease in GDP was very similar compared to other Baltic countries (Estonia –14.7% and Latvia –14.4%). However, this decrease in GDP was very big compared to average change in EU (minus 4.35%).
- In 2001–2008 fixed investment in Lithuania increased by 3 times, and in 2010–2017 they increased by 67%. Relatively low investment level in 2009–2010 was related with significant decrease of investments in private sector and slow increase of economy after the crisis. The biggest share of all fixed investments (approx. 83%) during the whole analyzed period belongs to private business sector.
- The analysis of fixed investments based on purpose has shown that the biggest amount of investments was made in construction sector during the whole analyzed period. The growth of investments after the financial crisis is especially high in equipment sector in which the investments in 2017 exceeded the level of investments in 2008 by 23.8%. Even more, the investment in dwellings sector in 2017 were even 5.2 times bigger compared to 2001.
- The researches have shown that the level of investments in Lithuania was 21–29% from GDP in 2001–2008. Over the last 7 years (2011–2017), investments amounted to 19% of GDP on average, which is almost by 4–5 percentage points less than in the period from 2001 to 2008.
- Chosen and analyzed effectiveness indicators of fixed investment show that over the last 5 years (in 2013–2017) Gross value added and Gross fixed capital

formation ratio and Consumption expenditure and Gross fixed capital formation ratio remain stable (4.3 and 4.8, accordingly).

- Results of correlative and regression analysis show that the relationship between gross fixed capital formation and economic growth is strong and almost direct.

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New Empirical Evidence on the Purchasing Power Parity from VISEGRAD Group Countries



Martin Pažický

Abstract The aim of this chapter is made to test the validity of purchasing power parity (PPP) between the Slovak Republic vis-à-vis the member countries of Visegrad Group using Augmented Dickey-Fuller (ADF) test for unit root and various techniques inspecting the presence of cointegration (i.e. the Durbin-Watson, the Engle-Granger and the Johansen procedures). Applying both the Engle-Granger and the Johansen methods, we found evidence of PPP between the Slovak Republic and Hungary and between the Slovak Republic and Poland, which is consistent with the economic theory. The existence of the long-run relationship was confirmed by the vector error correction model (VECM). However, we have not found any cointegrating vector in the case of the Slovak Republic and the Czech Republic, which rejects the existence of a persistent long-run equilibrium between exchange rate, domestic prices (i.e. in the Slovak Republic) and foreign prices (i.e., in the Czech Republic)

Keywords Purchasing Power Parity (PPP) · Exchange rate · Cointegration · Visegrad Group

1 Introduction

The Slovak Republic accepted euro as a domestic currency on January 01, 2009, and became a member country of Economic and Monetary Union (EMU). The process of monetary integration was not easy and the country had to meet a number of conditions for joining the union. The Slovak Republic joined the European Union (EU) in May 2004 and has already become a member of the Exchange Rate Mechanism II (ERM II) to prepare for the adoption of the euro. The main reason for the Slovak Republic's desire to join the monetary union was the creation of closer

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economic cooperation with the countries of the European Union. Such a close relation meant new economic opportunities, in particular in international trade. For a small open economy like the Slovak Republic, the open markets and reduction of trade barriers are essential for sustainable economic growth. Other countries have seen these benefits too and have also tried to join the EMU. These countries were obliged to meet a set of constraints and convergence criteria in order to adopt the euro. One of the key criteria was price stability measured by the rate of inflation. The economic theory linking the relationship between the exchange rate and the country's price level is known as purchasing power parity (PPP) theory.

The concept of PPP was introduced by Cassel (1923), who formulated the synthesis of earlier economists. Purchasing power parity has become a key concept in the international economy. The theory is used as a long-term equilibrium condition for open macroeconomic regimes. PPP compares currencies of different countries through the "basket of goods" approach. According to this theory, the two currencies are in the long-term equilibrium (or at par) when a basket of goods is priced (based on the exchange rate) the same in both countries. PPP assumes that the long-term exchange rate between the two currencies is equal to the ratio of their relative price levels. The advent of a flexible exchange rate has made purchasing power parity popular, which has motivated economists to test whether the concept holds in reality. To achieve this, several testing procedures have been developed consisting of different steps. The PPP analysis has become particularly interesting for countries that intend to adopt the euro.

The Slovak Republic has successfully implemented a new currency and nowadays it is a stable member of the EMU. The country is fully integrated into the European Economic Area (EEA).

Although the country is part of the EMU and most of its trading partners use the same currency, the Slovak Republic also trades with countries that do not use the euro as their domestic currency. Similarly, the European Union consists of countries that are not part of the common monetary union and use their own domestic currencies. For example, within the Visegrad Group (V4), the Slovak Republic is a pioneer in using the euro. The V3 countries (i.e., the Czech Republic, Poland, and Hungary) are key partners for the Slovak economy in terms of trade balance. According to Trademap (2018), up to 25.4% of total exports in 2017 went to V3 countries and up to 29.1% of total imports from Slovakia were from V3 countries (see Fig. 1). In particular, in recent years, doubts have been raised as to whether the common European currency is sustainable. It is increasingly claimed that the newer Member States, in particular, will sooner or later encounter the problem of keeping the euro. Some economists and politicians argue that these countries will be forced to return to their previous domestic currency. For instance, Stiglitz (2016) criticized the euro as a common currency. Some official representatives of some EU Member States (e.g., the Czech Republic and Hungary) also criticize the euro as a common currency. The other countries do not criticize the common currency, but have decided to keep their domestic currency (e.g., Sweden, Denmark, or the United Kingdom). The main argument of all critics is that by adopting the euro, a country will automatically renounce its monetary sovereignty and its ability to respond

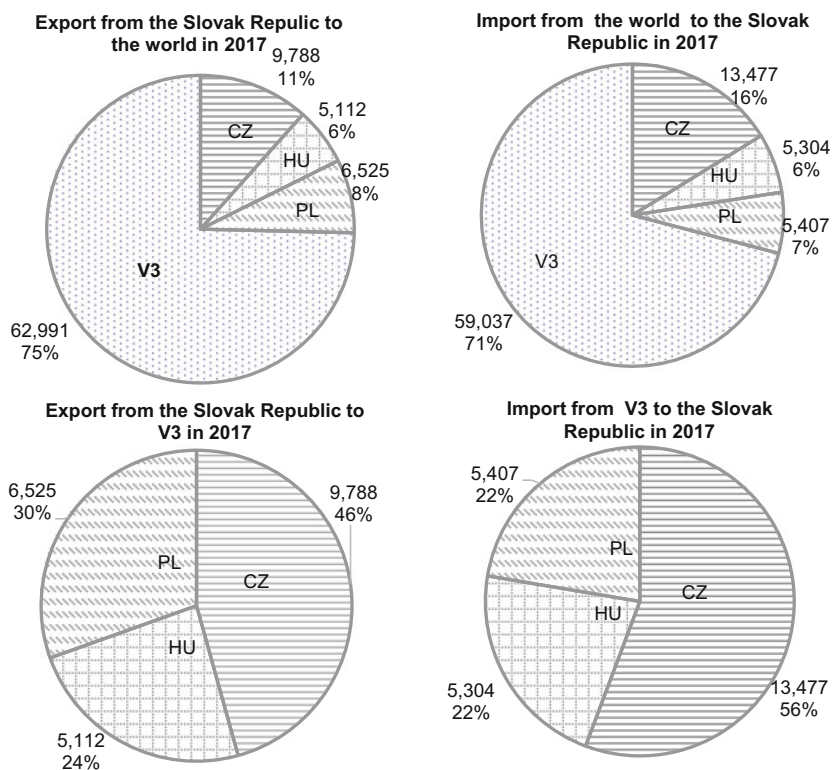


Fig. 1 Trade of the Slovak Republic in 2017 (in thousands of Euro). Note: *SK* the Slovak Republic, *CZ* the Czech Republic, *HU* Hungary, *PL* Poland. Source: Own prepared based on Trademap (2018)

flexibly to economic shocks. Even the current geopolitical situation is not unambiguously in favor of the vision of a positive future for the euro. The decision of the United Kingdom's referendum to leave the European Union in July 2016 and the growing pressure from US protectionism raise serious concerns about the existence of the euro. Moreover, the increasing popularity of cryptocurrencies and blockchain technologies raises doubts about standard cash currencies. In this respect, there arises a valid question regarding the sustainability of the euro. In the event of a euro collapse, all EMU countries would face the risk of transfer to national currencies, and the analysis of PPPs would be an important issue for them.

The Slovak Republic is also a member of the Visegrad Group, within which it is the only country using the euro. As other countries (the Czech Republic, Hungary, and Poland) are important trading partners of the Slovak Republic, it is important to analyze purchasing power parity. The main aim of this chapter is therefore to analyze the validity of purchasing power parity in countries that are members of the Visegrad Group. The chapter aims to verify the long-term relationship between the euro (as the

domestic currency in the Slovak Republic) and the Czech Crown (CZK), Polski Zloty (PLN), and the Hungarian Forint (HUF) using various cointegration techniques (the Durbin-Watson approach, the Engle-Granger method, and the Johansen procedure). The analysis is performed on monthly exchange rate and inflation data for the period 2005–2018.

The remainder of the chapter is organized as follows. Data characteristics supplemented by the formulation of the long-term PPP theory and methodological issues of cointegration techniques are outlined in Sect. 2. In Sect. 3, empirical results are presented, and Sect. 4 concludes.

2 Data and Methodology

The entire dataset consists of monthly CZK/EUR, HUF/EUR, and PLN/EUR exchange rates retrieved from Eurostat (2018a), where EUR represents domestic currency and the rest represents foreign currency. The rate of inflation is approximated by the harmonized index of consumer prices (HICP) for the Slovak Republic, the Czech Republic, Hungary, and Poland retrieved from Eurostat (2018b). All data are collected on monthly basis covering the period from January 2005 to April 2018, resulting in 160 observations for each variable. The euro is used as the domestic currency for the Slovak Republic and the inspection period takes into account the period before the euro adoption. Although the Slovak Republic started to use the euro since January 2009, the country was part of ERM II since May 2004 when it became an EU member state. It is therefore more appropriate to include also this period before the adoption of the euro. Time series for all variables were obtained from Eurostat. The data included are shown in Fig. 2.

2.1 Definition of Purchasing Power Parity

Purchasing power parity states that prices of goods and services should equalize between countries over time. This simplest definition can be formally written as follows:

$$S_t = \frac{P_t}{P_t^*} \quad (1)$$

where S_t denotes the nominal exchange rate defined as the domestic price of the foreign currency at time t ; P_t represents the price level in the domestic currency at time t and P_t^* is the price level in the foreign currency at time t . According to the law of one price, which is the core idea of PPP, the price level in all countries should be the same when measured in the same currency. This can be easily expressed by a simple mathematical modification of Eq. (1):

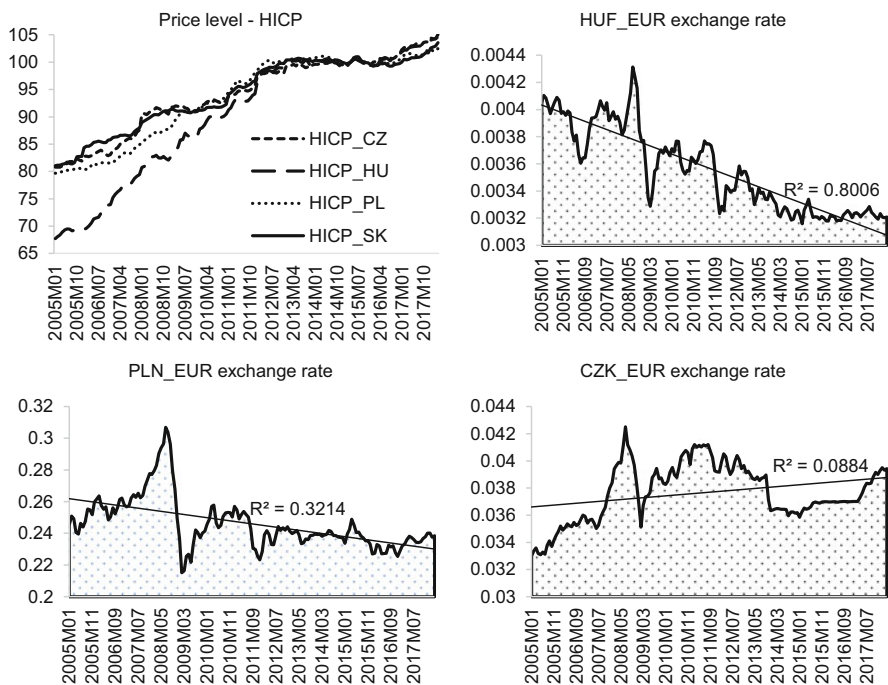


Fig. 2 Specification of time series. Note: Lines in the charts of exchange rates are trend lines showing the level of appreciation or depreciation against euro in the long-run. R^2 is a coefficient of determination representing a goodness of trend lines. Source: Own prepared based on Eurostat (2018a, b)

$$P_t = S_t P_t^* \tag{2}$$

If we denote the domestic value of the foreign price level as F_t , then:

$$F_t = S_t P_t^* \tag{3}$$

PPP defined by Eq. (2) can be, after rearranging, written as follows:

$$F_t = P_t \tag{4}$$

It is more convenient to express this simple theory in terms of the real exchange rate G_t . The theory of purchasing power parity suggests that the real exchange rate should be equal to 1 when PPP holds:

$$G_t = S_t \frac{P_t^*}{P_t} \tag{5}$$

The standard approach to the analysis of PPP assumes the logarithmic transformation (see Eqs. 6, 7, and 8) of all variables in the above equations. The logarithmic transformation is indicated by lowercase variables. More convenient forms of Eqs. (1, 4, and 5) are as follows:

$$s_t = \beta_0 + \beta_1(p_t - p_t^*) + \zeta_t \quad (6)$$

$$f_t = \varphi_0 + \varphi_1 p_t + \varepsilon_t \quad (7)$$

and

$$g_t = s_t + p_t^* - p_t \quad (8)$$

where s_t denotes the natural logarithm of the exchange rate S_t ; p_t and p_t^* represent the natural logarithms of the price level in domestic country (P_t) and in foreign country (P_t^*) respectively; f_t denotes the natural logarithm of the foreign price level expressed in domestic value and g_t is the logarithmic transformation of the real exchange rate G_t . The coefficients β_0 , β_1 , φ_0 , and φ_1 are estimated parameters from a particular regression; ζ_t and ε_t are error terms representing any short-run deviations from the long-run equilibrium created by random shocks. A key assumption for the validity of the PPP theory is that the variables in Eqs. (6 and 7) are cointegrated (i.e., there is a long-run equilibrium) and the estimated parameters β_1 and φ_1 must be equal to 1.

The long-run equilibrium can be verified using cointegration methods. The test for cointegration can be used as direct evidence of long-run relationship between two variables—see Enders (2010) or Gujarati and Porter (2009). The long-run purchasing power parity holds if the real exchange rate g_t defined by Eq. (8) is stationary. Standard method how to test stationarity is Augmented Dickey-Fuller (ADF) test for unit root—see, e.g., Enders (2010), Patterson (2000), Dickey and Fuller (1981). There are various tests for cointegration used for the PPP analysis—see, for instance, Baillie and Bollerslev (1994) or Kouretas and Zarangas (1998) or Bohdalová and Greguš (2014). The most common testing procedures for cointegration are the Durbin-Watson approach, the Engle-Granger method, and the Johansen procedure—see, e.g., Weliwita (1998), Lothian and Taylor (2000), Christev and Noorbakhsh (2000), Rublíková (2003), Koukouritakis (2009), Chocholatá (2007, 2009), Sideris (2005).

2.2 The Augmented Dickey-Fuller Test for Stationarity

The vast majority of economic data is nonstationary, which disqualifies the interpretation of standard t -statistics when deciding on statistical significance. It is, therefore, necessary to first test whether the examined variables are stationary and to deal with this issue accordingly. The essence of the cointegration analysis is therefore based on the analysis of whether the linear combination of nonstationary

time series is stationary. A common method to test whether time series is stationary is multivariate Augmented Dickey-Fuller (ADF) test for unit root. The procedure consists of several steps testing for the unit root in a particular variable, taking into account constant and trend, constant without trend, and no trend neither constant. The null hypothesis that $\gamma = 0$ (i.e., time series has a unit root and data are nonstationary) is tested against the alternative that $\gamma < 0$ (i.e., time series has no unit root and data are stationary). The generally accepted method of tackling the nonstationarity is data transformation in the first difference. Based on the ADF test, it is possible to decide on the order of integration in the given time series. Identifying the order of integration is an essential part of cointegration analysis, since only variables integrated at the same order can be cointegrated. There can be distinguished three cases, which will either suggest stopping the cointegration testing procedure or lead us to the next steps—see Enders (2010):

- (a) Both variables are stationary (i.e., $I(0)$), which means that standard regression analysis can be used.
- (b) Both variables are integrated of the same order (and nonstationary), which indicates that cointegration analysis is necessary and we can proceed further with cointegration analysis.
- (c) Variables are integrated of a different order and we can conclude that variables are not cointegrated.

After deciding that the examined variables (i.e., f_t and p_t) are integrated of the same order, it is possible to proceed with one of the techniques for identifying cointegration.

2.3 The Durbin-Watson Method

The simplest cointegration test is the use of Durbin-Watson (*DW*) statistics from the regression defined by Eq. (7). The Durbin-Watson method tests whether the residuals ε_t are generated by the unit root process. The hypothesis can be specified as follows—see Enders (2010):

$H_0: \varepsilon_t \sim I(1)$ corresponding to $\rho = 1$ or $DW = 0$ (i.e., time series are not cointegrated).

$H_1: \varepsilon_t \sim I(0)$ corresponding to $\rho < 1$ or $DW > 0$ (i.e., time series are cointegrated).

The model has several drawbacks. First, it is necessary to determine the critical values for deciding on the statistical significance of Durbin-Watson statistics, because critical values are given by empirical distribution. Second, a more serious drawback is that the model is valid only if the residuals ε_t are generated by the AR1 process. The AR1 process can be identified by analyzing the partial autocorrelation of the residuals from the correlogram. If residues are generated by the AR1 process, the conclusions on cointegration can be considered valid. Otherwise, the conclusions are not valid and it is not possible to conclude whether the variables are cointegrated.

2.4 The Engle-Granger Method

An alternative test for cointegration is the Engle-Granger method, assuming that the two time series (i.e., f_t and p_t) are integrated of the same order d . According to Engle and Granger (1987), the long-run PPP defined by Eq. (7) can be estimated by the standard regression method. If the variables are cointegrated, the residuals obtained from this equation must be integrated into the order less than d . The residual sequence from Eq. (7) can be denoted as $\hat{\varepsilon}_t$. The ADF test can then be performed taking into account that this residual sequence $\hat{\varepsilon}_t$ comes from a regression equation. Intercept neither time trend does not need to be therefore included. The test for a unit root in the estimated residuals using the standard Dickey-Fuller specification can be defined as follows:

$$\Delta \hat{\varepsilon}_t = \gamma_1 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p-1} \alpha_i \hat{\varepsilon}_{t-i} + \omega_t \quad (9)$$

where γ_1 and α_1 represent estimated parameters and ω_t is an error term in a given specification.

The hypothesis can be specified as follows—see Enders (2010):

$H0: \gamma = 0 \rightarrow$ residuals contain unit root (i.e., variables f_t and p_t are not cointegrated).

$H1: \gamma < 0 \rightarrow$ residuals have no unit roots (i.e., variables f_t and p_t are cointegrated).

The drawback of the Engle-Granger method is that the standard critical values are not adequate and appropriate critical values should be derived from MacKinnon (1991) empirical distribution.

2.5 The Johansen Method

A more sophisticated method for testing cointegration has been proposed by Johansen (1988) and Johansen and Juselius (1990). While the Engle-Granger method is suitable for a bivariate system consisting of one cointegrating vector, the Johansen method is adequate for more than two variables—see Asteriou and Hall (2007). The Johansen method is based on maximum likelihood estimation, which enables to capture the feedback effects between variables. The Johansen method begins with the following vector autoregressive (VAR) specification of a vector of N stationary variables:

$$X_t = \prod_1 X_{t-1} + \prod_2 X_{t-2} + \dots + \prod_k X_{t-k} + \phi D_t + v_t \quad (t = 1, \dots, T) \quad (10)$$

where X_t is a column of all endogenous variables; D_t contains a set of conditioning variables, ϕ is an estimated parameter; the stochastic terms v_1, \dots, v_T are drawn from N -dimensional identically and independently normally distributed covariance matrix. In our case the vector X_t is a vector of dimension $N = 2$ because it consists of two endogenous variables f_t and p_t specified by Eq. (7).

Since most economic time series are nonstationary, the VAR models defined by Eq. (10) are generally estimated in the form of their first differences. Equation (10) can be rewritten in the form of the first differences as follows:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \dots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-1} + \phi D_t + v_t \quad (11)$$

where

$$\Gamma_i = -I + \Pi_1 + \Pi_2 + \dots + \Pi_k \quad (i = 1, 2, \dots, k - 1) \quad (12)$$

and

$$\Pi = -(I - \Pi_1 - \Pi_2 - \dots - \Pi_k) \quad (13)$$

Equation (11) differs from a standard first difference specification of the VAR model only by the presence of ΠX_{t-1} term in it. This term contains information about the long-run equilibrium relationship between the variables in X_t . If the rank of Π matrix r is $0 < r < N$, then there can be defined two matrices α and β , both with dimension $N \times r$ such that $\alpha\beta' = \Pi$ where α is a matrix of error correction parameters measuring the speed of adjustment coefficients and β is the long-run matrix of coefficients corresponding to the set of cointegrating vectors.

In the first step of the Johansen method, it is necessary to control for the order of integration of the examined variables, similar to the other methods. In the next step, it is necessary to identify the appropriate lag length of the VAR model using either Akaike information criterion (AIC) or Schwarz information criterion (SIC). Since vast literature recommends the use of SIC for larger and more robust models, we will also use this indicator—e.g., Patterson (2000).

In addition to determining the optimal lag length, it is important to decide whether to include the intercept and/or the trend in either short-run model (i.e., the VAR model) or the long-run model (i.e., the cointegrating equation—CE). As selection criteria can be used the so-called Pantula principle, which is based on testing the joint hypothesis of both the rank order and deterministic components. There are five possible model specifications—see Patterson (2000) Asteriou and Hall (2007):

Model 1: No intercept neither trend in CE or test VAR.

Model 2: Intercept (no trend) in CE—no intercept in VAR.

Model 3: Intercept (no trend) in CE and test VAR.

Model 4: Intercept and trend in CE—no intercept in VAR.

Model 5: Intercept and trend in CE—intercept in VAR.

The testing procedures determining the number of cointegrating relationships are based on two likelihood test statistics known as the trace statistic (λ_{trace}) and the maximal eigenvalue statistic (λ_{max}), which are specified by the following equations:

$$\lambda_{\text{trace}}(r) = -T \sum_{i=r+1}^N \ln(1 - \hat{\lambda}_i) \quad (14)$$

and

$$\lambda_{\text{max}}(r, r+1) = -T \ln(1 - \hat{\lambda}_{i+1}) \quad (15)$$

where T is the total number of observations.

The hypothesis in the case of the trace test can be specified as follows—see Patterson (2000) or Asteriou and Hall (2007):

$H0: \Pi \leq r \rightarrow$ variables f_t and p_t are not cointegrated.

$H1: \Pi > r \rightarrow$ variables f_t and p_t are cointegrated.

The maximal eigenvalue is tested by the following hypothesis—see Patterson (2000) or Asteriou and Hall (2007):

$H0: \Pi = r \rightarrow$ variables f_t and p_t are not cointegrated.

$H1: \Pi = r + 1 \rightarrow$ variables f_t and p_t are cointegrated.

Both statistics are distributed as χ^2 with $N - r$ degrees of freedom, where N is the number of endogenous variables and r represents the value of the rank under the null hypothesis.

2.6 The Vector Error Correction Model

If the variables f_t and p_t are identified as cointegrated, following the above-mentioned techniques, the residuals from the equilibrium regression defined by Eq. (7) can be used to estimate error-correction (ECM) term expressing the dynamics of the equilibrium relationship between the two variables. The ECM specification combines the short- and long-run effects of the variables and it can be noted as follows:

$$\begin{aligned} \Delta f_t = & \mu + \gamma \varepsilon_{t-1} + \psi_1 \Delta f_{t-1} + \dots + \psi_p \Delta f_{t-p} + \omega_0 \Delta p_t + \omega_1 \Delta p_{t-1} + \dots \\ & + \omega_q \Delta p_{t-q} + u_t \end{aligned} \quad (16)$$

where f_t and p_t are nonstationary (and cointegrated) variables integrated of $I(1)$ order; ε_{t-1} is the stationary lagged residual representing the short-run deviations from the long-run equilibrium stated in Eq. (7); $\mu, \psi_1, \dots, \psi_p, \omega_0, \dots, \omega_q$ are unknown

parameters of the ECM model; γ represents the speed of adjustment parameter and u_t is a white noise term.

Finally, the residuals of this vector error correction model (VECM) defined by Eq. (16) should be tested using Jarque-Bera or Cramer-von Mises normality tests.

3 Results

In this section we present our results from the analyses outlined in the previous part. First, we present the results of the test for stationarity using the ADF test for unit roots and then we show the results for cointegration analysis using the Durbin-Watson, the Engle-Granger, and the Johansen methods. If we find evidence supporting cointegration, we can proceed with the VECM model to investigate the short-run relationship.

3.1 Stationarity

In the first step in the cointegration analysis, it is necessary to decide whether our variables f_t and p_t are stationary or not. Subsequently, it is crucial to identify the order of integration for the variables. For this purpose, we have performed the Augmented Dickey-Fuller (ADF) test for unit root. The results are shown in Table 1.

The results of the ADF test presented in Table 1 indicate that all examined have one unit root. Thus, all variables are nonstationary and they are integrated of order of one, $I(1)$. Since the data are integrated of the same order, it is possible to proceed further with the cointegration analysis.

Table 1 The ADF test for unit root results for variables f_t and p_t

	Level			1st Difference	Order of integration
	Neither intercept nor trend	Intercept	Intercept and trend	Intercept and trend	
p_t (SK)	4.3035 (1.0000)	-2.1937 (0.2095)	-1.5359 (0.8132)	-10.7663*** (0.0000)	$I(1)$
f_t (CZ)	1.6212 (0.9743)	-1.9899 (0.2911)	-2.0967 (0.5433)	-9.6055*** (0.0000)	$I(1)$
f_t (HU)	-0.7002 (0.4121)	-2.5937 (0.0964)	-3.206 (0.0870)	-9.2421*** (0.0000)	$I(1)$
f_t (PL)	0.4578 (0.8123)	-2.9040** (0.0471)	-3.5154** (0.0411)	-8.7342*** (0.0000)	$I(1)$

Note: The p -values are displayed in parentheses: * <0.1; ** <0.05; *** <0.01. SK the Slovak Republic, CZ Czech Republic, HU Hungary, PL Poland
Source: Own calculations

3.2 The Results of the Durbin-Watson Method

Because the variables f_t and p_t are integrated of the same order, we can perform the first test of cointegration. Table 2 captures the results of cointegration test using the Durbin-Watson method.

At the first look, it seems that in all three specifications we would not reject null hypothesis claiming that time series are not cointegrated and we would conclude that the variables are not cointegrated. It is worthy to point out that for Hungary and Poland the value is very close to the critical value threshold. However, based on a deeper analysis of residuals, we conclude that residuals ε_t are in all three specifications generated by the AR2 process instead of the AR1 process. Our final conclusion is therefore that the models are not valid and we cannot decide whether the variables f_t and p_t are cointegrated or not.

3.3 The Results of the Engle-Granger Method

An alternative testing procedure for identifying cointegration is the Engle-Granger method. Similar to the Durbin-Watson method, it is also required that the variables f_t and p_t are integrated of the same order. The model is based on t -statistics estimated by the ADF model for unit root. The results supplemented by calculated critical values and concluding statements are summarized in Table 3.

Table 3 shows that in the case of the Czech Republic, the variables f_t and p_t are not cointegrated, which means that there are no long-run equilibrium between exchange rate, domestic and foreign prices and as a consequence PPP does not hold. However, for the other two specifications, we can conclude that the variables f_t and p_t are cointegrated and PPP between the Slovak Republic and Hungary and between the Slovak Republic and Poland is confirmed.

Table 2 The Durbin-Watson statistics for cointegration test

Model specification ^a	Durbin-Watson stat	Critical value ^b	Residuals-generating process	Conclusion
$f_t(CZ) = \varphi_0 + \varphi_1$ $p_t(SK) + \varepsilon_t(CZ)$	0.0632	0.2000	AR(2)	Test is not valid
$f_t(HU) = \varphi_0 + \varphi_1$ $p_t(SK) + \varepsilon_t(HU)$	0.1740	0.2000	AR(2)	Test is not valid
$f_t(PL) = \varphi_0 + \varphi_1$ $p_t(SK) + \varepsilon_t(PL)$	0.1665	0.2000	AR(2)	Test is not valid

^aModel specification to determine the Durbin-Watson statistics between two inspected variables defined by Eq. (7), φ_0 represents a constant and ε_t stands for an error term in a particular model specification

^bCritical value is calculated from the empirical distribution corresponding to two variables (p_t and f_t) and 160 observations included in a given model

Source: Own calculations

Table 3 Results of the engle-granger method

Residuals ^a	ADF <i>t</i> -stat ^b	Critical value ^c	Conclusion
$\varepsilon_t(CZ)$	-2.1802	-3.3741	H0 cannot be rejected (no cointegration)
$\varepsilon_t(HU)$	-3.6923	-3.3741	H0 can be rejected (cointegration)
$\varepsilon_t(PL)$	-3.8913	-3.3741	H0 can be rejected (cointegration)

^aResiduals generated by the models specified by Eq. (7) in Table 2

^b*t*-statistics from the augmented Dickey-Fuller test for cointegration

^cCritical values are calculated by MacKinnon equation $CV = \phi_\infty + \phi_1 T^{-1} + \phi_2 T^{-2}$, where *CV* is a critical value at a given confidence level, *T* represents number of observations in a baseline model specified in Table 2 (160 observations in our case) and ϕ_∞ , ϕ_1 , ϕ_2 are the coefficients from the MacKinnon empirical distribution corresponding to the model with 2 variables with constant at 0.05 confidence level

Source: Own calculations

3.4 The Results of the Johansen Method

In this section, we control for the cointegration between the variables f_t and p_t using the Johansen estimation procedure. Johansen method is considered a more sophisticated technique, which can be used as robustness check of our previous results. After identification of the same order of integration of the analyzed variables in all four countries, it follows the determination of the optimal lag length of the unrestricted VAR model. As it was already mentioned, we use Schwarz information criteria (SIC) to identify the optimal lag length (since we use 160 monthly observations, the maximal lag length is set as 12). For all three specifications the SIC criterion selected 4 lags as optimal. We, therefore, include 4 lags into the VAR in all our models. The results of the Pantula principle test for the trace statistics and the maximal eigenvalue statistics are captured in Table 4.

From the results shown in Table 4, we can clearly observe that there was found no evidence to support the presence of cointegration between the variables f_t and p_t in the case of the Czech Republic. The trace statistics yield the same conclusion as the maximal eigenvalue statistics. All model specifications (except for model 1 in the case of trace statistic) suggest that the variables are not cointegrated. However, model 1 is the most restrictive model and is considered the least likely in the literature—see, e.g., Petitjean and Giot (2004) or Asteriou and Hall (2007). As a matter of fact, we can conclude that the PPP was not confirmed in this case. The results are different in the case of Hungary and Poland. Most model specifications indicate that the variables are cointegrated. Particularly, in the case of Poland we have found clear evidence that PPP is valid. In the case of Hungary, some models reject cointegration, but in both trace and maximal eigenvalue statistics, we have at least three models, which speak for cointegration between variables f_t and p_t . Based on the Johansen test, we can say that there is a long-run equilibrium between Hungary and Poland (in relation to the Slovak Republic as a domestic country) in terms of exchange rates, domestic and foreign prices, but this was not the case for the Czech Republic.

Table 4 The Pantula principle test results

	Model 1	Model 2	Model 3	Model 4	Model 5
Trace statistics					
<i>Czech Republic</i>					
Trace stat	12.3807*	19.5078	12.5990	18.4414	16.7070
Critical value	12.3209	20.2618	15.4947	25.8721	18.3977
Probability ^a	(0.0489)	(0.0632)	(0.1304)	(0.3150)	(0.0849)
<i>Hungary</i>					
Trace stat	12.8367*	26.5007*	19.3661*	25.4172	23.6038*
Critical value	12.3209	20.2618	15.4947	25.8721	18.3977
Probability ^a	(0.0409)	(0.0060)	(0.0124)	(0.0569)	(0.0085)
<i>Poland</i>					
Trace stat	30.0658*	33.9209*	26.5527*	30.0745*	28.3414*
Critical value	12.3209	20.2618	15.4947	25.8721	18.3977
Probability ^a	(0.0000)	(0.0004)	(0.0007)	(0.0141)	(0.0015)
Maximal eigenvalue statistics					
<i>Czech Republic</i>					
Trace stat	8.8720	12.4740	8.0022	10.4615	8.7423
Critical value	11.2248	15.8921	14.2646	19.3870	17.1477
Probability ^a	(0.1260)	(0.1601)	(0.3785)	(0.5696)	(0.5226)
<i>Hungary</i>					
Trace stat	9.1421	17.7126*	15.2990*	18.9886	18.6249*
Critical value	11.2248	15.8921	14.2646	19.3870	17.1477
Probability ^a	(0.1137)	(0.0256)	(0.0342)	(0.0571)	(0.0303)
<i>Poland</i>					
Trace stat	22.8977*	22.9050*	22.8813*	23.7528*	0.0015*
Critical value	11.2248	15.8921	14.2646	19.3870	17.1477
Probability ^a	(0.0003)	(0.0034)	(0.0017)	(0.0108)	(0.0048)

^aProbability represents MacKinnon et al. (1999) *p*-values; asterisk (*) indicates rejection of the hypothesis at the 0.05 level

Source: Own calculations

3.5 VECM Specification

As we have rejected the cointegrating relationship for the Czech Republic, there is no need to estimate a VECM model to determine the deviation from the long-term equilibrium. In the case of Hungary and Poland, however, this deviation should be determined using the VECM model for each country separately. The estimated VECM based on model 3 from Pantula principle for *Hungary* considering one cointegrating vector and 4 lags has the following form:

$$\begin{aligned} \Delta f_t = & -0.1161(f_{t-1} - 0.9142p_{t-1} + 5.3019) + 0.3300\Delta f_{t-1} + 0.0891\Delta f_{t-2} \\ & + 0.3567\Delta p_{t-1} - 0.3946\Delta p_{t-2} + 0.0008 \end{aligned}$$

$$\Delta p_t = 0.0108(f_{t-1} - 0.9142p_{t-1} + 5.3019) + 0.0082\Delta f_{t-1} - 0.0142\Delta f_{t-2} \\ + 0.1357\Delta p_{t-1} + 0.0539\Delta p_{t-2} + 0.0013$$

where Δf_t represents a change in the foreign price level (in Hungary) and Δp_t is a change in domestic price level (in the Slovak Republic). The VECM enables us to combine the short-run dynamics and the long-run equilibrium. The long-run information in the above equations are captured in parenthesis and the remaining terms represent the short-run dynamics. The speeds of adjustments (representing the stability of the systems) are given by the coefficients -0.1161 and 0.0108 . Since the absolute value of both coefficients is less than one, both systems are stable. The speed of adjustment is very small and indicates that only 11.161% and 1.08%, respectively, of any deviation from the long-run equilibrium is corrected within a month.

The estimated VECM for *Poland* (based on model 3) considering one cointegrating vector and 4 lags is as follows:

$$\Delta f_t = -0.1055(f_{t-1} - 0.8584p_{t-1} + 0.7695) + 0.4270\Delta f_{t-1} - 0.0363\Delta f_{t-2} \\ - 0.0930\Delta p_{t-1} + 0.3423\Delta p_{t-2} + 0.0005$$

$$\Delta p_t = 0.0119(f_{t-1} - 0.8584p_{t-1} + 0.7695) + 0.0166\Delta f_{t-1} - 0.0106\Delta f_{t-2} \\ + 0.1082\Delta p_{t-1} + 0.0491\Delta p_{t-2} + 0.0013$$

The results are similar to the results for Hungary. The speeds of adjustments are again less than 1 in absolute value.

Finally, it is necessary to verify whether the residuals of this VECM defined by Eq. (16) are normally distributed. For this purpose, we used Jarque-Bera and Cramer-von Mises tests of normality. Based on both tests, the hypothesis that the residuals from VECM equations are normally distributed can be rejected on the level of 0.5 for both cases. These findings do not compromise the results of the VECM model.

Finding the existence of cointegration between the Slovak Republic and Hungary and between the Slovak Republic and Poland confirms the validity of PPP. In addition, it is important to estimate parameter φ_1 from Eq. 7. If the PPP holds, φ_1 should be equal to 1. Estimated parameter φ_1 can be found in the VECM specifications. In the case of Hungary φ_1 is 0.9142 and in the case of Poland 0.8584. Both estimated values are close to one. We can, therefore, conclude that the PPP theory is confirmed for Hungary and for Poland.

4 Conclusion

The discussion of PPP has never been ceased since Cassel (1923) introduced this theory. There have been carried out various research papers attempting to either confirm or reject the validity of this theory. The aim of this chapter is to investigate whether PPP holds between the countries of Visegrad group using cointegration techniques for searching a long-run relationship between exchange rate, domestic prices (i.e., in the Slovak Republic) and foreign prices. We found evidence supporting PPP between the Slovak Republic and Hungary and between the Slovak Republic and Poland applying both the Engle-Granger and the Johansen procedures. In addition to the finding of one cointegrating vector (i.e., indicating the existence of the long-term equilibrium), the validity of the PPP was confirmed by the VECM model as the φ_1 coefficient for both countries was close to one. In case of the Czech Republic, however, the conclusion is opposite. Compared to Hungary and Poland, a presence of cointegration with the Czech Republic was not found, which rejects the existence of a long-run equilibrium and compromises PPP. Our findings proved to be robust for a given dataset under various specifications.

A similar research to ours was carried out by Chocholatá (2007), who verified PPP in the V4 countries in 2007 when the Slovak Republic was in exchange rate transition period. Using cointegration techniques, the author documented that all analyzed exchange rates were identified to be nonstationary, which means that PPP did not hold. This finding is to some extent identical to our conclusion with respect to the Czech Republic. Chocholatá (2009) performed similar research for the Slovak Republic and Latvia. She was verifying the PPP in the period when both countries were members of ERM II in the process of the euro adoption. Although, she found some indications that the PPP might be valid in the case of Latvia, the conclusions for the Slovak Republic did not identify any long-run equilibrium supporting the purchasing power parity. Koukouritakis (2009) verified PPP between each of the twelve new EU countries in 2009. The results of his study suggest that PPP holds for Bulgaria, Cyprus, Romania, and Slovenia. For the rest of the countries, the long-run PPP was violated, which could be due to the fact that the currencies of these countries have been pegged to the euro and could not reflect the inflation differences. Coakley and Snaith (2004) used the US dollar and Deutsche Mark denominated exchange rate over the period 1977–2001 for 15 European countries to test for the long-run relative PPP applying nonstationary panel regression estimator. They conclude that the long-run relative PPP holds in their European sample.

There are several studies reporting that PPP does not hold. Therefore, it is useful to name the potential causes of this imbalance. Christev and Noorbakhsh (2000) used the cointegration techniques to validate PPP in six central and east European countries (Bulgaria, the Czech Republic, Hungary, Poland, Romania, and the Slovak Republic) in 1990–1998. They identified several reasons for possible deviations from the long-run equilibrium—slower domestic price adjustments to world prices and restrictive monetary policy, productivity shocks, inflexible exchange rate regimes, non-tradeable goods, and services. Similar conclusions made Sideris

(2005) who tested PPP for seventeen European countries. He identified productivity shocks, non-tradeable goods and services, and inflexible exchange rate regimes as possible reasons for deviations from the long-run PPP. In respect to our results, the rejection of the PPP between the Czech Republic and the Slovak Republic can be partially explained by expansionary monetary policy represented by the quantitative easing, which is far from equilibrium. Moreover, looking at the long-run evolution of all four currencies (i.e., EUR, CZK, HUF, and PLN), it is obvious that the national currency of the Czech Republic appreciated the most. The invalidity of PPP can be therefore partially explained by the real appreciation of the Czech crown (see Fig. 2) that could in tandem with different monetary policies create inequality in the long-run horizon.

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Part III
Finance

The Strategic Rationale of Mergers and Acquisitions on Emerging Markets: Evidence from Romania



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Abstract External growth operations, such as mergers and acquisitions (M&As), alliances, consortia, are often seen by the companies as a way of expanding their businesses or as a way of survival. In this chapter, we identify the determinants of the acquirers for choosing one type of merger in the detriment of others, considering a classification that suits better for the Romanian merger market (horizontal, vertical, and conglomerate). The independent variables indebtedness, premium, and the motives of operational synergies, managerial optimization, and increasing the market share, were useful predictors for choosing between the three types of mergers. The proposed research hypotheses are to be tested on a sample of 718 mergers that took place on the Romanian market, in the 2014–2016 period of time. The main results will show us that the indebtedness, and the fact that the acquiring companies paid a premium have the most significant influence on the type of merger chosen by the acquirer, given the fact that, in our sample, many acquirers register a negative book value of equity. Despite the fact that, on the Romanian market, many of the companies decide not to record a premium, its influence is significant for all types of mergers.

Keywords M&As · Horizontal · vertical and conglomerate mergers · Premium · indebtedness · Romania

1 Introduction

In Romania, the global financial crisis influenced both macroeconomic conditions and business community, creating imbalances in the macroeconomic indicators, on a side, and the financial position and performance of Romanian companies, on the

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other side, the latter encountering difficulties, in that period, in conducting their activities (Robu and Istrate 2014). In this context, they were constrained to search for ways to finance themselves or to establish strategies to improve their activities. A company's decision to engage in growth strategies such as mergers and acquisitions (M&As) involves a multitude of factors and motives, which also determine the acquirer's choice for the best target company. Worldwide, in the last two decades, the number of M&As increased, despite the number of failures in the field (Thanos and Papadiakis 2012; Junni et al. 2015). In Romania, the situation is opposite, the number of mergers was decreasing since 2009, when the pick was reached, with a number of 694 mergers, followed by the year 2010, with a number of 600 mergers (Official Gazette of Romania, fourth part).

In order to describe the situation in Romania, we consider as necessary to establish what type of economy it is, emerging or frontier, choosing a classification that suits better and justify the context in which Romanian M&As take place. There are multiple criteria used in classifying countries, each of them being based on different indices. As a consequence, not everyone agrees entirely on which countries are emerging markets, developing countries, or frontier economies, to present few of the possible outcomes of the country classifications.

Morgan Stanley Capital International (MSCI)'s All Country World Index (ACWI) is composed of 2400 constituents, 11 sectors, and it is the industry's accepted measure of global stock market activity (MSCI 2018). It provides a modern and fully integrated view across all sources of equity returns in 47 developed and emerging markets, in December 2018. For 2018, MSCI published a list of 24 countries as emerging markets, but they classify Romania as a frontier market. Standard and Poor's (S&P Indices) and FTSE Russell each classify 23 countries as emerging markets, while Dow Jones classifies 25 countries as emerging markets (S&P Global 2017). In all these classifications, Romania is also considered a frontier market.

We did not consider these classifications due to two facts: one, these classifications are based on questionnaires which focus on financial markets and, second, the Romanian Stock Exchange is insufficiently developed, including 87 listed companies, out of which 12 are financial companies (financial and insurance activities).

The International Monetary Fund (IMF) classifies countries in two categories: advanced economies, on a side, and emerging markets and developing economies, on the other side. In this case, Romania is classified in the second category, next to other 11 economies from Europe—Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, Macedonia, Montenegro, Poland, Serbia, and Turkey (IMF 2018).

World Economic Forum publishes the Inclusive Development Index (IDI), which is an annual assessment of 103 countries' economic performance. The chosen criteria cover eleven dimensions of economic progress in addition to Gross Domestic Product (GDP). The Inclusive Development Index was presented at the World Economic Forum's Annual Meeting in Davos, Switzerland, in 2017, as a part of an initiative called "Shaping the Future of Economic Progress." It has 3 pillars: growth and development, inclusion, and intergenerational equity—sustainable stewardship of natural and financial resources (WEF 2018; Sharafutdinov et al. 2018;

Asmorowati and Schubert 2018). Given the fact that the paper refers to M&As as growth strategies, we consider more appropriate to consider Romania as an emerging market. According to WEF, Romania held the fifth position in the WEF list in 2017 and rank down to the tenth position in 2018, among the most inclusive economies of its kind. In addition to this, FTSE Russell put the country on the watch list, in order to be reclassified from a frontier market to a secondary emerging one (FTSE Russell 2018).

In M&As, combining the specialized resources of the involved parties with environmental opportunities and constraints creates the basis for achieving synergy (Seth 1990). This is reached through organizational renewal and knowledge transfer. For metric valuation, various instruments are used, from accounting figures (cost savings or revenue growth), rates, the return reported on the financial markets, to subjective measures, such as the case of manager reports or voluntary reports. Although there are studies which commensurate the creation of separate value for the acquiring entity (Tanriverdi and Uysal 2011; Alexandridis et al. 2017) or for the target company (Datta and Puia 1995; Campa and Hernando 2004; Basuil and Datta 2015), Seth (1990) believes that they should always be seen as a whole.

2 The Typology of M&As: Understanding the Options of the Entities that Intend to Involve in Business Concentrations

M&As can be classified from several perspectives, each with distinct features. Moreover, the choice for a specific target company, located in a specific industry, is the result of clear motives. The latter covers a wide range, from the core activity of a specific target company to the development strategy of the acquiring company. This disclosure criterion leads to the most well-known classification of mergers, namely horizontal, vertical, concentric, and conglomerate M&As (Cartwright and Cooper 1992; Degbey and Pelto 2015).

Horizontal M&As consist of the combination of two companies with similar main activities, belonging to the same branch. They may reduce competition by reducing the number of firms and increasing concentration. If the merged firms can reduce costs by relocating production, the motivation to merge is increased. As negative consequences, such a change in the structure can increase market power and negatively affect market performance (Levin 1990; Fee and Thomas 2004; Gao et al. 2015). In many cases, this type of mergers/acquisitions lead to oligopolistic situations and must be regulated by antitrust legislation (Thomas 2017). In Markovits' (2014) opinion, a horizontal merger or acquisition involves companies that target the same customers, placed on a specific market, which have given purchasing decisions. This type of mergers can increase their participants' wealth by creating a new company that uses the assets or the human capital of the pre-merger companies, by taking full advantages of its antecedents or by providing

cash for the other firm's project, considering that the core activities of the companies are the same. According to Thomas (2017), in industrial organizational theory and antitrust practice, efficiencies are necessary in order for the profitable horizontal mergers of rival sellers to be beneficial to consumers. This view rests on the idea that, if a merger's profitability does not arise from reducing the merging seller's costs, then it must stem from increasing their market power. When the market power of the newly created entity is transposed in increased prices, the possibility of oligopoly or even monopoly arises. Mueller (1969) views M&As as a way to achieve monopoly power or practice some other unfriendly activity, i.e., practicing a policy of prices that affects both the consumers and the competition.

The basic merger paradox can be reflected in a simple question: if 65 to 85% of the M&As fail, why do they remain so popular (Schenk 2007)? If the positive synergistic effects from mergers are reflected in small profits, which do not overcome the cost, why merge? Posada and Straume (2004) and Brekke et al. (2017) assert that the non-merging firms always benefit more from the merger than the merging firms. In economics, this situation can fall under the merger paradox in Cournot oligopoly and Bertrand competition, knowing that Cournot is a model that competes on quantities, while Bertrand is a model that competes on prices (Fikru and Gaultier 2016; Baye and Kovenock 2016), the difference between the two is the initial decision to set a fixed quantity or a fixed price. Thus, if we start on the assumption that both firms have the same constant unit cost of production, this means that as long as the set price is above unit cost, the merged companies are willing to supply any amount that is demanded. If price is below cost, each unit sold increases the loss, so the merging companies want to limit the sales. Moreover, under Cournot competition, when there are more than three companies on the market, the merger will lead to a decrease in profits, thus the merger paradox (Head and Ries 1997).

In some cases, as a part of its commercial strategy, a company is in the position of acquiring/merging with a supplier (upstream) in order to simplify the supply process, or with a customer (downstream) to provide the basis for easier communication and better distribution (Lasserre 2012). The vertical M&As involve the combination of two companies with successive processes in the operating cycle, belonging to the same industry. They usually occur when the market for an intermediate product is imperfect, due to scarcity of resources or criticality in the purchased products, or moreover when there is a need of control over production specifications of the intermediate products.

A concentric merger/acquisition corresponds to a transaction between two companies with similar, but not identical, core activities. For example, a motorcycle company can merge with one that produces cars (Alemu 2015). Benefits from concentric M&As could derive from economies of scope, exploitation of shared resources, and from the opportunity of a diversification around a core of common strategic resources (Lasserre 2012).

As noticed, standard merger/acquisition analysis typically assesses its effects on price, quantity, and, more recently, product characteristics (in terms of quality), due to changes in market concentration. But it is possible for a merger or an acquisition

to change competition, but not the market structure, a case known as conglomerate/diversifying M&As (Garcia and de Azevedo 2017; Lin et al. 2018). In this case, there is no connection between the core activities of the involved entities. Economists have long tried to explain the benefits of this type of concentration, which are not as obvious as they are in the case of horizontal and vertical M&As. It is possible that the synergistic benefits, in this case, to lie in cost savings and administrative functions (Amihud et al. 1986; Bragg 2008). Hagedoorn and Duysters (2002) present another classification of M&As in terms of relationship between the involved companies: they believe that horizontal/vertical mergers/acquisitions are made between companies with related core activities (related M&As), while conglomerate mergers/acquisitions are between companies with unrelated core activities (unrelated M&As).

Beyond the transactions normally occurring between companies entering a concentration, there are, in theory and practice, negotiated M&As, and tender offers, friendly or hostile. Both mergers and acquisitions can be negotiated by the management, having the approval of the target's Board of Directors, or may result from offers made directly to the shareholders of the target company (Knoeber 1986). Historically, tender offers were an easy way to acquire a company, being an effective corporate governance mechanism, used as a takeover device to bypass an unreceptive board of directors (Offenberg and Pirinsky 2015). In the opinion of the latter authors, the hostile tender offers are preferred over the friendly ones, because they are faster and result in higher premiums for shareholders of the target company.

In the case of acquisitions, the management of the two companies needs to be further discussed because they do not require financial or performance changes, from an accounting point of view. Acquisitions only cause changes in the shareholder structure of the target company. Thus, a common situation is the one in which the acquisition is approved by the management of the target company. In fact, the acquiring entity announces the Board of Directors about the intention to acquire the target company, which approves the transaction. But not always the acquisitions are friendly, the opposite case being that of the hostile takeovers (Irfan 2010). These are acquisitions that do not benefit from the approval of the Board of Directors of the target company, so the bidder's management purchases securities in other ways: the acquiring company's management buys the titles of the existing shareholders, offering higher prices than the exchange rate (tender offers); pursues a simple majority of the target company's shareholders willing to vote for the change of current management with other people, who are willing to approve the acquisition (proxy fighting); pursues and purchases the securities put on sale by the target company on capital markets (Suzuki 2015). According to Irfan (2010), in order to avoid hostile vertical takeovers, target's managers keep R&D and advertising expenditures to a low level to make their firm an unattractive target.

Although, in most cases, the acquiring company is the one who imposes the rules in the post-concentration integration period, in the case of reverse acquisitions, the acquiring entity undergoes major changes imposed or determined by the target company (Denison et al. 2011). Another special situation is one of the backflip

acquisitions, in which the target company turns, post-acquisition, into a subsidiary of the acquiring company (Di Laurea 2014).

Furthermore, taking into account the specificities of the merger market in Romania, we consider the classification related to core activities as the most suited approach in our research.

3 The Strategy behind a Business Concentration: Choosing between Motives and the Expected Performance

M&As are external growth strategies, which have, as main declared purposes, the strengthening of a company's financial position and the increase in its economic benefits, either by increasing the revenues or by decreasing the expenses. Thus, the companies involved in M&As, as a result of participating in this type of transaction, benefit from both an operational and financial perspective (Pathak 2018). As part of their growth, the increase of the companies' market share is of great importance, because it may lead either to higher sale prices or low prices paid to suppliers. According to Shleifer and Vishny (2003), opportunistic managers participate in M&As in order to build an empire, a fact that is mostly associated with hubris theory. In Roll's (1986) opinion, managers involve their companies in M&As so they can improve the target's performance.

According to Andrade et al. (2001), the most well-known reasons for concluding mergers and acquisitions in economic theory basically refer to synergies or market share. In the first case, we include efficiency reasons that concern economies of scale or economies of scope. In the second case, we can have two situations: one, reaching a certain market share, which may lead to extreme situations of monopoly or oligopoly (this is the case of the horizontal mergers, which are combinations between entities with the same core activity), and two, the desire of the management of the acquirer to expand, with the purpose of diversifying the activity (in this case we can have both vertical or conglomerate mergers, depending if the acquirer wants to optimize its supply chain or to access new distribution markets or, in the second case, to try a new market). To these, we can add a more particular motive, the one of market discipline, which has the effect of eliminating competitors with non-efficient management. There are authors (Kräkel and Müller 2015; Aevoae 2018) who offer a similar perspective on motives that can lead to M&As. These can be considered for all three types of mergers and acquisitions. First, we are referring to performance-related motives, which include the improvement of the performance for the target company and/or the access, for the acquirers, to skills or resources faster or cheaper than if they were created/produced, which lead to their improvement of performance. Second, the motives are related to the market share, which may result from the concentration, as a consequence of the market access to products/services offered/provided by the target company, combined with the exploitation of an industry's expansion capacity or of a niche market.

Given the specific nature of horizontal mergers and their possibility to end in oligopoly or monopoly, we identified few motives that are specific to these restructuring operations: economies of scale; economies of scope; cost synergies, by using the production facilities or the distribution network of the involved companies; market expansion, taking into account either domestic or foreign markets; replacement of management with better teams, but there are also socially harmful consequences of horizontal mergers, notably market power and even loss.

Calipha et al. (2010) conclude that generally named M&A motives reflect external motives (such as growth, market expansion, or globalization) as well as more internal orientations (such as changing business models, optimizing the managerial process, or achieving synergies). The synergy represents the main goal for numerous managers involved in business concentrations, being widely documented in the existing literature in an attempt to explain the motive of mergers and acquisitions (Lensink and Maslennikova 2008; Carline et al. 2009; Pathak 2018). Synergy occurs when the combination of two or more businesses can create more shareholder value than if they were operated separately, through improvement in operating efficiency.

The premium can be also considered a motive for choosing to participate in an acquisition or a merger, being the first manifestation of synergy, according to Sirower (1997). If the premium can be considered an incentive for the shareholders of the target companies (Alsharairi et al. 2015; Fich et al. 2016), in case of mergers, in Romania, it results from a precise calculation. The premium is the difference between the book value of equity or the market value of the target company (established by an independent appraisal) and the par value of the shares that are issued for the shareholders of the acquired company (Ministry of Public Finance 2015). In international M&As, although some transactions are considered mergers, they are in fact acquisitions, with one company controlling the other. The only mergers that respect the definitions are those by consolidation, when the participating entities dissolve, creating a new company. Thus, the real number of mergers is so low that the acronym M&As basically means acquisitions. In Romania, the concept of acquisitions does not have a specific regulation. Thus, in Romanian Official Gazette, the merger projects are published, which means that, in our country the acronym means mainly mergers.

4 Hypotheses Development

Given the status of Romania as an emerging market and the fact that mergers are considered growth strategies, based on certain motives, we have established the following assumptions to be tested and validated:

H₁: In the Romanian merger projects, there is a significant association between the types of mergers, the declared motives and the year in which the merger took place.

H₂: In the Romanian merger projects, the probability of choosing a particular type of merger is significantly influenced by the merger motives, the existence of a premium and the indebtedness ratio of the acquiring entity.

These hypotheses will be validated using information related to the Romanian merger projects and SPSS 23.0.

5 Research Methodology and Design

To test and validate the proposed research hypotheses, the study analyses the empirical data manually collected from the merger projects, published in the Romanian Official Gazette, fourth part. To reach the proposed research hypotheses, we use multinomial logistic regression, to predict the probabilities of the different types of mergers in which the Romanian companies can involve (dependent variable), given a set of independent variables (the existence of a premium, the indebtedness ratio and the motive to participate in merger).

5.1 Target Population and Analyzed Sample

In order to confirm the research hypotheses, our target population consists of the acquiring companies presented in the merger projects, published in the Romanian Official Gazette, for the 2014–2016 period of time. According to article 242 from Companies Law no. 31/1990 republished in 2004, the merger project, signed by the representatives of the participating companies, must be filed at the trade registry office where each company is registered, together with a declaration of the company that ceases to exist after the merger, of how it has decided to terminate its liability.

The draft of the merger, approved by the delegated judge, is published in the Official Gazette of Romania, Part IV, at the expense of the parties, in full or in the extract, at the discretion of the delegated judge or at the request of the parties, 30 days prior to the dates of the extraordinary general meetings when merger is decided (according to art. 113 letter h).

Overall, out of the 737 merger projects published in the Romanian Official Gazette Part IV, for the 2014–2016 period of time, 718 projects were kept for analysis, 19 were removed because they were prepared by financial entities (12 projects) or the information, published in the extract, was insufficient for the analysis (7 projects).

5.2 Analyzed Variable and Data Source

The variables proposed for analysis are presented in Table 1.

For the aforementioned variables, data was manually collected, by reading and analyzing the merger projects, published in the Romanian Official Gazette, fourth part, for the 2014–2016 period of time. The motives, as they were chosen for the study, were selected after analyzing the Romanian merger projects, specifically a section called “The economic foundation of the merger.” Thus, first we consider the operational synergy, because the involved entities declared that they are participating because they intend to reduce costs (material, administrative, salaries, etc.). Second motive is related to efficiency reasons which result from managing entities that have, in most cases, the same shareholders. The third and last motive is related to the intention of increasing the market share after the concentration.

5.3 The Method for Data Analysis

In order to identify which are the odds for a company to involve in a specific type of merger, the study uses the logistic multinomial regression, described by Kleinbaum and Klein (2010: 18).

Considering

$$\frac{P(X)}{1 - P(X)} \tag{1}$$

– odds for individual X, then:

Table 1 The variables proposed for the analysis

Symbol	Description	Explanation
MT	Merger type	1-horizontal merger 2-vertical merger 3-conglomerate merger 4-not available
MO	Motives	1-operational synergies 2-managerial 3-market share
ID	Indebtedness	$ID = \frac{\text{Total liabilities}}{\text{Total assets}}$
Premium	Premium	1-with premium 2-no premium
Year	Year of the merger	2014, 2015, 2016

Source: Authors’ own study

$$\ln \left[\frac{P(X_j)}{1 - P(X_j)} \right] = \alpha + \sum_{i=1}^n \beta_i X_i \quad (2)$$

where $j = 1 \dots 4$, according to the explanation in Table 1. For merger type (MT), the last category (4) is considered to be the benchmark and it will determine the probabilities of emergence for the three merger types.

Thus, starting from the model presented in Eq. (1), our study proposes to analyze the following regression model, in order to estimate the influence of the determining factors on the emergence of a certain type of merger:

$$\ln \left[\frac{P(MT_j)}{1 - P(MT_j)} \right] = \alpha + \beta_1 \cdot MO + \beta_2 \cdot Premium + \beta_3 \cdot ID \quad (3)$$

6 Research Results

In order to present the descriptive statistics on the values recorded for the 718 absorbing companies in the sample, we take into consideration the information presented in Table 2.

Starting from the information in Table 2, it can be noticed that most of the mergers registered in Romania are horizontal (38.7%), which indicates that the entities predominantly aim at increasing the market share, on one hand, and at realizing operational synergies, in the form of economies of scale, on the other.

Table 2 Case processing summary

		N	2014	2015	2016	Marginal percentage
Merger type	1	278	106	82	90	38.7%
	2	255	74	101	80	35.5%
	3	147	34	45	68	20.5%
	4	38	24	6	8	5.3%
Premium	1	259	86	90	83	36.1%
No premium	2	459	152	144	163	63.9%
Motives	1	335	130	103	102	46.7%
	2	254	73	85	96	35.4%
	3	129	35	46	48	18.0%
Valid		718	238	234	246	100.0%
Missing		0	0	0	0	
Total		718				
Subpopulation		695 ^a				

Note: ^aThe dependent variable has only one value observed in 689 (99.1%) subpopulations Source: Authors' own study using SPSS 23.0

Table 3 The merger links, their strength, and the clusters in Romanian macro-regions

Macro-region	Total link strength	Links	Clusters
Bucharest-Ilfov	65	8	1
Muntenia-south	30	6	1
West	24	6	1
South-west	4	3	1
North-west	15	5	2
Centre	23	5	2
South-east	20	6	3
North-east	6	2	3
Foreign countries	5	3	1

Source: Authors’ own study using VOSviewer 1.6.9

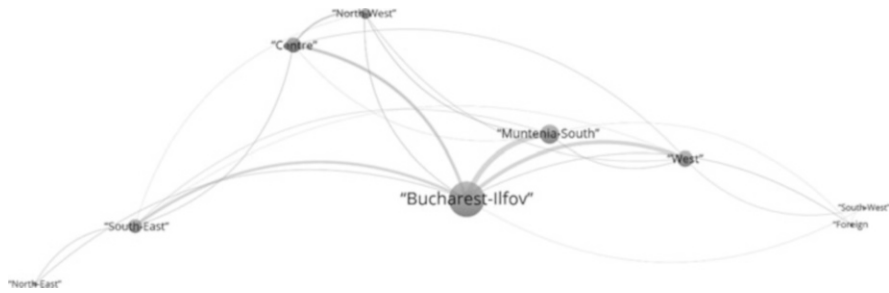


Fig. 1 The links between Romanian macro-regions. Source: Authors’ own study using VOSviewer 1.6.9

The vertical mergers occupy the second place, with a close percentage (35.5%), which is economically justified by the search for specialized suppliers or distribution channels. The last place is held by the conglomerate mergers, which are often justified by the desire to diversify the activity. Regarding the time distribution, the most prolific year was 2014 for horizontal mergers, for the vertical mergers it was 2015 and 2016, for the conglomerate ones.

Regarding the merger premium, it is obvious that 63.9% of the companies did not record a premium, but this is due to the Romanian legislation stipulating that, in the case of the target entities actively registering a negative book value of equity, the merger premium is not recorded. From a geographical point of view, mergers in Romania can happen between companies located in the same county/region or between companies located in different regions, considering the geographical representation provided by the National Institute of Statistics from Romania.

The links presented in Table 3 are graphically represented in Fig. 1.

By analyzing the data from the merger projects using VOSviewer and assigning each company’s county to a macro-region (see Table 3), we noticed that three clusters were created, based on the occurrences of the transactions: *cluster 1* for Bucharest area, South and West Romania, *cluster 2* for North-West and Central Romania, and *cluster 3* for East Romania, proving that the acquiring companies are interested in developing external growth strategies with entities located in

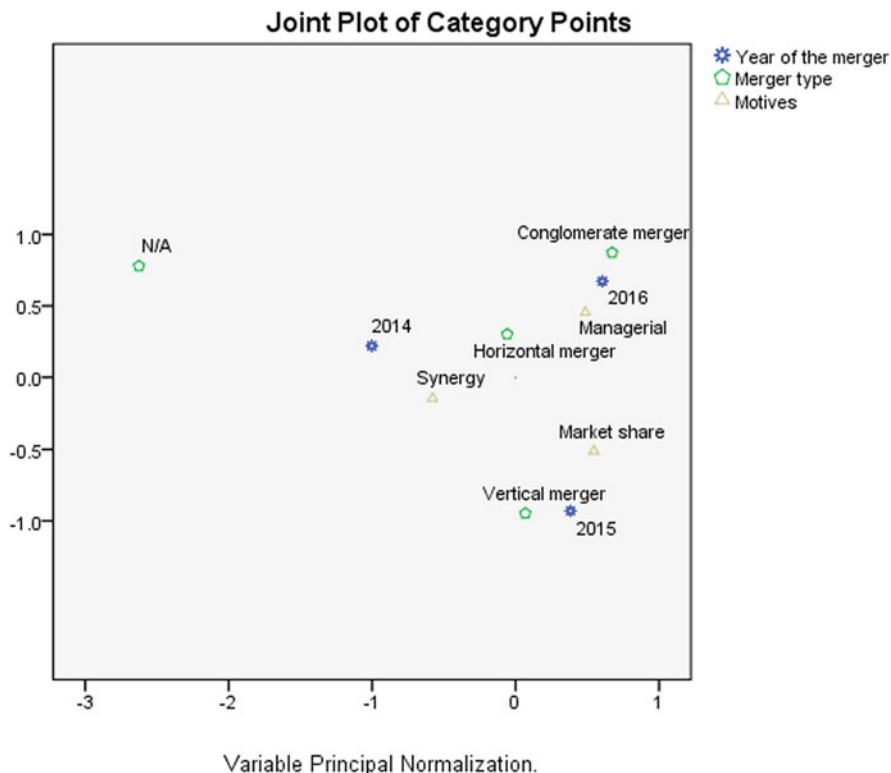


Fig. 2 The multiple correspondence analysis. Source: Authors’ own study using SPSS 23.0

neighborhood counties (nearby proximity). The link strength is given by the number of transactions and the links are reflecting the concept of cross-region mergers (i.e., Bucharest-Ilfov region has 8 links, which means the companies located here developed transactions with companies located in all the other regions).

Concerning motives, in Table 2, it is noticed that the most frequent merger projects justify the concentrations of entities through the expected operational synergies, most often seen as cost savings. In the next position, we find managerial motive, which in most cases is because the involved entities have the same shareholders/investors. Only in 129 merger projects, the main declared motive is to increase the market share, with the largest number registered in 2016, when the entities were involved mostly in conglomerate mergers.

In order to study the associations between the type of merger, the motives and the year in which the concentration of entities took place, we use Multiple Correspondence Analysis (MCA) to demonstrate the hypothesis H_1 .

According to Fig. 2, there is an association between the horizontal mergers and the motive of operational synergy, in 2014, between vertical mergers and the motive

Table 4 Model fitting information

Model	Model fitting criteria			Likelihood ratio tests		
	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept only	1729.818	1743.547	1723.818			
Final	1727.239	1795.886	1697.239	26.578***	12	0.009

Source: Authors’ own study using SPSS 23.0

Table 5 Goodness-of-fit

	Chi-square	df	Sig.
Pearson	2062.127	2070	0.545
Deviance	1682.579	2070	1.000

Source: Authors’ own study using SPSS 23.0

to increase market share in 2015 and, finally, between conglomerate mergers and managerial motive, in 2016. We consider the hypothesis H_1 as being valid.

After analyzing and processing the data at the level of the proposed sample, we identified the following: the distribution of the merger projects on the types described in the qualitative part of the chapter and, within them, the distribution over time (for the period 2014–2016), the percentage of the companies that registered the distribution of motives by types, and last but not least the estimation of the parameters of a model that allows the calculation of the likelihood that a certain type of merger will be chosen by the companies participating in the concentration, depending on the motive, the registration of a premium and the degree of indebtedness registered by the absorbing company.

Considering the information in Table 4, the results show that the Pearson test (Chi-square), used to show if there is a significant difference between the expected frequencies and the observed frequencies, is 0.009, less than the limit of 0.05. This demonstrates that there is a statistically significant relationship between the dependent variable—merger type (MT) and the independent variables. The estimated model fits the data better than the null model.

Unlike Table 3, the probability reflected in Table 5 should exceed 0.05 to be considered significant, as evidenced by the values of 0.545 (Pearson) and 1.000 (Deviance).

Parameters with significant negative coefficients decrease the chances of that response category compared to the reference category, which is code 4 (not available). Parameters with positive coefficients increase the chances of that category of response. Based on the analysis of the information contained in Table 6, we will consider each type of merger in reference to category 4 (Not Available, N/A).

Thus, the dependent horizontal merger variable is significant in relation to category 4 (N/A), and the independent variables indebtedness, premium, and the motive of operational synergy were useful predictors for choosing between the three types of mergers. The relation between them is significant (sig. <0.05).

Because the indebtedness coefficient is positive (3.354 and the odds ratio = 28.626), this means that, when the indebtedness increases by 1 unit, the chances for the acquiring company to opt/prefer/settle for horizontal merger (code 1)

Table 6 Parameter estimates

Merger type ^a		B	Std. error	Exp(B)
1 horizontal	Intercept	-0.531 (0.757)	1.647	
	Indebtness	3.354** (0.039)	1.627	28.626
	[Premium_yes_no = 1]	0.916** (0.040)	0.446	2.498
	[Premium_yes_no =2]	0 ^b	.	.
	[motive = 1]	-1.375** (0.030)	0.634	0.253
	[motive = 2]	-0.417 (0.546)	0.689	0.659
	[motive = 3]	0 ^b	.	.
2 vertical	Intercept	-0.559 (0.735)	1.654	
	Indebtedness	3.066* (0.060)	1.632	21.454
	[Premium_yes_no =1]	1.164*** (0.009)	0.445	3.203
	[Premium_yes_no =2]	0 ^b	.	.
	[motive = 1.0]	-1.057* (0.097)	0.637	0.348
	[motive = 2.0]	-0.469 (0.500)	0.695	0.626
	[motive = 3.0]	0 ^b	.	.
3 conglomerate	Intercept	-1.770 (0.296)	1.693	
	Indebtedness	3.568** (0.032)	1.662	35.436
	[Premium_yes_no =1]	1.096** (0.017)	0.461	2.993
	[Premium_yes_no =2]	0 ^b	.	.
	[motive = 1.0]	-0.944 (0.153)	0.661	0.389
	[motive = 2.0]	-0.048 (0.946)	0.716	0.953
	[motive = 3.0]	0 ^b	.	.

Note: *P*-values (for tests) in brackets. ***, **, and * indicate the statistical significance at the 1, 5, and 10%, respectively

Source: Authors' own study using SPSS 23.0

increase 28.626 times, compared to the reference category 4, as other effects remain constant. For the binomial variable premium (1 stand for mergers with premium and 0 for mergers with no premium) (0.916 and the odds ratio = 2.498), the acquiring entities which calculated the premium are 2.498 times more likely than those which did not record a premium to prefer horizontal mergers than the reference category

4. The motive coefficient 1, which stands for operational synergy (-1.375 and the odds ratio = 0.253), is negative, so those with the motive of operational synergy have lower chances by 74.7% than those which intend to increase their market share to prefer horizontal mergers, compared to the reference category 4 ($((0.253-1) * 100 = -74.7\%)$). The sig. for managerial motive coefficient (2) is not significant, so we do not interpret it because it has no extrapolation power.

In the case of vertical mergers, because the indebtedness coefficient is positive (3.568 and the odds ratio = 21.454), this means that when the indebtedness increases by 1 unit, the chances for the acquirer to prefer vertical merger (code 2) increase 21.454 times, compared to the reference category 4, as other effects remain constant. In the case of the premium (1.164 and the odds ratio = 3.203), the acquiring entities which calculated the premium are 3.203 times more likely than those which did not record a premium to prefer vertical mergers than the reference category 4.

Considering the third merger type, the conglomerate ones, the indebtedness coefficient is positive (3.066 and the odds ratio = 35.436), which means that when the indebtedness increases by 1 unit, the chances for the acquirer to prefer conglomerate merger (code 3) increase 35.436 times, compared to the reference category 4, as other effects remain constant. In the case of the premium (1.096 and the odds ratio = 2.993), the acquiring entities which calculated the premium are 2.993 times more likely than those which didn't record a premium to prefer conglomerate mergers than the reference category 4.

As a general result, the fact that the acquiring companies paid a premium has the most significant influence on the type of merger chosen by the acquirer, given the fact that, in our sample, many acquirers register a negative book value of equity. The indebtedness ratio has the second most important influence for the bidding company in choosing a specific target company, thus resulting in relatedness between the core activities of the companies involved in the concentration. We consider H_2 as being valid.

7 Conclusions

Romania is considered to be an emerging market by some country classifications (IMF and WEF) and as a frontier market by others (FTSE Russell, MSCI, S&P, and Dow Jones). Although mergers and acquisitions are having a rich history among developed countries, in Romania, according to the MPF, they started in 1998, with the support legislation in this respect (OMPF no. 1223/12.06.1998). In other news, these external growth options are new to the investors on the Romanian market.

We note a high indebtedness among Romanian companies, due to the financing options of the entities. In developed countries, where both a frequency and a high value of this type of operations have been recorded, entities prefer financing to the capital market (financing based on attracting investors). Romania is among the countries that carry out economic activities based on commercial credit and credit granted by financial entities.

The absence of the merger premiums is justified by the fact that the entities use external ways of financing, thus increasing the indebtedness ratio, but also decreasing the net book value of equity. In some cases, the liabilities outrange the assets, thus determining a negative value of equity. In Romanian legislation, the premium is recorded only when the net book value of equity of the target company is positive. Therefore, the binomial variable (the acquirer records a premium—yes; the acquirers do not register a premium—no) shows us the companies that calculate this difference. As a result, a significant number of companies (63.9%) record higher debts than their own assets, thus not recording the aforementioned premium.

The data show that the motives related to operational synergy have a significant influence on the odds of choosing to participate in horizontal mergers. In the cases of vertical and concentric mergers, the motives are not significant. Economic entities, following mergers and acquisitions, can achieve operational synergy by reducing administrative costs and centralizing their functions, as mentioned in the merger projects. We are talking about the integration of activities. However, some departments do not support integration, here we are talking about billing and collection centers that tend to be rather local.

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The Influence of a Group Purchasing Organization on the Management of Company Receivables



Grzegorz Zimon

Abstract Receivables management is a key element affecting the financial security and profitability of companies. The policy of managing receivables is a very sensitive issue and should be well thought out. Large opportunities in this area appear in companies operating in purchasing groups. Joint operation allows applying certain tools that effectively enable to manage our receivables policy. The purpose of the chapter is to present strategies and tools that facilitate the management of receivables in companies operating in purchasing groups. The chapter aims at presenting and explaining the influence of the purchasing group on receivables management. The analysis of the receivables management strategy was presented in a group of 35 Polish companies. The research period covered the years 2014–2016. Companies subject to research were commercial companies whose revenues ranged from PLN ten million to PLN 100 million. The analysis of the receivables management policy in companies was carried out on the basis of literature and using the initial and indicative financial analysis. The conducted analysis showed how the purchasing group influenced the policy of managing receivables in companies forming purchasing groups.

Keywords Receivables from recipients · Strategy · Purchasing group · Poland

1 Introduction

Every company manager knows that having financial liquidity, i.e., maintaining an ability to meet the company's due dates on various payments and obligations, is the daily problem the company faces (Higgins 2012). The level of financial liquidity to a large extent depends on the structure of current assets and the structure of their

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sources of financing. Therefore, the enterprise's managers have to choose optimal strategies for managing inventories, receivables, cash, and current liabilities. Then, as a result of combining individual strategies, the main liquidity management strategy is created. However, when analyzing individual components that have an impact on financial liquidity, it is difficult to disagree with the statement that receivables are the most important element that has a decisive impact on the financial safety of most enterprises. Receivables management is a process whose main assumption is to counteract the occurrence of overdue receivables. An enterprise that manages receivables efficiently is competitive in the market because it has free cash. Skillfully created receivables management strategy ensures access to free cash. On the other hand, having cash for day-to-day operations is the key to maintain a high position in the market and a good reputation among contractors. There are authors who claim that development strategies can only be created in those enterprises that have a strong position in the capital market, and this condition is met by the units where the decision on the so-called net working capital are made in the right way (Pluta 2003; Zimon 2018). Positive net working capital means financial liquidity, and as in the case of liquidity management the most important element is the receivables. When creating a receivables management policy, managers use a variety of methods and financial tools. A lot more possibilities in the use of appropriate tools supporting the receivables management strategies are obtained by enterprises operating within group purchasing organizations. The aim of the chapter is to present methods supporting the process of receivables management in group purchasing organizations and receivables management strategies that are used in them. Until now, the literature presents strategies for managing receivables and trade credit in SMEs operating in various industries. In turn, the chapter presents methods and strategies for managing short-term receivables in multi-entity organizations, which is rarely presented in the literature. The first part of the chapter presents the theoretical aspects of purchasing groups and receivables management. Then, research methodologies were presented, results of performed tests, and final conclusions were presented.

2 Receivables

Receivables in the structure of current assets they very often get the highest level. However, the share of receivables in the structure of current assets also depends on the branch where the company operates, in size and on whether it is a service, production, or commercial unit. In trade enterprises receivables reach very high levels. In such units, commercial transactions are usually made with the use of trade credit. In service enterprises, for example, tourist offices, mainly cash turnover is used. In small retail outlets, one can often find a situation where the trade takes place only for cash. Until recently there were many retail chains where purchases could only be made for cash.

When analyzing the structure of short-term receivables, the majority of enterprises account for the largest share in trade and other receivables, which has a decisive influence on the current level of cash. In the case of receivables three strategies can be distinguished (Zimon 2017):

- A conservative strategy, a safe strategy. It results in the resignation of clients regulating liabilities with a delay after a few requests.
- An aggressive strategy provides for granting of trade credit to recipients with a high solvency risk. Aggressive action increases the chance of gaining new customers and gives an opportunity to increase sales.
- Moderate strategy is an indirect solution in the case of receivables management.

The conservative strategy is intended to fully protect the enterprise from the risk of insolvency. An application of this policy for managing receivables requires some knowledge about contractors, their financial situation, opinions about them. The aggressive strategy has a chance to be applied in the case of companies that launch a new product in the market. Then it is absolutely necessary. In other cases it may lead to payment gridlocks. A moderate strategy is any strategy that deviates from classic strategies, that is conservative and aggressive. Very often it is a combination of an aggressive and conservative strategy. In the case of creating a receivables management strategy, the trade credit plays a key role in it. Trade credit is the main source of financing for companies (Bougheas et al. 2009). In Germany, France, and Italy, the United Kingdom or even China it is considered as a basic component of the financial policy of enterprises. The advantage of trade credit is its flexibility and high availability (Danielson and Scott 2007).

Very often, it is the only option for enterprises that have trouble obtaining a bank loan (Petersen and Rajan 1997). However, trade credit has not only advantages. It can also have flaws as it may negatively affect the company liquidity. This situation usually occurs when the debtor goes bankrupt and is unable to pay off his supplier (Jacobson and von Schedvin 2015; McGuinness et al. 2018). The supplier does not receive cash which aggravates his/her financial situation and can trigger a chain reaction. The creation of an appropriate credit management policy facilitates the process of debt recovery and liquidity management. This is confirmed by the study of many authors who recognize that the trade credit reduces the probability of difficulties in the ongoing financing of enterprises (Casey and O'Toole 2014; Carbo-Valverde et al. 2009; Ferrando and Mulier 2013).

3 Group Purchasing Organizations

Group purchasing organizations (GPO) are multi-stakeholder organizations whose main purpose is joint purchasing. A purchasing group can be defined as a group of companies from the same or different branch that merge to make joint purchases (Zimon 2019). They are managed by a specially created central unit whose purpose is to carry out tasks commissioned by enterprises forming a purchasing group

(Zimon 2013). The main aim of functioning together and joint purchasing is to enable them to obtain low prices in the first place (Kauffman and Wang 2002; Zhou et al. 2017; Nollet and Beaulieu 2003; Zimon and Zimon 2019). In general, the operation of purchasing groups is identified with the effect of scale, which allows reduce cost. (Nollet and Beaulieu 2005; Burns and Lee 2008). Some benefits also arise in the case of managing receivables from customers, liabilities to suppliers, which positively affects financial liquidity (Zimon 2018). Such organizations operate in the public and private sectors, as well as in virtually every industry. Most of the purchasing groups operate in the chemical, food, and medical industries (Schotanus et al. 2010; Marvel and Yang 2008; Polychronakis and Syntetos 2007; Tella and Virolainen 2005; Sandberg and Mena 2015).

Closing and isolation of enterprises and the lack of willingness to cooperate are badly perceived by other participants of the group. There were cases where such functioning enterprises were excluded from purchasing groups. Only those companies that cooperate within the purchasing group are able to use certain tools that support the process of building a competitive position in the market. These tools have a very positive impact on the receivables management process. This group includes group purchasing, benchmarking, joint monitoring of customers, and mutual transactions.

Group purchasing is the first method that has a big impact on all the elements that create working capital. Joint negotiations as a strong buyer with a supplier are a number of benefits in the area of receivables management. If individual entities within a group conduct similar activities, then in addition to a favorable price of purchased materials, goods, or services, they also obtain a beneficial commercial credit. A favorable loan allows acquiring new business partners and securing against the loss of permanent ones, thus improving the competitive position. A long payment term can be used in various ways. Enterprises may extend trade credit to their contractors, which will result in an increase in the level of receivables and a decrease in free cash in hand and on bank accounts. This management policy may lead to the acquisition of new contractors encouraged by favorable sales conditions, which will result in increased sales and thus an increase in the level of receivables.

Benchmarking or comparing with the best is a very effective tool supporting the receivables management process. Benchmarking is difficult to implement if we try to compare with a direct competitor due to problems with obtaining the needed information. In the purchasing groups the simplest kind of internal benchmarking can be successfully used. Internal benchmarking is considered the easiest due to easier access to all financial and nonfinancial data. In purchasing groups benchmarking can also be effectively carried out, especially in the area related to receivables management. The comparison of the receivables management strategy in units operating in the purchasing group allows obtaining information that should lead to a shortening of the receivables collection time.

Joint monitoring of customers. A proper implementation of receivables collection is closely related to their monitoring (Scherr 1989). The flow of information about unreliable customers should be the foundation for building individual receivables management strategies. Information that will avoid active debts reduces unnecessary

costs and the level of receivables. The creation of such databases in branch groups is quite demanding and it is a great convenience for enterprises.

Mutual transactions in the purchasing group are transactions between the central unit and the enterprise or between any enterprises operating in the purchasing group. In a branch purchasing group companies have more opportunities to help each other as they buy the same goods from the same suppliers. The same branch means a similar range that companies trade, which is why companies have more opportunities to help each other and support in situations of risk related to loss of financial liquidity. Mutual transactions should be divided into two types:

- Purchasing—A company with low liquidity buys goods from another unit operating in the purchasing group.
- Sales—Company with low liquidity sells the goods to another unit operating in the purchasing group.

In the case of purchase transactions, a company with low financial liquidity purchases a given product it does not pay for and uses an extended payment period. Therefore, it is financed by the supplier, and in the case when the purchased goods are sold, it pays by its cash.

In branch purchasing groups such operations will most often appear between the central unit of the purchasing group and individual companies forming a given purchasing group. Sales transactions take place when a company with low liquidity sells the goods to another unit operating in the purchasing group. It receives payment in cash or very soon after the sales. This type of transaction is characterized by low receivables turnover. An application of the above methods is very effective in enterprises that operate in purchasing groups. Enterprises that operate independently in the market cannot take advantage of mutual transactions, group purchases, or internal benchmarking. It is not easy for enterprises to create a common base of contractors with other enterprises. In the branch or multibranch purchasing group, all these methods can be effectively introduced. More benefits are obtained by enterprises operating in branch groups as they trade similar goods, materials with the same producers and sometimes the recipients. Figure 1 shows the main benefits in the area of receivables management, which are obtained by enterprises operating in the branch group purchasing organization.

4 Methodology and Subject of Research

The research covered 35 Polish small trading companies operating in group purchasing organizations. The companies belong to branch purchasing groups operating in the construction industry. The companies that operate in purchasing groups generate a turnover in the range from PLN ten million (USD two million) to PLN 120 million (USD 30 million). The research period concerned the years 2014–2016. The analysis was focused on the evaluation of the receivables management strategy. For this purpose, financial ratios, i.e., current liquidity ratio, quick liquidity ratio,

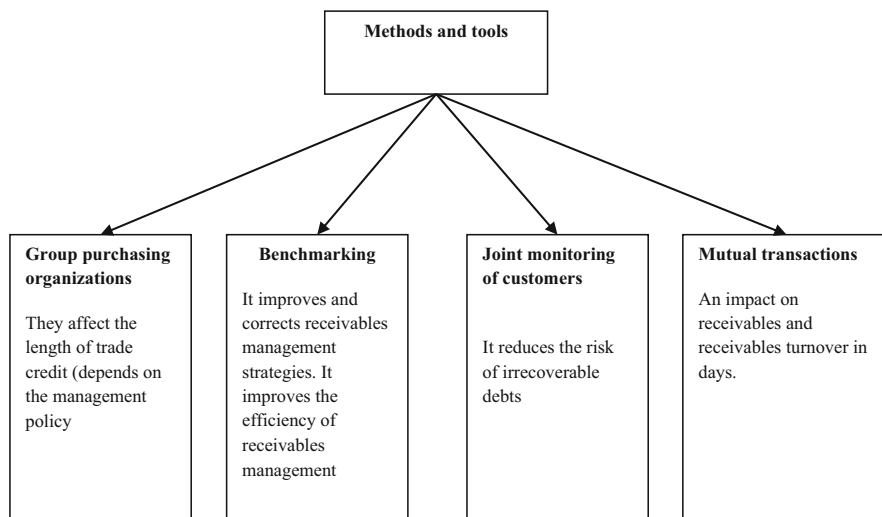


Fig. 1 Methods and tools supporting the process of managing receivables in group purchasing organizations. Source: Author's own study

Table 1 Financial liquidity ratios (LR), quick ratio (QR), share of short-term receivables in the structure of current assets (STR) and short-term receivables in days (STR in days) (2014–2016)

	2014	2015	2016	Mean	St. Dev.
LR	3.62	3.61	3.24	3.44	1.2
QR	1.9	1.79	1.84	1.85	0.7
STR	0.48	0.49	0.49	0.49	0.1
STR in days	73.4	70.3	66.8	67.8	11.4

Source: Author's own study based on financial statements of enterprises

index of noncurrent turnover in days, and the ratio of the share of receivables in current assets were used as basic tools.

5 Results—An Analysis of Receivables Management

The analyzed enterprises are small units. They achieve an average turnover of PLN 40 million. When operating in GPOs they use mutual transactions, group purchases, exchange information about contractors, and use benchmarking. All these tools enrich the policy of managing receivables and enhance the ability to settle current liabilities. This is confirmed by the financial liquidity ratio, quick ratio, and share of short-term receivables results presented in Table 1. Table 1 presents the yearly average for individual years, mean and standard deviation results for the period 2014–2016.

Based on the results from Table 1, it should be noted that there is an excess of liquidity in the surveyed enterprises. The average result of the liquidity ratio for all enterprises reached 3.44. This is a very high result, which proves the large opportunities that enterprises had to cover their current obligations. Only three companies obtained low results around 1.3, which did not mean a threat of loss of financial liquidity. In Table 1 a more detailed ratio of financial liquidity management was applied. It was mainly based on receivables and excluded inventories. It is generally assumed that the result in the range of 0.8–1 means very good results of this ratio.

The average result of quick ratio for the analyzed units is 1.85, which is a very high result. Only in the case of one enterprise the result is low. This indicates that inventories in the structure of current assets of this enterprise constitute a very large share. Individual results indicate that receivables play a greater role in financial liquidity management in the surveyed enterprises. In the structure of current assets there are more of them compared to inventories. Indeed, when comparing the share of receivables and inventories in the structure of current assets, receivables prevail in most enterprises. In 18 enterprises, the share of receivables in current assets in the analyzed period was over 50%. In 24 enterprises, the balance of receivables was higher than inventories. Only in 11 enterprise inventories exceeded the value of assets in the structure of current assets.

When analyzing the results from Table 1, it should be noted that short-term receivables are prevailing in current assets. Although these are companies from branch purchasing groups, receivables are the advantage. Joint purchasing, the use of economies of scale and additional discounts do not cause a large accumulation of inventories. This may indicate effective management of inventories, an increase in sales and extending trade credit for contractors. In the surveyed enterprises 33 sales revenues increased in the analyzed years 2014–2016.

Table 1 contains the results of short-term receivables turnover ratios in days. It should be noted that in general receivables from customers in 100% were short-term receivables. The average result of receivables turnover is about 68 days. This is not a low result, but it also does not indicate any problems with collecting receivables from recipients. The detailed analysis shows that only one company actually uses a too conservative policy of managing receivables. The turnover rates that it achieves are above 100 days. It would be worth shortening this time. Other companies make perfect use of the opportunities offered by cooperation within the purchasing group organizations. They are not forced to use an aggressive debt collection policy, which may have a positive impact on the company results and reputation in the market. To date, cost analyzes have been given as the only benefits when analyzing the functioning of purchasing groups. The analysis showed that functioning in the purchasing group has a positive effect on financial liquidity and leads to building a conservative policy for managing short-term receivables.

6 Conclusion

When assessing the surveyed enterprises, it should be clearly stressed that they apply a conservative receivables management policy. Receivables in the structure of current assets prevail, often they score above 49%. Receivables rotation rates in days get average results of around 68 days. The result of receivables turnover is neither high nor low. It indicates a moderate receivables management policy. There are no problems with regulating liabilities in the surveyed enterprises. The high result of fast liquidity ratios is a very good confirmation of this. Short-term liabilities are regulated on a current basis and there are no payment stopovers, otherwise, the companies would not obtain such good results for financial liquidity ratios. In general, the authors in their research indicate that low prices of purchased goods, finished goods, materials, services, and cost reduction are the largest and often the only benefits that companies receive when operating in GPOs (Burns and Lee 2008; Nollet et al. 2017).

Apart from group purchases, the analyzed units use mutual transactions, benchmarking in the area of debt collection policy, joint monitoring of receivables, which positively affects the management of receivables. These tools, thanks to mutual transactions, allow improving financial liquidity, e.g., an immediate settlement of receivables. Joint monitoring of contractors and an exchange of information about them allow excluding enterprises that prolong payment terms or do not pay their receivables at all. In turn, benchmarking allows improving the debt collection process. All these methods mean that the policy of managing receivables in the presented enterprises should be assessed as conservative, safe. The only downside of this policy is high liquidity, but there are some methods that allow speeding up the process of collecting receipts, for instance, additional discounts for early payment. However, such solutions costs and in the case of their use a company needs to have an alternative to invest the collected funds in order not to create the costs of unused opportunities.

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Anonymity in Cryptocurrencies



Hulya Boydas Hazar

Abstract Cryptocurrencies are defined as anonymous digital currencies. It is widely assumed that the real-world identities of the persons who engage in cryptocurrency transactions are secret and will remain secret. Digital signatures serve as identities of the parties involved in cryptocurrency transactions. They are essentially composed of a pair of keys, the secret key and the public key, which are used for signing transactions. These keys are issued as many times as needed thus creating different identities for the same person. Since transactions are recorded with these pseudo names, it is thought that the real identities may not be linked to the transactions. Unlinkability has to be achieved for complete anonymity. However, recent studies show that real-life identities can be linked to addresses of these cryptocurrencies and transactions which use them. Therefore, it is safe to say that most cryptocurrencies are pseudonymous rather than anonymous. In this chapter, the problem with anonymity and its implications in accounting will be discussed. In addition to this, protocols and services, which make it harder or even impossible to link addresses and transactions to their senders and recipients, will be reviewed.

Keywords Cryptocurrency · Blockchain · Bitcoin · Altcoins · Anonymity · Pseudonymity

1 Introduction

Cambridge Dictionary defines anonymity as “the situation in which someone’s name is not given or known” (2019). Therefore, the concept of anonymity in cryptocurrencies is related to disguising the real identities of those who are involved in cryptocurrency transactions.

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When Bitcoin, the first successful cryptocurrency, was introduced, it was said that the identities of those involved in Bitcoin transactions are kept secret. The way to keep the anonymity in Bitcoin transactions is to use a public key instead of a real identity. Nakamoto (2008) states that privacy can be achieved by keeping public keys anonymous. The public can follow the transactions, i.e., anyone can see that a certain amount is transferred to a recipient from another person. However, the public does not have information that links the transaction to any real-life person. Cryptocurrencies like Bitcoin are believed to be anonymous in the eyes of public because there is no need to use one's real name. "Bitcoin addresses are hashes of public keys" (Narayanan et al. 2016, p. 165). The hash of one's public key is his identity. No one needs to use his real identity so that the related transaction is accepted into the blockchain network.

However, Nakamoto (2008) warns us about the possibility of linkability of the public keys to real identities. When there is a transaction with multiple inputs, it is easy to see that they are all made by the same person. If a key which is used in any of these transactions is linked to a real-world identity, it is unavoidable to link all the related transactions to the same person. Key properties for unlinkability are as follows (Narayanan et al. 2016):

1. It should be hard to link different addresses of the same user.
2. It should be hard to link different transactions made by the same user.
3. It should be hard to link the sender of a payment to its recipient.

In terms of computer science, cryptocurrencies are considered pseudonymous, but not anonymous. An assumed identity that is not the real name of the person is called pseudonymity, and anonymity is achieved if unlinkability is maintained together with pseudonymity.

From these statements, it is understood that cryptocurrency transactions are pseudonymous. Moreover, there is a possibility of linking such transactions to real identities. Most countries are concerned that cryptocurrencies may be used in illegal activities and money laundering. Therefore, they are trying to regulate such currency markets. This chapter argues that there is no need for overregulation since it is possible for governments to find who is using these currencies.

2 Linking Cryptocurrency Transactions to Real Identities

Most cryptocurrencies are developed using the blockchain technology. The blockchain network is a public ledger where any user can see the history of transactions (Berg et al. 2018). Since identities and cryptocurrencies are addresses in the network, anyone can obtain hashes of these addresses (Dimitri 2017). When cryptocurrencies change hands, they move from one address to another. Even if every cryptocurrency has a different address, a person looking into the network will see that the ownership of some cryptocurrencies is changing (Icaew IT Faculty 2017). After that it is easy to map the addresses of sending and receiving parties.

There is no general protocol or a system to link the public keys, i.e., pseudonyms to the transactions. Careful mapping of transactions to addresses is required. On the other hand, linking the public keys to real identities is more difficult. However, privacy risk is more imminent for those who use paid services that store personal data (Catalini and Gans 2017).

Linking transactions to a public key are easier if a lot of transactions are made using the same public key. It is not easy to reveal the identities of those who hold on to their cryptocurrencies and do not use those addresses again. Unlinkability is tougher if the transaction is related to purchasing goods. The payment is in cryptocurrency. However, the goods have to be sent to a real name and address. This means the vendor has to keep a record which links the payment to a real identity.

3 Studies on Deanonimization of Cryptocurrencies

3.1 Methods Used in Studies

Studies related to deanonymization of cryptocurrencies use mainly two methods:

1. Analysis of the transaction chain: The studies which use this method obtain transactions from the public blockchain, classify addresses, and relate these addresses to real-world identities. Coin mixing is found to be a powerful way against this method.
2. Analysis of the protocols and network: The studies, which use this method, find the initial IP address of a new transaction via Sybil attacks. Sybil attack is a way to link a new transaction to an IP address to find the relationship between the cryptocurrency and the related IP address. Using services like The Onion Router (TOR) is found effective against Sybil attacks.

3.2 Literature Review

Meiklejohn et al. (2013) published their work on traceability of Bitcoin flows. The study states heuristics that can be used to link addresses that are controlled by the same user in the Bitcoin network. These heuristics do not automatically reveal the names of the owners of the addresses, but group them with respect to their controlling bodies. For instance, wallet services control addresses that they generate, but these services are not the owners of the money in these addresses. Initially, addresses are tagged to find out their controlling bodies. For instance, the addresses of widely used exchanges and wallets are determined by actually involving in Bitcoin transactions with them. Then, Bitcoin transactions in and out of these addresses are traced. These transactions are represented graphically.

When wallets and other services use the change address function, it is very difficult to trace Bitcoin transactions. However, such services are highly centralized and most of the time they would know the real identities of those who do business with them. These services do not register these identities to the blockchain network, but keep for their internal use. Such services would know the real identities of owners of the money, which use their addresses. Therefore, under certain conditions these services may reveal the true identities of the owners of the money in question.

Fleder et al. (2015) parsed publicly available information in the Internet like public forums, donation sites, and public social networks for real names of public keys. They collected the public key addresses of the Bitcoin network and the related usernames. The reason that users of the Bitcoin network reveal their public key addresses in public forums is stated in the study (Fleder et al. 2015). The study reveals that it is a common practice to attach a bitcoin address as a signature to emails or forum posts. For instance, in forum posts, users leave their addresses in the signature block when they make contributions. Their aim was to associate as many public key addresses as possible with the real usernames. They concentrated on the real name and public key pairs that they could find rather than the whole Bitcoin network. They followed the transactions of these addresses developing a user graph showing Bitcoin transactions with the real-world names. The study states that they successfully uncovered the FBI intervention and the seizure of Silk Road funds, transactions between users and gambling sites like SatoshiDice and transfers to Wikileaks donations. Nick (2015) analyzed the performance of several clustering algorithms in the Bitcoin network and stated that the approach called clustering in the Bitcoin network refers to the process of finding addresses that belong to the same wallet. In this study, he was able to capture 37,585 Bitcoin wallets and the addresses they own. He demonstrated that modern wallet software cannot protect its users fully. He found that even with the most basic clustering technique the probability of guessing the address of a user is 68.59%.

ShenTu and Yu (2015) summarize the findings of many studies of the weakness of Bitcoin anonymity as follows:

1. Most service providers in the Bitcoin network require that the users register their real names. This enables such services to find the real-world names and addresses of those involved in transactions.
2. A Bitcoin address which is revealed in the internet can be related to its real-world owner.
3. Transactions that follow one after another are fully transparent and traceable.
4. Gathering Bitcoins that have different addresses and sending them together to a recipient may expose other addresses of the sender.
5. If the change address function is used when transferring Bitcoins, attackers may follow the related transactions to the sender.

4 Techniques and Services to Secure Anonymity

Mixing technique requires the need for an intermediary, which is called a mixing service. Users of the mixing service transfer their cryptocurrency to this intermediary. The mixing service joins all coins in a pool. When a user asks back his coin, it comes from a different address. Coin mixing is a simple and effective anonymization method. It helps to break the link between the input and output of a cryptocurrency transaction and even hide the amount of the transaction. However, there are weaknesses with centralized coin mixing services (ShenTu and Yu 2015):

1. Mixers must know a user's input and output addresses, and hence cannot provide true anonymity for users.
2. Users must trust mixers and send coins to mixers in advance, so users face with the risk of currency loss.

Some online wallets may act as mixing services. However, there are dedicated services for coin mixing like Tor. Dedicated mixing services claim that they do not keep records nor ask the identity of users.

Each cryptocurrency may have a different address. Wallet software stores these addresses for future use. Moreover, some wallet software randomly changes the addresses of returned coins to increase unlinkability.

Online wallets are services where users store their coins online. Users are allowed to withdraw these coins when they need. Coins that are withdrawn are not the same ones that are deposited. Since they would have different addresses, it is difficult to draw a transaction graph and link the coins to their owners. The anonymity set gets bigger as more people use the service and keep their money for longer periods of time.

Online wallets are reputable businesses that are often regulated. They usually require users' identities and keep records of transactions internally. Therefore, they are able to link the deposits to withdrawals and both these transactions to real identities. Users need to trust online wallets that they will not reveal user identities.

Tor is considered to be an anonymous communication network (Narayanan et al. 2016, p.169). It is defined as "free software and an open network that helps you defend against traffic analysis, a form of network surveillance that threatens personal freedom and privacy, confidential business activities and relationships, and state security" (Torproject 2018). Tor is developed to protect against Internet surveillance known as traffic analysis. Traffic analysis is used for tracking the behavior of a user when the source and the destination of information transmission are known. Tor users do not have a direct communication with the party at destination. These users transmit information to other users in the network. After several transmissions to unrelated users, the information is sent to the party at destination. The path of transmission is never the same for multiple communications between the same parties. In 2015, FBI closed 400 illegal websites on the TOR network (ShenTu and Yu 2015). This statement makes one wonder whether Tor is as anonymous as it claims to be.

Zerocoin and Zerocash

Zerocoin is initially proposed by researchers from Johns Hopkins University. Miers et al. (2013, p. 397) defined Zerocoin as “a distributed e-cash system that uses cryptographic techniques”. Zerocash is the improved version of Zerocoin. Zerocoin is actually a coin mixing protocol. It has Mint and Spent operations. Mint operation is used for transforming Bitcoins to Zerocoins. Spent operation exchanges Zerocoins to Bitcoins. Zerocoin hides the addresses of the sender and the receiver by employing a protocol level mixing. Anonymity is achieved with cryptography. A mixing service is not needed. Zerocoin and Zerocash are not compatible with the existing Bitcoin network. They require protocol change. Protocol changes may cause a hard fork to the Bitcoin network. Therefore, studies concentrate on developing Zerocoin and Zerocash for altcoins.

5 Importance of Anonymity

Privacy is a requirement for a financial system since it deals with sensitive monetary information. The names of the related parties and the value of the transaction should not be public information (Nick 2015). If a cryptocurrency address is linked to a real identity, any user of the related network would know who owns the money. Moreover, user’s past transactions with that money are exposed. His/Her other cryptocurrencies are compromised if he/she is using the same pseudonym for his/her other cryptocurrencies as well. As it is seen, privacy is totally lost when the anonymity is lost.

Governments and public are concerned that cryptocurrencies may be used for money laundering and illegal activities. These currencies are not controlled by any central authority, and the markets where they are traded are not regulated. This adds to the worries of financial regulators and cybercrime fighters (Möser et al. 2013). There are cases that justifies this concern. For instance, there was an e-commerce web site called Silk Road where anything may be bought and sold with Bitcoins. It was found that drugs and firearms were traded as well. The positive side of anonymity is that it provides privacy. Privacy is required to protect people against those who may harm them. The downside of anonymity is that it may facilitate financial crimes.

6 Implications of Anonymity in Accounting

Transactions in cryptocurrency do not require personal identification. The data related to the cryptocurrency transaction does not cover any confidential information (name, surname, registered address, etc.) However, each transaction is registered to a public ledger, making the transaction transparent to the public, yet concealing the identities of the involved parties. As businesses begin to accept cryptocurrencies,

taxation poses a problem. “The major concern related to the taxation of virtual currencies is the difficulty to trace them because they are mined, used, and traded online completely anonymously” (nomoretax 2018).

In some countries, like the United States and Canada, virtual currency is treated as property. Therefore, any income in cryptocurrency should be taxed. Capital gains from trading such currencies need to be taxed as well. When cryptocurrencies are used to purchase goods and services, gains must be reported and taxed. However, it is unlikely that a tax authority will know about the income unless the vendor voluntarily reports it. Therefore, cryptocurrencies have the potential to become tax havens. Tax havens allow traders to conceal earnings from revenue services (Marian 2013).

Another problem with the anonymity of cryptocurrencies is that they can be used for money laundering and other crimes. Some countries take measures to identify the owners of cryptocurrencies to address the issue of anonymity (nomoretax 2018). For instance, China and South Korea passed laws related to cryptocurrency trading. In these countries, it is mandatory to register the real names of those who trade with exchanges.

The regulatory requirements in accounting are high regulatory requirements with respect to validity and integrity (Deloitte 2018). Regulation demands centralization where identities are fully disclosed. However, cryptocurrencies run on decentralized networks where privacy is the utmost concern. Therefore, accounting and anonymity seem to oppose each other.

7 Conclusion

Privacy, therefore anonymity, is important in financial systems. Cryptocurrencies use blockchain technology which is a public ledger. This means that all transactions can be viewed by users of the network. To maintain anonymity, the parties involved in transactions use public keys instead of their real names. Anonymity is needed when transactions are open to public. However, it raises concerns in the eyes of public and governments. The use of cryptocurrencies for illegal activities and the regulations of taxation for investing and trading such currencies pose problems. The current status of cryptocurrencies with its pseudonymous feature poses some problems for traditional accounting.

Different studies show that a relational graph of transactions between the public keys, i.e., pseu-identities, can be designed. Although more difficult, it is possible to reveal the real-world identities of these pseudonyms. It seems that the need of maintaining the privacy in financial systems cannot be completely achieved with the cryptocurrency network. In addition to this, illegal activities with cryptocurrencies can be traced to the source with special information technology.

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Preferences of Individual Investors from Different Generations in Poland in Terms of Socially Responsible Investments



Dorota Krupa, Leszek Dziawgo, and Michal Buszko

Abstract The purpose of this chapter is to present the approach and attitude of different generations of individual investors to socially responsible investments on the financial market in Poland. We use critical analysis of literature, statistical data analysis, as well as description and comparison methods. The study shows that there are differences between individual investors with different generations (Baby boomers, Generation X, and Generation Y) in their approach and attitude to social responsibility in the financial market. The Baby Boomer Generation is more likely to declare a socially responsible attitude when making investment decisions compared to younger generations.

Keywords Behavioral finance · Corporate social responsibility · Socially responsible investment · Individual investor · Generations · Financial market · Poland

1 Introduction

The issues of social responsibility in the context of the functioning of companies as well as the investment in the financial market have become of particular interest after the recent financial crisis in 2008. Both, Corporate Social Responsibility (CSR) and Socially Responsible Investments (SRIs) have been the subject of research in recent years. Fordham and Robinson (2018) underline that Corporate Social Responsibility (CSR) can be applied as a theory, research agenda, or idea. According to Blowfield (2005), CSR is a concept that captures the responsibility of business to the environment, its stakeholders, and to the broader society. The key impact on the development of corporate social responsibility is the detection of dishonest practices among companies that led to increased vigilance and greater sensitivity to corporate

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operations (Żołądkiewicz 2015). As Zheng (2019) notes, multiple consumers on the demand side fight through non-organized boycott activities against a misbehaved company on the supply side to force the company that lacks corporate social responsibility to change its behavior. Patrisia and Dastgir (2017) underline that if companies are under intense pressure from stakeholders, such as customers, employees, and socially responsible investors, they need to show their commitment and contribution to society in social and environmental issues. It should be noted that an implementation of CSR concept in business has become the basis for Socially Responsible Investment (SRI) in the financial market. The process of defining the concept of SRI and product standardization in the sector of socially responsible investments has been going on for years. In spite of the definitional discrepancies, it can be concluded that, in general, the SRI concept takes into account environmental (E), social (S), and corporate governance (G) factors in making investment decisions (Krupa 2013). In the investment process, the investor's goals coexist along with acceptable and desirable nonfinancial criteria (Jedynak 2016).

A study conducted by Pawłowski (2018) confirmed the importance of financial reporting as a source of information for individual investors in their decision-making processes, but nonfinancial information connected with CSR is also important for some investors (Vukić et al. 2017). It can be said that people's behavior on the financial market as well as access to the financial market offer, can be dependent on various factors, such as age, gender, education, place of residence, or social status (Walczak and Pieńkowska-Kamieniecka 2018). The influence of demographic characteristics on socially responsible investors' perceptions of CSR was investigated by Cheah et al. (2011). They show that younger, better educated, higher income, and socially responsible investors tend to have a better conception of CSR and consider the interests of shareholders and other stakeholders as important. Attitudes and behaviors of individual investors in relation to SRI may differ between cultures and countries. Researchers Valor, Cuesta, and Fernandez in their exploratory study of the obstacles from the development of SRI in Spain indicated the differences between Spanish investors and the SRI approach of investors in the United Kingdom, the United States, and Australia (Valor et al. 2009). Maison and Greszta described Polish people's reactions to a firm's activities in the area of CSR (also those who are not individual investors). In the result of the research conducted on the national representative sample of Polish people, they have found that the Polish expect from business, socially responsible activities, though there is also a large percentage of people who do not have such expectations, or who have a lack of knowledge in this area (Maison and Greszta 2014).

There is a need for studies that examine specific SRI demands from different types of investors. It is interesting to analyze these themes across generations of investors (Baby boomers, Generation X, and Generation Y). Therefore, the research problem is: Are there differences between the generations of individual investors in their approach to investing in a socially responsible way? The purpose of this chapter is to present the approach and attitude of different generations of individual investors to socially responsible investments on the financial market in Poland.

2 Data and Methodology

The work is based on the results of the research conducted by the Polish Association of Individual Investors for the project realized at Nicolaus Copernicus University in Torun in 2014. The survey was financed within a research project titled “Ecological Evolution of the Financial Market (EcoFin)” supported by Bank Zachodni WBK under Santander Universidades (project management: Dziawgo L. and Dziawgo D.). In the survey, 428 respondents participated. All respondents were investors belonging to the Association of Individual Investors, the largest organization in Poland, which is associated with stock market investors. Finally, 400 respondents from three generations were selected for the study. In the chapter, authors use critical analysis of literature, statistical data analysis, description method, and comparison method.

Generally, the Silent Generation, the Baby boom Generation, Generations X, Y, Z, and Alpha are distinguished. It should be noted that the division into generations might vary depending on the country and culture. This is mainly due to the diverse experience of people living in different places around the world at the same time. All of the generations presented above can be characterized by several differences. The individuals of the Silent Generation (Traditionalists) were small children during the Depression or WWII. They are described as being very loyal. They value rationing, saving, morals, and ethics (Williams and Page 2011).

For this chapter, it is necessary to distinguish between the baby boom generation and Generations X and Y.

Baby boomers are identified as being loyal to their employers. They accept direction and they are dedicated workers, even workaholics. They tend to be individualistic, self-absorbed, and cynical but they lack technical skills. Because they are focused on social issues, they are excellent networkers with their strong social skills. They have had more varied work histories, longer transitions out of the labor force, and work for more of their adult years than older generations (Bejtkovský 2016; Chaney et al. 2017; Quinn 2010).

People from Generation X are motivated by consistent work values. They tend to seek a balance between their work and personal lives. They are adept with technology because they have grown up in the presence of computers. This contributed to the development of their skills synthesizing diverse information to gain knowledge and understanding. Compared with baby-boomers they are distinguished as being independent, seeking emotional security, preferring informality, and having more entrepreneurial skills. The work–life balance, growth opportunities, and positive work relationships are more important for them than for boomers or Generation Y (Bejtkovský 2016). The last three generations (Generations Y, Z, and Alpha) are perceived as generations of young people. The characteristics of young people with different generations, i.e., Y, Z, and Alpha, from the perspective of creating a banking offer for these groups, were presented by Buszko et al. (2018). They underlined that the common feature of Y, Z, and Alpha generations is a high level of digitalization and everyday use of online, mobile, and intelligent technologies.

Generation Y (Millennials) is the first “global” generation. The people from Generation Y have similar characteristics and attributes irrespective of their country of origin. Millennials are, according to various sources, people born in the years from about 1980 to around 1995. Generation Y is also known as the Digital Nation or the Net Generation. Their social interactions take place in the real and the digital world at the same time. They mostly identify with the value system of their parents and they are also well educated. Most of the representatives of Generation Y are performance-oriented and confident (Nagy and Kölcsey 2017).

By pointing to the different characteristics of individual generations, behaviors, or values that are characteristic for these groups may also seem to be important. Also interesting are the differences in their approach to socially responsible investments, which are the subject of this work.

3 Results

It should be mentioned that selected research results taking into account the influence of the type of education of respondents (economic and noneconomic) on the occurrence of differences in the perception of socially responsible investment were presented in another article (Krupa 2018). It was shown then that individual investors with an economic education are more involved in investing in a socially responsible way in comparison to other groups of investors, but there are no significant differences in this aspect. Only a few more investors with an economic education had heard about socially responsible investing compared to the group of other investors. The activity of respondents with a noneconomic education in the area of indicating nonfinancial goals of socially responsible investments was much higher than among investors with economic education in all proposed responses. People with noneconomic education were much more likely to indicate that they would choose a product that, apart from financial benefits, would support care for human rights or protection of the natural environment.

This chapter focuses on taking into account the differences resulting from the age of individual investors in the approach and attitude toward socially responsible investments. The chapter presents selected results of the conducted study. One of the questions contained in the questionnaire concerned the age of the respondents. For the analysis, the answers of those respondents who gave their age and were born between 1946 and 1994 were selected. In the end, 400 people were analyzed. For the purposes of the chapter, the authors assigned respondents to specific generational groups in the process of analyzing the results of the study (Table 1).

The largest share among the respondents were representatives of the Baby Boomer Generation (54%), respondents from the X and Y Generations constitute, respectively, 33% and 13% of all respondents. The results of the survey divided into three generations are presented in Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. Under each figure, the number of respondents who answered the question (N) is indicated. Almost 70% of respondents, who are individual investors from Generation X,

Table 1 Respondents by generations

Generations	Year of birth	The average age	Group size	% share of respondents
Baby boomers	1946–1964	57.9	53	13%
Generation X	1965–1979	39.6	131	33%
Generation Y	1980–1994	26.8	216	54%
Sum	–	–	400	100%

Source: Authors’ own study

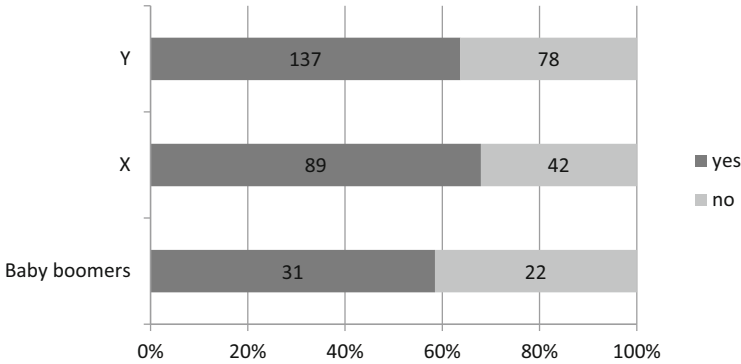


Fig. 1 Have you ever heard about Corporate Social Responsibility? Source: Authors’ own study based on the results of research obtained by Prof. Leszek Dziawgo as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universidades

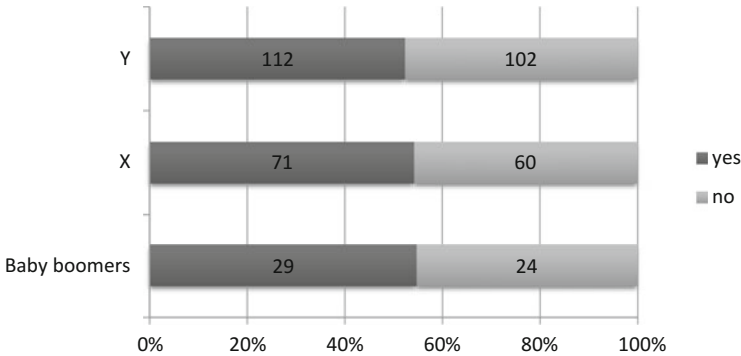


Fig. 2 Have you ever heard about Socially Responsible Investment? Source: Authors’ own study based on the results of research obtained by Dorota Krupa PhD as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universidades

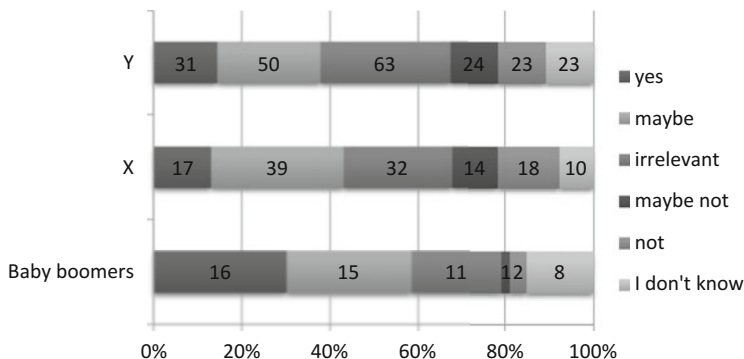


Fig. 3 Does the company’s compliance with the principles of CSR have a positive effect on your investment decisions? Source: Authors’ own study based on the results of research obtained by Prof. Leszek Dziawgo as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universidades

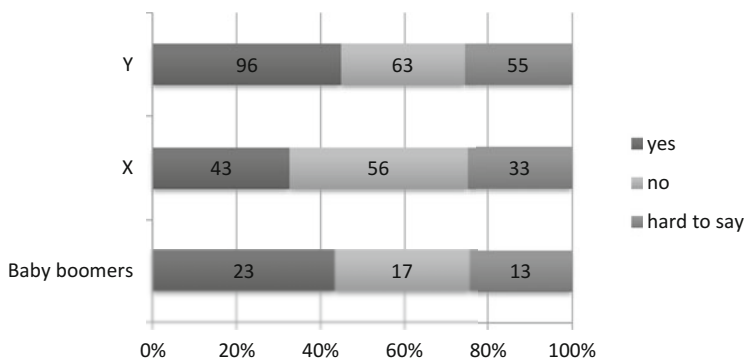


Fig. 4 Do you think that banks deserve the status of a public trust company? Source: Authors’ own study based on the results of research obtained by Prof. Leszek Dziawgo as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universidades

have heard about CSR, in Baby Boomers it is 58% of respondents (Fig. 1). For comparison, in another study conducted on a sample of a representative Polish society (not only individual investors), only 8% of respondents had ever heard about CSR (Dziawgo and Dziawgo 2015).

SRI is a lesser known concept in comparison with CSR (Fig. 2). 54% of respondents from Baby boomers have heard about SRI, in Generation X it is 54% and in Generation Y 52%.

In the next step, respondents had to answer one question: Does the company’s compliance with the principles of CSR have a positive effect on your investment decisions? The results are presented in Fig. 3. A company’s compliance with the

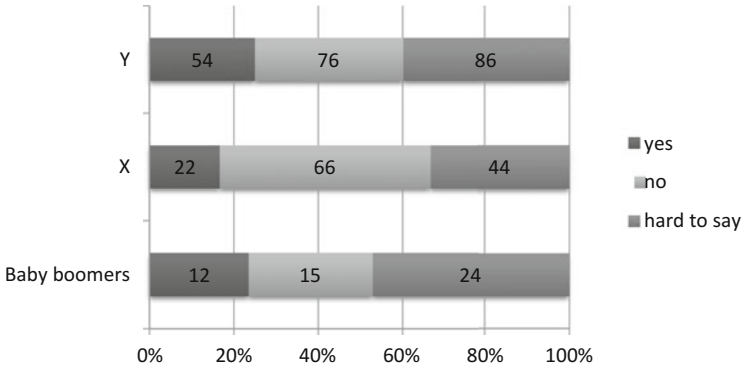


Fig. 5 Do you think that listed companies in Poland deserve the status of a public trust company? Source: Authors’ own study based on the results of research obtained by Prof. Danuta Dziawgo as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universities

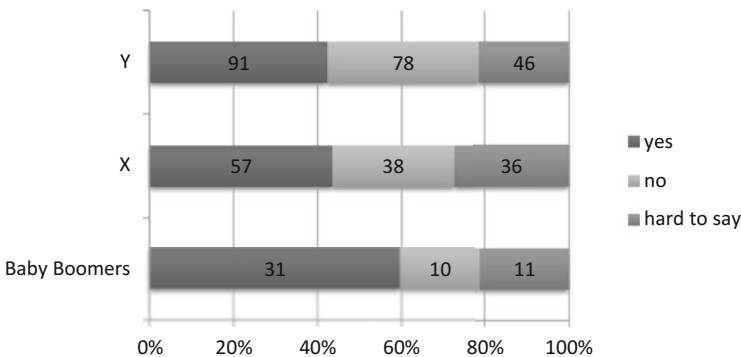


Fig. 6 Do you prefer those companies that you consider to be ethical/ecological when making decisions regarding the purchase of products and services or saving and investing? Source: Authors’ own study based on the results of research obtained by Prof. Danuta Dziawgo as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universities

principles of CSR has had a mostly positive effect on investment decisions of the Baby boomer Generation (58% of this group declared yes or maybe), respondents from Generation X had 43% positive answers, respondents from Generation Y, respectively, 38% positive answers.

In Figs. 4 and 5, the level of confidence of respondents to banks and listed companies is examined. According to 45% of respondents from Generation Y, 43% of the Baby boomers, and 32% of respondents from Generation X, banks deserve the status of a public trust company. According to 42% of respondents from Generation X, banks do not deserve the status of a public trust company

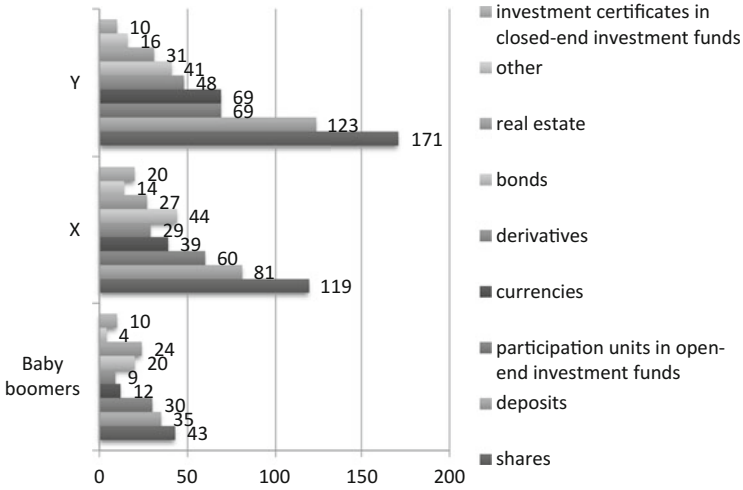


Fig. 7 What do you invest your money in? Indicate all the ways to invest the money you use [more than one answer possible] Source: Authors’ own study based on the results of research obtained by Prof. Danuta Dziawgo as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universities

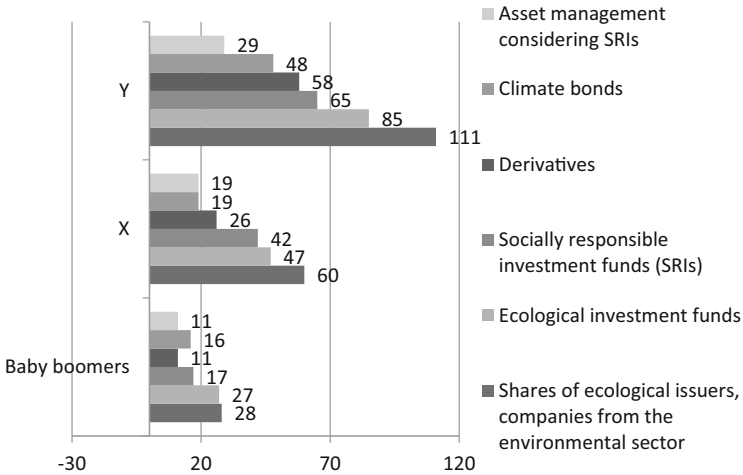


Fig. 8 If you could invest in a socially responsible investment, which product would you be interested in? Indicate up to 3 answers. Source: Authors’ own study based on the results of research obtained by Dorota Krupa PhD as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universities

(Fig. 4). The trust of respondents to listed companies is much smaller than that of banks. Respondents from Generation Y and the Baby boomers (respectively 25% and 24%) have the most confidence. As many as 50% of Generation X respondents



Fig. 9 If you had to invest your own money in a financial product that belongs to responsible investments, then this investment, apart from the financial benefit, should: [indicate up to 3 responses] Source: Authors’ own study based on the results of research obtained by Dorota Krupa PhD as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universities

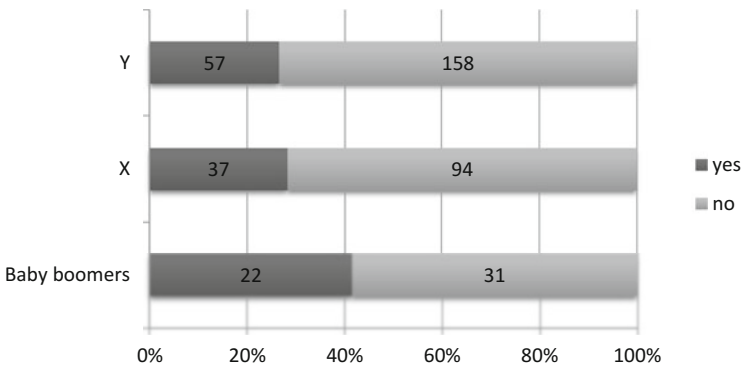


Fig. 10 When investing in companies on the Warsaw Stock Exchange, do you pay attention to their social responsibility? Source: Authors’ own study based on the results of research obtained by Damian Walczak PhD as part of a research project entitled “Ecological evolution of the financial market (EcoFin)” implemented with Bank Zachodni WBK as part of Santander Universities

claim that listed companies in Poland do not have the status of public trust companies (Fig. 5).

In the next questions, investors were asked about their preferences during the decision process. Results are presented in Fig. 6. 60% of investors from the Baby boomer Generation when making decisions regarding purchases of products and services, or saving and investing, prefer companies that are considered ethical

(Fig. 6). In the group of other investors, this share is respectively 43% for Generation X and 40% for Generation Y.

Investors' ways of investing money were a subject of interest to the question which results are presented in Fig. 7. The most frequently indicated ways of investing in all the studied groups are shares and deposits. Generation Y respondents in the surveyed group of investors invest to a greater extent in currencies and derivative instruments in comparison to other investors.

The results on investors' preferences regarding the type of potential SRI investments are presented in Fig. 8. The most frequently indicated SRI's product of investing in all the studied groups are shares of ecological issuers, companies from the environmental sector, and ecological investment funds. Generation Y respondents most frequently indicate such products.

In the next question, respondents were asked about their preferences regarding the area of social responsibility that could be related to their potential investments. Respondents were asked to indicate up to 3 responses. The most important for all of them is the ethical side of investment, however, in second place for Generation Y is supporting human rights but for Generation X and the Baby boomers it is supporting the protection of the natural environment. Results are presented in Fig. 9.

According to the answers presented in Fig. 10 more than 40% of respondents from the Baby boomer Generation declared that when they are investing in companies on the Warsaw Stock Exchange, they pay attention to their social responsibility. Among respondents from Generation X and Generation Y, this is respectively, 28% and 26%.

4 Conclusions

The study shows that there are differences between different generations (Baby boomers, Generation X, and Generation Y) of individual investors in their approach and attitude to social responsibility in the financial market. Socially responsible investment is a lesser known concept in comparison with corporate social responsibility in all generations, but most of the respondents in each group have heard about both. A company's compliance with the principles of CSR has had a mostly positive effect on investment decisions of Baby boomer Generation respondents than respondents from the two other groups. The trust of respondents to listed companies is much smaller than that of banks. Respondents from Generation Y have the greatest confidence in both banks and listed companies and the smallest from Generation X. Respondents from the Baby boomer Generation to a greater extent than respondents from other generations, when deciding on the purchase of products and services, or saving and investing, prefer companies which they consider to be ethical. Shares of ecological issuers, companies from the environmental sector, and ecological investment funds are SRI's product, which is the most indicated by respondents from all groups, but especially by Generation Y respondents. Baby boomers pay

more attention to the social responsibility of companies when they invest in the WSE than other generations.

Generally, as a result of the research it can be said that the Baby Boomer Generation is more likely to declare a socially responsible attitude when making investment decisions when compared to examining representatives of younger generations. This topic can be an interesting area for further in-depth research and analysis.

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Deposits as a Key Source of Financing Cooperative Banks: The Deposit Activities of a Group Cooperative Banks in Poland



Maria Magdalena Golec

Abstract Cooperative banks, similarly to other credit institutions, obtain financial resources from entities with finance surplus and satisfy the needs of those entities, which suffer from financial deficits. In comparison to commercial institutions, it is the large and stable deposit base, which is crucial for financial performance of cooperative banks. The aim of this chapter is to examine the scale and structure of deposit activities of cooperative banks as compared to the activities of other banks in Poland in 2015–2017. Taking into account selected group of cooperative banks, the second objective is to specify the factors that affect the structure of deposit activities. The study uses quarterly financial data from the years 2009–2016 of a selected group of 75 cooperative banks in Poland. Cooperative banks in Poland use deposits as a source of financing their activities to a greater extent. Cooperative banks tend not to use interbank deposits, but the local government sector is an important source of financing for them. Based on the econometric panel models, it was found that the increase in the share of deposits from the nonfinancial sector in assets is positively affected by the increase in lending, while the negative dependence is on the scale of operations.

Keywords Cooperative banks · Deposits · Deposit base · Poland

1 Introduction

Similarly to other European banking systems, also in Poland, cooperative banks play an important role in the functioning of the financial system. The sector of Polish cooperative banks (553 entities as of the end of 2017) is the largest segment of the banking sector, its workforce includes 20% of employees in the banking sector, however, the share of this group of entities is only less than 10% of the market in

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terms of value (including 9.8% in assets, 10.1% in nonfinancial sector deposits, 7.3% in the nonfinancial sector loans market, according to data for 2017) (UKNF 2018).

The activities of cooperative banks determine the cooperative form of management and the banking nature of the services offered (the so-called dual bottom-line organizations) (Fonteyne 2007; Gniewek 2016; Groeneveld 2017). In addition to the positive economic results that determine the existence of a business, the purpose of their activity should also meet the goals of the shareholders and take care for the local community (Hudon and Perilleux 2014; Nastarowicz 2017). As credit institutions, cooperative banks finance their operations primarily with outside capital, while the traditional business model favors the use of customer deposits that finance active operations of banks. Recently, the traditionally emphasized attribute of cooperatives—"proximity of clients" has become less important, as the use of e-technologies by consumers and other participants of economic life has been growing. However, do such changes apply only to the largest institutions in the sector? It was assumed that it is crucial to analyze the scope of the cooperative banking sector in the area of deposit activities and determine potential factors affecting the structure of their deposit base.

The purpose of this chapter is to examine the scale and structure of deposit activities of cooperative banks as compared with the activities of other banks in Poland in 2015–2017 and to identify factors that affect the structure of the deposit base on the basis of a selected group of cooperative banks. The study uses quarterly financial data from 2009 to 2016 of a group of 75 cooperative banks in Poland. The variability of the group of banks was assessed with the use of descriptive statistics tools, and the econometric regression models were used to determine the conditions of the deposit base. Quantitative research for Polish cooperative banks regarding the determinants of the deposit base has not been conducted before.

2 Deposits in the Activities of Cooperative Banks in the Literature

Cooperative banks, like other credit institutions, are financial intermediaries which obtain funds from surplus entities and meet the financial needs of deficit entities, in accordance with the co-operative principle "local money for local needs", avoiding spatial transformation of monetary funds (Boscia and Di Salvio 2009; Becchetti et al. 2016). Unlike large commercial banks, cooperative banks operate in a traditional, "deposit and credit" business model (Ayadi 2016). Therefore, their financial results are influenced more by income from interest than by fees and commissions, while their activity on the money market is quite limited (for example, it is pointed out that loans in cooperative banks are held until maturity, the OTH model (originate-to-hold), in contrast to the typical OTD (originate-to-distribute) approach of commercial banks (Ferri 2012). Such a model of cooperative banks' operating increases their security and financial stability, as the departure of commercial banks from the

traditional deposit and credit banking increases the volatility of revenues, contributes to the growth of nonperforming loans and lower capital protection ratios (Clark et al. 2018; Goddard et al. 2008; Hesse and Cihák 2007). The lower credit risk of credit cooperatives emphasized in the literature may also be a consequence of credit cooperatives using additional information, resulting from long-term mutual relationships with clients (not used in transactional banking) in the process of credit risk assessment (so-called relationship banking) (Ayadi et al. 2010; Kata 2008). On the other hand, some studies on the safety of cooperative banks' activities do not confirm their greater stability and even indicate that this group of institutions is more likely to go bankrupt (Fiordelisi and Mare 2014).

For the financial management of cooperative banks, a relatively large and stable deposit base is of key importance. Acquired deposits are the basic way to finance lending activities, as access to other sources of financing activities is quite limited, both in relation to own and outside funds (Fonteyne 2007). Cooperative banks have limited opportunities to acquire own funds, because the share fund increases with the acquisition of new members, and the reserve fund is powered by the accumulation of financial surpluses. In addition, it is difficult to manage equity, because legal regulations do not make it possible to perform market valuation of shares or to sell them, and the rights of shareholders are limited to the nominal values of shares of cooperatives (Ayadi et al. 2010). Moreover, due to the policies of financial supervision and management, there is a greater uncertainty in the amount of the dividend obtained in cooperatives than in other managing entities (Borgen 2004; Brown and Davis 2009). In practice, members of cooperatives are more interested in the possibility of using specific services than in the rate of return on capital brought in. Hence even in the absence of legal restrictions on dividend payments, the management of the cooperative tends to leave a significant portion of profits in the form of reserves, rather than making payments to shareholders. The above-mentioned barriers to cooperative activity may be conducive to their stability, however, in the periods of economic downturn they limit the possibilities of significant growth. The deposit base is gaining in importance also due to limited possibilities of cooperative banks to use money directly from the interbank market. The secondary source of power for these entities is associating banks. Since it limits the links between cooperative banks and the wholesale money market, the fact of belonging to cooperative structures also plays an important role in investment policy. It is because in Poland cooperative banks, with their free, unspent financial resources are obliged to locate them in associating banks (Czopur 2012). Although the investment activity of banks may be financed by issuing own debt securities, cooperative banks use this form of obtaining funds relatively rarely due to the scale of their operations. In addition, cooperative banks in Poland were given legal permission to issue their own securities relatively recently, along with the amendment to the act regulating their activities in 2009. However, this option is used only by the largest institutions, and additionally their number is quite limited. In 2018, there were less than 20 cooperative banks on the corporate bond market, also studies conducted in 2014 confirm a similar number of issuing banks (Mosionek-Szweda and Panfil 2014).

The indicated characteristics of credit cooperatives are key for using these entities mainly from customer deposits to finance their operations. It is also emphasized that these banks tend to accumulate larger amounts of cash than it is necessary, creating and maintaining so-called deposit cushions. Having additional funds is crucial in a situation of greater market demand for loans, reducing dependence on other entities and the market (Becchetti et al. 2016; Fonteyne 2007). Nevertheless, the sector of cooperatives in question is diverse and among banks one can distinguish both “deposit” (surplus) institutions—accumulating larger amounts in customer deposits than in loans granted, and “credit” (deficit) entities, where the amounts of money granted in loans are higher than deposits, and where secondary sources of acquire financing are used (Golec and Płuciennik 2017). In Poland, deposit institutions (net lenders) are predominant. From the point of view of the entire sector, the surplus scale in cooperative banks is growing. In 2017, the surplus of customer deposits over loans granted amounted to PLN 41 billion, and the average Loan to Deposit ratio was lower than 61%.

3 Deposits of the Cooperative Banking Sector Compared to the Banking Sector in 2015–2017

The characteristics of credit cooperatives indicated in the literature are also characteristic for Polish cooperative banks. Although when compared to other European banking sectors, the entire banking sector in Poland is characterized by a rather traditional model of financing and investment (with an average share of wholesale financing at the level below 10% of assets and a share of assets held for trading at the level of approximately 2.5%), the importance of deposits in financing the activities of cooperative banks (excluding associating banks) is significantly higher than in commercial banks (by approx. 20 pp.) and it is about 80% in the years 2015–2017 (Fig. 1) (NBP 2017, p. 93).

When investigating the differences in the structure of liabilities, it was found that cooperative banks tend to be more oriented toward obtaining funds from the nonfinancial sector (Fig. 2). In the analyzed years 2015–2017, the ratio of the share of deposits of this group in total deposits did not change and amounted to nearly 95%. Sectoral reporting data indicate that the use by cooperative banks of funds raised from other financial institutions is marginal, the share of financial sector deposits is close to zero and in 2017 it amounted to 0.2% of the total of deposits. The share of central and local government deposits is only slightly higher in cooperative banks (5.2%), however, it is emphasized that it is cooperative banks that keep current accounts and accumulate approx. 30% of the funds of local governments (UKNF 2018, p. 7) (a similar level of the ratio results from the aggregation of reporting data). A sectoral approach to data does not reflect the specifics and internal diversity of cooperatives in an adequate way. According to the data gathered by Kozłowski, who studied cooperative banks broken down into peer groups, it can be concluded that the

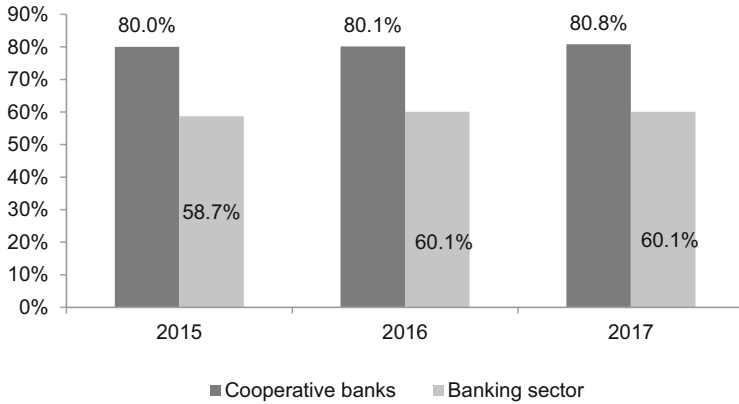


Fig. 1 Share of nonfinancial sector deposits in assets in cooperative banks (excluding associating banks) and in the banking sector in Poland, 2015–2017. Source: Own study based on data from the Polish Financial Supervision Authority

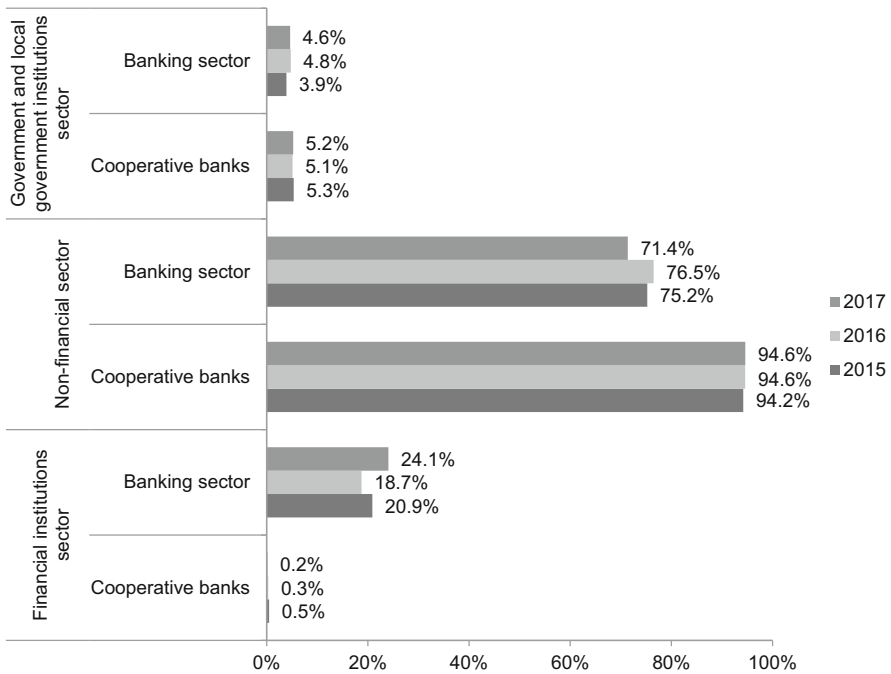


Fig. 2 The structure of cooperative banks' deposits (excluding associating banks) against the banking sector in Poland in 2015–2017. Source: Own study based on data from the Polish Financial Supervision Authority

bigger a bank the lower the share of liabilities toward farmers and the higher the share of liabilities toward SMEs (Kozłowski 2016).

4 Data and Methodology

4.1 Data

Considering the significant diversification of the scale of activities of credit cooperatives, the image of the sector presented in the form of reports of value may be determined by the results of only a handful of very large entities. However, groups or sectors of cooperative banks are characterized by considerable diversity, with the smallest market participants sometimes several hundred times smaller than the largest players deciding about the “sector appearance.” Therefore, a study was carried out on the scale, structure, and conditions of deposits using financial data from 75 cooperative banks in Poland, a group of banks representing approximately 13% of all entities in the credit cooperative sector in Poland. Quarterly data was used for the period from December 2009 to March 2016 (made available by ZRBS).

The studied banks are a quite diversified group of cooperatives, with the coefficient of variability of assets and deposits reaching 0.9 (Table 1). The average value of assets is PLN 181.5 million. Assets lower than or equal to 561 million are held by as many as 95% of the studied banks. Smaller institutions are quite similar, with significant greater variation observed in the group of banks larger than the average value (there is a right-side asymmetry of distribution, and the skewness index is approx. 2.4). Deposits of the studied group of banks assume slightly lower values with similar distribution.

At 0.76 (median 0.77), the average share of deposits from the nonfinancial sector in the total balance sheet was slightly lower than in the Polish cooperative banks’ sector. It is worth noting, however, that the minimum indicator is 0.4, and the maximum -0.9 . A feature of share ratios—total deposits and deposits of the nonfinancial sector—is a left-side asymmetry of assets, and there are more units with higher values of these indicators, with relatively limited variation. The studied banks, like other credit cooperatives, do not tend to use cash obtained from the interbank market (the average share of deposits from the financial sector in assets is 0). However, it can be noticed that there are several institutions in the analyzed group that obtain funds from other financial institutions, up to a maximum of 20% of assets (however, for 95% of entities this ratio does not exceed 2%). The share of deposits of local government institutions is higher in the examined group of banks than the sectoral ratio and amounts to 10%, with significant differentiation. Although its minimum value is 1%, only 5% of institutions have the value of this indicator at the level equal to or lower than 2%, while the maximum value is as much as 43% (with 23% for 95 percentile). The study of deposit structure also included the share of term

Table 1 Descriptive statistics of the scale of activities, deposits, and their structure of the group of banks studied

Variable	Mean	Median	Coefficient of variation	Skewness	Percentile 5%	Percentile 95%
Assets [thous. PLN]	181,674.0	134,756.0	0.89	2.43	47,954.0	561,195.0
Deposits [thous. PLN]	155,750.0	117,010.0	0.90	2.40	30,524.0	492,180.0
Share of deposits in assets	0.85	0.86	0.06	-3.46	0.77	0.90
Share of nonfinancial sector deposits in assets	0.76	0.77	0.10	-1.15	0.62	0.86
Share of nonfinancial sector deposits in deposits	0.90	0.91	0.08	-1.48	0.77	0.98
Share of deposits from the financial sector in deposits	0.00	0.00	4.58	6.86	0.00	0.02
Share of deposits from the budget sector and local government in deposits	0.10	0.08	0.68	1.57	0.02	0.23
Share of term deposits in deposits	0.49	0.50	0.23	-0.28	0.30	0.67

Source: Own calculations

deposits. The mean and median for this indicator are similar and amount to 50% of the deposit base, however, they take different values for individual banks and in different quarters (from 0.13 to 0.75).

4.2 Methodology

The analysis of the structure of deposits and its differentiation indicates that the examined group of banks is not homogeneous. Different factors affect the policies of banks in terms of fund acquisition. The study took considered financial microeconomic factors, allowing to assess the differentiation of considered variables. The categories included are:

- Scale of operations: Value of assets, number of employees, loans, capital.
- The banking business model: The importance of deposits, the share of loans, the gap as the difference between deposits from the nonfinancial sector and loans to the nonfinancial sector, the share of interest income on banking operations.
- Profitability: ROA.
- Security: Capital adequacy ratio.

Based on literature research, it was assumed that cooperative banks are characterized by a certain specificity in the scope of deposit activities. Therefore, the hypothesis was adopted that along with a more “cooperative” approach to running a business, a bank will have a specific deposit base in terms of scale and structure that is different from commercial banks. For the purposes of quantitative research, the following research hypotheses were adopted:

- H1: An increase in the scale of operations and a departure from the traditional bank model reduces the importance of deposits in the structure of financing operations.
 H2: An increase in the scale of operations results in a decrease in the importance of deposits from local governments and budgets in deposits.
 H3: An increase in the scale of operations and departure from the traditional banking model reduces the share of term deposits in the structure of deposits.

Regarding the last research hypothesis, it was recognized that a larger and more modern cooperative bank using modern technologies offers its clients more diverse deposit products, including savings accounts and foreign currency accounts. Hence the share of term deposits may be lower. In order to test the research hypotheses, regressive econometric models were used. In the first stage, models were prepared using the method of least squares, which were evaluated using diagnostic tests. After using the Breusch–Pagan test, it turned out that the more appropriate panel models are those using the generalized least-squares method. In turn, Hausman’s test allowed us to determine that for the considered data the most correct models are fixed effects models (Dańska-Borsiak 2011). Thus, the estimated models took the form:

$$y_{it} = \alpha_i + \lambda_t + \beta' x_{it} + \varepsilon_{it} \quad (1)$$

where:

y_{it} —Cross-sectional/time series-dependent variable.

α_i —Individual result, fixed in each time period, but different (maybe different) for each object in the panel.

$\beta' x_{it}$ —Matrix of observations on the independent variables.

λ_t —Fixed periodical result with the same value for all the units in the panel in the same period, but it is different (it can be different) in each time period.

ε_{it} —Random confounding factor.

Using the Gretl program, the models for the following endogenous variables were estimated: the share of nonfinancial sector deposits in assets, the share of deposits of

the budget and local government sector in deposits, and the share of term deposits in deposits. In the course of the research, a number of models were calculated, and the study will discuss those characterized by the best parameters.

5 Findings

In the model explaining the share of nonfinancial sector deposits in assets (Table 2), the important independent variable being a destimulant is the value of assets, capital adequacy ratio, ROA, and shares of other deposit categories. The increase in the importance of deposits is positively influenced by the increase in the value of loans and increasing the value of the financing gap (Table 2). The stimulating nature of the value of loans can be explained by the link between the conducted lending activity and the way it is financed. Namely, the increase in demand for loans may trigger the need to offer deposits on more favorable terms than those available on the market, so as to obtain larger amounts of funds in this form. Assets: independent variable, which is key for the research hypothesis, unfortunately, has a minimal impact on the deposit ratio index. According to the model (determined for the values in PLN), the

Table 2 A panel model of the share of nonfinancial sector deposits in assets for the cooperative banks studied

Variable	Coefficient
Constant	0.89437*** (0.0045)
Loans	2.2e-10*** (0.0000)
Assets	-2.6e-10*** (0.0000)
Funding gap	7.3e-10*** (0.0000)
Capital adequacy ratio	-0.00342** (0.0002)
ROA	-1.55293*** (0.3154)
Share of deposits for the financial sector in deposits	-0.63435*** (0.0699)
Share of deposits for local governments and budgetary sector in deposits	-0.76793*** (0.0147)
R ²	0.733
F (7, 1865)	655.42

Standard errors for coefficients in brackets; ***, **, and * indicate the statistical significance at the 1, 5, and 10%, respectively

Source: Own calculations

Table 3 A panel model of the share of deposits from the budget and local government sector in deposits for the cooperative banks studied

Variable	Coefficient
Constant	0.97929*** (0.0044)
Funding gap	6.0e-11*** (0.0000)
Employment	-0.00009*** (0.0000)
Share of deposits for the nonfinancial sector in deposits	-0.97615*** (0.0049)
R ²	0.959
F (3. 1865)	14281.2

Standard errors for coefficients in brackets; ***, **, and * indicate the statistical significance at the 1, 5, and 10%, respectively

Source: Own calculations

increase in assets by PLN one million, with the remaining variables unchanged, will result in a reduction of the index by 0.026 percentage points.

In the model explaining the indicator of the share of deposits of the budget and local government sector in deposits, three explanatory variables (and a constant) were used (Table 3). Also in this model, the value of the gap had a positive effect on the explained variable. On the other hand, employment as a variable characterizing the scale of activity, affects the value of the analyzed indicator to a small extent, but negatively. According to the model, with other parameters remaining stable, an increase in employment by one employee reduces the share of the analyzed group of deposits by 0.0087 percentage points. An exogenous variable, which explains the indicator of the share of local government deposits very well, is the share of deposits from the nonfinancial sector. This shows the potential of different types of deposits to be substituted.

Calculations of econometric models for the ratio of term deposit deposits to deposits did not give satisfactory results. Therefore, a model was determined for the value of term deposits of the nonfinancial sector (Table 4). According to the model, the increase in the value of assets by PLN 1, with other values unchanged, causes an increase in term deposits from customers by PLN 0.53. In turn, the increase in the value of equity limits the growth of the examined deposits by PLN 0.87. In addition, according to the model, the value of customer term deposits is negatively correlated with the ratio of the share of loans in assets and with the ratio of interest income as a result of banking operations.

Table 4 A panel model of term deposits of the nonfinancial sector for the cooperative banks studied

Variable	Coefficient
Constant	-6.5e +7*** (8.2e +6)
Assets	0.53483*** (0.00841)
Capital	-0.87075*** (0.1013)
Share of loans in assets	1.2e+7** (3.4e+6)
Share of interest result in operating result of a bank	6.8e+7*** (1.1e+7)
R ²	0.926
F (4.1867)	5401.43

Standard errors for coefficients in brackets; ***, **, and * indicate the statistical significance at the 1, 5, and 10%, respectively

Source: Own calculations

6 Conclusion

Cooperative banks in Poland are institutions that conduct a different policy in the area of acquiring funds compared to other entities in the industry. To a greater extent, they use deposits obtained from nonfinancial customers, including local governments. Detailed studies of a group of banks in relation to the deposit policy allowed to determine the internal diversity of the institutions. It was established that only a few institutions have a different policy of acquiring funds. For majority of entities, deposits of the nonfinancial sector play a dominant role in the structure of financing sources.

The quantitative research confirmed the hypothesis about the negative correlation between the scale of operations and the importance of deposits. An increase in the scale of operations and departure of a bank from the traditional model reduces the importance of deposits in the structure of financing of operation. However, it is necessary to emphasize the relatively low strength of this relationship. In addition, the negative impact of the scale on the share of deposits was determined only on the basis of the balance sheet total, and other parameters proved to be statistically insignificant. With regard to the hypothesis concerning the negative correlation between the scale of operations and the ratio of the share of local government deposits, the factor number of employees was used to confirm it. The other parameters were also not significant. The study was conducted based on the data of a selected group of cooperative banks, a fixed period and it is of a diagnostic nature for a specific banking sector.

Cooperative banks in Poland are mostly deposit institutions. Long-term customer relationships with banks also include bank accounts and funds accumulated on it. It can be assumed that these institutions use the funds collected in this way in order to

obtain a beneficial partial margin and thus generate economic benefits. On the other hand, such a high level of deposits, which in practice is located (through the affiliating bank) on the interbank market may be perceived negatively by shareholders interested in acquiring funds or locating them in local communities.

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Economic Analysis of Recent Laws on Corporate Reorganization Methods in Hungary



Éva Pálinkó and Kinga Pétervári

Abstract This chapter is based on primary research focusing on the effect of bankruptcy regulatory changes in Hungary after the 2008 global financial crisis. It studies the attitudes of Hungarian companies toward reorganization possibilities in a creditor-friendly environment and examines the outcomes of the new procedures. The conclusion is that the financial variables are seemingly irrelevant in decision-making. The bankruptcy procedure has become a useful tactic for the owner-management to keep their position and protected status as long as possible even at the expense of the divergent creditors. In a bank-based financial market, dwelled by mostly small enterprises not listed at the stock market, information is a precious commodity even for banks, let alone other creditors. The chapter's conclusion is that there is a genuine need for a different model for bankruptcy procedures in Hungary. A model in which financially rational decisions is not dysfunctional. We find that time is the most important factor here. It is therefore suggested that the rules should be designed so that the companies be motivated to file for bankruptcy in time. This design is the *automated mandatory auction bankruptcy procedure* or its pre-pack version.

Keywords Bankruptcy · Corporate reorganization · Fiduciary duty · Pre-pack bankruptcy · Auction bankruptcy · Information asymmetry

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1 Introduction

The global financial crisis of 2008 resuscitated the debate on corporate reorganization procedures all over the markets. In other words, the crisis triggered a market cleanup and bankruptcy legislation that provided a solution through preferring corporate reorganization over liquidation procedures. Such preference may be sound, if the illiquidity of an otherwise viable company is mostly due to the external impact of a critical situation in the market, such as supply chain debt, or a debt queue. Although this viable company would, otherwise, be profitable, it faces troubles with paybacks. The aim of reorganization procedures is, in such cases, to provide for a preliminarily friendlier environment for a possible continuation of the business operations of the company if it is capable, and/or to liquidate it, if it is incapable, as quickly as possible. But time is one of the most important factor here (Bisogno 2012).

The following is based on primary research focusing on the effect of bankruptcy regulatory changes in Hungary after the 2008 global financial crisis. The working hypothesis was that in a crisis, the promotion of reorganization procedures for bankrupt companies as opposed to liquidation, should further the continuation of otherwise viable companies if the reason for the financial distress was an external cause, such as a suppliers debt queue or a chain of debt, rather than the potential of the company. The results of the research demonstrate that in fact there was no such significant relation between the new rules and the attitude of the companies and their stakeholders. As a consequence, the final proposal is that there is a genuine need for a different model for bankruptcy procedures in Hungary.

This chapter is structured as follows: firstly, the global resuscitation of reorganization after 2008 is discussed (Sect. 2); secondly, the role of the reorganizations plans is described (Sect. 3); thirdly, the legal environment in Hungary is illustrated (Sect. 4) fourthly, the data and the methodology (Sect. 5) then the empirical analysis (Sect. 6); and finally the possible solutions, the authors' suggestions are detailed (Sect. 7).

2 Renaissance of Reorganization

The reorganization procedure has stood in the center of focus of insolvency procedure almost all over the globe, mostly taking the US Chap. 11 as an example of a well-functioning solution. Even if it is vehemently criticized (LoPucki and Kalin 2001; LoPucki and Doherty 2015), several empirical studies justify the efficiency of this kind of reorganization for the most interested parties in companies (Gine and Love 2010; Bris et al. 2006; Corbae and D'erasmo 2014). It is also affirmed that it enhances productivity growth in companies and thereby contributes to the common good and economic welfare of the entire economy (Ayotte and Skeel 2010).

This attitude is well documented in a new study by the EU on business failures and insolvency (McCormack et al. 2016) based on the initiatives of many Member States. In the past 2–3 decades, most European countries tried to introduce a much more flexible bankruptcy regime, because the overwhelming majority of bankruptcy procedures had turned into liquidation. Although for absolutely different reasons, the picture is not at all different within the EU in Central Europe, where the otherwise preferred bankruptcy procedures turn systematically into liquidation. Here financially distressed companies tend to avoid reorganization due to the wearisome and unpredictable process of bankruptcy and choose instead a relatively quicker solution in liquidation (Janda and Rakicova 2014; Damijan 2014).

One major difference between the American and the European rules is the aspect or the notion of the regulations applicable to insolvency. While the US attitude toward bankruptcy is to view it as something normal (“it happens”), the Europeans deal with it as something wrong, as something which should be prevented. The former attitude embraces it as an outcome of the nature of the market, whereas the latter sees it rather as a defect, as a frustration of contract (Brouwer 2006).

It is a commonplace to say that the continental legal culture is different from the common law countries, which ultimately makes for a different legal and economic environment for the procedures relating to financially distressed companies (Djankov et al. 2003; Beck and Levine 2004; Brouwer 2006). The USA’s Chap. 11, which includes reorganization procedures, is a more malleable system with more room for negotiations among the stakeholders of the company than is provided for in the continental bankruptcy regime. Throughout the procedures of this latter system there is an inherent focus on creditor protection, rather than on balancing the interests of the debtor, the directors, and the different classes of creditors. The UK market-based system, however, despite being creditor-friendly, has become more flexible providing several ways to support the bargaining possibilities of the actors in the procedure.

Generally speaking, stock markets are smaller in Europe than in the United States, and so company financing is more dependent on bank loans than equity investment. The strict protection of creditors’ rights is therefore essential to the viability of financial markets here.

The typical European system of bankruptcy operates in a market dominated by small enterprises and banks. Studies in the field indicate that most reorganization procedures in the majority of European countries sooner or later turn into liquidation. The variation of the figures for different countries is also explained by the legal environment, and the legal culture of the given market. Recent research carried out in countries with French civil law traditions indicates that in Belgium 79% of companies under bankruptcy procedure end up being liquidated; and so do 72% in France. This figure, however, is 46% in England, a common law country (Dewaelheyns and Van Hulle 2009). This is no wonder, though, since in the former legal environment, the most influential creditors, the banks, can acquire leverage over shareholders and non-secured creditors.

But also the structure and the cultural legacy of the court systems support this discrepancy. The judiciary in the common law system is endowed with wider

autonomy and less procedural formalism (Beck and Levine 2004; La Porta et al. 2008). Originally, bankruptcy cases belonged to the realm of torts and were developed case by case, with reasoning in the United States, for example, focusing on bargaining and negotiations from a very business-oriented point of view. The French and German civil law traditions on the other hand are based on the Roman law concept of *pacta sunt servanda*, contracts must be fulfilled. This is guaranteed by states, which are, in exchange, legitimized. Legally speaking, therefore, this is the common point of reference in the continental attitude toward creditor protection, with certain exceptions of course, such as the Netherlands, for example. The fact that certain legacy could still affect legislation and hegemonize outcomes can well be evidenced by both comparative and historical analysis (De Ruyscher 2018; Pétervári 2018).

3 Economic Role of Reorganization Rules and Reorganization Plans

An efficient reorganization procedure guarantees both that financially distressed but value-producing companies are adjusted to the market, and that financially bankrupt companies are closed down and liquidated. A financially distressed company is viable if the value of the continuation of the business (V_C) exceeds the value of the liquidation of the company (V_L). In other words, if the expectations are that a company, in financial distress, is going to create value, it is worth granting it another chance. Otherwise, it should be wound up, or liquidated, if $V_L > V_C$. Such a reasonable decision facilitates efficient capital allocation and serves the interests of the creditors too. The role of bankruptcy rules is to support the making of such an informed decision by the interested parties.

Furthermore, a creditors' agreement enhances efficient capital allocation if the value of the continuation of the business exceeds the value of the liquidation to be enforced in the liquidation procedure. Plainly speaking, the surplus in the value of the continuation of the business is created from the future value-producing activity of the company. This kind of decision for a value-producing activity, based on cooperation, may be inferred from two fundamental sources: firstly, from the historical data of these companies and secondly, from their future expectations. These expectations can be shown in a well-reasoned reorganization plan, which proves the efficiency of the necessary means and resources of the restructuring process to achieve the desired results and to convince the creditors. As a matter of fact, all such decisions depend on expectations. In market-based financial systems, the stock exchange provides an indication of investor expectation in the company, whereas in more bank-based financial systems such information is less readily available. Here decision makers have to consider past events and developments which might give an indication of the future viability of companies that had filed for bankruptcy.

Although a perfect market would not require the institutions of creditor protection, the existing markets are far from perfect. Information is not equally accessible

to all stakeholders and so the decision whether to liquidate or reorganize a company often causes ineffective results (agency problem). The economic function of reorganization rules, therefore, is to ensure protection to the creditors and/or the debtors and thereby to efficiently allocate capital either by promoting a reorganization plan or a creditors' agreement, or by liquidating the company in an organized way.

A basic principle of economics is, that in a perfect market, in the long run, market forces drive the market to an equilibrium. A company failing to produce at least normal profit, in the long run, is going to go bankrupt. Stakeholders, however, may not see these problems until the company publicly declares bankruptcy. If illiquidity is caused by irrational management ($ROIC < WACC$), then the value destruction status—even without further loans—increases the equity leverage (D/E , Debt/Equity ratio). In such a debt spiral, the value of the debt (D) may finally reach or exceed the value of the company (V), meaning that the cause of illiquidity is actual lack of assets.

The economically relevant content of the bankruptcy rule in case of financially distressed companies stems from three groups of factors: operation inefficiency, high financial leverage as a consequence of the lack of value production, and illiquidity. In a perfect market, as indicated, stakeholders would have all information necessary to tell whether a company should be saved ($V_L < V_C$) or liquidated ($V_L > V_C$), and the rules would not matter.

Yet, the rules matter.

4 The Legal Environment in Hungary

After the Changes of 1990, there was hardly any culture for bankruptcy procedures also due to the problems of the transition to a market economy. And this legacy had obvious drawbacks. There was hardly any filing for bankruptcy even in cases of need. In 1990, when the socialist markets finally irreversibly collapsed, and the companies embarked upon the competitive markets, many of them became insolvent but none of them was motivated to initiate a procedure (Tarafás 2002). The new bankruptcy laws, therefore, which came into effect in 1992, initiated a huge wave of bankruptcy procedures in Hungary, because they introduced an institution of obligatory (self-)bankruptcy procedure. The purpose of these laws was primarily to provide a basis for the credibility of economic policy and to eliminate the risk of a serious liquidity crisis. This was needed to activate stakeholders in bankrupt companies and thereby leave room for maneuver for healthy firms. Although, paradoxically enough, obligatory bankruptcy was deemed to be an anti-market institution, the aim of it was to create the market, to clean the market. Unsurprisingly, this had many critics abroad (Bonin and Schaffer 1996). The fact was that although the threat of obligatory bankruptcy procedure itself had a benevolent effect, it also forced otherwise viable companies into insolvency because of the suppliers' chain of debts and debt queues generated in the market transition.

Hence an amendment in 1993 (Act No. LXXXI of 1993) withdrew the mandatory bankruptcy procedure clause from the bankruptcy act. This also resulted, however,

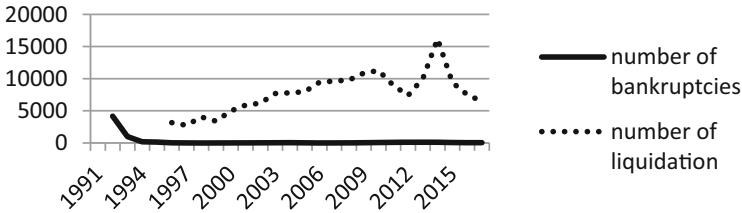


Fig. 1 Number of newly filed bankruptcy and liquidation procedures (1991–2017). Source: KSH data (<https://www.ksh.hu>); Statisztikai Tükör (2011–2018); Erdős (2007)

in the abolition of the institution of automatic stay, which again brought about the near total cessation of the formal bankruptcy (reorganization) procedure for a further 15 years in Hungary.

Notwithstanding these problems, the bankruptcy laws of the early 1990s were intended to enhance efficient capital allocation and to protect creditors' interests in a market economy, while promoting the possible avoidance of liquidation. Interestingly enough, however, insolvency practices have been applied almost exclusively in liquidation procedure in the Hungarian transitional markets, over the past 3 decades, as Fig. 1 illustrates.

Clearly, the intent to reinvigorate the institution of bankruptcy in general, in Hungary, accidentally met with the aim of the globally enhanced preferences of the markets as a response to the financial crisis in 2008. The new law (Act No. LI of 2009) on reorganization, however, was criticized right at its birth (Csőke 2009). The priority of reorganization procedure over liquidation was declared and the automatic stay rule was reintroduced. On the other hand, the law did not prescribe the obligation for companies filing for bankruptcy and entering reorganization procedure to have a reorganization plan prepared. Neither was it required that if the directors had failed to come up with any revitalization ideas the owners should be notified immediately. This could have given owners leverage, since this process could have given them the chance to decide on time whether to file for bankruptcy and (whether or how) to negotiate with creditors. In these situations, of course, the owners could have deliberated on whether the directors should stay in position or should be changed in accordance with the wishes of creditors, or whether to introduce some form of special crisis management.

Given the missing fine-tuning of the regulations, the new modifications could obviously not guarantee a more favorable environment for reorganizations. As Fig. 1 shows, apart from the years 1991–1993, the period of obligatory bankruptcy procedure, the number of reorganizations is statistically negligible.

5 Data and Methodology

The research was carried out in 2014, in the Budapest–Capital Regional Court. It focused on the new bankruptcy procedures right after the crisis-driven amendments of 2009. Since this Court collects the necessary data for liquidation and

Table 1 Various filings for reorganization at Budapest–Capital Regional Court, depending on how they ended (2009–2014)

End of procedure in filings for reorganization		Number of cases		% of reorganization filings
		Total-pool	Small-pool	Total-pool (%)
Settlement		79	34	27
Liquidation		167		58
Refusal	Documents not completed	21	17	7
	Previous liquidation	10	10	3
	Termination of procedure	5	4	2
Other termination		6	6	2
Total		288	71	100

Source: Amadeus database and the Budapest–Capital Regional Court

reorganization procedures separately, one could easily distinguish those cases that included reorganization procedures, at least at the time of filing. Also, the Court had separate records of the cases which ended with a settlement and those which did not. There were 332 filings with this Court for reorganization procedures in 2009–2014.

Further financial data on the relevant companies were collected from the Amadeus database. These data include financial statements, balance sheets, and other public information, such as corporate governance statements or the legal structure of the companies, extending from a few years before and to a few years after bankruptcy was filed for. Amadeus provides 10 years of coverage for such data.

Out of those 332 filings (total-pool) 97 cases (small-pool) were processed entirely. While the thus examined small-pool cases were read and analyzed, those which finally ended up in liquidation could not be included in this study, because procedures had not yet been closed at that time. Table 1 demonstrates the way filings for reorganization ended.

The analysis focuses on the reasoning behind decision-making about the reorganization of these financially distressed companies. The specific questions are (i) whether historical data were used and influenced the reorganization plan, and how well it was applied and/or (ii) whether the expectations of these companies were shown, argued or considered in the reorganization plan.

Again, as indicated, correct financial decisions could only be made if information is in the market and easily, equally accessible to all stakeholders. Yet, Hungarian companies are characteristically not listed on stock exchange, and thus historical data are the most important information about a company for the stakeholders. For this reason our research focuses on such data. Further, this primary research also includes thorough scrutiny of reorganization documents in the case of the 79 companies chosen, to facilitate analysis of the reasons behind the settlements or creditors' agreements in the reorganization procedures.

As a first step, we examined the value parameters indicating the severity of the financial distress of the company in order to assess whether there was a significant difference between those companies, which ended up being reorganized and those that were liquidated. The data were drawn from the financial statements of the

companies. As Table 1 shows two groups were formed from the 307 bankrupted companies: the group of companies remaining in reorganization procedure (79) and the group of companies, which ended up in liquidation procedure due to a failure to come to a creditors' agreement (or settlement) (167).

Here we applied a static analysis of the fundamental data in the annual statements of the companies before they filed for bankruptcy. Then the companies under reorganization procedure were allocated indicators believed to allow a proper examination of the viability of the companies under scrutiny by providing a fair view of operation efficiency, financial structure, and liquidity. The year of filing for bankruptcy was taken as a starting point and every subsequent year of operation from then on was taken into account. This analysis also included the median values of the indicators selected to measure the viability of the companies in both groups.

6 Findings

6.1 Empirical Analysis

It is conspicuous from the analysis of historical data on value-production that there are no significant differences between the two groups of companies before the date of filing for bankruptcy. These data focus on the year of filing for bankruptcy ("T"), especially on operation efficiency data, and the financial structure (equity leverage) and liquidity data of the given company.

Figure 2 demonstrates the critical values of the parameters used in the analysis as part of the descriptive statistics, such as operation efficiency, indebtedness, and liquidity. It also shows the relation of the companies not reaching or exceeding the critical value of the selected financial parameters in the group of companies with agreements and in the group of companies that ended up in liquidation.

In the case of *operation efficiency performance*, a zero result for the net income from the assets ($NI/TA = 0$) was applied as the critical value. If the NI/TA ratio is below zero, it means that the company cannot cover even its accounting costs, and is therefore highly unlikely to secure the expected return on equity for shareholders. This is clearly a case of value destruction.

The occurrence of this problem is relatively similar in the two groups of companies. In the year before filing for bankruptcy (T-1), 74% of those companies which concluded an agreement in the reorganization procedure show a profitability of below 0. This demonstrates that this ratio is higher in this group than in the other group in which reorganization turns into liquidation. In the 4 years before filing for bankruptcy, at least 50% of the companies in both groups were loss-making. Thus value destruction in all these companies was constant over the previous 4 years.

In the case of *indebtedness*, the applied critical value was a financial leverage ratio of 1 ($TL/TA = 1$). This fits exactly the economic criteria for filing for bankruptcy ($V = D$), which means that the company is only able to cover its debt (calculated on book value). The companies under reorganization procedure

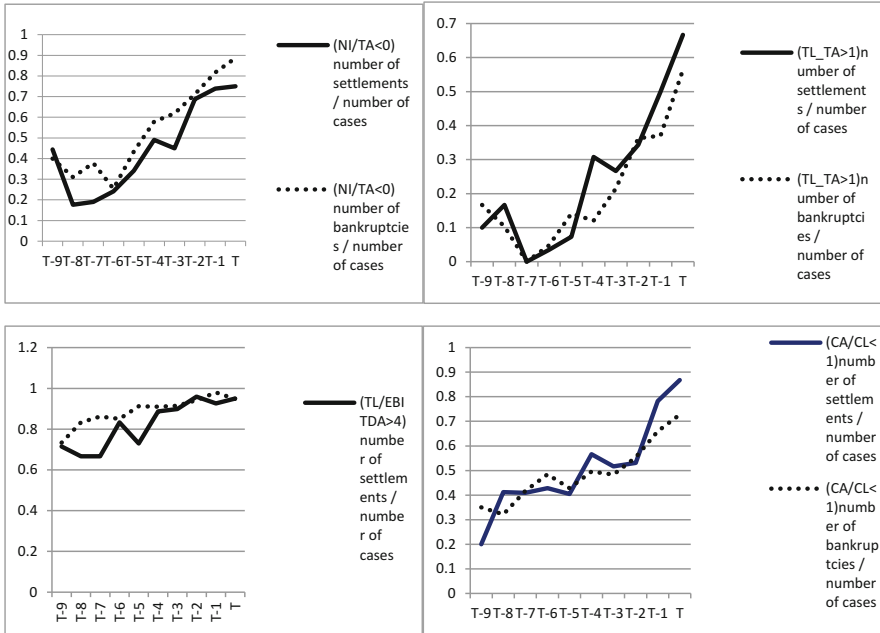


Fig. 2 Relation of companies not reaching or exceeding the critical value of selected financial parameters in group with agreements, and in group under liquidation procedures. Source: Own calculations based on data from the Amadeus database and that of the Budapest–Capital Regional Court. Note: “T” stands for the year of filing for bankruptcy, after which every subsequent year of operation was taken into account

seemingly underwent an increasing loss of assets before filing for bankruptcy. Interestingly enough, those companies which managed to conclude an agreement had had a worse (or at least as bad) picture related to indebtedness, than those which ended up in liquidation. In this latter group, only 37% of the companies had total liabilities exceeding total company assets as valued in the balance sheets.

For the determination of debt coverage ratio the value of total liabilities (TL/EBITDA) was applied rather than the value of long-term liability (D/EBITDA). Clearly, D/EBITDA indicates the degree of “excessive lending” which shows the degree of long-term liquidity in the practice of credit rating (Damijan 2014). Due to the lack of an efficient financial intermediary market for SMEs, the only way to get credit is often to receive commercial credit. That is why long-term liabilities are replaced by total liabilities in this case study. If this ratio is above four, the expected cash flow would not cover expected costs. And so the number of companies with a value of more than four for this ratio, was complemented by those companies, for which this ratio was negative because of the value of EBITDA.

On the basis of examination of the TL/EBITDA ratio, it can be asserted that there were no significant differences between the two distinct groups of companies before they filed for bankruptcy. From the beginning of the period that started 4 years

before filing for bankruptcy, 90% of the companies had seriously suffered from problems of excessive borrowing. None of these companies would have been recommended for investment by any of the credit rating agencies.

In the case of *liquidity*, a short-term liquidity ratio of 1 was applied as the critical value; $CA/CL = 1$. The result is the same as in the cases of equity efficiency and indebtedness, namely that the companies in both groups have no significantly different indicator values relating to liquidity problems for some years before filing for bankruptcy.

In brief, there is a close positive covariance in profitability, indebtedness, and liquidity indicator values for both groups of companies from the 9th year before filing for bankruptcy onward. The correlation coefficient seems to be fixed in all cases well above 0.8. Variation for those companies in the two distinct groups which fail to reach at least the critical value for the indicators under scrutiny above, demonstrates a similar positive covariance in the years prior to filing for bankruptcy. With merely one exception, the value of the correlation coefficient is above 0.9.

6.2 *The Reorganization Plans*

Notwithstanding this indebtedness, there may be reorganization plans which could push a constantly value-destroying company back onto profit-making track either with the resources and assets at hand or with a serious restructuring of those assets. This requires, however, very detailed reasoning and argumentation.

The function of a reorganization plan is to elaborate how to re-establish the liquidity of the company for continued short-term operation with due regard to the market environment and the company's potentials. This includes plans for the collecting of receivables and the sale of assets without jeopardizing the short-term financing of operations to be continued. In addition, portfolio services need to be adjusted to the (new future) market expectations and the long-term financing of the company needs to be ensured by restructuring company resources and/or by optimizing capital leverage. Such a reorganization plan would also indicate how to reach a profitable company structure efficiently and whether to sell the assets of the company in toto or piece by piece. These requirements can only be met if the interested parties can *make an informed decision* regarding the risks relating to the expected cash flow, compared to the value of the liquidation ratio ($V_L > V_C$) in which case the alternative of a swift sale of assets is preferable.

In none of the court cases under scrutiny was there any sign of efficiency criteria in the decision-making process regarding the possibility of making settlements. The stakeholders made no requests whatsoever to the debtor to show whether the company would have a higher value if it continued operation instead of selling its assets quickly in order to make payments. This had, however, no relevance, since the negotiations over any settlements only involved the degree of immediate or short-term repayment. Despite the aims of the bankruptcy laws, no elaborate reorganization plan was found in the records of any of the cases at hand.

Table 2 Status of companies in 2017 filing for bankruptcy with the Budapest–Capital Regional Court according to data registered at 2013

Status of the company		Number of companies with settlement	Rate of companies with settlement
Active	Active (=operating)	3	0.04
	Active (=in insolvency proceedings)	31	0.39
	Active (in liquidation, dissolved)	3	0.04
Non-active	Active (=dormant)	30	0.38
	Bankruptcy (=in liquidation)	12	0.15
Total		79	1.00

Source: Amadeus database and the Official Gazette

But this should come as no surprise. According to the parameters detailed above, in most of the cases, filing for bankruptcy was decided far too late, after having passed the critical status of $V = D$. The majority of all companies under scrutiny had already been losing assets ($V < D$) before filing for bankruptcy regardless of whether they had made a settlement or were heading for liquidation.

A rational market participant makes decisions based on future expectations, which require a sufficient level of convincing prediction about the revitalization ability of these companies. Yet there was no reorganization plan at all in any of these reorganization or settlement procedures. Then what was the motivation of the decision makers?

According to the Amadeus database, in 2013, there were only 3 active, operating companies out of the 79 surveyed which had been registered as being under reorganization procedure (2009–2013), whereas the court data registered only 1 such company. That means that the financially distressed companies with a settlement under scrutiny did not survive more than 1–3 years after entering such an agreement. During this period all these companies were wound up, became inactive or ended up in a liquidation procedure.

Table 2 illustrates how the reorganization of the companies under scrutiny has failed. One of the lessons to be learned is that a moratorium (“credit-restructuring” or automatic stay) does not replace company reorganization. Settlements turned into credit restructuring which, however, consisted of no more than the repayment rate of liabilities and its timing.

It can be inferred from these nationwide data in the Amadeus database, that 5 years after the introduction of the new reorganization supporting rules of 2009, only 1% of the financially distressed companies having filed for bankruptcy procedures chose further reorganization, i.e., settlement of a kind. Besides, according to the total-pool screened in the Budapest–Capital Regional Court only 1/3 (27.43%) of these ended with a settlement (see also Fig. 2).

The primary research in 2014 shows that the new reorganization rules do not bring any significant changes at all in the operation of bankruptcy procedures

regarding the decision-making process over whether reorganization or liquidation would better suit the case in hand. There has been no conspicuous move toward a more efficient management of financial difficulties or toward a more efficient creditor protection scheme for bankrupt Hungarian companies. The new rules, following international trends in the field, prefer corporate reorganization process to liquidation, yet the number of companies under reorganization procedure is negligible compared to that of those undergoing liquidation. There were no corporate reorganization plans whatsoever in the data which could have supported the presumption that a company could be effectively readjusted to the market based on a creditors' agreement. There are only three companies showing some sort of business activity 1–3 years after having entered into a creditors' agreement related to a corporate reorganization plan. It seems that the new corporate reorganization rules provided a delaying technique/tactic for the debtors rather than promoting effective reallocations of capital.

Given these results, and assuming that market participants are rational actors in Hungary as well as elsewhere, one is faced with another question. Are the bankruptcy laws in Hungary efficient enough? If one considers the results of our research, one starts questioning the adequacy of the laws. How could it be that the majority of the companies' filing for bankruptcy sit on negative assets for years before that moment? If the financial variables do not affect the behavior of the directors, then what does?

7 Recommendations for Better Information Access— Prepack Bankruptcy—Automatic Mandatory Auction Bankruptcy

7.1 Prepack Bankruptcy Procedure

The prepack insolvency procedure is in fact an agreement developed by English bankruptcy professionals, basically as an alternative to the US Chap. 11 model. It has the advantage of a relatively quick and relatively cheap means of sale or reorganization of the financially distressed company. In this regime, the financially distressed company, *before* filing for bankruptcy, negotiates the sale of the assets with the buyer in advance and then, *after* filing for bankruptcy, the trustee or administrator has nothing to do but to approve and to enforce the pre-negotiated contract thus agreed.

It is a *package* deal, since no amendment can be made by the appointed administrator during the prepack insolvency procedure, because, if that were possible, the renegotiations could impede achievement of the aim of a swift and workable conclusion of the procedure. And it is a *prepackage* deal, because the bargaining and the drafting of the agreement are prior to the company's filing for bankruptcy. Also, the negotiations could entail a prepack sale or a prepack reorganization as

needed (Phillips and Kaczor 2010), since these procedures are designed to guarantee the continuous operation of the company, as a legal successor, in either way.

As usual, the greatest advantage of this procedure is its greatest disadvantage, as a prepack negotiation requires neither the approval of the court nor that of the nonparticipant creditors. These creditors, therefore, often remain dissatisfied. Yet, the undisclosed nature of the entering into an agreement, may enable a company to avoid negative market reactions and a consequent plummeting of its market value. This further protects employees' interests, since one of their main concerns is that they do not lose their jobs. Also, since the appointed administrator does not need to negotiate but to only enforce the contract, the process is significantly cheaper. Not only are the costs of the administrator lower but also the time spent on the often frustrating negotiations regarding the bankrupt company is considerably shorter. If it is cheaper, then more assets can be distributed. Clearly, the essence of the prepack regime is reorganization, and its swift, and thus less costly, accomplishment by not requiring approval of the agreement (Bork 2012).

As a consequence, however, it is very likely, that those creditors who had no opportunity of getting into the bargaining process go to court. And then, the problem starts. Due to the fact that in these cases there is no market, the court will thoroughly scrutinize the case at hand, because it has to be proven that the final negotiated price and all the other conditions of the agreement were fair. The courts, however, seem to embrace the idea of the prepack bankruptcy procedure. In one of the leading cases of DKLL Solicitors (DKLL Solicitors v. Her M. Revenue & Customs [2007] EWHC 2067 Ch), the court approved the prepack sale of the debtor although it was the tax authority which could not collect in the bankruptcy procedure. Also, in another case the court endorsed the prepack sale of a bankrupt law firm in four separate contracts (Halliwellis LLP [2010] EWHC 2036 Ch), which clearly shows that certain parts of businesses may also qualify as the subject matter of a prepack regime.

Since, obviously, prepack bankruptcy allows directors, even inefficiently operating directors, to remain in their positions, a prepack sale is more likely to be accomplished on time, when the company is still in a better shape. In any event, however, if any creditors have filed for an insolvency procedure, the prepack regime cannot apply.

Due to severe criticisms of this possible preferential treatment of directors at the expense of perhaps all the creditors, prepack bankruptcy professionals have come up with the so-called SIP 16, which is a code of practice (Statement of Insolvency Practice) to be followed in the procedure. Although they are referred to as recommendations, their use is mandatory. This procedure is supposed to guarantee the actual legal duty of the directors (fiduciary duty) toward the creditors in bankruptcy procedures.

Despite their both applying common law, the English and US bankruptcy models are basically different: the English one is creditor-protective, whereas the American one is debtor-protective. The courts in the US model, in exchange for their approval, expect that at least 50% of the creditors representing two-thirds of the total sum of debt have consented to the agreement or the reorganization plan. In the final analysis, the same critique is valid for this regime as for the English regime.

7.1.1 Application in Hungary

Prepack bankruptcy is a kind of out-of-court procedure, which makes it a useful tool for both selling and reorganizing a company in the vicinity of bankruptcy. It may bring together the possible advantages of both formal (regulated) and informal pre-bankruptcy approaches. In addition to guaranteeing the trust of the interested parties in the bankruptcy procedure, it provides for swiftness and cost efficiency in drafting and enforcing a workable reorganization plan.

International experience is quite telling though. It has already been asserted that such a prepack negotiation will not work if a financially distressed company has many doubting creditors and there is a strong asymmetry among the stakeholders (Ross et al. 2011). So even if some sort of out-of-court bankruptcy exists in most EU Member States, exactly these concerns make the Hungarian introduction of this institution so materially risky. In Hungary, the majority of companies are SMEs, which are overwhelmingly dependent on commercial loans. This creates discrepancies in knowledge and understanding of financial markets among both businesses and management, which inevitably leads to further informational asymmetry. This disadvantage can be counteracted by enforcing the obligatory consent of the different classes of creditors and the obligatory approval of the court. Such rules, however, would demolish the benefit of swift decision-making.

7.2 Auction Bankruptcy Procedure

7.2.1 Swedish Model of Mandatory Automatic Auction Bankruptcy

The model is simple: *after* filing for bankruptcy an immediate, automatic, mandatory auction bankruptcy procedure takes place. From that time on, the court appoints a supervisor who acts as the agent of the company with the same fiduciary duty to the creditors as the directors previously had to the company. The appointee's task is to fix the estimated value of the company. In cases of doubt, independent expertise may be called on, especially if the company is to be sold in parts. The aim of the auction is to guarantee the quick sale of the company.

In certain cases, the company can be sold even *before* it files for bankruptcy (prepack auction), but in this case too, the approval of the surveillant is required. If there is only one offer, which is often a trial to buy back the company, the surveillant has to look for more bidders before entering into an agreement.

One may also make an agreement with unsecured creditors. But the absolute priority rule cannot be eschewed in these cases either, thus the secured creditors and certain claims (tax, wages) need to be paid up in full, the rest to a proportion of 25%. This makes for quite a challenge in coming to agreement with non-secured creditors, and therefore such agreements are rare.

Since there is not much bargaining in the Swedish model, it is quick. In fact, time is the most precious commodity here. Directors need to serve for their

re-employment. This means that all employment contracts automatically terminate, or are converted to 6-month employment contracts, and it is the new owner who decides whether or not to re-employ directors, which generates a definite incentive for the directors to disseminate information in time and thus make reorganization possible.

According to the leading promoters of the *Swedish mandatory automatic auction* bankruptcy model, this procedure may function as a good compromise between the advantages and disadvantages of English and American prepack bankruptcy (Eckbo and Thoburn 2009). The most important issue in this model is, whether the buyer can efficiently reorganize the bankrupt company. And in this respect, there is a question as to which model is more efficient: the flexible Chap. 11 (Baird and Rasmussen 2006) or this automatic but mandatory auction (Eckbo and Thoburn 2009). It is suggested that the quickest *bona fidei* solution is the best. That would preclude one of the biggest bankruptcy-related problems, namely the pre-calculation opportunities of directors. The auction model is useful because it can itself create a secondary market for bankrupt companies even though buying a bankrupt company is a far more complex transaction than buying a healthy one. Information asymmetry is very hard for outsiders to surmount.

Companies on the verge of bankruptcy may be profitable, but because the directors' consent is required in the case of a pre-bankruptcy sale, the bargain may be biased. The mandatory automatism of the auction model, however, excludes this sort of problem.

7.2.2 Application in Hungary

In the transition period of the 1990s, when Hungary joined global free markets, the basic economic ideas for bankruptcy procedures were characterized by US Chap. 11 patterns. These rules, however, are designed for big companies financed by stock markets, and are less suitable for continental markets composed of companies characteristically financed by the banking systems or by commercial loans, and where SMEs with the feature of information asymmetry figure prominently. This is, even more, the case for Hungary where the filing for bankruptcy takes place too late ($V < D$).

Regarding these challenges faced by these models, many questions remain.

1. In the undeveloped financial market of Hungary, would it be possible to create a secondary auction market for bankrupt companies? (Klapper et al. 2006).
2. What are the chances that the traditionally skeptical legal-administrative attitude toward the market in Hungary would undermine the entire auction procedure?
3. How efficiently would these rules change the directors' attitudes on the verge of bankruptcy?
4. Could global markets and thus EU laws have a benevolent influence on bankruptcy practices?

8 Conclusion

In Hungary information needs to be provided in a much more efficient way than it is at present. Giving a second chance, in the form of reorganization, to a bankrupt company is not necessarily an effective way to solve the efficiency problem, due to lack of information or severe information asymmetry. In a certain way, contrary to what the European Commission currently recommends, this article strives to show that the Swedish (prepack) auction model is best suited to circumstances in (Central-) Europe, under continental legal culture. The emphasis here is also on the time span. For biased information, in given cases, a swift transaction and a restart may be a fair trade-off.

If one aim of bankruptcy procedure is to maximize the value of a financially distressed company, then efficient resource allocation is also an important goal in this section of the market. With automatic mandatory auction bankruptcy, the decision as to whether to reorganize or to liquidate a company may be better founded. The auction makes for a more careful deliberation of decisions and the provision of more information, at significantly lower costs, than do traditional reorganization procedures, and this further increases the chance of more creditors being paid back. Automatic mandatory auction also enhances otherwise efficient reorganization and thus the chance that bankruptcy be filed for in time. This strengthens trust in the market, and the protection of the creditors' interests, thereby decreasing the costs of loans. Economic growth however can only be achieved by value-producing companies. As it was demonstrated, while there is lots of debate on protecting the reliability of capital markets, legislation is not pragmatic enough.

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Part IV
Public Economics

The Impact of Legislative Policies on the Judicial Reorganization Procedure and the Risk of Illegal Financing in Romania



Simona Petrina Gavrila and Tudor Florin

Abstract The purpose of this study is to analyze the judicial reorganization process in Romania and how the state supports the companies in financial difficulty. Judicial reorganization has been created as a legal tool for traders in insolvency but whose businesses are capable of overcoming difficult times. In line with the European vision, in order to give firms in difficulty a second chance, the Romanian legislature adopted a normative act aimed at facilitating access to this second chance for traders. Almost 5 years after the adoption of this law, although it was considered to be one of the most progressive European laws in the matter, following the tendency of traders to use judicial reorganization for the purpose of disregarding budgetary obligations, but also the risk of financing illegal activities in the field of organized crime, the Romanian legislature wants to amend legislation in the sense of to guarantee the recovery of these budgetary obligations. On the other hand, the proposed legislative amendments do not respond to the criticism of the insolvency practitioners regarding the adoption of fiscal measures capable of actually encouraging judicial reorganization.

Keywords Insolvency · Judicial reorganization · Budgetary claims · Tax fraud · Fraudulent bankruptcy · Romania

1 Introduction

Most studies (Didea and Ilie 2016; Costin and Miff 2000; Ființescu 1930) assign the genesis of the Roman law bankruptcy institution as a derivative of the debtor's foreclosure, although there are authors (Boardman 2003) who mention the existence

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of this institution, in an express form, in the old Babylon. From the etymological point of view, the term *bankruptcy* originates in the Latin verb *fallo*—*fallere*, translated as to miss, to rid, in the sense that the bankrupt debtor fails to fulfill its obligation to pay (missing from the debt to pay its creditors), but, at the same time, meaning also to cheat, to deceive (Pașcanu 1926; Costin and Miff 1996; Bufan et al. 2014).

The importance of efficient bankruptcy procedures is widely recognized and the acute recent economic crisis has emphasized the noteworthiness of this topic, which international literature has analyzed in several ways, focusing the attention on different variables, such as accessibility of bankruptcy procedures, their costs and duration, incentives and/or penalties for debtor and creditors related to the onset of a procedure, and so on. The aim of this chapter is to analyze the reorganization from the perspective of Romanian legislation, in order to understand whether it is sufficiently accessible to debtors and if it respects the principle of balance between the interests of the creditors and the debtor.

In order to achieve this purpose, we will analyze the state of development of the legislation in the field, the law no. 85/2014 concerning the procedures of insolvency and insolvency prevention, as adopted by the Romanian Parliament, compared to the legislation as amended by the Government through the issuance of the Emergency Ordinance no. 88/2018. Unfortunately, in the absence of statistical data from a sufficiently long period of time, the analysis will be rather empirical. After applying these legislative changes a sufficiently long time to allow for a proper analysis of the number of successful reorganizations, we will be able to verify the conclusions of this study.

The main findings of the chapter are that the Romanian legislation on judicial reorganization was one of the modern legislation that respects both the principle of granting a second chance to the insolvent debtor and the recommendations of the World Bank and the European Commission. With the recent legislative changes, the Romanian legislature made the procedure difficult and has considerably reduced the chances of reorganization.

The chapter is articulated as follows: Sect. 2 presents the general framework concerning insolvency, while Sect. 3 shows the main aspects related to judicial reorganization and State Institutions; Sect. 4 introduces legislative policy in the area of reorganization, while Sect. 5 analysis the supplementing and diversifying the financing sources; Sect. 6 how creditors could be willing to get involved in reorganization plans; and Sect. 7 draws some conclusions, also clarifying the limitations of the study and suggesting improvements for future researches.

2 General Framework Concerning Insolvency

Relatively recently, on March 12, 2014, the European Commission has adopted the Recommendation regarding a new approach of business failure and insolvency, whose stated goal is “to ensure that viable businesses that are facing financial difficulties (. . .) have access to national frameworks of insolvency that would enable them to restructure their activity at an early stage, with a view to preventing their

insolvency and, therefore, maximizing the total amount for creditors, employees, owners and the economy as a whole”.

Through this recommendation, The Commission has set minimum standards concerning the preventive normative framework for restructuring and debt discharge for entrepreneurs in insolvency. In Sect. 3 (Preventive Frameworks of Restructuring), art. 6, letter E it is specified that debtors should be able to restructure their economic activity through a Restructuring Plan, adopted by means of a flexible procedure, within which “the new sources of financing necessary for implementing a Restructuring Plan should not be declared void, voidable or unenforceable as an act to the detriment of the general mass of creditors”. Also, the Commission recommends, within letter D of the same Sect. 3 to protect new sources of financing (“including new loans, sale of certain assets by the debtor and conversion of debts into shares”).

The Romanian Law No. 85/2014 concerning the procedures of insolvency and insolvency prevention complies with the line drawn by the European Commission and recognizes the particularly important role played by financing for the recovery of the society in difficulty. It has been laid down by Article 4 that the law is based on several principles, among which numbers also ensuring access to sources of financing in insolvency prevention, during the observation and reorganization period, with the creation of a regime adequate for protecting these debts (paragraph 8). The principle of ensuring access to sources of financing in insolvency and insolvency prevention procedures is a starting point for taking measures intended to stimulate the recovery of companies in difficulty.

Following the adoption of this regulation, it has been asserted that Romania would have one of the most developed legislation in insolvency matters, the assertion being supported by indicating the Report on the observance of standards and codes of insolvency and creditor/debtor regimes, prepared by the World Bank in 2014.

Among the fundamental principles of insolvency, the Romanian legislator inserted: giving the debtors an opportunity for an efficient and actual recovery of the business, either through the procedures of insolvency prevention or through judicial reorganization; ensuring an equal treatment of creditors of the same rank and recognition of the rights of existing creditors and following the priority order of the debts, being based on a set of clearly determined and uniformly applicable rules.

Didea and Ilie (2016) indicate that the new regulation purposes of insolvency include supporting the continued activity of debtors, keeping jobs and covering claims on the debtor, focusing mainly amicable procedures for the renegotiation of debts or the conditions of such debts, more specifically the ad hoc mandate or the composition agreement. Consequently, the rules that regulate the insolvency prevention and insolvency proceedings have also acquired an obvious social nature, because they aim at saving the jobs of the debtor’s employees (Nemeş 2015).

Moreover, according to the Nasz (2015), the Insolvency Code seems to have eliminated shortcomings, causes that had prevented the debtor from resorting to amicable procedures for the renegotiation of debts, the most important including the difficulty of homologating the composition agreement, as the current requirement is

that the composition agreement project should be approved by creditors representing at least 75% of the value of the debts accepted and undisputed, and the value of the disputed and/or litigated debts should not exceed 25% of the body of creditors, the introduction of the private creditor test, if, through the composition agreement project, reductions of the debts to the government budget are proposed, the elimination of the requirement that the debtor, following the implementation of the recovery measures proposed through the composition agreement project, should pay a certain minimum percentage of the total value of the debts, etc.

3 Aspects Related to Judicial Reorganization and State Institutions

According to Comşa and Comşa (2017), in order to exist an actual opportunity for reorganization, it has been estimated that there required (i) a coherent and adequate plan of reorganization; (ii) competent administrators with double training, legal, and economic, who would defend the interests of the debtor company; (iii) a regulation focusing on reorganization rather than liquidation; (iv) supplementing and diversifying the sources of financing; and (v) creditors willing to be involved in the reorganization plans.

Starting from this assertion, we find that, if the first two aspects belong exclusively to the debtor in insolvency, the following three are external factors, on which the debtor has no control, and that the state, through its bodies, is the only one that can impact them decisively.

Thus, the regulation manner of insolvency, respectively the legislative policy in this area is the competence of Parliament, as a representative of the legislative power. The aspects related to the supplementation and diversification of the financing sources are influenced both by the debtor's conduct, the risks that potential financiers are willing to take, and by the way in which legislation enables to be rendered such financing and the tax rules that may either encourage or impede funding. Ultimately, in analyzing the attitude of creditors willing or not to involve in the reorganization plans, an important element is the attitude of the budgetary creditors. In the following, we will analyze in detail the manner in which state acts in the three directions: legislative policy in the area of reorganization, supplementing and diversifying the financing sources, and creditors willing to get involved in reorganization plans.

4 Legislative Policy in the Area of Reorganization

At the time of its adoption, Law No. 85/2014 concerning the procedures of insolvency prevention and insolvency was regarded as one of the best in Europe, which ensured a real balance between the interests of the debtor and those of the creditors participating in the procedure and gave a real chance to reorganization.

Subsequently, the state considered in the Memorandum of Reasons of the Government Emergency Ordinance no. 88/2018 that there is a danger of affecting the competitive environment by abusive use of insolvency procedures by some debtors who make use of the mechanisms regulated by the Law of insolvency in order to evade the payment of amounts due to the general consolidated budget. This, together with the fact that it is necessary to increase the efficiency of insolvency procedures and to improve the protection of creditors' rights, which would contribute substantially to improving the business environment, thus creating the premises for the viable businesses recovery and a faster recovery of debts, including the budgetary debts, determined the amendment of Law 85/2014 by the adoption of the Government Emergency Ordinance no. 88/2018.

The priorities consisting of avoiding unnecessary bankruptcies, shortening the procedure duration and cost have also been invoked by Marcucci (2000), prior to the adoption of legislative amendments by the Italian Parliament: Decrees 35/2005, no. 5/2006, No. 169/2007, and no. 78/2010. Nevertheless, subsequent studies (Bisogno 2012) have argued that there are no significant differences between years before and after the amendments of the Italian Bankruptcy act.

It is necessary to analyze the main amendments adopted through this normative act, likely to change the precarious balance in which the private creditors and debtors were, in relation to the budgetary ones.

An unfortunate amendment of Article 5 paragraph (1), made by Law 85/2018 is the entering of the requirement for opening the insolvency procedure upon the debtor's request, in the sense that the threshold value of debts should be RON 40,000 (about Euro 9000) and the amount of the budgetary debts should be less than 50% of the total declared amount of the debtor's receivables. We appreciate that by this amendment, it is taken out the possibility that the debtor in imminent insolvency would redirect to reorganization. Also, the introduction of the requirement according to which minimum 50% of the total amount of debts be other than the budgetary ones, makes that debtors with large debts to the state budget not be able to formulate in due time requests for opening the insolvency procedure, which will lead to an increase by penalties in these debts and a decrease in the chances of reorganization.

The new legislative provision will result in ensuring an unequal treatment for the debtors who are in the same legal situation, that is, they are in insolvency, and still they cannot resort to the collective procedure in order to try to save their business, although the purpose of insolvency procedure has remained the same—setting up a collective procedure for covering the debtor's liabilities, while giving, where possible, an opportunity to recover its business (Nasz 2018).

Milos and Deli (2018) showed the fact that the introduced rule changes the concept of the Criminal Code with regard to the bankruptcy offense. According to Article 240 paragraph (1) Criminal Code: Non-introduction or late introduction, by the natural person debtor or by the legal representative of the legal person debtor, of the request to open the insolvency procedure within a time limit exceeding by more than 6 months the time provided by the law from the occurrence of the state of insolvency, shall be punished by imprisonment from 3 months to 1 year or by fine.

Another amendment likely to lower the reorganization chances of a company in insolvency is to stipulate conditions for the budgetary creditors in order to vote for a reorganization plan that would provide the reduction of debts.

Thus, the budgetary creditor may approve the reorganization plan where it is proposed to decrease the unsecured budgetary debt, a decrease underlain within the plan, if the following criteria are met: the measure of decrease is the optimum manner to recover the unsecured budgetary debt, compared to the situation of debtor's entering into bankruptcy; the debtor holds a trading fund that would enable him/her to continue the business and the decrease measure leads to making viable the debtor company.

In case that through the reorganization plan it is proposed the measure of reducing unsecured budgetary debts by up to 50%, the budgetary creditor approves the plan if there are cumulatively met the above criteria and at least one criterion of the following: (a) to result in a level of at least 50% of the current tax liabilities due during the period of executing the reorganization plan compared to their average annual level prior to entering in insolvency; (b) the debtor company has to carry out an activity of public interest; and (c) the debtor company must carry out a strategic activity in a certain economic branch.

We find, from the analysis of these conditions, that a budgetary creditor is obliged to vote against a reorganization plan, with the consequence of triggering bankruptcy, even if through bankruptcy would obtain less if there is no public interest or strategic activity, or if it is not ensured a certain level of tax liabilities that will arise and will be collected in reorganization.

On the opposite side, a salutary amendment, likely to correct some excesses of the tax authorities, is the introduction of Article 108 paragraph 8¹, according to which the fiscal debts found by a fiscal administrative act challenged, and whose foreclosure has not been suspended by a final court order, will be admitted to the body of creditors and entered under resolutive condition until the appeal is finalized by the administrative contentious court. In practice, immediately after the opening of the procedure, the tax authorities issued taxation orders, which are enforceable titles and which, on the strength of this nature, were entered in the body of creditors, even though they were appealed against.

This amendment integrates the Minutes of Practice Uniformization in Insolvency, which recommended the solution of registering the tax claims challenged with the right to vote, but in Milos and Deli (2018) appeared to be reserved for this amendment, showing that it does not solve the issue of the compulsoriness to settle the challenge in administrative court, within a reasonable time, which should be in accordance with the times for settling the challenges by the syndic judge under the insolvency procedure.

Another relatively beneficial amendment, likely to ensure compliance with the rules concerning State aid is the prohibition of the budgetary debts conversion into securities, apart from shares. We judge that this regulation, however, will not be used in practice, until now the budgetary creditors not having expressed their option to credit the debtors in insolvency.

If, as shown by Gavrilă et al. (2017), in the insolvency procedure regulated by Law 85/2014, the budgetary creditors were visibly favored up against private creditors, but there was a balance between the interests of the insolvent debtor and those of the creditors, including the budgetary creditors, we consider that the adoption of Government Emergency Ordinance no. 88/2008 does not regard the desideratum of giving the insolvency debtors a second chance, creating the premises that the budgetary creditors would be a brake on the reorganization.

The debtor subject to insolvency procedure has the right to benefit from a partial debt discharge through the reorganization plan. According to Article 139 paragraph (2) of Law 85/2014, this is a positive effect for the debtor, but the law presumes that such a solution is also correct for the creditors, since each creditor must receive through the reorganization plan at least as he would have in the bankruptcy procedure. The benefit of the partial debt discharge helps the debtor to survive, however, practically, all the effects of this solution have to be analyzed in order to identify and remove those that are likely to endanger reorganization. Some of these consequences are of a fiscal nature and the way of applying and interpreting the various regulations applicable to the situation is far from being clear.

Also, it should be taken into account that the effects of the reorganization plan on the debtor's debts are not definitive: in case the plan fails, the debts reduced through the plan will be renewed. Consequently, these effects are hit by a resolutive condition, whose fulfillment (entry into bankruptcy) leads to their disappearance.

From the fiscal point of view, the amount by which the body of creditors is reduced through haircut is deemed as income, except the income from the cancellation, recovery, including the re-invoicing of expenses for which it has not been given deduction, according to Article 23 of the Tax Code d, (here being included the obligations of taxes and duties—debit and accessories—which are not deductible expenses) and is taxed according to the Romanian tax legislation. It follows that within the reorganization by diminishing the debts, the debtor will have to own liquidity for the payment of this tax born during the insolvency period, otherwise risking, according to Article 143 paragraph (3) of Law 85/2014, to enter into bankruptcy as a result of failure to pay the current debts older than 60 days and above the threshold value. We reckon that, for existing a real chance of reorganization, the tax legislation should be amended so as for these amounts no tax to be taken up.

Through the amendments brought to paragraphs (3) and (4) of Article 75 of the Law No. 85/2014 concerning the procedures of insolvency prevention and insolvency there have been increased the responsibilities of the legal administrator in that, on the one hand, it has been introduced a 10-day time limit, calculated from the date of lodging the request for payment of the current debts; on the other hand, it has been provided that if the insolvency practitioner has failed to analyze and pronounce within that time on the request for payment made by the holder of a current debt, in case the amount of the debt exceeds the threshold value, that creditor may request, during the period of observation, to be opened the debtor's bankruptcy procedure, if its current debt is not paid within 60 days of failing to pronounce on the payment request.

In practice, the request for passing the debtor under the bankruptcy procedure may be formulated, for the above-described assumption, after a period of 70 days has elapsed from the date on which the creditor has made the request for payment of the current debt the amount he claims with this title not having been paid or what remained to be paid not exceeding the threshold value.

Consequently, if the administrator's response to the payment request is positive, the debtor is required within maximum 60 days from the date on which the practitioner made the favorable decision to the petitioner creditor to pay the amount owed (or at least the remaining amount for payment to be below the threshold value) and if the legal administrator failed to analyze the petitioner's request, following the expiration of the 70 days from the date of filing the payment request, the creditor concerned has the right to request the opening of the debtor's bankruptcy procedure (Nasz 2018).

We reckon that this amendment is uninspired as is depriving the debtor of a real chance to reorganize following the fault of the legal administrator who fails to analyze a payment request and, as a result of this omission, the claim requested is presumed to be certain and exigible.

5 Supplementing and Diversifying the Financing Sources

The importance of indicating the necessary financial resources in relation to the proposed method of reorganization was also recognized by Adam and Savu (2006) and Țândăreanu (2012). Thus, the plan will mention the domestic sources of financing available or which will be available in the future, including the assets and amounts of money that will be obtained from future customers, and external financing means, with the stipulation of measures to attract them. The plan will also have to establish actual destinations for an efficient and profitable allocation of resources.

Following the entry into force of Law No. 85/2014, in the legal literature (Carpenaru et al. 2014) there have been expressed opinions according to which "it is improbably to be found persons that will advance amounts of money as a loan in the difficult situation of the insolvent debtor's business. ... and, anyway, this matter depends on the financing policies of the credit institutions."

In practice (Adam and Savu 2006), it has been found that the debtors undergoing reorganization proposed either plans based on lowering the debtor's assets with a view to paying off debts and attracting resources, or plans for financial or operational reorganization of the business that required prevalently external sources of financing.

These financing sources can be obtained in one of the following ways:

- (a) For the financing necessary to the implementation of the financial recovery plan, the debtor may apply to a capital injection by increasing its share capital, an operation that implies a public offer of securities, under the conditions provided

by Law No. 297/2004 concerning the capital market. As stated by Adam and Savu (2006), in the case of new shares issuing, before being offered to the public, they will be offered for subscription, especially to the existing shareholders, in proportion to the number of shares they possess.

Nevertheless, in practice, there are rarely found external shareholders, associates, or investors willing to take the risk of contributing by resources to saving the business. Piperea (2008) draws attention that the refusal of financing from the investors is a considerable pressure on the administrators of the company as it is very difficult for them to raise additional capital from third parties under these circumstances.

- (b) The issuance of bonds by the debtor is possible only in the case of joint stock companies and is achieved under the conditions provided by the Law No. 31/1990 (Companies Law) and Law No. 297/2004 concerning the capital market. They do not confer their holders any power of decision or of administration in that company and do not affect the ownership rights of the shareholders. The size of the mortgage bond depends not only on the financing needs of the enterprise and on its capability to reimburse, but also on the supply of capital on the financial market.

Also in this situation, regardless of the nationality or citizenship of the persons who subscribe to these shares, in the case it will be applied the law of the debtor in insolvency, as *lex societatis*.

- (c) Financing through bank loans is the most sought external source of financing, but the cases when credit institutions lend debtors undergoing reorganization are extremely rare, this being due mainly to the low number of cases where the judicial reorganization procedure has reached the end (Târșia 2012). Also, the creditors providing rescheduling or refinancing impose particularly severe and burdensome conditions for companies in difficulty, which counterbalance the risk to which they expose through financing them.

It should also be mentioned that the rules of banking prudentially and tightening of capital requirements for the activities of lending to companies in insolvency have diminished the appetite of many financial banking entities in Romania to provide financing for the successful rescue of viable activities. The peculiarities of a process of rescuing a company in insolvency through the provision of crisis facilities within the procedure require the employment of staff with a complex qualification, who should have knowledge of financial analysis of some entities in difficulty, should know the particularities of the Law on insolvency, should have the ability to swiftly absorb information on various fields of activity (industry, services, production, energy) and strong negotiation skills.

By contrast, up against the lack of appetite of potential financiers to take risks, there is a risk in practice of diverting the insolvency procedure from its primary purpose, to the area of economic crime. If initially insolvency has been used in attempts by criminal group members to remove the traces of money laundering,

currently there is a danger that, even by resorting to the insolvency procedure, such offenses be committed.

Thus, relatively recently, the judge has considered (the Conclusion of the Council Chamber dated 10.06.2016, pronounced by the Preliminary Chamber Judge at the Bucharest Court of Appeal, the 2nd Criminal Section in the file No. 2428/2/2016) that in a criminal case, there are indications in regard to the perpetration of money laundering offense within the insolvency procedure. In that case, it was held that the general procedure of insolvency was opened against the debtor, with the consequence of entering in the body of the creditors of the Bank [...] as the debtor's majority creditor with the amount of RON 378,533,313.01, accepted integrally by the legal administrator, although the Bank [...] does not legally justify the extent and certainty of the debt. Thus, although the money made available to the debtor did not come from the funds of the Bank, the Bank [...] has adjudicated the assets from the debtor's patrimony at undervalued prices, on account of a fictitious debt, for whose achievement *in integrum*, the bankruptcy procedure is still ongoing. The potential money laundering offense occurred through a financial arrangement conceived by a law firm by which, under the dissimulation of loans granted by the BANK. . . , funds suspected of coming from offenses committed have been made available through the correspondent accounts of the BANK in offshore jurisdictions . . . at the free disposal of the parties, in exchange for establishing guarantees to the bank, with the consequence of acquiring by the credit institution real estate for resale and obtaining profit.

Despite this situation, the Romanian law does not directly impose on insolvency practitioners the obligation of reporting suspicious situations to the National Office for the Prevention and Control of Money Laundering, although they are bound to monitor the debtor's current activity during the suspect period, when the right of administration has not been withdrawn.

Article 10 of the Law No. 656/2002 on the prevention and sanctioning of money laundering, as well as for the introduction of measures for preventing and combating of terrorist financing, lists the persons who have the obligation to report to the auditors (the natural and legal persons providing tax or accounting consultancy, f) notaries public, lawyers, and other persons exercising liberal legal professions; service providers for trading companies and other entities or legal constructions; persons with duties in the process of privatization; real estate agents; associations and foundations, and even other natural or legal persons who trade goods and/or services, with amounts in cash, in lei or foreign currency, whose minimum limit is the lei equivalent of EUR 15,000), in this category there are not also indicated the insolvency practitioners.

Although we do not have accurate statistics or data referring to a longer period, from a press release of the National Office for the Prevention and Control of Money Laundering, it follows that, in the first semester of 2016, the Office received 3.516 reports, of which 2222 from the credit institutions, 324 from fund transfer services, 533 from notaries, 151 from criminal prosecution bodies, 143 from natural or legal persons selling goods or services, 5 being formulated by insurers and reinsurers, 4 from insolvency houses and one from casinos (<http://www.onpcsb.ro/pdf/Raport%20activitate%20%202016%20-%20semestrul%20I.pdf>).

Regarding the highlighted aspects, we consider that it would have been appropriate that, along with the amendment of the insolvency law, the Romanian legislator also include, among the professional obligations of the insolvency practitioner, that of reporting the debtor's suspect transactions during the period previous to the opening of the procedure or in the period during which the debtor keeps the right to administer, under the supervision of this practitioner.

6 Creditors Willing to Get Involved in Reorganization Plans

In essence, the creditors' position in relation to the reorganization of an insolvent company is expressed at the time of the adoption of the reorganization plan, which must be approved within the Creditors Meeting. At this stage, the vote of the creditors is essential, the debtor's fate depends on it.

Budgetary creditors, depending on the confidence or lack of confidence in the real possibilities of debtor's reorganization, or the desire to bring as soon as possible or as much as possible of the debt may vote for or against the reorganization.

According to ROSC, "the environment of regulation, particularly as concerns tax authorities, does not sufficiently support corporate reorganizations and other preventive measures. There are frequent mentions concerning the alleged inability of the tax authorities to participate in operations and schemes of reorganization (arrangement), in terms of lack of legal capacity, but also because of the EU rules concerning state aid."

Law No. 85/2014, in its initial form, solved this problem by introducing the principle of private creditor test.

According to Article 107 (1) TFEU, except the derogations provided in the Treaties, is deemed incompatible with the internal market the aids granted by states or through state resources in any form whatsoever, which distorts or threatens to distort competition by favoring certain enterprises or the fabrication of certain goods, to the extent they affect the trade between Member States.

Nevertheless, the conditions which a measure should meet in order to come under the notion of "aid" within the meaning of Article 107 TFEU are not fulfilled if the beneficiary enterprise can obtain the same advantage as that made available to it through state resources under circumstances that correspond to normal market conditions (see, to that effect, Decision dated June 05, 2012, Commission/EDF, C-124/10 P, paragraph 78, and Decision dated 24.01.2013, Frucona Košice/European Commission, C-73/11 P, paragraph 70).

According to Article 5, paragraph 71 of Law 85/2014, "the private creditor test is the comparative analysis of the degree of sufficiency of the budgetary debt by reference to a diligent private creditor, within a procedure of insolvency prevention or reorganization, as compared to a bankruptcy procedure". The analysis is based on an assessment report drawn up by an assessor or other specialist and reports

including on the duration of a bankruptcy procedure as compared to the proposed payment schedule. It will be not deemed State aid a situation in which the private creditor test proves that the distributions that the budgetary creditor would receive in the case of an insolvency or reorganization procedure are higher than those which they would receive in a bankruptcy procedure.

In Bufan (2014), it has been shown that only the editing of a law text will not be enough to change the mentalities; it is necessary completion of the insolvency law with an internal procedure at ANAF level; the lack of a special, well-conceived and implemented procedure, which will obviously imply a series of hierarchical verifications and approvals, would lead in the future to the ineffectiveness of the new law provisions. There are several reasons: the lack of practice in such procedures, the suspicions, and presumptions inherent in such circumstances, the absence of a body of specialists to guarantee the accuracy of the necessary estimates, etc.

Within the amendments that were beneficial to the procedure (Milos and Deli 2018), it has been also designated the provision referring to the persons who can take the private creditor test, namely an assessor or other specialist (unfortunately, it is worth noting the drawback related to a definition missing on this line), as there will be needed multidisciplinary teams to perform this analysis, removing from the law contents the obligation according to which the specialist to be appointed by the tax creditor (in practice, the tax creditor does not assume this right), so it will be able to be appointed by the insolvency practitioner, but, even more important, mentioning the compulsoriness of carrying it out during the stage of the reorganization plan, when it is proposed to lower the budget claim.

7 Conclusion

The Romanian regulation on insolvency, namely Law 85/2014, was a progressive normative act which, as resulted from the World Bank Report, in contrast with the laws of other states, correctly regulated the debtor's situation in insolvency, respecting the necessary balance between its interests and those of its creditors and the responsibility for the requirements of giving it a second chance, by granting a real possibility of reorganization. For the stated purpose of making more efficient the insolvency procedures and improving the protection of creditors' rights, which should have as a consequence the improvement of the business environment, the recovery of viable businesses and the faster recovery of claims, the Romanian legislator amended the Law No. 85/2014 by adopting GEO 88/2018.

From the analysis of the legislative changes, it results in a hesitant position of the legislator. On the one hand, it proclaims the principle of giving a second chance to debtors in insolvency by creating the legal framework necessary for reorganization and, on the other hand, it adopts regulations that make this procedure more difficult, such as the introduction of additional conditions for public creditors for voting a reorganization plan which would provide the reduction of debts, introduction of the condition for the debtor who formulates the request for opening the insolvency

procedure that at least 50% of the total amount due of the debts be other debts than the budgetary ones, which will make that the debtors with large debts to the state budget not be able to formulate in time requests for opening the insolvency procedure, with the consequence of a decrease in the reorganization chances, failure to correlate the insolvency legislation with the tax legislation, according to which an income tax will also be due for the amount representing the haircut of the creditors' group.

It is also found that legislative measures reducing the chances of reorganization are not counterbalanced by strong measures that would increase the protection provided to those who lend to debtors in insolvency, which makes that such an operation remain risky and, therefore, too little attractive for potential financiers.

Also, although in the last normative act adopted, the Government Emergency Ordinance no. 88/2018, proclaims the need to avoid harming the competitive environment by using abusively insolvency procedures by certain debtors who use the mechanisms regulated by insolvency law in order to avoid payment of the amounts due to the general consolidated budget, it fails to take the necessary steps to incriminate acts as special infractions and nor introduces the rules necessary to prevent the commission of offenses such as money laundering.

Also against the stated purpose of decreasing the insolvency-related offense is also the implicit change which the introduction of the condition for the debtor who formulates the request to open the insolvency procedure, that minimum 50% of the total amount due of the debts to be other than the budgetary ones, has on the offense of fraudulent bankruptcy.

In comparison with the relatively short time since the adoption of GEO No. 88/2018, it was not possible to compare the number of successful reorganizations in the period prior to these amendments and in the subsequent period, but this is a research direction to follow, after a sufficiently long time has passed, which would enable the collection of accurate data.

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Socioeconomic Determinants of Health Status Among Older Adults in Poland



Magdalena Kludacz-Alessandri and Małgorzata Cygańska

Abstract One of the basic needs of the people is good health that is central to human happiness and well-being. The aim of the study was to investigate the health status of older adults (persons aged 50 years or higher) from Poland and to identify the factors affecting their health among sociodemographic and economic characteristics. The source of information used in the study was the panel data from wave 6 of SHARE (the Survey of Health, Aging, and Retirement in Europe). This database contains micro data from over 120,000 interviews with people over 50 years old from most of the EU countries and gives a broad picture of their health, socioeconomic status, life satisfaction, social, and family networks. The main methods used in this study to calculate the associations between socioeconomic determinants and health were the analysis of correlation and multiple regression. The findings showed that among the strongest determinants of health status of elderly in Poland are mainly various socio-demographic factors, such as education and job situation for the subjective dimension (self-esteem) of physical health; age and BMI for the objectivized (frequency and type of recognized health problems) physical health status; and marital status, gender, and education for mental health. We did not find any relationship between economic factors (income and property) and health status.

Keywords Health status · Socioeconomic determinants · Regression analysis · Share data

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1 Introduction

Health is an essential component of human capital over and above education, training, and experience. In times of aging societies, the question about health and life satisfaction of the elderly seems to be highly justified. Health is determined to a great extent by social and economic factors. Today, there is growing interest in the connection of individual health outcomes to their socioeconomic context. The health of individuals and the population depends on numerous and interrelated conditions, especially on socioeconomic determinants. The scientific literature defines socioeconomic position (SEP) as a complex parameter encompassing economic and social resources available to individuals, as well as their position or status in the social hierarchy (Galobardes et al. 2006).

Health and socioeconomic position are strongly related. There is ample evidence for the impact of socioeconomic factors on health within and across countries as well as over time, highlighting social inequalities in health as a universal feature of society. Income, wealth, education, current job situation, neighborhood conditions, and social networks interact in complex ways to affect the health-related behaviors, environmental exposures, availability and use of medical services, and finally the health status of individuals. Generally, individuals with low socioeconomic status have worse health outcomes than better situated members of society (Maurer 2006). An extensive body of literature documents also higher death rates among people of lower compared to higher socioeconomic position.

Health status of a population is important for the development of all countries. However, its improvement does not depend only on quality of medical care. The reduction of health disparities needs also the appropriate social and material conditions of living. The health condition of adults and the elderly depend on many factors, including the aging process and diseases that occur with age, resulting from a specific lifestyle. Important demographic and socioeconomic factors affecting the health of the elderly include age, sex, education, level, material status, and quality of family relationships. On the other hand, these factors together with general health affect the satisfaction of life that is identified with a sense of happiness. Once people reach old age, health inequalities can be widened because of various social, economic, and environmental determinants.

The aim of the study was to investigate the health status of older adults (persons aged 50 years or higher) from Poland, and to identify the factors affecting their health among sociodemographic characteristics. We used such characteristics, like gender, age, education, income, current job situation, marital status, satisfaction from social networks, and a value of property. Important was also to identify the associations between indicators connected with health status and life satisfaction.

Research regarding the health status of Polish people has been conducted for many years, however, they are characterized by a large dispersion and they are not concentrated only on the elderly. Most of them have regional character, due to limitations in the availability of demographic and epidemiological data in socioeconomic cross-sections. Data collected as part of national statistics allow only partial

analysis of differences, taking into account primarily gender, age, and place of residence (Sowa 2007). This study can be considered as a significant contribution to national information on health-related issues of elderly in Poland. It contributes to the literature by exploring how the social and economic indicators relate to the health of the elderly Polish population by analyzing three models regarding the mental health, the physical health, and the self-assessed health status. There are few but none comprehensive studies regards the determinants of health status of elderly in Poland and this study will fill this gap. An understanding of the determinants of the health of the aging populations can be important for health policy and planning.

The chapter is organized as follows. The second and third sections are based on the theoretical framework, methodology, and data where the topic is analyzed. The fourth and fifth sections are focused on the empirical analysis and a discussion of the results. And finally, the last section concludes with some final remarks.

2 Literature Review

Determinants of health status can be understood as the factors impacting on physical and psychological health state of human body. These factors combined with each other can result in either a positive or negative effect on the health of individuals, as well as entire communities. The previous studies reveal that 20 major risk factors are responsible for nearly half of the total number of premature deaths that occur globally each year (Ulla Díez and Perez-Fortis 2009). That is why addressing the social determinants of health and reducing related health inequities are center stage for many studies.

The determinants of health can be broadly divided into three groups: the social and economic environment, the physical environment and individual characteristics and behaviors of individuals (WHO 2010). Another popular and functional classification proposed by Lalonde (1974), includes four factors influencing the length and quality of life of society (the health field concept):

- Lifestyle (type and amount of food consumed, stimulants, and physical activity)
- Biological factors (genetics, gender, age, and congenital features)
- Environmental factors (social, economic, natural, and psychological)
- Health care (treatment, rehabilitation, health promotion, as well as availability, quality, and organization of the system)

The social determinants of health regard the living conditions of individuals so the circumstances in which people are born, grow, live, work, and age. They depend on the distribution of economic resources and social norms and policies at local, national, and global levels. The socioeconomic conditions are perceived as the main causes of differences in health status between population groups within and between countries (WHO 2010). They belong to the fundamental causes of health inequalities because they are primary and essential for access to key resources that can be used to minimize risk factors of multiple disease outcomes. These key resources usually

refer to economic capital (material resources—money) and social capital (nonmaterial resources—power, prestige, institutionalized knowledge and skills, beneficial social connections) (Flaskerud et al. 2012).

Most of the previous studies focus on the socioeconomic status defined as levels of education, income, or profession and its contribution to health (Marmot 2004; Wilkinson and Pickett 2006). Lifestyle factors like physical exercise, nutrition, and smoking habits play a key role in explaining the variance in morbidity and mortality levels across the socioeconomic determinants spectrum (Kjøllestadal et al. 2010; Paek et al. 2006; Shahar et al. 2005; Khaw et al. 2008). Among others also neighborhoods can influence health through their physical characteristics, such as air and water quality (Chuang et al. 2005; Giles-Corti and Donovan 2002; Gordon-Larsen et al. 2006). On the availability and quality of neighborhood services influence also access to schools, transportation, healthcare, and employment resources (Fernandez and Su 2004). Studies conducted in the United States show that the most important determinants of health status are socioeconomic factors. They determine the health of individuals in 40%. The second factor responsible in 30% for health is the behavior of people, especially physical activity, alcohol, and smoking. Health protection affects health status only in 20%, and the physical environment in 10% (ACPH 1999).

Some of the studies present the impact of socioeconomic determinants in the context of cross-national studies (Kennelly et al. 2003; Anand and Bärnighausen 2004), others present the results for the individual countries (Oldenburg et al. 2000; Fedorov and Sahn 2005). Studies have been undertaken in both developed and developing countries to ascertain the relationship between socioeconomic variables and health status indicators at both national and household levels. For instance various individual characteristic, socioeconomic, and institutional variables were the strong determinants of health status in such countries like (Alhassan and Abdu 2017):

- Canada—Immigration category (family class, skilled worker-principal applicants), sex, world region of birth, education level, age group, family income, and employment type (Zhao et al. 2010)
- Thailand—Education, living conditions, health resources, income (Saroj 2004)
- India—Lower caste, old age, illiteracy, economically dependent household with lower per capita consumption expenditure (Alam 2008)
- Kenya—Income per capita, female literacy, public health expenditure, and immunization coverage (Gakunju 2003)
- Pakistan—The private health service, poverty, gender disparity (Shaikh and Hatcher 2005)
- Uganda—Age, gender, income, education, and user fee (Lawson 2004)

Most of the above studies used national-level secondary data to investigate the relationship between socioeconomic variables and health status indicators, but there are also studies using primary data collected from individual households. In this case, the socioeconomic determinants of health status were (Seleka and Juana 2013):

- United States—Gender (Martin and Kinsella 1994), the number of children (Winter et al. 1993)
- Nigeria—Education, age at marriage, age at first birth and income (Ene-Obong et al. 2001)
- Ethiopia—Literacy, wealth, and satisfactory health facilities (Kimhi 2002)
- Malawi—Age, sex, type of house construction materials (proxy for wealth), and the region of residence of the respondent (Kim et al. 2007)

Most of the studies concentrate on the socioeconomic determinants for health for the whole population, some of them concentrate on children (Roberts 1997; von Rueden et al. 2006), teenagers (Currie et al. 2009; von Rueden et al. 2006), and young adults (Ulla Díez and Perez-Fortis 2009). So far little consideration was given to the socioeconomic determinants of health status among older adults, especially in Poland, where the number of older people is constantly rising. In 2016, the percentage of people over 45 years old stated almost 50% of the whole population and was higher than 20 years ago by approximately 8.5% (GUS 2016). The advantage of our study is that it is based on the novel SHARE survey that uses closely comparable data from one source and contains numerous objective and quasi-objective assessments of individual health. Most previous comparative studies regarding Poland relied on national data sources.

3 Methodology

Our data came from the 6th wave of the Survey of Health, Aging, and Retirement in Europe (SHARE) (Börsch-Supan 2018). It is a multidisciplinary, cross-national micro data base containing information on health and socioeconomic status of over 60,000 Continental Europeans, from 12 countries, aged 50+ years. Our sample consists of the respondents residing in Poland. We used individual-level data from more than 1800 individuals. Our analysis focuses on self-reported health outcomes and objective health measures characterizing the social, economic, and environmental situation of individual older people (Malter and Börsch-Supan 2017). The basic descriptive statistics of their distributions in the tested sample are in Table 1.

The survey covered 1826 people aged 41–100 years. Majority of them were females (56.63%, $n = 1034$). The average age was 66.61 (SD = 10.01). The most numerous group were respondents aged 60–70 years (39.26%, $n = 717$), slightly smaller was group of people aged 60–70 years (28.64%, $n = 523$). The least numerous group were 90–100-year-old people (1.36%, $n = 25$). Surveyed people came mainly from the rural areas and villages (30.12%). The majority of respondents were retired (59.69%, $n = 1090$), while 376 (20.59%) were employed or self-employed (including working for family business). The civil status analysis showed that the vast majority of respondents (70.60%) remained in a relationship (married, remarried, or concubinage), and 29.40% were single (bachelors, widowers, or divorced).

Table 1 Description of explanatory variables and basic descriptive statistics

Variable	Definition	Mean	SD
Age	The number of years the respondent has lived from the time of birth.	66.61	10.02
Education	The number of years an individual has spent in a formal educational system.	11.86	2.91
Income	Total income received by all household members—An average month last year (in EURO)	1697.71	4274.44
SN satisfaction	Satisfaction with personal network (1–10)	8.85	1.77
BMI	Body mass index	27.68	5.05
Property	Value of property (in EURO)	58,436.7	81,351.56
		n	%
Gender	Female	1034	56.63
	Male	792	43.37
Marital status	Living with a partner in household		
	Yes	1289	70.60
	No	537	29.40
Job position	Employed or self-employed		
	Yes	376	20.59
	No	1450	79.41

Source: Own work

Table 2 Description of dependent variables and basic descriptive statistics

Variable	Definition	Mean	SD
casp	CASP index for quality of life and well-being	35.87	6.74
eurod	Depression scale EURO-D	3.27	2.5
ac012	Life satisfaction (1–12)	7.19	2.04
sphus	Self-perceived health: 1 (poor)–5 (excellent)	2.33	0.93
chronic	Number of chronic diseases	2.04	1.74
ph005	Limited in activities because of health (1–3)	1.78	0.78
hc602	Times talked to medical doctor/nurse about your health last 12 months	7.31	7.89
		n	%
ph004	Long-term illness		
	No	607	33.39
	Yes	1211	66.61

Source: Own work

The state of health may be subject to objective assessment, on the base of biomedical indicators, and subjective assessment, on the base of responding to the health of the examined person. Therefore, our dependent variables are based on two groups of variables regarding the health status: (1) self-assessed health status and (2) objectivized (based on reported facts) evaluation of health status. In Table 2,

there is a description and a summary of the most important statistics for each dependent variable.

Among dependent variables, two of them represent mental health measures (eurod, casp), and the others represent physical health measures, where two regards self-assessed health status (sphus, exage). The last dependent variable included into analysis was life satisfaction. Life satisfaction is an expression of a satisfactory quality of life parameters. It reflects the level of satisfaction of human needs and shows how people assess their lives and how they feel about their perspectives and future directions. It is a measure of well-being, so it depends on the mood, emotions, contentment with relationships, realized goals, happiness, and attitude toward daily life (Srivastava 2016).

The analysis was carried out using standard statistical methods. To describe and evaluate dependencies between the tested variables correlation analysis and multiple regression were used. These analyzes are available in the package statistical programs Statistica 13.1 (StatSoft). Statistical significant differences were determined with a probability of 0.05. The direction and strength of the association between health status, life satisfaction, and selected socioeconomic variables were measured with the use of the correlation coefficients. The R² determination coefficient was used to assess the fit of regression functions to the empirical data. Multiple regression analysis is one of the most popular statistical methods for identifying and describing the relationships among multiple factors. This method allows to assess the relationship between two or more independent variables (predictors, explanatory variables) and a single continuous dependent variable (outcome, target, or criterion variable). It is also used in predicting the value of the outcome variable based on the value of a number of independent variables.

The popularity of multiple regression analysis results from its widespread availability and the possibility of application to diverse types of data and problems. It is also easy in interpretation and robust to violation of the essential assumptions. One of the most serious difficulties in multiple regression models is multicollinearity that occurs in a situation of a high correlation between the independent variables. Such a situation in a regression equation can result in several problems that make it difficult to correctly identify how much the combination of the independent variables affects the dependent variable (Ali and Bakheit 2011).

4 Results

We expected that better health results were achieved at a higher level of the following variables: level of education, income, and property. These factors create more favorable living conditions, and are associated with higher health awareness (education). A negative relation can be expected between the age and health status (Bago d'Uva et al. 2008; Frijters et al. 2005; Roy and Chaudhuri 2008). A separate variable is BMI index related to nutrition. A higher BMI index may be associated

Table 3 Correlation coefficients among socio economic variables and variables of health

Socioeconomic variables	Variables of health							
	Casp	Sphus	eurod	Ph005	Ph004	chronic	Hc602	Ac 012
Gender	-0.06 ^a	-0.013	0.192 ^a	0.03	-0.17	0.094 ^a	0.057 ^a	-0.026
Age	-0.23 ^a	-0.36 ^a	0.195 ^a	0.31 ^a	0.21 ^a	0.34 ^a	0.14 ^a	-0.07 ^a
Marital status	-0.19 ^a	-0.12 ^a	0.18 ^a	0.11 ^a	0.04	0.094 ^a	-0.05	-0.19 ^a
SN satisfaction	0.28 ^a	0.09 ^a	-0.11 ^a	-0.10 ^a	-0.02	-0.02	0.04	0.31 ^a
Job situation	-0.20 ^a	-0.32 ^a	0.17 ^a	0.27 ^a	0.24 ^a	0.29 ^a	0.17 ^a	-0.10 ^a
Income	-0.01	-0.06	-0.01	0.00	0.04	0.02	-0.05	-0.05
Property	0.09 ^a	0.10 ^a	-0.10 ^a	-0.08	-0.01	0.003	-0.06	0.06
Education	0.22 ^a	0.27 ^a	-0.19 ^a	-0.20 ^a	-0.02	-0.08	-0.10 ^a	0.14 ^a
BMI	0.02	-0.06 ^a	-0.03	0.09 ^a	0.11 ^a	0.20 ^a	0.11 ^a	0.08 ^a

Source: Own work

^aCoefficient is statistically significant at $p < 0.05$ level

with negative health outcomes. The correlation levels between selected variables are presented in Table 3.

Of the 72 relationships reported in Table 3, 46 are positively statistically significant ($p < 0.05$). Given the purpose of the study, of greatest interest is 22 relationships (these correlations are presented in bold in Table 3). On this basis, it can be said that some independent variables can be considered as significant determinants of health status of older people from Poland. None of the correlation coefficients between independent variables are high, suggesting that multicollinearity is not an issue.

A high correlation is evident between the age and most of the variables of health. The results of the study showed a statistically significant correlation between age, life satisfaction, and the health status in each of the analyzed areas ($p < 0.05$). The highest correlation was observed between age and number of chronic diseases and Self-perceived health. It has been observed, that older people were characterized by a poorer quality of life and worse health status in each of the studied areas than younger people.

Significant factors affecting health status of the elderly are also: job situation and education. The coefficients concerning the associations between health status and the analyzed socioeconomic characteristics amounted to 0.36 ($p > 0.05$) for the age, 0.32 ($p > 0.05$) for the job situation, and 0.27 ($p > 0.05$) for the education. There is no significant relationship between economic factors (income, property) and health variables.

The study shows that older patients reported worse health and lower quality of life. There are also differences in the assessment of life satisfaction depending on the health status. The correlation between selected variables of health status and life satisfaction are presented in Table 4.

All relationships reported in Table 4 are statistically significant ($p < 0.05$). The most important determinant of life satisfaction of elderly is their health condition, especially the mental one, but physical limitations are also important. A person who

Table 4 Correlation coefficients between variables of health and life satisfaction

Life satisfaction	Variables of health						
	Casp	Sphus	eurod	Ph005	Ph004	chronic	Hc602
Ac012	0.59 ^a	0.34 ^a	-0.40 ^a	-0.26 ^a	-0.18 ^a	-0.20 ^a	-0.07 ^a

Source: Own work

^aCoefficient is statistically significant at $p < 0.05$ level**Table 5** Results of multiple regression analysis

	Factor I <i>Eurod</i>	Factor II <i>Sphus</i>	Factor III <i>chronic</i>
Age	–	–	0.33 ^a
BMI	–	–	0.2 ^a
Job situation	–	-0.25 ^a	–
Education	-0.20 ^a	0.20 ^a	–
Gender	0.16 ^a		
Marital status	0.17 ^a		
R^2	0.09	0.13	0.15
<i>F-statistics</i>	12.88 ^a	28.012 ^a	159.83 ^a
<i>SE</i>	2.15	0.93	1.59

Source: Own work

^aCoefficient is statistically significant at $p < 0.005$ level

is affected by a chronic illness encounters limitations that occur as the disease progresses, which contributes to difficulties in fulfilling basic social roles. Physical limitations that significantly affect the quality of life also become important.

The relationships between the variables were checked by multiple regression analysis. Among the independent variables were, again: age, BMI, job situation, education, gender, and marital status, SN satisfaction, income, and property. The final selection of variables was performed by backward stepwise regression analysis, which involves the elimination of individual variables that have a low correlation with the outputs until we obtain a satisfactory version of the model. In this method of analysis, we start with the full model and eliminate the least significant variable. The model is then refitted to this subset of variables and the new least significant variable is eliminated. This procedure is applied iteratively until all nonsignificant variables have been removed from the dataset (Macchia 2012). Table 5 presents the standardized regression coefficients (beta), which represent the impact of individual predictors on the dependent variables.

The results of the Fisher–Snedecor test (F-test) and the corresponding level of p values indicate that the developed models describe significant statistical relationships. Based on the results, we conclude that the first model allows to explain 9% of the variation of the original dependent variable (Eurod). The average difference between the observed values of the explanatory variable and the theoretical values is 2.15. The value of the determination coefficient in the second model indicates that the set of two independent variables explain 13% variation of the second dependent variable (Sphus). The average difference between the observed values of the

explanatory variable and the theoretical values is 0.93. Predictors included in the third model explain approximately 15% of the variance of the third dependent variable. The standard error indicates that the average difference between the observed values of the variable and the values obtained by using the equation is 1.59.

The key independent variables were:

- Education, gender, and marital status—In the model describing the variable of mental health (Eurod).
- Age and BMI—In a model describing variable of physical health (chronic).
- Job situation and education—In a model describing the variable of self-assessed health status (Sphus).

Predictors included in the second model explain approximately 13% of the variance of the second factor (Sphus). In the third model, the value of the determination coefficient (R^2) was reported at 0.15, which indicates that variation in the explained variable (*chronic*) is described in 15% by explanatory variables (age, BMI). The results of the regressions suggest a significant association between the selected socioeconomic variables and health status of older people.

5 Discussion

The sociodemographic determinants have a considerable impact on self-reported health status and number of diseases. In summary, most of the studies show that health status indicators are determined by social characteristics, which include gender, education, household size, age, economic status like income or wealth, and environmental factors. For instance, the number of reported diseases and health complaints is influenced by gender, age, duration of employment, and the level of education (Baranski and Boczkowski 2009).

Our findings are in line with Deeks et al. (2009) that age and gender are associated with health-related behaviors. Another very important determinant of health status of the elderly in Poland is education. Also, many previous studies have proved that the quality of life of older people is significantly determined by their educational level (Aleksandre et al. 2009; Halicka 2004). A higher level of education correlates with higher quality of life and vice versa. The level of education determines also physical health and the well-being of older people. Bień (2006) reports that the level of education and material situation are the important determinants of the health condition of older people in Poland. Better educated people and those in a better material situation enjoy better health and better mental well-being (Halik 2002). Subramanian et al. (2010) also reported the reverse relationship between years of education and poor self-rated health status. A similar inverse association between these variables was observed for men and for women.

According to the collected data, professional status turned out to be the factor that impacts the health status of elderly. There were statistically significant differences between the health status of retired people and professionally active ones. Active

persons assessed their health status higher and had less physical limitations and chronic diseases. Professional status is not often analyzed in the literature. It is difficult to study because it requires taking into account the importance of different aspects of working life. Among the employed persons, their professions differ in their qualifications, prestige, and characteristics of their work, and each of the mentioned features of professional status is associated with the risk of death (Gregorio et al. 1997).

Another, very important determinant of health status and life satisfaction in late adulthood is the family. We found that marital status and satisfaction from social networks were strong determinants of quality of life and life satisfaction. The quality of life in elder people is conditioned by the social context and experiencing loneliness. Also, other studies show that older people living in their families enjoy a higher quality of life than residents of a social welfare home (Okla 2006). The quality of the relationships, especially with a partner and with the children, significantly shapes the level of health and life satisfaction. Both poor relationships with children and the lack of children determine significantly lower parameters life satisfaction of an elderly person (Halicka 2004).

The research conducted in Western countries (Weich et al. 2002; Mackenbach et al. 2008) and in postcommunist countries (Leinsalu 2002) showed that the risk of disease is definitely higher among people from lower social groups, with lower incomes. We did not find significant relationship between economic variables (income, property) and health status of elderly. The reason for such a situation in Poland may be the strong financial support of retired people by their children and the family. This problem needs further investigation.

Hunger and Major (2015) confirmed that BMI is indirectly related to poorer self-reported health. They measured the influence of BMI on both, psychological (depression, self-esteem, and quality of life), and physical health. It was partly consistent with our study, where BMI appeared as a strong determinant but only of a number of chronic diseases.

6 Conclusion

We reviewed actual knowledge regarding economic and social determinants of health status and research gaps and priorities in this area. We have focused on such determinants of health, like gender, age, gender, BMI (Body Mass Index), education, job situation, wealth (accumulated material assets and income), marital status, and satisfaction from social networks. For health status, several indicators were analyzed—self-reported health status, chronic diseases, quality of life and well-being, depression scale, limitation with activities, and long-term illness.

The chapter attempts to assess the relationship between various sociodemographic factors and health status of elderly people from Poland. The results of the conducted study showed, that sociodemographic factors—such as gender, age, education, job situation, BMI, and marital status—are strong

determinants of health status of elderly in Poland. We did not find any relationship between economic factors (income and property) and health status.

The most important factor of the subjective dimension (self-esteem) of physical health of older people in Poland was education and job situation. The strongest impact on the objectivized (frequency and type of recognized health problems) physical health status had age and BMI. The most important determinants of mental health in late adulthood are marital status, gender, and education. Most of the health indicators together with marital status and satisfaction from social networks impact also life satisfaction of elderly.

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The Strategic, Cognitive, and Institutional Perspectives of Transparency: The Meijer's Model Applied to Italian Local Government



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Abstract Public administrations are introducing managerial innovations, accounting and control systems into their organizations to enhance economic, financial, and organizational performance. Transparent communication is an important vehicle to increase the accountability of public administrations toward the community, contributing to a lasting development of the degree of credibility and trust toward the institutional system. Transparency generates the basis for social control, consensus building, and networks between public organizations and stakeholders, but also requires greater openness to the external context. This study investigates transparency processes in public governments, highlighting their complexity and the effects on the activities of open governments. To analyze the managerial approach to transparency, we have adopted Meijer's model (Public Administration Review, 73, 429–439, 2013). The model studies transparency in public organizations from a strategic, cognitive, and institutional perspective and the way in which it is developed through the interaction between governments and stakeholders. The results show how power games, cognitive frames, and institutional rules influence the creation of government transparency. They highlight the importance of analyzing their interrelation in order to gain a better understanding of the complex dynamics of transparency in open public organizations.

Keywords Transparency · Local governments · Open administration · Management tools · Italian public context

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1 Introduction

Changes to Italian anti-corruption rules (President of the Italian Republic 2012, 2013) have altered the way in which Italian public governments communicate results and provide access to information and data regarding its activities. The need to realize a communication activity is based on timely publications, high-value information availability and open formats (Moore 2003). Based on stakeholder expectations, the clarification of many and varied information is a condition for the exercise of democratic power and constitutes a function of public interest for local authorities. Communication according to transparency approach is linked to the system of rules that regulate the functioning of administration. This approach requires the introduction of an anti-corruption plan and the adoption of a more active role in the local context by publishing on websites' information such as budgets, management plans, strategic documents, programs and projects, costs of initiatives, and public results. The continuous activity carried out by local authorities produces changes in the performance achieved (Daujotaitė and Adomavičiūtė 2017) and also in the way of satisfying citizens. When administrators and public managers exercise their responsibility through the management of financial resources, a process of sharing and usability of the information is required (Kluza 2017). The objective of transparency can be achieved through the creation of communication tools that are able to transfer information to citizens. This process involves a social action through the direct involvement of entrepreneurs, local associations, companies, citizens, and other interested parties. The tools to carry out this process can be discussion forums and specific communication tools for social and entrepreneurial initiatives that allow debate and interaction.

We study transparency in public governments' communication with stakeholders, highlighting the different aspects of this approach and its effects on the activities of open governments. In particular, the research aims to investigate the process of transparency within local authorities.

To achieve this goal, we adopted Meijer's model (2013). This model investigates transparency in public organizations from a strategic, cognitive, and institutional perspective and the way in which transparency is developed through the interaction between governments and stakeholders. The results obtained by applying Meijer's model to Italian local government, highlight the different dimensions of transparency and their interrelation. The contribution of the present research is to identify an interpretative key that can contribute to explaining the processes of transparency in public administrations. The theoretical model adopted has been used to identify some dimensions of transparency by linking them to institutional contexts and their complexities. This study can provide a first interpretative approach that local authority administrators could use to detect some critical issues in the achievement of transparency processes.

The study is structured as follows. The first section introduces the research to investigate transparency processes in public governments. Then, we review the literature on transparency adopted in organizational public contexts; it considers

transparency as a result of the interaction between different actors and communication activities. In Sect. 3, we discuss the three different perspectives of analysis involved in Meijer's model (strategic, cognitive and institutional) and their double effects: on the one hand, their impact on the construction of transparency and on the other hand, how the transparency process affects the three perspectives of analysis. We conduct an exploratory case study applying Meijer's model to a local government body in order to reconstruct the different dimensions of transparency and the interaction between its main actors. The results could be useful for gaining a better understanding of transparency in the managerial process from a strategic, cognitive, and institutional perspective. The contribution focuses on the degree of openness of a small Italian local government and its implications on the communication activities of public actors.

2 Literature Review on Transparency through Interaction and Communication

The literature on transparency deals with various issues. The theme of transparency is linked to the quality of communication. The use of techniques and new tools to convey information to the outside is a strong requisite. The communication process represents a primary institutional duty of the public administration as it guarantees effectiveness (Szydło 2016), efficiency, and the achievement of transparency (Fairbanks et al. 2007; Bertot et al. 2010).

This topic has not been extensively analyzed in public sector studies (Peck 2007; Piotrowski and Van Ryzin 2007; Valentini 2013). Some important characteristics of transparency have been studied (Otenyo and Lind 2004; Piotrowski 2009; Guillamòn et al. 2011) and also different approaches related to its measurement (Heise 1985; Stirton and Lodge 2001; Fairbanks et al. 2007; Hazell and Worthy 2010; Meijer 2012; Lowatcharin and Menifield 2015), its barriers (Pasquier and Villeneuve 2007; Janssen et al. 2012) and how it is perceived (Rawlins 2008; Relly and Sabharwal 2009). Transparent communication of reliable data and information is linked to the achievement of adequate awareness of subjects operating within the public administrations that are responsible for their good performance. The concept of transparency refers to the overall activity of the organization and therefore presents different aspects of analysis. Finel and Lord (1999) defined transparency as "legal, political and institutional structures that make information about the internal characteristics of government and society available to actors both inside and outside of the domestic political system" (Finel and Lord 1999, p. 316). Rawlins (2009) highlights the relevant elements of transparency: "Information that is truthful, substantial, and useful; participation of stakeholders in identifying the information they need; and objectives, balanced reporting of an organization's activities and policies that hold the organization accountable" (Rawlins 2009, p. 74).

Transparency has been related to the availability of information for decisions, the procedures followed by public authorities and the performance of the various organizational structures (Curtin and Meijer 2006). Furthermore, the acquisition of information to support and satisfy external actors plays a signal role in monitoring the internal functioning of public authorities (Grimmelikhuijsen and Welch 2012; Meijer 2012; Grimmelikhuijsen and Meijer 2014). Some contributions, based on social psychological theories, study the effects and the mechanism of the relationship between transparency and reliability of public institutions (Grimmelikhuijsen and Meijer 2014). Other approaches (Relly and Sabharwal 2009) examine whether norms can influence public administrators in their perception of a nation's transparency in political and institutional processes, highlighting that sometimes the opening factors that impact this perception can be non-homogeneous and diversified. Magnini et al. (2000) study two projects in which the use of technology can improve communication between public administrations and stakeholders. The authors emphasize that the requisite for transparent communication is that "information is available and reaches every citizen with the same clarity, to avoid disparity" (Magnini et al. 2000, p. 2). In this sense, IT tools become an important element to support and guarantee the transparency and to make clear the relationship among decisions, activities, and responsibilities of public actors toward the community. Effective communication is facilitated by the ways of access to information by stakeholders (Martinson 1996) in reporting the organization's activities, initiatives, and policies.

Piotrowski and Van Ryzin (2007) consider the importance of interactivity with respect to transparency. They develop different indices to evaluate citizens' demand for transparency at the local level, suggesting different dimensions of the assessment. The information flow depends on the quality of information perceived by citizens. In this sense the communication channels must be effective to allow a useful exchange of information. Fairbanks et al. (2007) outline a transparency model to stimulate institutional communication. This model must be used to understand how to make institutional activities more transparent and how the government should interact with stakeholders, identifying practices and structures that promote transparent communication. Rawlins also emphasizes the relevance of an interactive activity in transparency processes, where the involvement of stakeholders (Rawlins 2009) and the creation of useful channels to reach citizens (Heise 1985; Cotterrell 2000) become essential. In this research, transparency is related to the organization's context analysis and it is the product of complex interactions between different public actors.

Christensen and Cheney (2015) define two aspects related to observation of an organization. Firstly, they considered communication and expectations about what communication can and should accomplish in improving transparency. Secondly, they affirm that the organizational approach allows us to understand what transparency does in "contexts where the ideal is most vigorously articulated and elaborated" (Christensen and Cheney 2015, p. 85). In this sense, aspects related to transparency are not seen as static and immutable forms but elements subject to environmental changes reflecting specific historical and cultural context and to continuous critical

revisits (Christensen and Cheney 2015, p. 86). The study of the context of an organization in its complex interactions and different perspectives contributes to the construction of government transparency (Meijer 2013).

3 The Construction of Transparency: The Heuristic Model and Implications in Public Administrations

Starting with some studies that analyze transparency as interaction and sharing activities (Fairbanks et al. 2007; Vicente et al. 2007; Rawlins 2009; Meijer 2013), we adopted the heuristic model developed by Meijer (2013). Focused on theories on complex decision-making processes in the public sector (Koppenjan and Klijn 2004; Teisman and Klijn 2008; Da Cruz et al. 2016) and social construction of new technologies (Bijker et al. 1987; Williams and Edge 1996), the model investigates the construction of transparency in interaction between public organizations and stakeholders, analyzing the organization according to strategic, cognitive, and institutional complexities (Meijer 2013).

3.1 Strategic Complexities

Strategic complexity is linked to strategic uncertainty, intended as the decisive behavior of actors in an interactive decision-making situation (Brandenburger 1996; Heinemann et al. 2009; Meijer 2013). In this sense, we wonder what the players want and how they react to the development of new forms of transparency. The behavior of the actors may increase or decrease the construction of transparency according to the political game and the influence of the action of each stakeholder. Political power can limit or improve transparency. However, strategic complexity not only influences the construction of transparency; changes in transparency also affect strategic interactions in different policy fields. On the one hand, the strategic perspective is related to the power of different government actors (e.g., agencies, government organizations, and external stakeholders) in the sociopolitical creation of transparency and, on the other hand, to the way in which various modifications in transparency processes can impact their power, policymaking logics and adoption of actions consistent with the objectives.

3.2 Cognitive Complexities

The actors, whether opponents or supporters of transparency, have different perspectives. For example, if some administrators define the efficiency approach

differently, they also interpret some transparency measures related to the efficiency of public services differently. The change processes in transparency also determine cognitive consequences: the cognitive frame of various actors may be influenced by access to public information. In this case, transparency not only affects access to information, but also the attention actors pay to these issues. Discussion and debate are conducted based on documented questions. For this reason, debate depends on the accessibility of information (Stone 1997; Meijer 2013). Cognitive complexity relies on recognizing the meaning of transparency according to the different actors; in the case of political participation, for example, transparency can be considered as a right or a menace to democracy. The transparency process can also redefine the role of public actors, influencing cognitive aspects.

3.3 Institutional Complexities

Institutional analysis is related to institutional uncertainty in terms of insecurity about the primary guidelines of political and administrative action (Schedler 2001; Meijer 2013). We evaluate if the different values (for example democracy or efficiency), conceptualized by actors in a different way, can affect the construction of transparency. In this context, transparency “does not result from (democratic) values but becomes a value of its own” (Meijer 2013, p. 432). The institutional perspective considers the role of administrators and officials, which operate according to an institutional and legal framework, providing information to external actors. At the same time, we can consider the impact of changes in transparency on institutional rules, changing the roles of external subjects in decision-making processes, and identifying new approaches for interaction between public organizations and stakeholders.

3.4 Applying the Meijer Model to Local Authorities

The Meijer model (2013) analyzes these three different perspectives of analysis and their double effects: on the one hand, how each perspective affects the construction of transparency and, on the other, how transparency affects various aspects of the three perspectives of analysis. The issues raised by the heuristic model are summarized in Table 1.

In this study, the heuristic model was applied to local authorities. The managerial logic within these administrations makes it appropriate for analysis to be conducted at different levels of inquiry. In such organizations, a strategic consideration is that the actors formalize political decisions through plans and programs that reflect the desire to activate a consensus on the use of resources. In this sense, the distribution of resources must be communicated in accordance with transparency rules that could affect their position in the decision-making process. In addition, new practices of

Table 1 “Heuristic Model for the Social-Political Construction of Government Transparency” (Meijer 2013, p. 432)

Strategic analysis	“How do power games influence the construction of government transparency? How do new forms of transparency influence power games?” (Meijer 2013, p. 432)
Cognitive analysis	“How do various cognitive frames influence the construction of government transparency? How do new forms of transparency influence cognitive frames?” (Meijer 2013, p. 432)
Institutional analysis	“How do institutional rules influence the construction of government transparency? How do new forms of transparency influence institutional rules?” (Meijer 2013, p. 432)

Source: Meijer (2013, p. 432)

transparency established by the rules may have an impact on their position and on the interaction between politicians and managers governing local authorities, who sometimes interpret the role of information in different ways (Liguori et al. 2012).

Planning, for example, defines the commitments between the institution itself and other stakeholders, as the decision-making processes performed by the political actor in the allocation of financial resources become a prerequisite for regulating relations between an administration and its citizens and the transparency mechanisms that support political consensus. The construction of transparency in these contexts reflects a different way of interpreting the rules of good performance and the impartiality of an administration and makes it possible for organizational behavior to ensure efficiency, effectiveness, and economy of operations (Basílio et al. 2019). The presence of politicians and managers and their complex mode of interaction (Frederickson and Smith 2003; Svara 2001) often makes the process of internalization of goals and the roles involved in managing local administration non-homogeneous. This affects solutions to public needs, the growth of credibility, and confidence with respect to the community as a whole.

Recognition of the cultural, institutional, and social values of actors is also a relevant aspect, because the different ways in which they are perceived affects strategies and the implementation of transparency. The way processes of transparency are acquired can also affect the role played by both politicians and managers, who can, for example, reinterpret the mechanisms for discussion and interaction with stakeholders.

4 The Empirical Case Study

4.1 *The Principle of Transparency in Italian Public Context*

In the Italian public context, the process of management innovation in the public administration aims to implement accounting tools and control systems to improve economic, financial, and organizational performance and thus contributes to developing greater transparency. Regulatory changes in the last two decades have progressively defined different channels in which public governments communicate the results of their actions. Italian Law 241 (President of the Italian Republic 1990) introduces transparency principles in relation to the use of resources and the supply of public administration services. Other rules concerning transparency are Legislative Decree 29 (President of the Italian Republic 1993) on the subject of reorganization and civil services; the Bassanini Law 59 (Italian Government 1997) that regulates the paths concerning administrative simplification; Law No. 150/2000 that establishes rules on information and communication activities among public administrations; Law No. 69/2009 about publication of data and information of public managers and executives on institutional websites; and Legislative Decree 150 (President of the Italian Republic 2009) that defines objectives and measurement approaches to provide a complete representation of the performance expected and the performance actually achieved by the public organization. Legislative Decree 150 defines transparency as a process inspired by the criteria of good management, total openness and impartiality. The monitoring procedures are based on the structure of the public administrations' website that must contain all aspects of the organization that relate to performance indicators, the use of resources, the achievement of objectives and results, and the evaluation by control bodies (President of the Italian Republic 2009, p. 7).

Other regulations on transparency have been produced, such as Law 190 (President of the Italian Republic 2012) on the prevention and repression of corruption and illegality in the public activity and Legislative Decree 33 (President of the Italian Republic 2013) on the reorganization of rules concerning publicity and transparency obligations through the implementation of suitable tools to promote the dissemination of results by local bodies. It requires the introduction of an anti-corruption plan and the development of information channels toward the external context through the publication on websites of documents that contain accounting data, indicators, and tools for assessing economic and financial performance. The recent Legislative Decree 97 (President of the Italian Republic 2016) provides for total accessibility of data and documents held by public administrations, in order to defend the rights of citizens and to promote the participation of actors in administrative activities.

Public transparency is closely linked to communication and digitalization processes. The distinctive feature of local bodies is that the institutional activities are placed within the sphere of technical and political-institutional functions. This influences the communicative relationship established between the institution and the external stakeholders.

Communication takes on internal and external importance. The internal relief is given by the methods of the reporting process that presupposes an organizational interaction between the governing bodies and the service managers. The contents of financial and non-financial documents depend both on the information needs of the public organization but also on the value that administrators attribute to the contents and purposes of these tools.

The external communication process becomes important because it is linked to the function of protecting the public interest by these organizations. The assignment of resources and the measurement of results take on external relevance, as there is, from the community, a need for transparency and accountability of institutional choices about the use of public resources.

Another important purpose of the transparency processes is that through the measurement of the revenues and expenses of different services, the local authority shows that there are no irregularities and that the rules are respected.

Local authorities through this communication system give an account of their activity and the citizen can formulate an opinion on the interventions adopted and on the ways to satisfy the needs. For example, the public relations office (URP) accepts requests or complaints or positive/negative judgments that often concern aspects relating to the use of public services by the community.

Transparency regulations have also changed the logic of the budget system, which becomes not only a document authorizing the expenditure but a tool for representing management results.

Italian law establishes that all information on the entity's financial and economic situation is published on the website. Moreover, it is necessary to communicate also specific information on non-financial results that measure the quantity and quality of services rendered.

The Compass of Transparency (in accordance with Legislative Decree 33 [President of the Italian Republic 2013]) is an initiative introduced recently and promoted by the Italian Ministry for Simplification and Public Administration to develop the quality of online information and digital services through the involvement of citizens. This instrument, through the determination of indicators, highlights the degree of disclosure and transparency of the various local authorities without entering into the specific content of the information (Italian Minister for Simplification and Public Administration 2018). The analysis certainly reveals an evolutionary process that aims to improve transparency and communication processes. The goal, yet to be perfected, is to deepen the interaction between the communication of results and the consent of citizens on the activity of the institution. This implies evaluating the degree of citizens' interest in financial and non-financial information and the degree to which information influences the judgment on the actions of public administrators.

The transparency measurement tools introduced by the regulations are essentially related to the information provided, the degree of accessibility, and methods of communication to citizens. The construction of transparency process also entails the study of public organizations based on a contextual approach that considers the interaction between governments and the actors and their perceptions according to different aspects of investigation (Meijer 2013).

4.2 *Methodology and Research Site*

In order to report some empirical evidence on the construction of transparency, we decided to conduct an exploratory case study (Yin 2003; Eisenhardt and Graebner 2007). The study follows an interpretive approach (Scapens 2004), designed to capture the perceptions of actors working in the field, interpreting their approach according to the identified theory. This is not intended to establish an empirical basis for subsequent generalizations; but the intent is to further examine the specificity of the context to validate the explicative aptitude of the theory. In addition, consistent with the objectives of this study, the case is examined according to a longitudinal approach. The organization was chosen for its willingness to cooperate and its good reputation in promoting innovative practices.

A local body that assumes the characteristics of an open administration has been analyzed to explore its method of developing a managerial approach to promote transparency and the effects on communication paths to the local community. The municipality is a small town situated in Sicily with a population of 25,615 inhabitants (2017). The local body is supported by digitalization and standardization of transparency procedures, favoring interaction among firms, local organizations, and citizens.

The case study was carried out ex-post, by retrospective reconstruction. The analysis was conducted during the period 2015–2017. We collected internal documents provided by the municipality observed as well as information and data from semi-structured interviews with some managers and institutional actors. Specifically, data was collected through interviews, document analysis, and consulting the local government website. The interviews involved the Mayor, the Deputy Mayor, and some members of the Executive Committee, the Municipal Secretary as the person responsible for transparency, four managers of the various sectors, and the President of the Local Council. The interviews were conducted individually in the form of informal conversations lasting 40 min. Transcripts of the interviews were made known to the respondents who approved them. The documentary analysis focused on the following documents: strategic reports, anti-corruption plans, the performance plan, the executive management plan, and all documents on transparency procedures. Information and data were transcribed with the aim of highlighting the main perceptions and activities related to the construction of transparency.

In order to improve external communication, the institution has implemented a redefinition of the procedures supported by digitalization. For example, the institution has tried to improve the definition of indicators to better provide information on the degree of efficiency and effectiveness in order to consolidate the performance evaluation process and to develop an adequate management control system. During the planning phase, negotiated processes take place in which the relevant actors, such as the politicians and managers, contribute significantly to the formulation of the programs and objectives. The control system is more fragmented and is focused only on some parts of the public activity, for example, on financial data. There has been a tendency in the past to consider the moments of planning, control, and

evaluation as separate and independent activities and this has led to a reduction in their usefulness.

In recent years, the local authority has tried to redesign and gradually implement the control and evaluation performance system, on the one hand, by organizing more formal discussion and negotiation moments between politicians and managers and, on the other, by developing additional objectives and strategic indicators according to a scale priority by improving its measurement.

The selected case study provides a basis with which to highlight different aspects of transparency. In order to evaluate the processes of transparency, the initiatives and the standardization of the procedures and the perceptions that the actors have with respect to the approach to transparency have been analyzed.

The local authority has started mechanisms to enable transparency, the aims of which are expressed in the three-year Corruption Prevention Plan 2015–2017. The current administration shows a willingness to defend the cultural identity of community administration, promoting and supporting transparency initiatives as sources of social development of the territory. During the interviews, it emerged that politicians and managers tend to prefer informal communication, promoting interaction between different sectors.

The administration has also developed a process of adaptation to the Prime Ministerial Decree 252 (President of the Council of Ministers 2012), creating regulations concerning the criteria and methods to be adopted to disclose information. The Italian local administrations are thus obliged to publish various documents and reports on their institutional website in a distinct section called Services for Citizens. Furthermore, the various communication methods adopted should be constantly maintained and adapted according to information needs of community. The set of transparency rules are intended to stimulate local authorities to measure and communicate the activities carried out for residents and companies in order to satisfy the duty of accountability. This activity is aimed at protecting the public interest by making the procedures known to the community and offering an interpretation of the provisions taken in order to verify the institutional objectives.

In this specific space on the local authority's website, information about services are provided for employees, citizens, and firms. The space is divided into 13 topics such as regulations, transparency, citizen services, performance evaluation plan, nomination of independent organism assessment (OIV), administrative control activities, management control activities, assessment activities, organization, public works, planning and government of the territory, open government, and PEG (Piano Esecutivo di Gestione).

4.3 Results

The case study explored has been useful in helping to reconstruct the strategic, institutional, and cognitive aspects of transparency. We tried to understand the construction of transparency in the relationship between the municipality and the

main actors, such as the public utility companies, in terms of the strategic behavior of these actors, cognitive frames according to public information availability, and institutional values. The empirical evidence shows for each perspective how different factors influence and have influenced the development or the weakening of transparency; at the same time the results show that changes in the transparency processes have modified the interaction between the organization and the actors. The construction of transparency according to the strategic, cognitive, and institutional complexities (Meijer 2013) is the result of different perceptions by various actors.

4.3.1 Strategic Complexities

This dimension highlights what the players want and how they react to the development of new forms of transparency. The conduct of institutional actors may increase or decrease the construction of transparency. In turn, changes in transparency can also affect strategic interaction in different policy fields, influencing decision-making processes. The main questions that refer to the strategic dimension are:

Q1: “How do power games influence the construction of government transparency?” (Meijer 2013, p. 432).

Q2: “How do new forms of transparency influence power games?” (Meijer 2013, p. 432).

With respect to the first question, the interviewees believe that the power game is the combined results of the institutional activity and the managerial one. The two spheres influence the construction of transparency through the adoption of measures, initiatives, and measures for the fulfillment of the obligations of publication and dissemination of information required by current legislation and which constitute in particular the appropriate completion of specific measures to establish the legality as a widespread cultural assumption. Besides this, they also believe that the power game interprets transparency as a tool to prevent and fight corruptive behavior.

With reference to the second question, the interviewees believe that, in some cases, transparency processes influence the decisions about the allocation of financial resources. However, transparency processes do not influence other decision-making processes. The fact that institutional decisions taken and accounting information and performance documents will then be published and made known to the outside world does not interfere with the decision-making process and does not inhibit or influence it.

4.3.2 Cognitive Complexities

The cognitive frame of various actors may be affected by access to public information. The transparency process can also redefine the role of public actors, influencing cognitive aspects.

This aspect relies on recognizing the meaning of transparency according to the different actors. The main questions that refer to the cognitive dimension are:

Q1: “How do various cognitive frames influence the construction of government transparency?” (Meijer 2013, p. 432).

Q2: “How do new forms of transparency influence cognitive frames?” (Meijer 2013, p. 432).

With respect to the first question, the interviewees believe that the cognitive domain has a certain influence on how to construct transparency. Awareness of the relevance of the concept of efficiency and effectiveness of administrative action favors greater compliance with regulations, for example, in relation to publicizing obligations and the formulation of plans and programs. In addition, the knowledge of compliance with accounting procedures and the process of budgeting, through the distribution of resources by means of responsibility areas, influence the organization’s transparency process.

With regard to the second question, the interviewees believe that application of the transparency legislation leads to a change in the cognitive domain of actors and that can influence the introduction of new technical-IT tools. In this sense, it is relevant to reorganize the information system according to the information to be published and update the institutional website by adding new sections and reorganizing the information based on transparency regulations. In addition, the transparency process also has some advantages for internal activities. The greatest benefits have occurred within the institution and can be identified in the improvement of internal informal communication. Actors recognize the importance of increasing the level of information available to external subjects. Finally, transparency can cause changes in organizational terms. The responsibilities to be attributed to various actors within the organization have had to be identified in order to comply with the obligations and transparency procedures.

4.3.3 Institutional Complexities

In this context, it is necessary to assess the institutional values (for example, democracy or efficiency), conceptualized differently by actors, which can affect the construction of transparency. At the same time, changes in transparency can influence institutional rules, altering the method of interaction between a public organization and its stakeholders.

The main questions that refer to the institutional dimension are:

Q1: “How do institutional rules influence the construction of government transparency?” (Meijer 2013, p. 432).

Q2: “How do new forms of transparency influence institutional rules?” (Meijer 2013, p. 432).

With regard to the first question, the interviewees believe that the institutional dimension is linked to the cognitive aspect and to how the working environment is

perceived. The way in which the subjects interpret the values influences the processes of implementation of transparency. However, the law prescribes some procedures and their application does not necessarily imply the possession of values or principles.

With regard to the second question, the interviewees consider transparency as a tool that helps to strengthen values such as democracy and participation. *Transparency is already a value in itself, but it is certainly also a useful tool with which to affirm the other fundamental values on which a social system is based.* Two levels can be distinguished: the organizational and individual levels. If transparency is related to the organizational level, it is an instrument and a method with which to open the administration's activity. However, if transparency is linked to an individual level, it is perceived more as an institutional value. Finally, the application of transparency regulations may affect relations with other institutional bodies, such as corporate holdings. In some cases, local bodies publish documents and data referring to investee companies; in this case, therefore, the exchange of information and the level of communication with them increases. Finally, transparency certainly improves the context of institutional values. When a transparency process is implemented, for example through the publication of relevant information or events and initiatives that can have a positive impact on the territory, it improves the positive perception of the public activity by the stakeholders. When efficiency improves, institutional subjects, and public managers acquire the importance of democracy, participation, and the value of constant dialogue with citizens.

5 Contribution and Limitations

In this study, we provide an overview of the transparency processes, exploring the key components of transparent communication. The Meijer model (2013) is applied, analyzing three different perspectives of analysis and their double effects: on the one hand, how each perspective influences the construction of transparency and on the other hand, how transparency affects various dimensions of the three perspectives of analysis. The issues raised by the heuristic model are analyzed with respect to empirical evidence from an Italian local government.

Based on the perceptions of the interviewees on the strategic aspect of transparency, we can see a relationship between the political mechanisms and the transparency processes. In this sense, the method of operation of political and managerial actors influences the methods of implementing transparency. There is no direct influence of transparency on the decision-making process.

With reference to the cognitive dimension, there is a reciprocal influence between the way in which the role of transparency is perceived, managerial principles and the process of its implementation. Transparency can affect organizational processes, as it can motivate public organizations to rationalize activities and improve reporting and measurement processes. Analysis of the institutional dimension shows that institutional values have a weak impact on the transparency process, while the transparency

process has a strong impact on the strengthening of institutional values. When virtuous processes of transparency are activated, improving accessibility, and publicity of public activity, the level of quality perceived by the community improves and that increases the effectiveness of administrative action. In this phase, administrators and managers acquire greater awareness of the importance of democratic participation and sharing.

The last result highlights an important aspect of transparency communication. In fact, a relationship exists between transparency, its dimensions, and the effects it has on the expectations of multi-stakeholders. The participation of stakeholders and interaction with the same make a continuous improvement in transparency more achievable. This study helps to provide a better understanding of some dynamics of transparency processes that affect the context of public administrations. By framing and discussing the empirical results in a conceptual interpretative framework, specific dimensions of analysis that characterize the role and the way in which transparency is interpreted have been highlighted.

This methodological approach offers a descriptive framework of the practices adopted and the perceptions of a virtuous municipality. To deepen the mechanisms of transparency and its different dimensions, further contributions may investigate similar organizations with regard to communication transparency instruments and accountability systems. It would be useful to make a comparison among them for a more in-depth examination of transparency in communication in the context of open administration.

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The Role of South African Universities in Driving Sustainable Development: The Student's Perspective



Tshedu Matiwaza and Suvera Boodhoo

Abstract Students are seen as future decision makers and leaders of tomorrow. Therefore, this study addresses student perceptions of sustainable development. As universities are instrumental in educating future leaders and decision makers, it is imperative for universities to play a critical role in educating students to carry out research that facilitates sustainable practices. This study is conducted to determine the factors influencing student perceptions of sustainable development, especially their perceptions of environmental development, economic development, and social development. The study focuses on postgraduate students studying at a South African university. In addition, the study investigated how the university addresses sustainable development through teaching in order to equip students to be responsible and sustainability-conscious individuals. The study adopts a quantitative research design and makes use of factor analysis to assess the quantitative data. The results indicated that students view education and social development as key to sustainable development. However, it is evident that more emphasis needs to be placed on economic and environmental development through the enrichment of curricula.

Keywords Sustainable development · Higher education · Sustainable education · South Africa

1 Introduction

Sustainable development is defined as a pattern of resource use aimed at meeting human consumption while preserving the environment (Buchholtz and Carroll 2009). It is also defined as carrying out responsible activities that meet today's

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needs without comprising the needs of future generations (Heizer and Render 2014). It encapsulates economic, social, and environmental development. According to Springett (2013), sustainable development can be better understood as a threat to sustainability as it has a dangerous association with economic growth, which the author describes as a 'smacking of positivism and modernism'. Redclift (2005) takes the contrary view that sustainability is contradictory to development. Students are future leaders who will become active participants in the economy through decision making, policy implementation, and practices. It is imperative that student perceptions of sustainable development are evaluated to ascertain their awareness of the need to preserve the natural environment. Corrective learning can remedy negative attitudes by influencing positive attitudes that build strong sustainability values and beliefs. Sustainable development is a cornerstone of a healthy environment; universities (and other higher education institutions) need to produce sound graduates who are sustainability-conscious and are willing to learn. Universities have always been assessed by their potential to provide quality education; along the way, they have gradually institutionalized sustainability practices through curricula, research, and other operations (Nejati and Nejati 2013). Their role in driving sustainable development should now be measured by evaluating student attitudes, perceptions, and knowledge levels. Students need to be nurtured to become role models for sustainable development. This study is significant due to the relevance of sustainable development in higher education and society. Issues relating to environment, economic, social, and educational spheres need to be addressed to create awareness and channel a new order of thinking towards sustainable development. Therefore, the aim of this study investigates student's perceptions toward sustainable developments using the following economic, social, environmental, and education constructs and identifies the interrelatedness of these variables and their effect on sustainable development. The findings indicated that students view education and social development as key to sustainable development. However, students did not view economic and environmental development as important. Therefore, more emphasis needs to be placed on economic and environmental development through the enrichment of curricula. The structure of this chapter consists of a literature review, methodology section, results, and recommendations.

2 Literature Review

The World Commission on Environment and Development investigated sustainable development and suggested guidelines or principles for sustainable development. The Brundtland Report prepared by the United Nations in 1987 stressed that critical environmental issues were a result of poverty of the South and unsustainable consumption behaviors of the North (United Nations 1987). The commission was established to unite all nations to pursue sustainable development and recognized human capital development as a key tool for alleviating poverty, inequality, and a form of wealth distribution. Economic growth, environmental protection, and social

equality were identified as the main pillars supporting sustainable development (United Nations 1987). Holden et al. (2017) assert that sustainable development is based on three moral imperatives: satisfying human needs, social equity, and respect for the environmental limits. The authors advocated for scientific insights on the notion that sustainable development is the balance among social, environmental, and economic pillars. Their view is that sustainable development should rather be viewed as human behavior and a constraining device of economic activity and growth. Holden et al. (2017), criticize the sustainable development guidelines devised by the United Nations, stating that these guidelines did not consider environmental limits and the potential drawbacks of scaling on economic growth.

2.1 Environmental Development

Environmental development is an effort made to repair environmental impacts and resource consumption. For example, when industrial processes became more efficient, it may contribute to economic growth but may prove to have a negative environmental effect (Biasutti and Frate 2016). Zsoka et al. (2013) define environment development as natural resources; this includes climate change, urbanization, waste, and natural disaster mitigation. Education for environmental development is crucial as it raises awareness and responsible behavior and has a significant influence on lifestyles and consumer behavior. Holt and Barkemeyer (2012) indicate that the twenty-first century faces many changes resulting from environmental and social issues within the public and private sectors. This has been the result of environmental awareness campaigns and social issues being communicated through more structured channels.

2.2 Social Development

Society is a deciding factor in aiding the preservation of the environment (Biasutti and Frate 2016). As degrading social issues can hinder the success of a community in driving sustainable development debate and practices. Kahn (2015) identifies the rise of neo-liberalism that is severely criticized as having brought about dominance and deregulated growth resulting in a “growth trap”; economic growth is thus favored over nourishing society. Social development should, therefore, be taken equally as seriously as economic development. One way of ensuring that social development is taken seriously is through Corporate Social Responsibility (CSR), which is described as conservation of natural resources. Luke (2013) asserts that CSR plays a fundamental role in having to answer to society. CSR programmes are rooted in sustainable development pledges to shareholders and stakeholders of organizations and therefore should encapsulate organization’s response to community outreach, social impact, cultural sensitivity, and environmental regulation standards. Redcliff

and Woodgate (2013) stress that the relationship between sustainable development and nature can be explored and tested by the extent to which human capital can be substituted for natural capital. A focus on consumption and ecological modernization can be another way of relegating societal and sustainable development imperatives. They argue that subordination of nature to economic growth leaves society vulnerable. Djuric and Filipovic (2015) identify the importance of the social pillar and argue that human and social capital management models affect or at least contribute to the sustainable development phenomenon in the world and as an alignment tool in organizations. The use of human and social capital constructs and contributions are linked to sustainable development; what is yet to be determined is whether they stimulate the creation of a sustainable management mentality.

2.3 *Economic Development*

Economic development is mostly centered on economic growth ensuring poverty alleviation in society through an active and productive economy (Biasutti and Frate 2016). This pillar of sustainable development is responsible for carrying out mandates to satisfy the needs of the community through the creation and implementation of policies that generate wellness and productivity. Economic development relies heavily on fiscal policy as an important factor in balancing environmental development, social development, and sustained economic growth (Lopez and Figueroa 2016). Their view is that fiscal policies are structured in a way that production is heavily dependent on natural resources; this is environmentally insensitive and is another contributor to the unequal distribution of wealth. In addition, the authors stress that in developing countries due to the lack of environmental and social sustainability has resulted in credit and environmental market failures. Further contributors to the unequal distribution of wealth are tax policies that should be tools for growing and nurturing the economy but instead create inequality. The problems of unbalanced growth, inequality, and lack of environmental sustainability can be combated through equitable fiscal and tax policies, and education endowment that would promote knowledge and critical thinking. Lopez and Figueroa (2016) call for specialization in the dirty industries where experts can help critically manage the problems or issues, develop and disseminate new scientific knowledge and ultimately stimulate practical, innovative solutions.

Spangenberg (2013) identifies a solution to unsustainable economic growth through slimming an economy and limiting the total amount of resources that can tackle and stabilize unsustainable consumption. However, whether a resource-limited economy could still be a market-driven and competitive remains questionable. A sustainable economy must encompass foresight and innovative ideas; in a way it will derive solutions to present-day problems and future challenges. Economic activities should consider social and environmental pillars as well as education so that the economy can both satisfy human needs and answer to sustainability. In addition, the focus should be directed to policy makers and the contributions

toward sustainable governance. Policy makers are seen at the economic driving minds responsible for ensuring economic well-being of every economy. Therefore, civil science must be incorporated at all levels of government. For meaningful development to take place there must be an interaction between various stakeholders and provision made for facilities in the community either at the local or state levels of government. It is important to formulate reasonable policies that create economic development and incorporate sustainability. The economy exists because of society and society exists because of the environment; mass education can thus create awareness and knowledge to pursue the sustainable development agenda (Backstrand 2003).

2.4 Education for Sustainable Development

According to Biasutti and Frate (2016), education for sustainable development is responsible for teaching, creating awareness, and equipping students with viable knowledge focused on sustainable development. Research, interdisciplinary thinking, assessment and monitoring programmes, and teaching future-orientated and global practices for addressing worldwide issues are considered appropriate techniques. These institutions eliminate ignorance by developing social and ecological trends whilst bringing about new approaches for the survival of the future (Barth and Tim 2011). Over the past several decades, universities and higher education institutions have adopted and committed themselves to sustainable development (Nejati and Nejati 2013). Education is key since it enables higher-level interpretation, critical thinking, and reflective decision-making; it also links interdisciplinary knowledge and approaches (Barth and Timm 2011).

Cortese (2003) evaluates the importance and role of higher education for sustainable development. The key aspects were changes to the mindset of graduates that affected transformation at all educational levels. Cortese (2003) found that graduates from high ranked institutions were embarking and leading unhealthy, inequitable, and unsustainable lifestyles hence the need to introduce and expose young minds to sustainability through education. Arbuthnott (2009) also highlights the importance of education for sustainable development, suggesting that education for sustainable development should extend beyond attitudes and perceptions for it to be viable. According to Filho et al. (2015), the case for new methods and practices in sustainable education should be reviewed by identifying current gaps in curricula, on-campus greening activities, projects, and research. The three pillars of sustainable development cannot be studied in isolation; interdisciplinary learning and understanding of the three concepts are paramount to address the issues relevant to fostering sustainable development. Therefore, advocacy for interdisciplinary skills incorporation in the literature of sustainable development should be non-negotiable and including interdisciplinary methods in curricula should be mandatory so that problem-based learning can be applied to all three pillars of sustainable development (Dale and Newman 2005). Howlett et al. (2016) raise the argument for substantive

changes in both curricula and pedagogical practice in higher education institutions. The authors challenged dominant epistemologies and discourses to unsettle current methods, practices, and ways of thinking. They argued that higher education curricula should be interdisciplinary to allow pedagogical practices to equip students for critical and reflective thinking. Therefore, sustainable development in higher education should be critically challenged (Corcoran et al. 2004). Interdisciplinary and multi-focused education for sustainable needs to be developed to eliminate practices, which limit sustainable development. Education has therefore been highlighted as a vehicle of sustainability consciousness and awareness and is thus a valid and sound pillar of sustainable development.

2.5 Sustainability Development in Higher Educational Institutions

Education has been portrayed as the key for raising awareness of sustainable development. It is a valuable tool for sustainable development that stimulates interest in and knowledge of the subject. According to Zeehers and Clark (2014), the United Nations studies on human environment stimulated an interest in and persuasion for the inclusion of sustainable development in higher education and recommended that practices and policies for sustainable development need to be enforced at all levels. The findings also stimulated students to pursue additional sustainable scholarly endeavors. Barth and Timm (2011) conducted a study at Leuphana University in Germany to establish if higher education for sustainable development was acceptable to students, and to determine student perceptions on the subject. The study indicates that the university curriculum on sustainable development was compatible with the needs of any interested individual. Students are consciously aware of environmental issues; universities and other educational institutions can further this awareness by increasing practices within their curricula, research, and other outreach programs (Nejati and Nejati 2013). Wong (2001) also measured student perspectives of sustainability at the University of Taiwan. The study was carried out to understand the environmental crisis that the country faced by determining student perceptions regarding the environment, resource sustainability, and green consumerism. The severity of the environmental crisis prompted awareness and environmental campaigns.

Wong (2001) concluded that if environmental awareness is vast then students become environmentally concerned which results in environmentally sustainable and responsible individuals. The findings show that students discontinued wasteful ways by changing their consumption patterns in order to save the environment. Tuncer (2008) also carried out a case study at a Turkish university to test student perceptions of sustainable development. The aim of the study is to determine if gender influenced student perceptions of sustainable development and if sustainable development enrolment courses had an effect on the perceptions. The results

revealed that there is a significant difference in perceptions between male and female students and that there was no significant difference between students who enrolled in sustainable development related courses and those that did not. Kagawa (2007) also studied student perceptions of sustainable development in a university setting; the results portrayed that students associated sustainable development with environmental issues rather than economic and social issues. This indicates that students do not consider other facets as they took sustainability at face value; they did not notice the impact it can have on the economy. Perceptions and attitudes drive behavior in any context. If the student perceptions are measured as positive, then students will become more conscious of their surroundings. This will ensure that students practice responsible behavior and create positive and sustainable mind-sets. The conclusions to be drawn from these studies are that students do have a background knowledge and are consciousness of sustainable development; however, there is a need for educational courses to escalate the awareness of sustainable development. Education is a significant awareness tool and is a reminder of what the students know within themselves. These studies have shown that students can be natured into being responsible and sustainable individuals through education, policies, and practices. A look into South African universities educational endeavors, policies, and practices are discussed next.

2.6 South African Universities Role in Driving Sustainable Development

South African universities are actively involved in sustainable development initiatives and causes. Among the many activities and initiatives are the Global change institute, which is established as a platform for fostering informed actions for environmental development and innovating the South African nation to the global level. The main purpose of this institute is to address global and climate change as part of the sustainability initiatives. It offers extensive research, viable teaching, and opportunities to partaking in sustainability activities (University of Witwatersrand 2017a). The Centre for Sustainability at the University of Witwatersrand also offers cross-disciplinary sustainability integration for the mining industry. Particular attention is paid to the transformation of societies through fostering the emergence of ecological systems and influencing perceptions for a better society. In addition, incorporation of subjects such as ethics and sustainability, and combining law and sustainability has harnessed the knowledge of students, which positively influences students thinking and perceptions (University of Witwatersrand 2017b).

Sustainable development has been viewed as paramount due to issues such as environmental degradation and the growing demand for social justification. There is a need to uplift academia into a sustainability space, hence the university provision of LIB guidelines for managing various resources (University of South Africa 2017). It is critical for universities and higher educational institutions to report on

sustainable development issues and initiatives. The University of Johannesburg has published a sustainability report to give feedback on the research conducted by the institute. The Faculty of Arts at the University of Johannesburg engages and incorporates sustainability into its strategic plan (University of Johannesburg 2017). Sustainability is a key issue that is addressed in the mission of the University of Cape Town, showing the criticality of the phenomenon. The institute also provides meaningful research and teachings that engage and challenge learners and the individuals of the society. Movements such as the Students Representative Council, the Green Campus Initiative amongst others, represent the strong efforts being made to combat sustainability issue (University of Cape Town 2017).

The Centre for Sustainable Communities at The University of Pretoria is another meaningful platform for sustainable development. The main aim is to engage the community, network with organizations that develop resources and give back to the community (University of Pretoria 2017). This is an initiative for engaging and tackling societal inequalities that are presented by sustainability imbalances. These are just some of the initiatives at the universities mentioned above. Educational institutions in South Africa have proved to be worthy of playing a meaningful role to facilitate and drive the sustainability agenda, by offering different initiative, merging sustainability in their curricula, offering sound teaching and carrying out responsive research that gives constructive feedback. Policies and framework for measuring or determining the impacts of non-sustainability have been developed; it is now in the hands of society and decision makers to conserve the environment and natural resources. In addition, higher education institutions have positively influenced student thinking, shaped their views or perceptions, and nurtured their knowledge of sustainable development.

3 Methodology

The study was conducted at a South African university in the Faculty of Commerce, Law and Management. The research method followed a quantitative research approach and specifically adopted both descriptive and inferential statistics. The population consisted of postgraduate students studying at honors level at the university. A sample of 151 students was drawn from a population size of 242 registered honors students from the Commerce, Law and Management Faculty. The sample size was calculated using the simplified formula provided by Israel (1992) from Yamane (1967) to calculate sample sizes with a 95% confidence level and where $P = 0.05$.

3.1 Research Instrument

A survey method is used for data collection. A closed-ended questionnaire with 20 questions in a 5-point Likert scale varying from 1 to 5 (where 1 = strongly disagree and 5 = strongly agree) was prepared and distributed among students. The survey is divided into four sections. Section A evaluated the student attitudes towards environmental issues, section B assessed students understanding of economic issues, section C evaluated the perceptions of students regarding social construct, and section D assessed the views of students toward educational contributions by higher educational institutions. The research instrument is measured for consistency using the Cronbach coefficient Alpha. The 20 items scaled at 0.810 which is acceptably above 0.7. Conclusion can be drawn that the research instrument represented and captured the variable or construct being investigated. Factor analysis is used to assess the validity of the questionnaire; the analysis was performed using SAS. Only items with loadings >0.4 were significant. Only 6 factors with the highest loading greater than unity were extracted thereby confirming the validity of the questionnaire (Table 1).

The aim of study was to investigate the student perceptions of sustainable developments using economic, social, environmental, and education constructs and to identify the interrelatedness of these variables and their effect on sustainable development.

4 Results

Student perceptions of sustainable development were analyzed using descriptive statistics. Table 2 indicates student’s perceptions toward environmental issues.

Table 1 Sustainable development measuring instrument (students’): factor analysis

Factor	Eigenvalue	Factor name
1	4.400	When people interfere with the environment, they often produce disastrous consequences.
2	2.137	Environmental protection and people’s quality of life are directly linked.
3	1.836	Biodiversity should be protected at the expense of industrial agricultural production
4	1.616	Building development is less important than environmental protection
5	1.331	Environmental protection is more important than industrial growth
6	1.130	Government economic policies should increase sustainable production even if it means spending more money

Factor names used have been sourced from Biasutti and Frate (2016)

Table 2 Student perceptions toward environmental issues

	Item	1		2		3		4		5		Sentiment mean
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		
1	When people interfere with the environment they often produce disastrous consequences	5	3%	15	10%	36	24%	66	44%	29	19%	3.66
2	Environmental protection and people's quality of life are directly linked	3	2%	5	3%	22	15%	77	51%	44	29%	4.02
3	Biodiversity should be protected at the expense of industrial agricultural production	2	1%	20	13%	49	32%	58	38%	22	15%	3.52
4	Building development is less important than environmental protection	10	7%	32	21%	46	30%	42	28%	21	14%	3.21
5	Environmental protection is more important than industrial growth	4	3%	23	15%	44	29%	53	35%	27	18%	3.50

Factor names used have been sourced from Biasutti and Frate (2016)

It is evident that students believe that environmental protection and people's quality of life are directly linked as 29% of students strongly agreed and 51% indicated agreement. Students also believed that when people interfere with the environment, they often produce disastrous consequences; this is indicated by 19% who strongly agreed and 44% agreed. Table 3 indicates students perception towards economic issues.

It is evident that students believe that government economic policies should act if a country is wasting its natural resources; this is indicated by 42% of students who strongly agreed and 43% who agreed. Students also believed that government economic policies should increase fair trade; this is indicated by 25% of students who strongly agreed and 58% who agreed. Table 4 indicates student's perceptions toward social issues.

Table 3 Student perceptions toward economic issues

	Item	1		2		3		4		5		Sentiment mean
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		
6	Government economic policies should increase sustainable production even if it means spending more money	1	1%	6	4%	23	15%	83	55%	38	25%	4.00
7	People should sacrifice more to reduce economic differences between populations	4	3%	13	9%	41	27%	59	39%	34	23%	3.70
8	Government economic policies should increase fair trade	2	1%	2	1%	23	15%	87	58%	37	25%	4.03
9	Government economic policies should act if a country is wasting its natural resources	0	0%	5	3%	18	12%	65	43%	63	42%	4.23
10	Reducing poverty and hunger in the world is more important than increasing the economic well-being of the industrialized countries	1	1%	9	6%	31	21%	58	38%	52	34%	4.00

Factor names used have been sourced from Biasutti and Frate (2016)

It is evident that students believe that society should further promote equal opportunities for males and females; this is indicated by 54% of students who strongly agreed and 41% who agreed. Students also believed that each country can do a lot to promote sustainable development. This is indicated by 41% of students who strongly agreed and 52% who agreed. Table 5 indicates students' perception toward educational issues.

It is evident that students believed that lecturers in universities should promote critical thinking rather than lecturing; this is indicated by 59% of students who strongly agreed and 36% who agreed. Students also believed that universities should

Table 4 Student perceptions toward social issues

	Item	1		2		3		4		5		Sentiment mean
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		
11	Each country can do a lot to promote sustainable development	1	1%	1	1%	8	5%	79	52%	62	41%	4.32
12	The society should further promote equal opportunities for males and females	1	1%	1	1%	6	4%	62	41%	81	54%	4.46
13	The contact between cultures is stimulating and enriching	2	1%	3	2%	25	17%	79	52%	42	28%	4.03
14	The society should provide free basic health services	1	1%	3	2%	19	13%	64	42%	64	42%	4.24
15	The society should take responsibility for the welfare of individuals and families	2	1%	10	7%	24	16%	70	46%	45	30%	3.97

Factor names used have been sourced from Biasutti and Frate (2016)

promote the connection between local and global issues; this is indicated by 46% who strongly agreed and 46% who agreed. The sentiment means was used to highlight and track perceptions, which indicated that the two most important factors influencing perceptions are education than social issues. Environmental and economic issues were ranked last. The economic and environmental components may need to be enriched in syllabuses or curricula so that perceptions might be shaped positively. The perceptions of students have served as a base for the study and identified gaps within their understanding of the pillars of sustainable development. There are knowledge gaps that can be embraced and enriched by the university. There is clearly a relationship between environment, economic, social, and education, seen by a contribution of each factor to sustainable development. Perceptions do play a role in determining the future shaping of sustainable practices and policies and the variability in different studies.

Table 5 Student perceptions toward educational issues

	Item	1		2		3		4		5		Sentiment mean
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		
16	Universities should use student centered teaching methods	0	0%	6	4%	27	18%	69	46%	49	32%	4.07
17	Universities should promote future oriented thinking in addition to historical knowledge	0	0%	1	1%	20	13%	67	44%	63	42%	4.27
18	Universities should promote interdisciplinary between subjects	0	0%	3	2%	24	16%	76	50%	48	32%	4.12
19	Universities should promote the connection between local and global issues	1	1%	2	1%	9	6%	69	46%	70	46%	4.36
20	Lecturers in universities should promote critical thinking rather than lecturing	0	0%	2	1%	6	4%	54	36%	89	59%	4.52

Factor names used have been sourced from Biasutti and Frate (2016)

5 Conclusion

Students' perceptions have indicated a link to the pillars of sustainable development, and it is, therefore, important that these are shaped positively by engaging and teaching courses that incorporate sustainability. This will ensure that future work on sustainable development can combat and find solutions to the world crises that we are facing by using all three pillars of sustainable development. This agenda must continue effectively so that all the generations can meet their current needs and ensure that the earth is preserved. The study has proved to be valuable as the factors discussed are important constructs that foster sustainable development. Policies and framework for measuring or determining the impacts of non-sustainability have been put across and therefore it is up to society and decision makers to further sustainability to ensure that the environment and natural resources can be preserved and conserved for current and future generations. In addition, higher educational institutions have a positive influence on students' thinking and help shape their views and nurture their knowledge of sustainable development. The study had to be undertaken

over a limited period. In future, multiple educational institutions could be evaluated to identify what they are doing to drive the cause of sustainable development. A further investigation into each educational institution's sustainability practice, and the inclusion of sustainability content in their curricula would be of value. In addition, biographical details of respondents should be captured so that the author could evaluate and draw conclusions from gender, age, etc.

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Part V
Regional Studies

The Economics of the European Union from the Efficiency and Fairness Viewpoints



Toshitaka Fukiharu

Abstract The aim of this chapter is to examine the reason why the idea of the EU was created from the purely economic viewpoint, and show the reason why Brexit occurred. So far, the EU has adopted the integration of markets. It has the second stage of the integration of defense. This strategy is named the EU process. Theoretically, there exists another strategy, named the reversed-EU process, which starts with the integration of defense, proceeding to the integration of markets. In order to achieve the intended aim, we compare the two processes, by constructing a three-country economic model with public good. We have the following result. On the one hand, for the EU process, the efficiency probability that each integration is consecutively Pareto improving is 100% and the fairness probability that by each integration the Gini coefficient consecutively declines is almost 100%. Meanwhile, for the reversed-EU process, the efficiency and the fairness probabilities are less than 50% each. This result constitutes the purely economic reason why the idea of the EU process was created. It is shown that the above result requires the identity assumption of the three countries' economic structure, which is the reason why Brexit occurred.

Keywords General equilibrium · Simulation · Sustainability · EU · Fairness · Brexit

1 Introduction

The sustainability of the European Union has been in danger after Brexit occurred in 2016 and the yellow vest movement succeeded to it in France. The European countries have attempted to remove the walls of countries. Their final goal is to integrate themselves into one society. Economic integration, well-known by the introduction of Euro appeared to have been more advanced than the political or

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defense integration until the Brexit broke out in 2016. The political integration, such as the unification of defense was far from underway, since the United Kingdom did not favor the idea. After the breakout of Brexit, this integration gained momentum (Erlanger 2017), although the United States may well be opposed to it in consideration of NATO and US military industries (Erlanger 2018). During and after the World War I Armistice Memorial in Paris, both French and German leaders expressed their hope of the creation of a European Army (Bennhold and Erlanger 2018). The present state of the defense integration is known as PERMANENT STRUCTURED COOPERATION (PESCO), summarized as “it is driven by the Member States who are making more binding commitments to each other in the area of defense, while respecting national sovereignty” (European Council 2018, p. 1).

In this chapter, we examine two questions by purely economic reasons: from the viewpoints of efficiency and fairness. The first one is why the idea of the EU, the integration of the European countries, was formed, and the second one is why Brexit occurred. The EU has adopted the integration of markets. Actually, it has the second stage of the integration of defense. This process is named the EU process. Theoretically, there exists another process, named the reversed-EU process. This process starts with the integration of defense. Later, the integration of markets is adopted. In this chapter, by the comparison of the two processes, we answer the two questions. Traditionally, solely the efficiency analysis has attracted attention in the comparison of the two processes: e.g., analysis in terms of the Pareto improvement (Arrow and Hahn 1971). Fukiharu (2011, 2015a) followed this tradition, examining the EU problem from the efficiency viewpoint. Recently, however, the fairness aspect also has attracted attention: e.g., analysis in terms of the Gini coefficient (Krugman 2007; Stiglitz 2012; Piketty 2014; Fukiharu 2013, 2018).

In Sect. 2, we construct a general equilibrium model with public good, and examine the case of isolated-three-country where the parameters are specified numerically. It is important to note that the parameters of production and utility function are the same among the three countries, following the tradition of the classical Heckscher-Ohlin model. In Sect. 3, we examine the case of solely-market-integration under some specified parameters. In Sect. 4, the case of solely-defense-integration is examined under the same specified parameters. In Sect. 5, we examine the case of market-and-defense-integration under the same specified parameters. Until these sections both efficiency and fairness analyses are attempted on this GE model. Finally, in Sect. 6, the robustness of the conclusions is examined by expanding the number of examples to ten thousand, in which the parameters of the models are selected randomly. The actual computation of simulations is conducted in Fukiharu (2014a, b, 2015b, c).

2 The Isolated-Three-Country Case

There are three neighboring countries, A , B , and C . They are threatened by the same intruder X . Country A has a population L_{0A} . In this section, it is assumed that $L_{0A} = 100$, while those in Country B and C : L_{0B} , L_{0C} , are 1000 and 1100, respectively. In this case, when the level of defense is raised in each country its own output is raised since it offsets a part of the intrusion on their territories. At the same time, the raised security raises the utility of their own households. Thus, the defense is a public good. With respect to the public good, one way of determining its optimal level is to use the Lindahl mechanism (Lindahl 1919). We start with the analysis in Country i for the isolated case; isolated three countries under isolated defense ($i = A, B, C$).

2.1 Agent Behavior for the Isolated-Three-Country Case

Country i has two industries. Industry 1 is the civilian good industry, which is owned by the households, producing the civilian good, x_{ci} , hiring labor, l_{ci} . It is assumed that output depends on the level of defense, d_i . Production function, $f_{1i}[l_{ci}, d_i]$, is the following Cobb-Douglas type:

$$x_{ci} = f_{1i}[l_{ci}, d_i] = l_{ci}^{\alpha_{1i}} d_i^{\alpha_{2i}} \quad \alpha_{1i} + \alpha_{2i} < 1 \quad (i = A, B, C) \quad (1)$$

We start with military good industry in country i ($i = A, B, C$).

Country i 's government owns Industry 2, the military good industry. It produces the military good, M_i , utilizing civilian good, x_{mi} , and labor, l_{mi} . The production function, $f_{2i}[x_{mi}, l_{mi}]$, is the following Cobb-Douglas type:

$$M_i = f_{2i}[x_{mi}, l_{mi}] = x_{mi}^{\beta_1} l_{mi}^{\beta_2} \quad \beta_1 + \beta_2 \leq 1 \quad (i = A, B, C) \quad (2)$$

Note that f_{2i} does not depend on d_i , and this is the case among the three countries. This assumption is made for avoiding complicatedness. Equations (1) and (2) may lead to the image of each country as the one, whose farmland on the frontier is under constant invasion. It may be possible for each government to manufacture the military good intentionally away from the frontier. Country i 's level of defense, d_i , is defined by the following defense function, where M_i is military good, and v_i is military personnel.

$$d_i = f_{3i}[M_i, v_i] \quad (i = A, B, C)$$

The method of the provision of the level of defense, d_i^0 , is the minimum cost principle subject to $d_i^0 = f_{3i}[M_i, v_i]$. In order to use this principle, the government needs the information on the price of civilian good, p_{ci} , and the wage rate, w . In this

chapter, it is assumed that the military personnel are provided with the civilian wage rate. Formally, the demand for civilian good, x_{mi}^D , the demand for labor, l_{mi}^D , and the demand for military personnel, v_i^D , are derived, given d_i^0 , with p_{ci} and w parameters, by the following cost minimization:

$$\text{Min } p_{ci}x_{mi} + w(l_{mi} + v_i) \text{ s.t. } (2) \text{ and } d_i^0 = f_{3i}[M_i, v_i] \quad (i = A, B, C). \quad (3)$$

The defense function is specified by the following CES type where τ is the parameter of substitution:

$$f_{3i}[M_i, v_i] = (M_i^{-\tau} + v_i^{-\tau})^{-n/\tau} \quad (i = A, B, C) \quad (4)$$

In this section, parameters are selected randomly, for example, by

$$\alpha_{1i} = 1/6, \alpha_{2i} = 2/3, \beta_1 = 4/5, \beta_2 = 1/5, n = 1, \tau = -2/3 \quad (i = A, B, C) \quad (5)$$

Under Eq. (5), we can analytically compute the government's demand functions $\{x_{mi}^D, l_{mi}^D, v_i^D\}$, as well as the minimum cost function, $cd[d_i^0]$, with p_{ci} , w , and d_i^0 parameters.

We proceed to the civilian industry in country i ($i = A, B, C$).

The consumption good industry shares the burden of keeping the defense. Under Lindahl mechanism, when the public good's share of burden for the consumption good industry is given by t_{fi} , the industry behaves as follows:

$$\text{Max } \pi_{ci} = p_{ci}x_{ci} - wl_{ci} - t_{fi}cd[d_i] \quad (i = A, B, C) \quad (6)$$

Under Eq. (6), the demand function for labor, l_{ci}^D , the demand function for defense, d_{fi}^D , and the supply function, x_{ci}^S , are analytically derived with p_{ci} , w , and t_{fi} parameters. Utilizing these demand functions, the profit function, π_{ci} , is derived with p_{ci} , w , and t_{fi} parameters. The aggregate household in Country i receives this profit ($i = A, B, C$).

Finally, we proceed to the aggregate household in country i ($i = A, B, C$).

The (aggregate) household maximizes the utility subject to income constraint, where the utility function is the following Cobb–Douglas type:

$$u_i = U_i[x_{ci}, d_i] = x_{ci}^{\gamma_{1i}} d_i^{\gamma_{2i}} \quad \gamma_{1i} + \gamma_{2i} = 1 \quad (i = A, B, C)$$

It is assumed in this chapter that the aggregate household has no choice of leisure consumption, and the initial endowment of labor, L_{0i} is supplied to the labor market. When public good is introduced into the economic model, given $t_{hi} = 1 - t_{fi}$ as the share of burden for the household, the aggregate household behaves as follows:

$$\text{Max } U_i[x_{ci}, d_i] \text{ s.t. } p_{ci}x_{ci} + t_{hi}cd[d_i] = wL_{0i} + \pi_{ci} \quad (i = A, B, C) \quad (7)$$

Thus, given p_{ci} , w , and t_{fi} , the aggregate household expresses its desired level of defense.

In this section, for the purpose of simulation the same parameters are specified as follows:

$$\gamma_{1i} = 3/4, \gamma_{2i} = 1/4 \quad (i = A, B, C) \quad (8)$$

Under Eq. (8), we can analytically derive the demand function for consumption good, x_{chi}^D , and the demand function for the defense, d_{hi}^D , with p_{ci} , w , and t_{fi} parameters.

2.2 General Equilibrium for the Isolated-Three-Country Case

When the public good is introduced, the country i 's government cannot provide the public good if d_{hi}^D and d_{fi}^D are different from each other. Under the Lindahl mechanism, the equality of d_{hi}^D and d_{fi}^D is achieved by the proper selection of t_{fi} : i.e., we select $0 \leq t_{fi} \leq 1$, which satisfies

$$d_{hi}^D = d_{fi}^D = d_i \quad (i = A, B, C)$$

It must be noted that in order to derive this equality, each government must the consumption good price and wage rate beforehand in order to compute the minimum cost of defense. Thus, $\{p_{cA}, t_{fA}, d_A\}$, $\{p_{cB}, t_{fB}, d_B\}$, and $\{p_{cC}, t_{fC}, d_C\}$ are determined simultaneously in this model.

The equilibrium condition for the consumption good market is given by the following:

$$x_{ci}^S = x_{mi}^D + x_{chi}^D \quad (i = A, B, C)$$

The equilibrium condition for the labor market is given by the following:

$$L_{0i} = l_{mi}^D + v_i^D + l_{ci}^D \quad (i = A, B, C)$$

Following the tradition in economics, we assume that $w = 1$. Utilizing the Newton method, we derive general equilibrium prices, $\{p_{ci}^*, t_{fi}^*, d_i^*\}$, as follows.

$$\begin{aligned}
p_{cA}^* &= 2.82793, t_{fA}^* = 0.678245, d_A^* = 92.5532, p_{cB}^* = 4.15327, \\
t_{fB}^* &= 0.67312, d_B^* = 894.154, p_{cC}^* = 4.21982, \\
t_{fC}^* &= 0.672963, d_C^* = 982.548
\end{aligned} \tag{9}$$

Alternatively $\{p_{ci}^*, t_{fi}^*, d_i^*\}$ can be derived by the price-adjusting *tatonnement* in the form of differential equations. This *tatonnement* is useful in overcoming the difficulty when we use the Newton method (Fukiharu 2014a). Utilizing Eq. (9), we can derive the equilibrium utility level of the (aggregate) household for the isolated-three-country case, u_i^{*I} ($i = A, B, C$), as follows:

$$u_A^{*I} = 40.3002, u_B^{*I} = 298.697, u_C^{*I} = 324.563 \tag{10}$$

2.3 Gini Coefficient for the Isolated-Three-Country Case

Utilizing Eq. (9) we can derive the income and disposable income of Countries A, B, and C for the aggregate household as $\{113.095, 86.3804\}$, $\{1136.69, 860.784\}$, and $\{1250.54, 946.763\}$, respectively, where the difference of income and disposable income is the burden of keeping the armed forces for household. We can compute the Gini coefficient of the three countries in terms of household incomes for the isolation case, $Gini^I$.

$$Gini^I = 0.303279$$

The Gini coefficient of the three countries in terms of households' disposable incomes for "isolated-three-country" case, $Gini_d^I$, is computed as follows:

$$Gini_d^I = 0.302857$$

3 The Solely-Market-Integration Case

In this section, we examine the solely-market-integration case, where civilian goods produced in each country are consumed in the integrated (common) market and the free labor migration is admitted with nationality remaining the same. This situation may well be understood if a family has the same residence as before and a father and/or mother work in different countries.

3.1 Agent Behavior for the Solely-Market-Integration Case

We have the same situation as in Sect. 2, except for the consumption good price. Since the markets are integrated, there exists the same consumption good price, p_c , for the three countries. Thus, p_{ci} in Eqs. (3), (6), and (7) must be replaced by p_c ($i = A, B, C$). Solely this modification is required in this section. Thus, from Eq. (3), where $p_{ci} = p_c$, the government's demand functions, $\{x_{mi}^D, l_{mi}^D, v_i^D\}$, as well as the minimum cost function, $cd [d_i^0]$ are derived with p_c , w , and d_i^0 parameters ($i = A, B, C$). From Eq. (6), where $p_{ci} = p_c$, the civilian industry's demand function for labor, l_{ci}^D , the demand function for the defense, d_{fi}^D , and the supply function, x_{ci}^S , are derived with p_c , w , and t_{fi} parameters ($i = A, B, C$). In the same way, from Eq. (7), where $p_{ci} = p_c$, the household's demand function for consumption good, x_{chi}^D , and the demand function for defense, d_{hi}^D , are derived with p_c , w , and t_{hi} parameters ($i = A, B, C$).

3.2 General Equilibrium for the Solely-Market-Integration Case

In the Lindahl mechanism, we must select $0 \leq t_{fA} \leq 1$, $0 \leq t_{fB} \leq 1$, and $0 \leq t_{fC} \leq 1$, which satisfy

$$d_A = d_{fA}^D = d_{hA}^D, d_B = d_{fB}^D = d_{hB}^D, d_C = d_{fC}^D = d_{hC}^D \quad (11)$$

As explained in Sect. 2, p_c , w , t_{fA} , t_{fB} , and t_{fC} , as well as d_A , d_B , and d_C , must be determined simultaneously. The equilibrium condition for the common consumption good market is the following:

$$x_{cA}^S + x_{cB}^S + x_{cC}^S = x_{mA}^D + x_{mB}^D + x_{mC}^D + x_{chA}^D + x_{chB}^D + x_{chC}^D$$

The equilibrium condition for the labor market is the following:

$$L_{0A} + L_{0B} + L_{0C} = l_{mA}^D + l_{mB}^D + l_{mC}^D + v_A^D + v_B^D + v_C^D + l_{cA}^D + l_{cB}^D + l_{cC}^D$$

Utilizing the Newton method, we can compute the solely-market-integration equilibrium, $\{p_c^{*E}, t_{fA}^{*E}, t_{fB}^{*E}, t_{fC}^{*E}, d_A^{*E}, d_B^{*E}, d_C^{*E}\}$, as follows:

$$\begin{aligned} p_c^{*E} &= 4.0111, t_{fA}^{*E} = 0.84101, t_{fB}^{*E} = 0.654733, t_{fC}^{*E} \\ &= 0.646167, d_A^{*E} = 239.534, d_B^{*E} = 837.628, d_C^{*E} = 894.638 \end{aligned} \quad (12)$$

Alternatively, $\{p_c^{*E}, t_{fA}^{*E}, t_{fB}^{*E}, t_{fC}^{*E}, d_A^{*E}, d_B^{*E}, d_C^{*E}\}$ can be derived by the price-adjusting *tatonnement* in the form of differential equations. This *tatonnement*

is useful in overcoming the difficulty when we use the Newton method (Fukiharu 2014a).

From Eq. (12), the countries' equilibrium utility levels, u_A^{*E} , u_B^{*E} , and u_C^{*E} , are computed as follows:

$$u_A^{*E} = 47.8001, u_B^{*E} = 299.021, u_C^{*E} = 325.297 \quad (13)$$

The comparison between Eqs. (10) and (13) indicates that the “solely-market-integration” equilibrium is Pareto improving compared with the isolated-three-country equilibrium.

3.3 Gini Coefficient for the Solely-Market-Integration Case

From Eq. (12), we can derive the Country A, B, C income and disposable income for the household as {149.389, 112.042}, {1134.45, 850.841}, and {1241.73, 931.295}, respectively, where the difference of income and disposable income is the burden of keeping the defense for household. We can compute the Gini coefficient of the three countries from the household incomes for the solely-market-integration case, $Gini^E$.

$$Gini^E = 0.122528 < Gini^I = 0.303279$$

Gini coefficient of three countries, computed from the households' disposable incomes, for the solely-market-integration case, $Gini_d^E$, is as follows:

$$Gini_d^E = 0.288341 < Gini_d^I = 0.302857$$

By market integration, the Gini coefficient declines: world income distribution becomes fairer than in the isolated-three-country case. This result is similar to that of Fukiharu (2018).

4 The Solely-Defense-Integration Case

In this section, we examine the solely-defense-integration case, where the free labor migration is admitted with nationality remaining the same. This situation may well be understood if the discussion of household in Sect. 3 is repeated.

4.1 Agent Behavior for the Solely-Defense-Integration Case

We have the same situation as in Sect. 2, except for the definition of the defense level. Since the defense is integrated, the level of defense must be the same: $d_A = d_B = d_C = d^0$ for the three countries, where d^0 is provided by country A. Solely this modification is required in this section.

Thus, from Eq. (3), the government's demand functions, $\{x_{mi}^D, l_{mi}^D, v_i^D\}$, as well as the minimum cost function, $cd [d^0]$, are derived with p_{ci} , w , and d^0 parameters ($i = A, B, C$). From Eq. (6), the civilian industry's demand function for labor, l_{ci}^D , the demand function for the defense, d_{fi}^D , and the supply function, x_{ci}^S , are derived with p_{ci} , w , and t_{fi} parameters ($i = A, B, C$). In the same way, from Eq. (7), the household's demand function for consumption good, x_{chi}^D , and the demand function for defense, d_{hi}^D , are derived with p_{ci} , w , and t_{hi} parameters ($i = A, B, C$).

4.2 General Equilibrium for the Solely-Defense-Integration Case

In the Lindahl mechanism, we must select $0 \leq t_{fA} \leq 1$, $0 \leq t_{fB} \leq 1$, $0 \leq t_{fC} \leq 1$, $0 \leq t_{hA} \leq 1$, $0 \leq t_{hB} \leq 1$, $0 \leq t_{hC} \leq 1$, $t_{fA} + t_{fB} + t_{fC} + t_{hA} + t_{hB} + t_{hC} = 1$, which satisfy

$$d^0 = d_{fA}^D = d_{fB}^D = d_{fC}^D = d_{hA}^D = d_{hB}^D = d_{hC}^D.$$

As explained in Sect. 2, p_{cA} , p_{cB} , p_{cC} , w , t_{fA} , t_{fB} , t_{fC} , t_{hA} , t_{hB} , and t_{hC} , as well as d^0 , must be determined simultaneously. The equilibrium conditions for the consumption good market are the following:

$$\begin{aligned} x_{cA}^S &= x_{mA}^D + x_{chA}^D \\ x_{ci}^S &= x_{chi}^D \quad (i = B, C) \end{aligned}$$

The equilibrium condition for the labor market is the following:

$$L_{0A} + L_{0B} + L_{0C} = l_{mA}^D + v_A^D + l_{cA}^D + l_{cB}^D + l_{cC}^D$$

Utilizing the Newton method, we can compute the solely-defense-integration equilibrium, $\{p_{cA}^{*C}, p_{cB}^{*C}, p_{cC}^{*C}, t_{fA}^{*C}, t_{fB}^{*C}, t_{fC}^{*C}, t_{hA}^{*C}, t_{hB}^{*C}, t_{hC}^{*C}, d^{0*C}\}$, as follows:

$$\begin{aligned}
p_{cA} *^C &= 1.2802, p_{cB} *^C = 2.08162, p_{cC} *^C = 2.2537, t_{fA} *^C \\
&= 0.147366, t_{fB} *^C = 0.264086, t_{fC} *^C = 0.290494, t_{hA} *^C \\
&= 0.0207641, t_{hB} *^C = 0.132043, t_{hC} *^C = 0.145247, d^0 *^C \\
&= 2416.86
\end{aligned} \tag{14}$$

Alternatively, $\{p_{cA} *^C, p_{cB} *^C, p_{cC} *^C, t_{fA} *^C, t_{fB} *^C, t_{fC} *^C, t_{hA} *^C, t_{hB} *^C, t_{hC} *^C, d^0 *^C\}$ can be derived by the price-adjusting *tatonnement* in the form of differential equations. This *tatonnement* is useful in overcoming the difficulty when we use the Newton method (Fukiharu 2014a). From Eq. (14), the countries' equilibrium utility levels, $u_A *^C$, $u_B *^C$, and $u_C *^C$, are computed as follows:

$$u_A *^C = 230.458, u_B *^C = 640.915, u_C *^C = 648.597 \tag{15}$$

The comparison between Eqs. (10) and (15) indicates that the solely-defense-integration equilibrium is Pareto improving compared with the isolated-three-country equilibrium.

4.3 Gini Coefficient for the Solely-Defense-Integration Case

From Eq. (14), we can derive the income and disposable income of countries A, B, and C for the household as $\{179.718, 134.788\}$, $\{1109.5, 857.143\}$, and $\{1216.36, 942.857\}$, respectively, where the difference of income and disposable income is the burden of keeping the defense for a household. We can compute the Gini coefficient of three countries in terms of household incomes for the solely-defense-integration case, $Gini^C$.

$$Gini^C = 0.275822 < Gini^I = 0.303279$$

The Gini coefficient of three countries in terms of household disposable incomes for the solely-defense-integration case, $Gini^C_d$, is as follows:

$$Gini^C_d = 0.278435 < Gini^I_d = 0.302857$$

By the solely-defense-integration, the Gini coefficient declines: the world income distribution becomes fairer than in the isolated-three-country case.

5 The Market-and-Defense-Integration Case

This case corresponds with the formation of a supranational organization. The civilian goods produced in each country are consumed in the integrated (common) market with the same price, p_c , and the free labor migration is admitted in this organization with nationality remaining the same. This situation may well be understood if the discussion of household in Sect. 3 is repeated. At the same time, the level of defense in each country is given by d^0 .

5.1 Agent Behavior for the Market-and-Defense-Integration Case

We have the same situation as in Sect. 2, except for the consumption good price and the level of defense. Since the markets are integrated, there prevails the same consumption good price, p_c for the three countries, Thus, p_{ci} in Eqs. (3), (6), and (7) must be replaced by p_c ($i = A, B, C$). Since the defense is also integrated, the level of defense must be the same: $d_A = d_B = d_C = d^0$ for the three countries, where d^0 is provided by country A.

Thus, from Eq. (3), the government's demand functions, $\{x_m^D, l_m^D, v^D\}$, as well as the minimum cost function, $cd [d^0]$, are derived with p_c , w , and d^0 parameters. From Eq. (6), where $p_{ci} = p_c$, the civilian industry's demand function for labor, l_{ci}^D , the demand function for the defense, d_{fi}^D , and the supply function, x_{ci}^S , are derived with p_c , w , and t_{fi} parameters ($i = A, B, C$). In the same way, from Eq. (7), where $p_{ci} = p_c$, the household's demand function for consumption good, x_{chi}^D , and the demand function for defense, d_{hi}^D , are derived with p_c , w , and t_{hi} parameters ($i = A, B, C$).

5.2 General Equilibrium for the Market-and-Defense-Integration Case

In the Lindahl mechanism, the integrated government selects $0 \leq t_{fA} \leq 1, 0 \leq t_{fB} \leq 1, 0 \leq t_{fC} \leq 1, 0 \leq t_{hA} \leq 1, 0 \leq t_{hB} \leq 1, 0 \leq t_{hC} \leq 1, t_{fA} + t_{fB} + t_{fC} + t_{hA} + t_{hB} + t_{hC} = 1$, which satisfy

$$d^0 = d_{fA}^D = d_{fB}^D = d_{fC}^D = d_{hA}^D = d_{hB}^D = d_{hC}^D.$$

In the market-and-defense-Integration case, p_c , w , t_{fA} , t_{fB} , t_{fC} , t_{hA} , t_{hB} , and t_{hC} , as well as d^0 , must be determined simultaneously. The equilibrium condition for the consumption goods market is the following:

$$x_{cA}^S + x_{cB}^S + x_{cC}^S = x_m^D + x_{chA}^D + x_{chB}^D + x_{chC}^D$$

The equilibrium condition for the labor market is the following:

$$L_{0A} + L_{0B} + L_{0C} = l_m^D + v^D + l_{cA}^D + l_{cB}^D + l_{cC}^D$$

Utilizing the Newton method, we can compute the market-and-defense-Integration equilibrium $\{p_c^{*N}, t_{fA}^{*N}, t_{fB}^{*N}, t_{fC}^{*N}, t_{hA}^{*N}, t_{hB}^{*N}, t_{hC}^{*N}, d^{0*N}\}$, as follows:

$$\begin{aligned} p_c^{*N} &= 1.89152, t_{fA}^{*N} = 0.229159, t_{fB}^{*N} = 0.229159, t_{fC}^{*N} \\ &= 0.229159, t_{hA}^{*N} = 0.026575, t_{hB}^{*N} = 0.132043, t_{hC}^{*N} \\ &= 0.149101, d^{0*N} = 2171.43 \end{aligned} \quad (16)$$

Alternatively, $\{p_c^{*N}, t_{fA}^{*N}, t_{fB}^{*N}, t_{fC}^{*N}, t_{hA}^{*N}, t_{hB}^{*N}, t_{hC}^{*N}, d^{0*N}\}$ can be derived by the price-adjusting *tatonnement* in the form of differential equations. This *tatonnement* is useful in overcoming the difficulty when we use the Newton method (Fukiharu 2014a).

From Eq. (16), the countries' equilibrium utility levels, u_A^{*N} , u_B^{*N} , and u_C^{*N} , are computed as follows:

$$u_A^{*N} = 192.778, u_B^{*N} = 658.996, u_C^{*N} = 702.77 \quad (17)$$

On the one hand, the comparison between Eqs. (13) and (17) indicates that the market-and-defense-Integration equilibrium is Pareto improving compared with the solely-market-integration equilibrium. On the other hand, the comparison between Eqs. (15) and (17) indicates that the market-and-defense-integration equilibrium is not Pareto improving compared with the solely-defense-integration equilibrium.

5.3 Gini Coefficient for the Market-and-Defense-Integration Case

From Eq. (16), we can derive the income and disposable income of countries A , B , and C for the household as $\{216.893, 162.67\}$, $\{1116.89, 837.67\}$, and $\{1216.89, 912.67\}$, respectively, where the difference of income and disposable income is the burden of keeping the defense for household. We can compute the Gini coefficient of the three countries in terms of household incomes for “formation of a supranational organization,” $Gini^N$.

$$\begin{aligned} \text{Gini}^N &= 0.261368 < \text{Gini}^C = 0.275822 < \text{Gini}^E = 0.288341 < \text{Gini}^I \\ &= 0.303279 \end{aligned} \quad (18)$$

The Gini coefficient of the three countries, in terms of household disposable incomes for “formation of a supranational organization,” Gini^N_d , is computed as follows:

$$\begin{aligned} \text{Gini}^N_d &= 0.261368 < \text{Gini}^C_d = 0.278435 < \text{Gini}^E_d = 0.288341 < \text{Gini}^I_d \\ &= 0.302857 \end{aligned}$$

By forming a supranational organization, the Gini coefficient declines further: the world income distribution becomes fairer than in other cases.

5.4 Remark 1

A few comments here are appropriate. It must be noted that the conclusion is not robust. In order to see this, suppose that

$$\begin{aligned} \alpha_{1A} &= 2/7, \alpha_{1B} = 2/5, \alpha_{1C} = 2/5, \alpha_{2A} = 1/7, \alpha_{2B} = 1/10, \alpha_{2C} = 1/8, \gamma_{1A} \\ &= 3/16, \gamma_{1B} = 1/2, \gamma_{1C} = 2/3, \gamma_{2A} = 13/16, \gamma_{2B} = 1/2, \gamma_{2C} = 1/3, n = 1, \tau \\ &= -1/4, \beta_1 = 1/9, \beta_2 = 8/9, L_{0A} = 5000, L_{0B} = 8000, \text{ and } L_{0C} = 10000. \end{aligned}$$

Equilibrium utilities are computed as follows (Fukiharu 2019):

$$\begin{aligned} u_A^{*I} &= 2878.13 < u_A^{*E} = 2913.84 < u_A^{*N} = 8146.25, u_B^{*E} = 764.619 \\ &< u_B^{*N} = 1394.04 < u_B^{*I} = 4215.93 < u_C^{*E} = 439.065 \\ &< u_C^{*N} = 718.995 < u_C^{*I} = 5057.74 \end{aligned}$$

(Market integration : “efficiency” violated in countries *B* and *C*)

$$\begin{aligned} u_A^{*I} &= 2878.13 < u_A^{*C} = 7349.74 < u_A^{*N} = 8146.25, u_B^{*N} = 1394.04 \\ &< u_B^{*C} = 1415.23 < u_B^{*I} = 4215.93, u_C^{*C} = 585.912 \\ &< u_C^{*N} = 718.995 < u_C^{*I} = 5057.74 \end{aligned}$$

(Defense integration : “efficiency” violated in countries *B* and *C*)

This computation implies that when the identity assumption on the functions is not satisfied, nice property of the EU process does not follow. The importance of the identity assumption on the functions was first stressed by Fukiharu (2004), who asserted that the identity assumption on the functions in the Heckscher–Ohlin Theorem is crucial in achieving the nice property of the theorem.

6 Robustness

In the previous sections, two examples with the identity assumption are constructed and a tentative conclusion is derived: the EU process of “first market integration proceeding to defense integration” is superior to the reversed-EU process of “first defense integration proceeding to market integration” from the viewpoints of both efficiency and fairness. In this section, the robustness of this conclusion is examined by expanding the number of examples to ten thousand with the parameters selected randomly.

Two types of robustness simulation are attempted in this section depending on τ in the defense function in Eq. (4). The first type, named *AAA*, computes a set of GE utilities for three countries and the Gini coefficients, as well as the conclusions, if the 34 equilibrium conditions are indeed satisfied when $0 < \tau < 10$. The second type, named *BBB*, computes a set of GE utilities for three countries and the Gini coefficients, as well as the conclusions, if the 34 equilibrium conditions are indeed satisfied when $-1 < \tau < 0$. Actually, in Eq. (4), τ is defined on the condition: $-1 < \tau < \infty$. Moreover, note that in the program the Newton method is utilized, which requires the specification of initial point for the computation of general equilibrium with public good, and the convergence to the GE is not guaranteed depending on selection of the initial point. In order to avoid this difficulty, in this program, the final point of trajectory on the price adjustment *tatonnement* with a fixed time interval, is selected as the initial point of the Newton method, with the hope that the trajectory is satisfactorily close to the GE.

6.1 Simulation When $\tau > 0$

In the first type simulation, *AAA*: $0 < \tau$, we select arbitrarily 100 tuples of $\{\alpha_{1A}, \alpha_{1B}, \alpha_{1C}, \alpha_{2A}, \alpha_{2B}, \alpha_{2C}, \gamma_{1A}, \gamma_{1B}, \gamma_{1C}, \gamma_{2A}, \gamma_{2B}, \gamma_{2C}, n, \tau, \beta_1, \beta_2, L_{0A}, L_{0B}, L_{0C}\}$, with the condition that

$$\begin{aligned} 0 < \alpha_{1A} = \alpha_{1B} = \alpha_{1C} < 1, 0 < \alpha_{2A} = \alpha_{2B} = \alpha_{2C} < 1, \alpha_{1i} + \alpha_{2i} < 1, 0 \\ < \gamma_{1A} = \gamma_{1B} = \gamma_{1C}, \gamma_{2A} = \gamma_{2B} = \gamma_{2C} < 1, \gamma_{1i} + \gamma_{2i} = 1, n = 1, 0 < \beta_j \\ < 1, \beta_1 + \beta_2 = 1, 1 \leq L_{0i} \leq 1,000,000, w = 1 \quad (i = A, B, C. \quad j = 1, 2) \end{aligned} \quad (19)$$

$$10 > \tau > 0 \quad (20)$$

6.1.1 The EU Process

First, out of these 100 tuples, the results of $m = 85$ cases satisfy the required 34 equilibrium conditions. Out of these $m = 85$ cases, $P_1 = 85$ cases satisfy “both stages are Pareto improving on the EU process.” We repeat this 100-tuple-simulation 100 times from the efficiency viewpoint. The line graph in Fig. 1 provides a line connecting 100 points (ratios of P_1/m), while the dashed line provides the mean = 1. The line graph shows a straight line, since all of the ratios are one. We may safely assert that the probability of “Pareto improving on both stages” on the EU process is approximately 100% if we assume that the substitution parameter, τ , is positive.

For the fairness part, out of $m = 85$ cases, $G_1 = 85$ cases satisfy “for both stages the Gini coefficient declines on the EU process.” We repeat this 100-tuple-simulation 100 times from the fairness viewpoint. The line graph in Fig. 2 provides a line connecting 100 points (ratios of G_1/m), while the dashed line provides the mean = 0.99988. Note that all the ratios except one element show one. We may

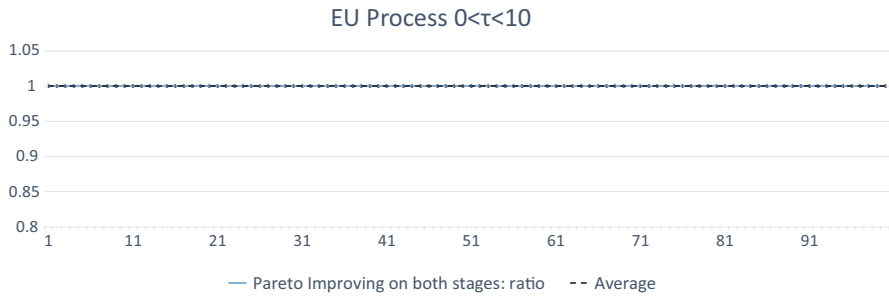


Fig. 1 The ratios of “Pareto improving on both stages” case for the EU process. Source: Author’s own study

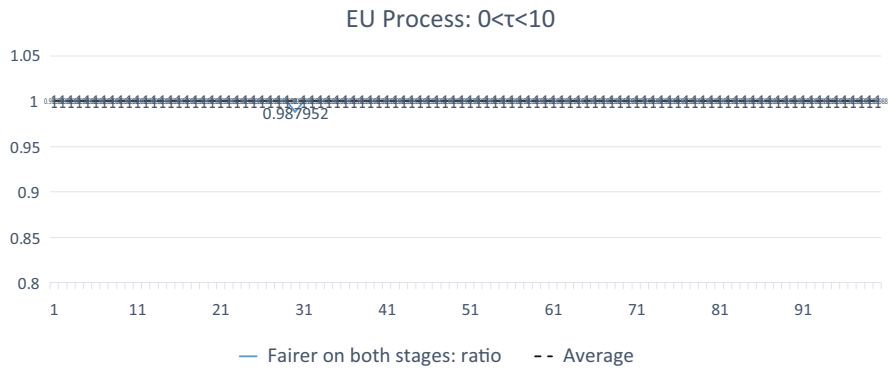


Fig. 2 The ratios of “fairer (income distribution) on both stages” cases for the EU process. Source: Author’s own study

safely assert that the probability of “more fairness on both stages” on the EU process is approximately 100% if we assume that the substitution parameter, τ , is positive.

6.1.2 The Reversed-EU Process

Concerning the efficiency aspect, on the one hand, out of the above $m = 85$ cases, $P_2 = 37$ cases satisfy “both stages are Pareto improving on the reversed-EU process”: “first defense integration proceeding to market integration.” On the reversed-EU process, we repeat the “100-tuple-simulation” 100 times from the efficiency viewpoint. The line graph in Fig. 3 provides a line connecting 100 points (ratios of P_2/m), while the dashed line provides the mean = 0.409351. We may safely assert that the probability of “Pareto improving on both stages” on the reversed-EU process is approximately 40% with the assumption $\tau > 0$.

Concerning the fairness aspect, on the one hand, out of these $m = 85$ cases, $G_2 = 33$ cases satisfy “for both stages Gini coefficient declines on the reversed-EU process.” We repeat the “100-tuple-simulation” 100 times on the reversed-EU process from the fairness viewpoint. The line graph in Fig. 4 provides a line connecting 100 points (ratios of G_2/m), while the dashed line provides the mean = 0.38241. We may safely assert that the probability of “more fairness on both stages” on the reversed-EU process is approximately 38% with the assumption of $\tau > 0$.

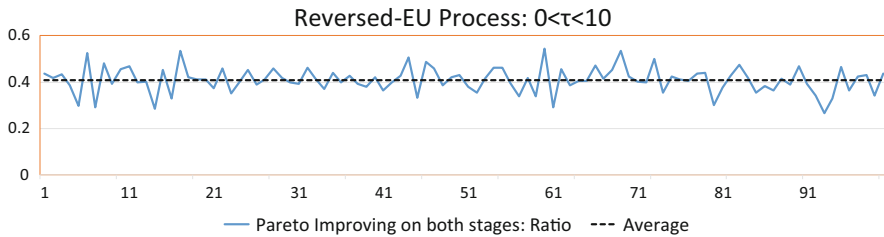


Fig. 3 The ratios of “Pareto improving on both stages” cases for the reversed-EU process. Source: Author’s own study

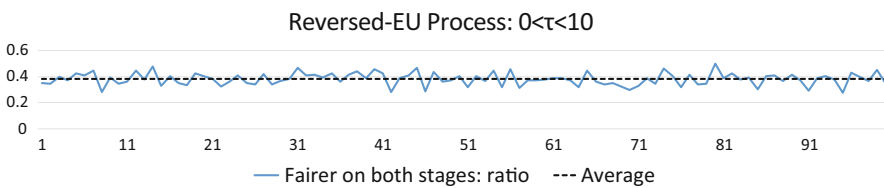


Fig. 4 The ratios of “fairer (income distribution) on both stages” cases for the reversed-EU process. Source: Author’s own study

6.2 Simulation When $0 > \tau > -1$

In the second type simulation, *BBB*: $-1 < \tau < 0$, we select 100 tuples of $\{\alpha_{1A}, \alpha_{1B}, \alpha_{1C}, \alpha_{2A}, \alpha_{2B}, \alpha_{2C}, \gamma_{1A}, \gamma_{1B}, \gamma_{1C}, \gamma_{2A}, \gamma_{2B}, \gamma_{2C}, n, \tau, \beta_1, \beta_2, L_{0A}, L_{0B}, L_{0C}\}$ arbitrarily, with the condition that Eq. (19) and $0 > \tau > -1$.

6.2.1 The EU Process

Out of these 100 tuples, the results of $m = 77$ cases satisfy the required 34 equilibrium conditions. On the other hand, out of these $m = 77$ cases, $P_1 = 77$ cases satisfy “both stages are Pareto improving on the EU process.” We repeat the “100-tuple-simulation” 100 times on the EU process from an efficiency viewpoint. The line graph in Fig. 5 provides a line connecting 100 points (ratios of P_1/m), while the dashed line provides the mean = 1. The line graph shows a straight line since all the ratios are one. We may safely assert that the probability of “Pareto improving on both stages” on the EU process is approximately 100% with the assumption of $-1 < \tau < 0$.

On the other hand, out of these $m = 77$ cases, $G_1 = 77$ cases satisfy “for both stages Gini coefficient declines on the EU process.” We repeat this “100-tuple-simulation” 100 times on the EU process from the fairness viewpoint. The line graph in Fig. 6 provides a line connecting 100 points (ratios of G_1/m), while the dashed line

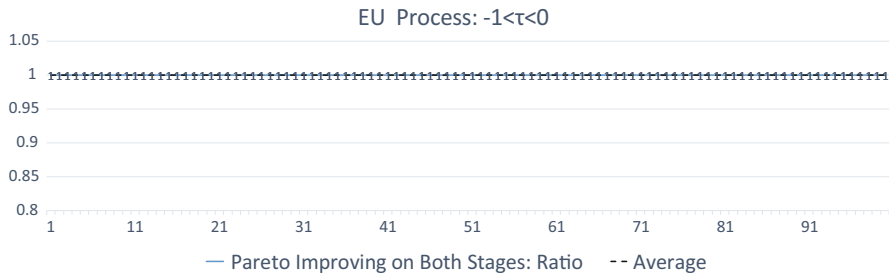


Fig. 5 The ratios of “Pareto improving on both processes” case for the EU process. Source: Author’s own study

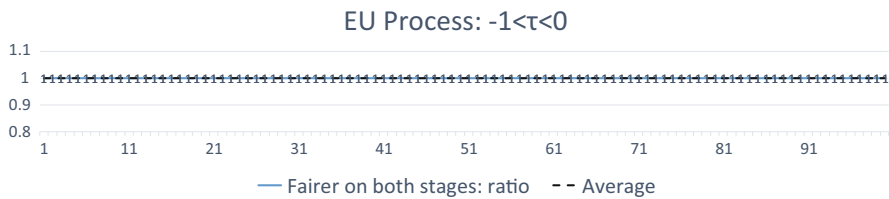


Fig. 6 The ratios of “fairer (income distribution) on both stages” cases for the EU process. Source: Author’s own study

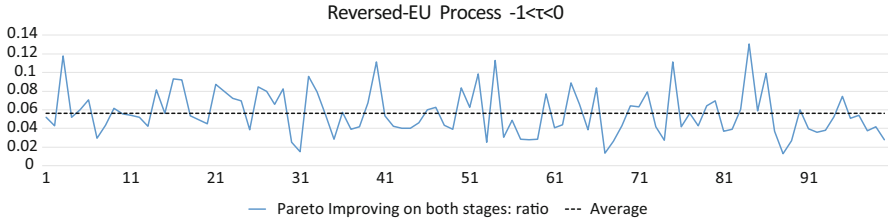


Fig. 7 The ratios of “Pareto improving on both stages” cases for the reversed-EU process. Source: Author’s own study

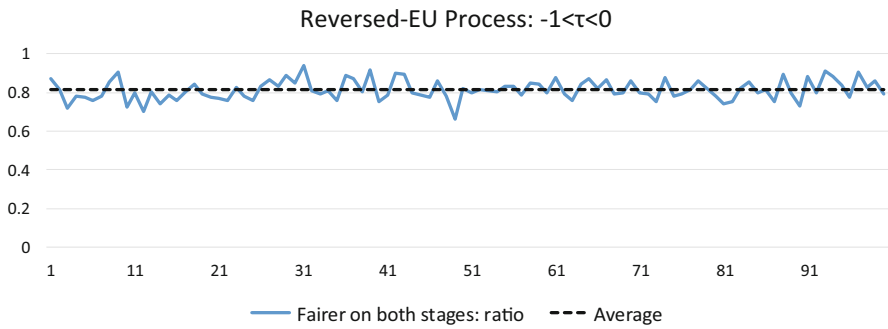


Fig. 8 The ratios of “fairer (income distribution) on both stages” cases for the reversed-EU process. Source: Author’s own study

provides the mean = 1. Note that all the ratios show one. We may safely assert that the probability of “more fairness on both stages” on the EU process is approximately 100% with the assumption of $-1 < \tau < 0$.

Concerning the efficiency aspect, on the one hand, out of the above $m = 77$ cases, $P_2 = 3$ cases satisfy “both stages are Pareto improving on the reversed-EU process.” We repeat this “100-tuple-simulation” 100 times on the reversed-EU process from the efficiency viewpoint. The line graph in Fig. 7 provides a line connecting 100 points (ratios of P_2/m), while the dashed line provides the mean = 0.0564495. We may safely assert that the probability of “Pareto improving on both stages” on the reversed-EU process is approximately 5% with the assumption of $-1 < \tau < 0$.

Meanwhile, concerning the fairness aspect, out of these $m = 77$ cases, $G_2 = 61$ cases satisfy “for both stages the Gini coefficient declines on the reversed-EU process.” We repeat this “100-tuple-simulation” 100 times on the reversed-EU process from the fairness viewpoint. The line graph in Fig. 8 provides a line connecting 100 points (ratios of G_2/m), while the dashed line provides the mean = 0.81273. We may safely assert that the probability of “more fairness on both stages” on the reversed-EU process is approximately 80% with the assumption of $-1 < \tau < 0$.

From these 8 simulations, it may be concluded that the robustness of conclusion in the previous sections is firmly guaranteed: i.e., the EU process is a rational

selection to form a supranational organization from both viewpoints of efficiency and fairness, so long as the production and utility functions are similar among the member countries.

6.3 Remark 2

The result in this section has similarities with the one in Fukiharu (2018), in the sense that by globalization of the economy, there is a tendency for the international income distribution to become fairer in the two results so long as the EU process is adopted. However, there is a difference in the probability for this phenomenon to occur. In this section, the probability is almost 100% on the EU process, while in Fukiharu (2018), it is approximately 70%. The difference of the probability stems from the difference of the assumption on economic agents. In the present paper without capital input, while public good is introduced, agents in the computation of the Gini coefficient are aggregate households in the three countries. Meanwhile, in Fukiharu (2018), those agents are households, capitalists, and entrepreneurs in the three countries, for the purpose of examining the variation of the domestic income distribution at the same time. If the capitalists and entrepreneurs are introduced into the present chapter, the probability may well become lower. The focus in the present chapter is on how the income distribution becomes fairer consecutively depending on the order of the globalizations of market and defense. The result in this section implies that on the reversed-EU process there is no tendency on average for the income distribution to become consecutively fairer by globalization.

7 Conclusions

Behind the protest against the integration of the European countries, there appears to exist the dissatisfaction with the unfairness of income distribution among the European people. In Fukiharu (2011), one of the contributions on the problem of the integration of countries, or globalism, the analysis was conducted solely from the viewpoint of efficiency viewpoint. The present chapter examined European countries' strategy of becoming one supranational society not only from the efficiency viewpoint but also from the fairness viewpoint.

On the fairness viewpoint, we have Fukiharu (2018), examining the effect of globalism of market on the international and domestic income distributions. The focus of the present chapter was, rather, on how the income distribution becomes fairer consecutively depending on the order of the globalization of market and defense.

The present chapter defined the strategy of the European Union as the EU process with two stages: i.e., after achieving the integration of their national markets, it proceeds to the integration of their national defense, constructing a supranational

society. Theoretically, in order to achieve a supranational society, the EU could select a different strategy. Reversing the order of the integrations, the EU could select the reversed-EU process with two stages: i.e., after achieving the integration of their national defense, it proceeds to the integration of their national markets, constructing a supranational society. The aim of the present chapter was to compare the EU process and the reversed-EU process from both the efficiency and the fairness viewpoints.

This paper adopted a simulation approach in which the probabilities of efficient and/or fair properties are computed by constructing 10,000 cases of the three-country general equilibrium model with public good. This simulation showed that, on the one hand, for the EU process, the first probability that each transition stage is Pareto improving was 100%, and the second one that on each transition stage the Gini coefficient declines was almost 100%. On the other hand, on the reversed-EU process, the first probability was less than 50% and the second was less than 50% on average. In this way, the superiority of the EU process to the reversed-EU process was confirmed theoretically.

This chapter has made an important assumption: identity assumption of production and utility functions of three countries. If a different numerical specification was selected in the GE simulation, it was shown that the assertion does not hold: i.e., market integration is not Pareto improving. Brexit thus might be explained by the non-identity of production and utility functions among member countries.

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Stages of Development Hypothesis in a Globalised World



Konrad Sobanski 

Abstract The chapter tests the stages of development hypothesis for the balance of payments (SDH) in the years 1992–2016. We use data for 80 economies that are divided into five income groups. The research method includes regression. Our study yields yet limited support for SDH. The curve representing the relationship between current account and income per capita is not typically U-shaped as presumed by SDH. The association seems linear and positive. Developing countries whose income per capita is closer to that of industrialised economies tend to run lower current account deficits. The richer a developed economy the higher its current account surplus. However, the relationship is not confirmed in a dynamic setting of panel data, which indicates a high degree of persistence in the current account in individual countries. The findings of the study prove that low-income countries are able to overcome the liquidity constraint and attract foreign capital at an early stage of their life cycle.

Keywords Balance of payments · Current account · Stage of development · Relative income

1 Introduction

The stages of development hypothesis (SDH) assumes that a country goes through a number of balance of payments stages in the process of growth (Fischer and Frenkel 1974; Halevi 1971). Economies that start from a relatively low national income per capita are expected to have low savings and even lower investment, as they are not creditworthy and do not have access to international financial markets. As economies move from a lower to an intermediate stage of development, typically

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experience foreign capital inflows from advanced countries and, hence, run current account deficits and accrue net foreign liabilities. As economies reach an advanced stage of development, they run current account surpluses, and therefore, export capital to less advanced economies and pay back foreign liabilities (see Brzozowski and Prusty 2013; Chinn and Prasad 2003; Fischer and Frenkel 1974; Roldos 1996).¹

The chapter analyses the balance of payments (BoP) positions of developing and advanced economies to verify the stages of development hypothesis in the years 1992–2016. We conduct an empirical research using data on the current account and the stage of development for 80 economies that are divided into five income groups: low-, lower middle-, upper middle-, high-, and very high-income. The data are from the World Bank (World Development Indicators).

We investigate the stages of development hypothesis across the contemporary economies at least for two reasons. First, the empirical literature on the subject provides a diverging picture on the stages of development hypothesis for the balance of payments. Second, majority of the existing empirical studies relate to the pre-crisis period. Consequently, there is a need to verify any potential structural change in the relationship that might have occurred after the global economic crisis of 2008.

The structure of the chapter is as follows. The second section presents the literature on empirical verification of SDH. The third section depicts methodology of this research. In the fourth section current account positions across the globe are presented. In the next section the results of cross-section and panel regressions are presented. Conclusions are presented in the final section.

2 Review of the Literature

The relationship between the current account and the stage of development has been analysed in the past by economists in regression analyses of current account determinants. The regressions have been carried out in various samples and over different time spans, using differentiated estimation methods.

Chinn and Prasad (2003) have empirically analysed an association between the relative income per capita and the current account in a broad sample of 89 industrial and developing countries over the period 1971–1995. In a cross-section regression, they are unable to find evidence in favour of SDH for explaining current account positions across economies. The coefficient on the income term is positive (0.119) and the coefficient on the quadratic term is negative (−0.096) with both coefficients being strongly statistically significant (at a p -value of 5%). This suggests a pattern that is the opposite of that predicted by SDH. The results are driven mainly by the

¹SDH is closely linked with the intertemporal approach to the balance of payments that presents the current account balance as a difference between domestic savings and investment (see Buiter 1979; Sachs 1981; Obstfeld and Rogoff 1995).

industrial countries in the sample. When the researchers exclude African countries from their full sample, the coefficients for the income and the squared term are both positive (and still significant), which is not in line with SDH as well. The panel regression analysis reports similar results. The researchers find an inverted U-shape relationship in the full sample and in a group excluding African countries, but without statistical significance. Only for a group of developing countries, the coefficients are consistent with the implications of SDH, but only the quadratic term is significant.

Lee et al. (2006) analyse macroeconomic determinants of the current account in 54 advanced and emerging market economies over the period 1973–2004, selected because of their significance in global trade. The country coverage used by the IMF researchers is more homogeneous as compared with Chinn and Prasad (2003). Their OLS regression model indicates that an increase in relative income raises the current account balance and this relationship is strongly significant. The coefficient of 0.02 on the income term implies that a country with a per capita income of 50% of the US level has on average a current account to GDP ratio lower by 1 percentage point as compared to that of the United States. Economists do not incorporate the squared term in their analysis.

A similar study has been carried by Rahman (2008) who analysed 21 industrial and 38 developing countries over the period 1997–2008 (1992–2006 for transition economies). The results from the pooled model imply a coefficient of 0.03 for the relative income that is statistically significant. However, the fixed effects estimate for the income term turns out insignificant, probably as the influence of the relative income is captured by country-specific constants. On the other extreme, Prat et al. (2010) do not find statistically significant impact of the relative income on the current account over the period 1970–2008 in a group of 33 countries (from which about two-thirds of the countries are also part of the sample analysed by Lee et al. (2006)).

In a more recent study, Behringer and van Treeck (2018) investigate whether changes in income distribution can explain current account developments in a sample of 20, mainly industrialised, countries for the period 1972–2007. The economists incorporate the stages of development hypothesis in their models. To measure a country's relative stage of economic development, they use the ratio of PPP converted GDP to working age population relative to the average productivity of three advanced economies (Germany, Japan, and the United States). The results of majority of models estimated for 4-year period averages (using OLS, two-stage least squares, and fixed effects) do not support SDH as coefficients are not statistically significant and change the sign depending on the variable included to control for income distribution. Only one model indicates that the relative output per worker significantly affects the current account (with a positive coefficient of 0.034). However, models estimated based on higher-frequency data (annual) indicate a negative and statistically significant relationship. An increase in the relative output per capita by 10-percentage points year on year decreases the current account to GDP ratio by approximately 0.5 p.p.

In turn, Herrmann and Jochem (2005) analyse the impact of the relative income on the current account in a panel of eight Central and East European countries that

joined the European Union in 2004. The research is based on high-frequency (quarterly) data from 1994 to 2004. The authors refer the per capita income of sample countries to the German income. They conclude that current account deficits are largely brought about by the level of development of the CEE economies. A per capita income that is lower by 10 percentage points (as compared with that of Germany) decreases savings and thus the current account balance (as % of GDP) by around 0.15–0.3 percentage points.

The overview of the cited literature leads to a conclusion that there is a diverging picture on the stages of development hypothesis for the balance of payments. This is probably to some extent the effect of differentiated samples, including country groupings, frequency of data, and time spans over which economists have run their regressions. This justifies further investigations of SDH.

3 Methodology of the Research

This study involves two steps in testing for the pattern of a U-shaped relationship between the current account and the stage of development. First, we analyse SDH by comparing distributions of the current account balance in different income groups. Then, we estimate cross-section and panel regressions for the full sample and selected subsamples, using various estimation techniques.

In cross-section models, we examine the relationship based on the full-sample averages (1992–2016) of the current account (dependent variable) and GNI per capita (independent variable) for each country. Using this approach, we are interested more in the sign of regression coefficients rather than in their absolute sizes. Our methodological approach is similar to that used by Alfaro et al. (2014) who apply OLS regression to analyse the relationship between productivity growth and capital flows in a large group of countries.²

In panel models we capture variations in the current account and GNI per capita. Our panel is unbalanced and contains 371 observations for 80 countries. We analyse various models for panel data: pooled OLS, fixed effects (FE), and random effects (RE). To minimise the possibility of measurement error in annual data and since our interest is in a long-term relationship between the current account and the stage of development, we use a panel of nonoverlapping 5-year averages of the data for each country. Therefore, we transform 25 annual observations for a particular country over the 1992–2016 period into five 5-year observations.

Our models include two explanatory variables: the per capita income and the squared term of this variable. The relative income squared allows to capture non-linearities in the analysed relationship and empirically verify the relevance of SDH

²Alfaro et al. (2014) include the productivity growth as the explanatory variable in their univariate model of capital flows (measured by the negative of the current account) and investigate the sign of the coefficient to draw conclusions on the validity of the Lucas paradox.

that predicts a U-shaped relationship between the current account and the stage of development.

The analysed group consists of medium- and large-sized economies, i.e. these with an average yearly GNI of at least 20 billion USD³ in the years 2012–2016. From this group, some countries are excluded if they meet at least one of the supplementary criteria:

- Economies with a significant share of fuels in their total merchandise exports (an average for the years 1992–2016 of more than 40%).
- Economies with an average annual inflation rate of more than 50% throughout the analysed period (1992–2016).

The selection criteria are met by 80 economies.

We normalise the current account by dividing it by GDP. The stage of development is measured by GNI per capita. The income per capita for a given economy is measured in relative terms, i.e. as the ratio of domestic GNI per capita (expressed in US dollars) to the US per capita income. Economies are attributed to five income classes using selected thresholds. Countries with the relative GNI per capita of:

- No more than 5% are classified as low-income countries
- Above 5% but no more than 12% are classified as lower middle-income countries
- Above 12% but no more than 25% are classified as upper middle-income countries
- Above 25% but no more than 75% are classified as high-income countries
- Above 75% are classified as very high-income countries

The basic data set has annual data for the period 1992–2016. We use data from the World Bank (World Development Indicators).

4 Current Account Positions in a Globalised World

We start our analysis with a graphical representation of the relationship between the current account and the class of GNI per capita income. The scatterplots below present the current account balance (as a share of GDP) in five groups of economies (low-, lower middle-, upper middle-, high-, and very high-income) in the years 1992–2016 (see Fig. 1). They yield but limited support for the stages of development hypothesis. In each of the analysed periods, the curve is not typically U-shaped as presumed by SDH.

The BoP position in respective income groups seems differentiated. The average current account balance in low-income countries is negative in all analysed 5-year periods, which is not in line with SDH that presumes a surplus at this stage of an economy's life cycle. The average deficit ranges from 0.35% GDP in the years

³The Atlas methodology is applied (see World Bank 2018).

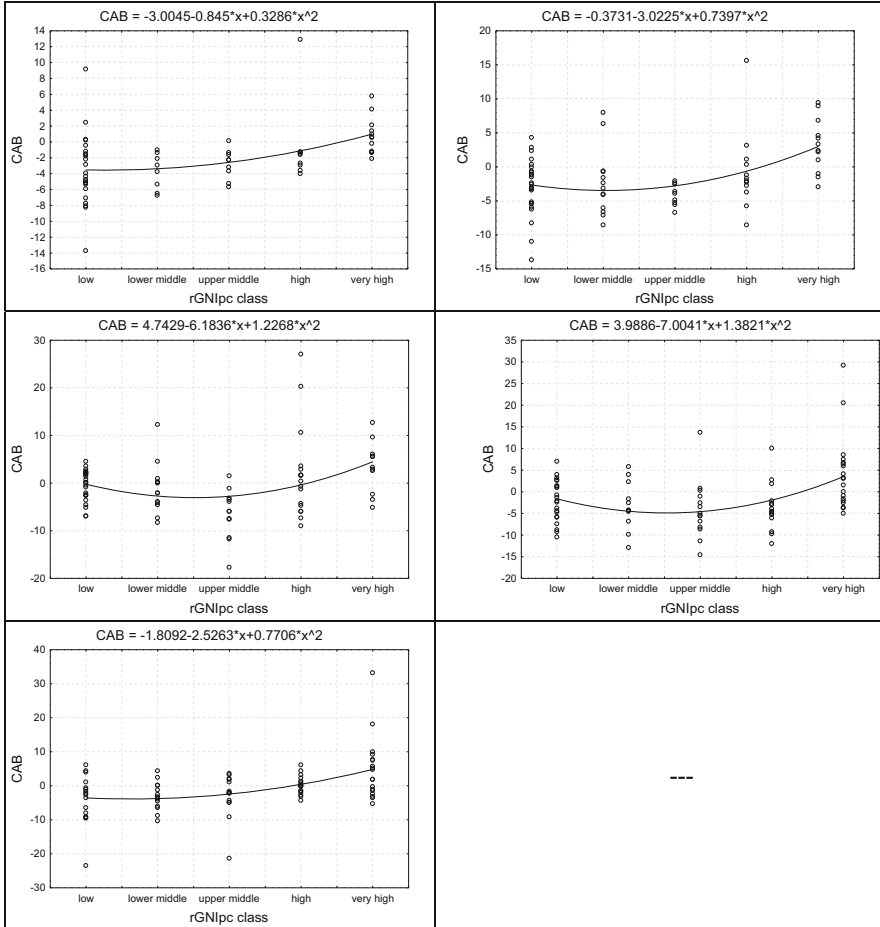


Fig. 1 The current account balance in world economies for the years 1992–2016. Source: Own compilation. Other remarks: The figures depict the average current account balance (expressed as a percentage of GDP) in 5-year periods for respective world economies grouped in five income categories (low-, lower middle-, upper middle-, high-, and very high-income): for the years 1992–1996 (the top left-hand figure), for the years 1997–2001 (the top right-hand figure), for the years 2002–2006 (the middle left-hand figure), for the years 2007–2011 (the middle right-hand figure), and for the years 2012–2016 (the bottom left-hand figure)

2002–2006 to 3.84% in the years 2012–2016 (see Table 1 and Fig. 1). The median for the current account is negative (from -4.1% to -2.11% of GDP) in all analysed periods except for 2002–2006. Both the lower and upper quartiles were initially negative, which means that at least 75% of low-income countries had a deficit in the current account. The situation has changed from 2002 to 2006 when the upper quartile turned into positive. In the last two periods, the differentiation of the current account balance in low-income economies increased as measured by the standard

Table 1 Descriptive statistics for the current account balance in respective income groups (% of GDP)

Income class	Mean	Median	Min	Max	Lower quartile	Upper quartile	SD
1992–1996							
Low	-3.46	-4.10	-13.65	9.22	-5.60	-1.35	4.42
Lower middle	-3.67	-3.31	-6.70	-0.98	-5.85	-1.68	2.25
Upper middle	-2.76	-2.26	-5.67	0.17	-3.62	-1.55	1.88
High	-0.63	-1.57	-3.94	12.92	-2.93	-1.28	5.18
Very high	0.82	0.64	-2.08	5.82	-1.19	1.79	2.35
All	-2.15	-2.06	-13.65	12.92	-4.70	-0.98	4.00
1997–2001							
Low	-2.88	-2.50	-13.62	4.39	-5.33	-0.59	4.15
Lower middle	-2.30	-3.11	-8.53	8.02	-5.98	-0.68	4.89
Upper middle	-4.05	-3.86	-6.68	-2.01	-5.22	-2.48	1.61
High	-0.61	-1.86	-8.51	15.69	-3.21	0.79	5.98
Very high	3.16	2.89	-2.92	9.44	0.07	5.77	3.95
All	-1.52	-2.20	-13.62	15.69	-4.81	1.09	4.89
2002–2006							
Low	-0.35	0.14	-6.93	4.55	-2.43	2.15	3.24
Lower middle	-1.05	-2.01	-8.30	12.28	-4.08	0.32	5.32
Upper middle	-6.47	-5.90	-17.67	1.51	-9.48	-3.34	5.21
High	1.84	0.50	-8.91	27.05	-4.61	2.96	9.60
Very high	3.46	3.40	-5.05	12.81	-2.35	6.18	5.44
All	-0.39	-0.55	-17.67	27.05	-4.50	2.38	6.61
2007–2012							
Low	-2.04	-2.11	-10.39	7.09	-5.67	1.45	4.84
Lower middle	-3.14	-4.24	-12.88	5.91	-6.81	2.31	5.68
Upper middle	-4.08	-5.16	-14.54	13.78	-8.18	-0.97	6.73
High	-3.53	-4.43	-11.88	10.09	-6.07	-1.99	5.42
Very high	4.10	3.07	-4.97	29.22	-2.12	6.74	8.55
All	-1.37	-2.49	-14.54	29.22	-5.37	2.51	7.02
2012–2016							
Low	-3.84	-2.34	-23.51	6.10	-8.47	0.25	7.21
Lower middle	-3.08	-3.35	-10.27	4.41	-5.92	0.17	3.96
Upper middle	-2.86	-2.01	-21.35	3.69	-4.79	1.85	6.44
High	0.24	0.11	-4.32	6.21	-1.48	1.35	2.74
Very high	4.96	3.45	-5.23	33.18	-1.31	7.81	9.23
All	-0.68	-1.24	-23.51	33.18	-3.53	2.26	7.12

Source: Own compilation

Other remarks: Mean—average for the current account/GDP ratio in a given income class; SD—standard deviation for the current account/GDP ratio in a given income class

deviation and the quartile range (surpluses started to prevail in more and more countries).

The intertemporal approach to the balance of payments finds some support in middle-income countries. Both lower and upper middle-income economies have negative means and medians for the current account ratio in all analysed periods. In the majority of periods, these measures are more deeply negative for upper middle-income countries, which is again in line with SDH. The upper quartile is negative for the upper middle-income countries in all periods except for 2012–2016. This means that at least 75% of analysed upper middle-income countries had a deficit in the current account in almost all analysed periods. For lower middle-income countries the upper quartile is positive more frequently.

For high-income countries the mean and median indicate a more balanced current account. In the years 1992–1996 and 1997–2001 high-income countries had on average a low deficit in the current account (approximately 0.6% of GDP) and in the years 2002–2006 and 2012–2016 a surplus of no more than 1.85% of GDP. This supports SDH to some extent. However, in the period 2007–2012 high-income countries were characterised by a larger deficit. The mean and median decreased to -3.53% and -4.43% of GDP, respectively. This shows that high-income countries temporarily lost their shares in foreign markets after the outbreak of the global economic crisis that erupted in 2008 (as a result the current account moved towards a deficit).

The current account balances across very high-income countries are generally consistent with SDH. The average current account ratio and its median are positive in all analysed periods. The mean gradually increased from 0.82% in the first analysed period to 4.96% in the last one. However, we see also a significant rise in differentiation across countries as measured by the standard deviation for the current account ratio. This measure went up systematically in the period 1992–2016. This was as a result of more and more extreme values that started to prevail throughout the period of advanced globalization.

5 Regression Results

The main objective of our cross-section regression analysis is to determine the relationship between the current account balance and the stage of development as measured by GNI per capita. We do not expect reverse simultaneity in the analysed relationship, but we consider that there are other current account determinants that might be correlated with the relative income. For instance, in the permanent income theory and the intertemporal approach to balance of payments the economic growth rate is assumed to affect negatively the current account balance (economies experiencing a faster economic growth have lower balances in the current account). On the other hand, the growth rate is negatively associated with GNI per capita as richer countries tend to develop at a more sluggish pace. Consequently, we check whether there is a problem of endogeneity in our model, i.e. whether the income term

Table 2 Cross-section regression results—multivariate model

Variable	Coefficient	Std. error	<i>t</i> -ratio	<i>p</i> -value
const	−0.0366	0.0096	−3.825	0.0003***
rGNIpc	0.0607	0.0513	1.184	0.2400
sq_rGNIpc	0.0171	0.0449	0.3806	0.7046
Mean dependent var	−0.0122		S.D. dependent var	0.0614
Sum squared resid	0.2282		S.E. of regression	0.0544
<i>R</i> -squared	0.2336		Adjusted <i>R</i> -squared	0.2137
<i>F</i> (2, 77)	11.7325		<i>P</i> -value (<i>F</i>)	0.00003

White’s test for heteroskedasticity

Null hypothesis: Heteroskedasticity not present

Test statistic: LM = 4.982 with *p*-value = $P(\text{Chi-square}(4) > 4.982) = 0.2892$

Chow test for structural break at observation 41

Null hypothesis: No structural break

Test statistic: $F(3, 74) = 0.8977$ with *p*-value = $P(F(3, 74) > 0.8977) = 0.4465$

Source: Own compilation

Other remarks: OLS model based on 80 observations. Dependent variable: CAB. Independent variables: *rGNIpc*— relative GNI per capita, *sq_rGNIpc*—relative GNI per capita squared. The relative GNI per capita is measured as the ratio of the country’s income per capita to the US income per capita. The symbol *** indicates statistical significance at the 1% level. As residuals in our models seem not to be normally distributed, we use the White’s test to check for heteroskedasticity that is a special case of the Breusch–Pagan test where the assumption of normally distributed errors is relaxed. The null hypothesis of homoscedasticity was not rejected

is correlated with the error term (as a result of correlation with another current account determinants not accounted for in the model). We estimate a model with the two-stage least squares method (TSLS/IV) using a cumulative consumer price increase over the analysed period as an instrumental variable. We choose CPI as it seems correlated with the income term (poorer countries tend to have larger problems in maintaining price stability and thus higher cumulative inflation), but it is not directly impacting the current account. Using the Hausman test we are not able to reject the null that the income term is exogenous, so we conclude that there is no correlation between the explanatory variable and the error term. In this case two-stage least squares estimators have worse properties than OLS ones. At the same time, using the first-stage *F*-test we confirm that the cumulative inflation is a strong instrument in our TSLS model.

For our cross-section sample, OLS coefficients on the relative income and its squared term are both positive (which is not in line with SDH that expects a negative coefficient for the income term and a positive coefficient for the squared term). Both coefficients for exogenous variables turn out to be strongly statistically insignificant (see Table 2). The coefficients of determination show that no more than 23% of the response variable variation is explained by our linear model, which is not surprising as our model excludes potentially important determinants of the current account but the relative income. To check the robustness of our results, we have conducted the regression using the income term expressed in US dollars (as we have rescaled GNI

Table 3 Cross-section regression results—univariate model

Variable	Coefficient	Std. error	<i>t</i> -ratio	<i>p</i> -value
const	−0.0385	0.0081	−4.742	<0.0001***
rGNIpc	0.0792	0.0163	4.856	<0.0001***
Mean dependent var	−0.0122		S.D. dependent var	0.0614
Sum squared resid	0.2287		S.E. of regression	0.0541
<i>R</i> -squared	0.2321		Adjusted <i>R</i> -squared	0.2223
<i>F</i> (1, 78)	23.5788		<i>P</i> -value (<i>F</i>)	6.05e−06

White's test for heteroskedasticity

Null hypothesis: Heteroskedasticity not present

Test statistic: LM = 2.3107 with *p*-value = $P(\text{Chi-square}(2) > 2.3107) = 0.3149$

Chow test for structural break at observation 41

Null hypothesis: No structural break

Test statistic: $F(2, 76) = 1.1488$ with *p*-value = $P(F(2, 76) > 1.1488) = 0.3225$

Source: Own compilation

Other remarks: see Table 2. The symbol *** indicates statistical significance at the 1% level

per capita of each country with relation to the US income in our baseline model). This has not changed our results as the income and income squared terms were not statistically significant. Then we tried including higher-order polynomials of relative income term in the model. When we replaced the squared term with the cubic term,⁴ the income term turned out to be statistically significant at the *p*-value lower than 2%. However, the cubic term was strongly statistically insignificant. What is more, the coefficient for the relative income was positive, and this for the cubic term also positive, which is not in line with the U-pattern prescribed by SDH. We verify with the Chow test whether there exists a structural break in our group of countries. We divide the analysed group of 80 countries into two subsamples (we split the group arranged alphabetically directly at observation 41—South Korea). We fail to reject the hypothesis that the current account equation is the same in the first group of forty countries and the remainder of the sample at the 10% level of significance.

However, when we exclude the squared term from the regression model, the coefficient for the relative income turns significant (see Table 3). It amounts to 0.08, which indicates that when you compare an economy with a relative GNI per capita larger by 10 percentage points than the other economy, the former is supposed to have a higher current account ratio by approximately 0.8 p.p. than the latter.

For our cross-section of economies, we also estimate models separately for all analysed 5-year periods. In most intervals, we observe positive coefficients for both explanatory variables (the relative income and its squared term) with no statistical significance as in our baseline cross-section model (see Table 4). When we exclude the squared term from the regression model we find a strongly significant positive impact of GNI per capita on the current account balance. The influence rises from 0.05 in the years 1992–1996 to 0.10 in the last period. In our cross-section, an

⁴This model describing SDH assumes a larger rise in the current account with an increase in GNI per capita after having reached the minimum point of the function.

Table 4 Cross-section regression for all 5-year periods

Models	1992–1996	1997–2001	2002–2006	2007–2011	2012–2016
const	−0.0370***	−0.0313***	−0.0168	−0.0317***	−0.0382***
rGNIpc	0.0526	0.0213	−0.00895	0.0087	0.0624
sq_rGNIpc	−0.0021	0.0474	0.0756	0.0489	0.0297
<i>R</i> -squared	0.2434	0.2838	0.2913	0.1576	0.2832
<i>F</i> statistic	9.4914	13.4715	5.7614	7.2051	8.2858
No. of observations	62	71	78	80	80
const	−0.0368***	−0.0358***	−0.0234**	−0.0383***	−0.0424***
rGNIpc	0.0502***	0.0710***	0.0654***	0.0660***	0.0968***
<i>R</i> -squared	0.2434	0.2690	0.1160	0.1450	0.2795
<i>F</i> statistic	19.2983	25.3912	9.9683	13.2316	15.7234
No. of observations	62	71	78	80	80

Source: Own compilation

Other remarks: OLS models for respective 5-year periods. Dependent variable and independent variables: for description see Table 2. The symbols **, *** indicate statistical significance at the 5%, and 1% levels, respectively

increase in the per capita income ratio by 10 percentage points leads to a rise in the current account to GDP ratio of almost 1 p.p.

Next, we turn to the panel approach based on a data set consisting of nonoverlapping 5-year averages from the period 1992–2016. As 5-year averages for the current account vary across countries and within time, we perform specification tests before relying on the fixed effects, random effects, or pooled least squares estimators. We construct two-way models, including both country-specific and time-specific effects. We decide to include the time effects as we expect that the timing could influence the current account. In other words, we verify whether the current account tends to generally exhibit higher balances in some of the analysed 5-year periods (we expect it to happen especially after the outbreak of an economic crisis), whereas in other periods it exhibits lower balances (we expect it to happen, e.g. in a boom phase of the business cycles). As we detect autocorrelation in residuals, we apply HAC standard errors (heteroskedasticity and autocorrelation consistent). We construct RE models using GLS method. The Breusch–Pagan test for the presence of random effects indicates that the variance of country-specific error is different from 0, thus counting against the pooled OLS model in favour of the RE alternative. In the case of FE models we apply the robust test for differing country intercepts. As the Welch *F* statistic is very large, we reject the null hypothesis that the countries have a common intercept. This counts against the pooled OLS model, in favour of the FE alternative. Finally, we apply the Hausman test that probes the consistency of the RE estimator. The *p*-value of less than 1% rejects the null hypothesis and suggests that the RE estimator is inconsistent. As a result, we further use the FE model to draw conclusions in our study.

For our sample, the coefficient on the relative income term is negative and the coefficient on the quadratic term is positive, suggesting a pattern that is in line with that predicted by the stages of development hypothesis. However, with both

Table 5 Panel regression results—FE model with country and time effects

Variable	Coefficient	Std. error	<i>t</i> -ratio	<i>p</i> -value
const	−0.0130	0.0163	−0.7945	0.4293
rGNIpc	−0.0373	0.0775	−0.4815	0.6315
sq_rGNIpc	0.0138	0.0382	0.3621	0.7182
dt_3	0.0147	0.0062	2.371	0.0202**
dt_5	0.0167	0.0066	2.533	0.0133**
Mean dependent var	−0.0117		S.D. dependent var	0.0616
Sum squared resid	0.2923		S.E. of regression	0.0320
LSDV <i>R</i> -squared	0.7919		Within <i>R</i> -squared	0.0375
rho	0.0129		Durbin-Watson	1.4006

Joint test on named regressors

Test statistic: $F(2, 79) = 0.1527$ with p -value = $P(F(2, 79) > 0.1527) = 0.8587$

Robust test for differing group intercepts

Null hypothesis: The groups have a common intercept

Test statistic: Welch $F(79, 91.1) = 58.504$ with p -value = $P(F(79, 91.1) > 58.504) = 5.56e-055$

Wald joint test on time dummies

Null hypothesis: No time effects

Asymptotic test statistic: Chi-square(4) = 16.3918 with p -value = 0.0025

Source: Own compilation

Other remarks: Fixed-effects, using 371 observations. Included 80 cross-sectional units. Time-series length: minimum 2, maximum 5. Dependent variable and independent variables: see remarks to Table 2. We only present time dummies that turned out to be statistically significant (dt_3 corresponds to the period 2002–2006, and dt_5 to the period 2012–2016). The symbol ** indicates statistical significance at the 5% level

coefficients being strongly insignificant, we are not able to statistically confirm SDH (see Table 5). The joint test on named regressors is unable to reject the null hypothesis that all named variables are statistically insignificant. But using the Wald joint test on time dummies we confirm that time effects significantly influence the current account. We see that the current account balance is structurally larger for all economies in the periods 2002–2006 and 2012–2016. Whereas the latter might be interpreted as a ramification of the global financial crisis that resulted in a deteriorated access to global financing, the former is rather surprising as it relates to the pre-crisis period. The larger current account balances in the two periods are observed mainly in high-income and low-income countries.

When we exclude the squared term from our regression model, the picture remains similar. Although the Breusch–Pagan test proves that there are random effects and the coefficient for the income term of 0.06 is statistically significant, the GLS estimates turn out to be inconsistent in the Hausman test at a very low p -value. We confirm in a Wald test that the fixed effects model is more adequate than OLS as countries in our sample do not have a common regression intercept. However, the income per capita turns out negative (−0.013) and statistically insignificant in FE model. This is potentially a result of excluding the cross-country variation (between variation) in FE model. The Wald joint test on time dummies indicates that there are

time effects in our sample. As indicated by the FE model with the squared term, the current account balance is larger in the period 2002–2006.

6 Conclusion

This chapter examines validity of the stages of development hypothesis in the years 1992–2016 using various quantitative techniques. We get some support for SDH based on an analysis of the distribution of the current account ratio in five income groups. The current account balances across very high-income countries are generally in line with SDH as the average and median are positive throughout the analysed period. In a group of high-income countries these measures indicate a more balanced current account as expected by SDH. Both lower and upper middle-income economies have negative means and medians for the current account ratio throughout the analysed period. In majority of periods these measures are more deeply negative for upper middle-income countries, which is again in line with SDH. However, the current account is on average in deficit in low-income countries in all analysed 5-year periods, which is not consistent with the implications of SDH.

In a cross-section regression, we do not find any confirmation of a U-shaped association between the current account and the stage of development. However, we see a significant linear relationship between these variables. In our cross-section an increase in the per capita income ratio by 10 percentage points leads to a rise in the current account to GDP ratio of almost 0.8 p.p. These results have been confirmed in all analysed 5-year periods. The influence rises from 0.5 p.p. in the years 1992–1996 to 1.0 p.p. in the last period.

In a panel regression, we use fixed effects models with country-specific and time effects that seem superior to random effects (as indicated by the Hausmann and Welch tests). As in the cross-section we do not find any support for the U-shaped relationship. But using the Wald test on time dummies we confirm that time effects significantly influence the current account. The current account balance was structurally larger for all economies in the periods 2002–2006 and 2012–2016. The latter could be perceived as a ramification of the global economic crisis that resulted in a deteriorated access to global financing. The former is rather surprising as it relates to the pre-crisis period. We do not find evidence of a linear association in our univariate panel regression. This is probably as a result of excluding the cross-country variation in the fixed effects model.

In conclusion, we see just a limited confirmation of the stages of development hypothesis. The curve representing the relationship between the current account and the income per capita is not typically U-shaped as presumed by SDH. The association seems linear and positive. Developing countries whose per capita GNI is closer to that of industrialised economies tend to run lower current account deficits. The richer a developed economy the higher its current account surplus. However, the relationship is not confirmed in a dynamic setting of panel data. This might indicate a high degree of persistence in the current account in individual countries. The

findings of the study shed some light on liquidity constraints in developing countries. The departure from SDH for low-income countries indicates that poorest countries are able to gather external financing and run current account deficits. It seems that in a globalised world with capital mobility financing constraints are much weaker than before.

Appendix: List of Countries

Afghanistan	El Salvador	Latvia	Romania
Argentina	Estonia	Lebanon	Serbia
Australia	Ethiopia	Lithuania	Singapore
Austria	Finland	Luxembourg	Slovak Republic
Bangladesh	France	Macao SAR, China	Slovenia
Belgium	Germany	Malaysia	South Africa
Bolivia	Ghana	Mexico	Spain
Bulgaria	Greece	Morocco	Sri Lanka
Cameroon	Guatemala	Myanmar	Sweden
Canada	Hong Kong SAR, China	Nepal	Switzerland
Chile	Hungary	Netherlands	Tanzania
China	India	New Zealand	Thailand
Costa Rica	Indonesia	Pakistan	Tunisia
Cote d'Ivoire	Ireland	Panama	Turkey
Croatia	Israel	Papua New Guinea	Uganda
Cyprus	Italy	Paraguay	United Kingdom
Czech Republic	Japan	Peru	United States
Denmark	Jordan	Philippines	Uruguay
Dominican Republic	Kenya	Poland	Vietnam
Egypt, Arab Rep.	Korea, Rep.	Portugal	Zambia

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The Economic Specificity of US Foreign Direct Investments to Selected European Union Countries



Rasa Daugėlienė

Abstract The chapter analyses practical issues regarding the economic specificity of US foreign direct investments (FDI) to selected EU countries. Therefore, four countries were selected—the United Kingdom, Germany, Belgium and Lithuania. There are plenty of tariff and non-tariff barriers to successful trade relations between the EU and the USA. The aim is to define the specificity of economic aspects of US FDI to selected EU Member States. The first task was, to analyze the legal basis of agreements that affect exports from the USA to the EU. The second task—to provide a comprehensive economic analysis of the main investment trends from the USA to selected EU Member States. The analysis starts with a description of the investment environment and continues with a presentation of the US outward FDI stock to the selected EU countries. The research *methods* used are a systematic overview of the history of investment relations between the EU and the USA, and a descriptive method presenting the current investment situation between the EU and the USA, its challenges, issues and trends.

Keywords Foreign direct investments (FDI) · USA · European Union · TTIP · EU–USA investment trends · Lithuania

1 Introduction

Despite the decline in foreign direct investments (FDI) in the world (even by 16% in 2017), it is important to stress that the spread of FDI is the main engine and source for economic growth. One of the main strategic investors for the EU is the USA. Investment and trade relations between these two world powers have the greatest influence on the economic development of the EU. As is known, the trade flows

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between the EU and the USA represent 40% of world trade in goods and services. Transatlantic trade and flows of investments amount to at least 11 billion euros per day.

International relations between the EU and the USA have been more deeply analyzed by Derek (2015), Meunier (2005), Howorth and Menon (2009), Blomstrom and Kokko (2003), Busse and Groizard (2006), Cooper (2014), Hart and Jones (2010), Hill (2003), Kopstein and Steinmo (2008) and others. Different economic standpoint concerned with European countries was presented by Kollias et al. (2016). The authors examined the interrelation between stock markets and exchange rates in the case of eight European countries. The impact of FDI on economic growth in Singapore between 1980 and 2014 was examined by Akalpler and Adil (2017). Economy of the USA and the EU was not analyzed. Cieřlik (2019) examined empirically the determinants of multinational activity of firms from the new EU-12 member states in Poland during the period 1990–2014. This allows to determine that there is a lack of specific scientific studies about the USA and the EU economic relations.

Regardless of recent economic challenges, the USA consistently directs its FDI each year towards the European Union, and the EU's FDI also continually increases in the USA. Many millions of jobs are linked to the transatlantic economy. Therefore, the aim of this chapter is to define the specificity of economic aspects of US FDI to selected EU Member States. In order to achieve this, the following tasks have to be completed. First, to analyze the legal basis of agreements that affect exports from the USA to the EU. Second, to provide a comprehensive economic analysis of the main investment trends from the USA to selected EU Member States. Working papers regarding this phenomenon analyze common FDI flows from USA to EU internal market. This chapter concentrates on EU countries that are remarkably significant in the field of FDI. The chapter raises the following two questions: What barriers are declared for trade between the EU and the USA? What are the main trends in US FDI to the selected EU countries? The research methods used in this study include a systematic overview of the history of relations between the EU and the USA, and a descriptive method of the current investment situation between the EU and the USA, its challenges, issues and trends.

2 Legal Basis of Agreements Affecting Exports from the USA to the EU: Historical Aspects of the TTIP Negotiations

One of the main aspects that receive considerable attention in US–EU negotiations has been the convergence of the regulatory system in order to simplify trade conditions between the USA and the EU. The idea of regulatory convergence is not new. Only a few bilateral agreements related to regulations have so far been signed between the EU and the USA, but the efficiency of their implementation and

their impact on mutual trade between the USA and the EU has differed. These agreements define the rules of trade for certain products and are not implemented efficiently because they are based on legally non-binding provisions. This means that the parties to the agreement undertake to comply with the agreement, but implementation of the provisions are not mandatory. Until now there is no such agreement between the USA and the EU which would cover all the rules and conditions of the mutual trade of goods and services. Consequently, in addition to customs duties, mutual trade between the USA and the EU is burdened by different technical regulations, standards, conformity assessments and certification procedures and requirements applied to separate groups of goods and services. The most important US–EU mutual agreements in the regulatory field are—EU–US Veterinary Equivalency Agreement, 1999, Mutual Recognition Agreements (MRAs) between the USA and the EU, 1998, and Organic Equivalency Cooperation Arrangement, 2012.

The EU–US Veterinary Equivalency Agreement provides for a mechanism that speeds up and simplifies the mutual recognition process of existing EU and US sanitary norms in the mutual trading of animals and animal products. Therefore, concrete steps are proposed in this agreement and these steps have to be followed by both parties of the agreement whether or not the exporting country complies with the requirements of the importing country. However, this agreement does not limit the right for both parties to have different veterinary inspection requirements and to maintain a reasonable level of public health protection.

In accordance with the Mutual Recognition Agreements between the USA and the EU, decisions have been adopted regarding telecommunications equipment, electromagnetic compatibility, electrical safety, recreational craft, pharmaceutical products and medical devices conformity assessment procedures. No contractual agreement exists on the mutual recognition of product standards; however, certification bodies have been established that have the right to perform assessment procedures on export-ready products for the standards applied in the importing country. However, the concept of Mutual Recognition Agreements has only been implemented in the fields of telecommunication equipment and recreational craft.

According to the EU–US Organic Equivalency Cooperation Arrangement, the EU agrees to recognize the national ecology programme carried out by the US Department of Agriculture. This programme establishes ecology standards for food and agricultural products and is equivalent to the EU ecology programme. This means that US agricultural and food products recognized as organic will also be labelled as organic products. Therefore, producers of organic products from the USA and EU are no longer required to conform to double standards. In addition, the reduced administrative burden on marketing organic products in the EU and the USA helps save time (additional inspections in the foreign market no longer necessary) and costs.

International investment procedures are not as simple as we might imagine. Every step functions precisely so that everything might be clear for both parties. Investment procedures are based on strict regulations established by both parties: the one receiving the investment and the other investing. The parties may not simply be the USA and the EU, but also countries within the EU where different regulations

may apply. But in general, the main regulations governing investments in the EU are the same in every Member State. Nowadays, there are many different fields that are key to investments between the USA and the EU—regulatory convergence, which is currently one of the key issues, technical trade barriers, food safety, animal and plant health regulations, chemical industry regulations, cosmetic product regulations, engineering industry product regulations, medical device regulations, regulations for pesticides, information and communication technologies regulations, pharmaceutical regulations, textiles regulations and vehicular regulations.

Regulatory convergence is an important field because EU companies currently seeking to export products to the USA must comply with US regulatory norms which are different from those applied in the European Union. This complicates the export of goods and services from the EU to the USA. As the European Commission (2016a) stated in their TTIP proposal, the objectives of such a US–EU agreement could be negotiated:

- To reduce the costs to companies from different regulations when exporting goods and services by maintaining welfare, health, environmental and other standards.
- To encourage the USA and the EU to exchange relevant information regarding changes to such requirements or regulations and to cooperate in reviewing and changing regulations.
- To bridge the gap between regulations in order to more effectively share common objectives; for example, if the same requirements for the charging networks for electric cars could be set, this would greatly encourage the use of electric cars.

According to the European Commission (2016a), the convergence of US and EU regulatory norms and requirements would help reduce monetary and time costs when exporting to or from the EU. It would especially help small- and medium-sized enterprises by allowing greater export volumes, improved competitiveness and better quality of services and goods. Consequently, the regulatory convergence of technical trade barriers can be overviewed and different fields of industry regulation, and convergence aims and expectations can be discussed. Technical trade barriers such as different regulations for certain products (for example toys) and procedures for testing the compliance of technical requirements makes trade more complex and creates additional costs for companies exporting their products (European Commission 2016b).

One further legal challenge that occurs in the trade between the USA and the EU is food safety and animal and plant health (SPS—sanitary and phytosanitary) regulations. Both parties attempt to find the best way to avoid duplicating test procedures and provide the smooth supply of products. As the European Commission (2016c) stated, the EU and US requirements for food safety and animal and plant health were similar, but certain terms used to satisfy the requirements for the EU and the USA are treated differently. This leads to additional test and inspection procedures when exporting products from the EU or the USA.

Another legal challenge arising between the USA and the EU are the engineering industry product regulations. According to the European Commission (2016d),

while engineering products such as refrigerators, mobile phones, boats, tractors and others account for 25% of all trade between the USA and the EU, different technical regulations, standards and testing procedures are applied on both sides and this makes exports and imports more difficult. According to the European Commission (2016e), different requirements currently exist in the USA and the EU for medical devices (scanners, X-ray machines, pacemakers etc.), and so new devices have to be tested several times. Equipment manufacturing companies experience additional costs and new devices take longer to become accessible to the user. Regulators from the EU, USA and other countries are already discussing and pesticides.

Information and communication technologies regulations (ICT) are another area of legal barriers related to technology certification between the USA and the EU. The European Commission (2015) proposes a negotiating position and objectives which would be beneficial for both the USA and the EU:

- Promote cooperation in the fields of ICT regulation and consumer protection.
- Bridge the gap between certificate procedures in the ICT sector to reduce unnecessary time and financial costs for both the USA and the EU.
- Establish common e-labelling and e-access standards. Such cooperation could put the EU and the USA at the forefront when developing global standards in these innovative areas. The possible resolution of this regulation could involve cooperation to improve the regulation of ICT products and services and help save consumers. It is also expected that both US and EU companies will be able to export their products more simply, and export costs will be reduced.

Other legal challenges arising between the USA and the EU include pharmaceutical regulations. According to the European Commission (2016f), negotiating is an important step because the USA and the EU already cooperate in the field of norms convergence for pharmaceutical product quality and safety, but there are still differences that form barriers to mutual trade and these barriers occur due to testing the activity of companies producing pharmaceutical products and testing new products before market entry.

Despite the previously mentioned legal challenges, the regulation of textiles is also one of the issues which makes trade between the USA and the EU more difficult. As the European Commission (2016g) states in one article about their position on textiles and clothing, currently the USA and the EU apply different labelling requirements for textile products, and there are differences in the application of product safety standards, testing procedures and identifying origin. This means that exporting to the EU or the USA involves a lot of unnecessary costs and wasted time.

Other legal challenges arising between the USA and the EU are the regulations regarding vehicles. Canis and Lattanzio (2014) explain negotiation that safety regulations for vehicles in the USA and the EU are different although their ultimate goal is similar—to ensure a high level of safety on the roads. Canis and Lattanzio (ibid.) state that both parties have a common negotiating position and certain objectives which can be enumerated as follows:

- To agree on the harmonization of US and EU technical standards, to provide for the mutual recognition of existing technical standards and the creation of a US–EU process for the harmonization of future vehicle regulations.
- To cooperate in the creation of global safety standards for vehicles.
- To harmonize certain standards and regulations of the EU and USA, especially in fields that are not regulated by new technologies.

On achieving these objectives, the main outcome is that the agreement should help the requirements and standards for vehicles in the EU and USA to converge, and reduce the time and financial costs in the mutual trade of vehicles, which would also facilitate the marketing of vehicles on both sides of the Atlantic.

3 The Analysis of Investment Environments and Trends: The United Kingdom, Germany, Belgium and Lithuania

In addition to the author's home country of Lithuania, the three largest recipients of FDI in the EU have been selected for analysis regarding investment trade—the United Kingdom, Germany and Belgium. These countries will all be analyzed on the basis of several spheres of investment. Geographical situation is very important. The investing companies draw special attention to real estate—location, availability of road links, ports, railways and even airports. When companies plan to invest in research and development or service industries, they concentrate on the local availability of skilled labour. Companies dealing with steel would be interested in a location near a rail connection. What is more, low labour costs and low tax rates may also be crucial. Different authors explain that the positive effect of an investment is the development of new jobs, increased capital for the host country, the introduction of new technologies and technical experience.

3.1 Case of the United Kingdom

The following provides the main factors influencing US investment in the United Kingdom. All the trends are based on the latest available statistical data. FDI flows to the United Kingdom are the largest in the EU. In order to invest in one or another attractive country, some main factors must be considered.

When one country is considering investing in another country, the taxation system of the recipient has to be thoroughly analyzed because different taxes are applied in each EU Member State. The corporate tax rate in the United Kingdom stands at 20% (Table 1). The corporate tax rate in the United Kingdom averaged 32.66% from 1981 until 2015, reaching an all-time high of 52% in 1982 and a record low of 20% in 2015. The level is based on the net income companies obtain while exercising their business activity, normally during one business year. Revenues from

Table 1 The main taxes collected in the United Kingdom (shown as a %)

Taxation	Corporation tax	VAT (standard)	Personal income tax	Export tax
Rate	20	20	45	VAT payable on imports from a non-EU country, imports from EU countries subject to common EU VAT rules

Source: Trading Economics (2016)

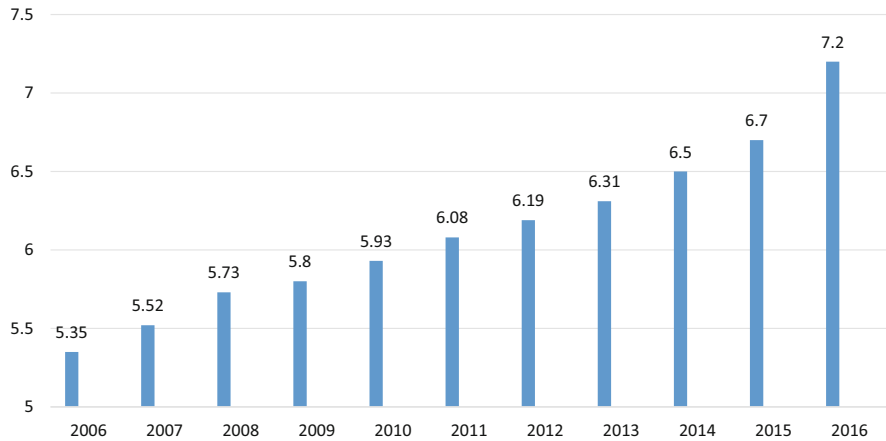


Fig. 1 UK minimum hourly wage (GBP/hour). Source: Department for Work and Pensions (2016)

corporate tax are an important source of income for the government of the United Kingdom. Therefore, the lower the corporation tax applied in the country, the better for the investor because less taxes will then be paid to the government of the United Kingdom. The personal income tax rate in the United Kingdom stands at 45%. This tax in the United Kingdom averaged 42.14% between 1995 and 2015, reaching an all-time high of 50% in 2010 and a record low of 40% in 1996.

As far as labour issues in the United Kingdom are concerned, investors also analyze the minimum wage. Every area has to be discussed and evaluated before deciding to invest in another country. According to the Department for Work and Pensions (2016), UK’s national minimum wage increased to £7.20 per h in April 2016 from £6.70 in 2015. Figure 1 shows the increase in the minimum wage from 2006 to 2016, where the minimum hourly wage can be seen to have increased from 5.35 to 7.2 GBP per h over 10 years.

The unemployment rate is also an important aspect for investment. One of the outcomes of investing countries is the creation of new jobs. Trading Economics (2016) provides statistics showing that foreign direct investment to the United Kingdom helped reduce unemployment rate from 5.2% in 2005 to 4.8% in 2016. This means that every year more and more workers find jobs and the unemployment rate decreases.

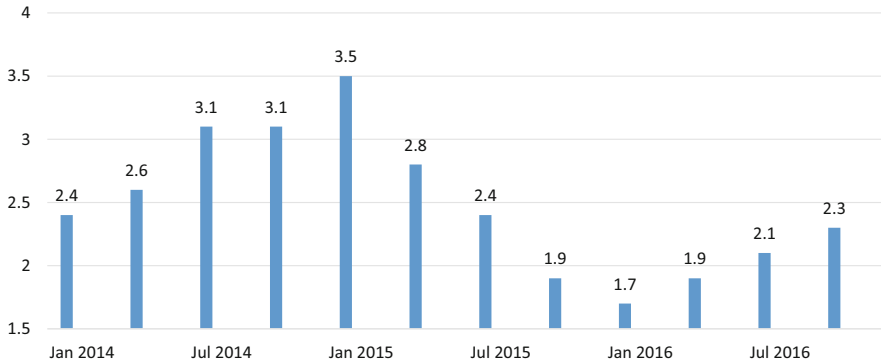


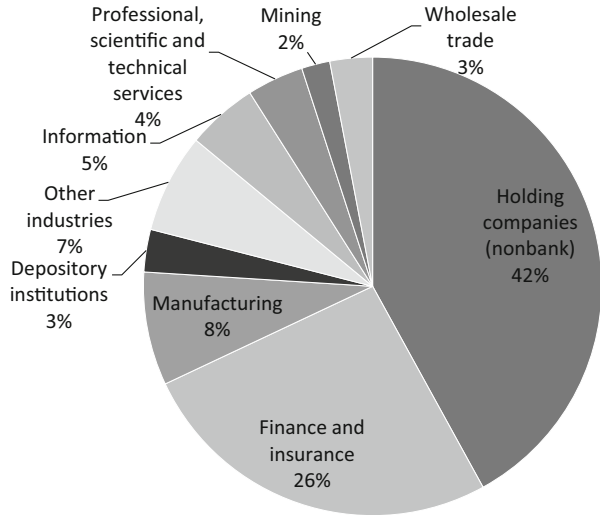
Fig. 2 Annual GDP growth rate in the United Kingdom (USD). Source: Office for National Statistics (2016)

Regarding transport related factors, the roads in the United Kingdom form a network of varying quality and capacity. According to the ITSD (2016), the United Kingdom is among the best countries in the world for road safety and is still improving. There are more than 7000 km of highway in the United Kingdom and 15,760 km of rail. The United Kingdom has more than 150 airports and aerodromes of which 20 major airports are in use. In the United Kingdom more than 60 ports can also be counted. The entire transport system of the United Kingdom has developed well and this further encourages FDI. Investors can be sure that the transport sector in the United Kingdom works well in every area.

Access to target markets is an important aspect when searching for a place to invest. Although the United Kingdom is located off the western coast of continental Europe, it is still the leading country in terms of FDI. This means that the geographical situation in the United Kingdom is beneficial for the country. All the target markets can be reached by sea or air. Maritime connections are also useful when an investor is deciding on a place for investment. According to the Office for National Statistics (2016), the UK economy advanced 2.3% year-on-year in the 3 months to September of 2016, better than the 2.1% expansion in the previous period and above market expectations of 2.1%. As Fig. 2 shows, growth in GDP has varied every year from 2014 to 2016 in the United Kingdom.

According to the data provided by Trading Economics (2016), inflation has varied greatly between January and October of 2016. The data could suggest that the sharp fall in the value of the pound following the June referendum is already pushing up the cost of imports of manufacturers, which is likely to feed through into UK consumer prices in the coming months. Despite the main factors considered before making FDI, examples of the main areas of investment also have to be analyzed. The following areas for investment are currently popular. The United Kingdom has been a major destination for US foreign direct investment (FDI). What is more, the United Kingdom is a key source of FDI in the USA. According to data provided by the Peterson Institute for International Economics (2016), the US direct

Fig. 3 US outward FDI stock to UK, 2014. Source: Peterson Institute for International Economics (2016)



investment stock in the United Kingdom was valued at \$588 billion in 2014, accounting for 12% of US outward FDI stock worldwide. About two-thirds of US direct investment in the United Kingdom went to holding companies (\$248 billion) and finance and insurance (\$152 billion). The smallest amount of investment went to mining (\$11.7 billion), wholesale trade (\$17 billion) and depository institutions (\$17 billion) (Fig. 3).

The US invests in holding companies in the United Kingdom due to the fact that the United Kingdom has one of the widest treaty networks available, such that payments from foreign high tax jurisdictions to UK companies will often attract low or zero withholding tax rates. Furthermore, the United Kingdom is also a member of the EU and accordingly a UK holding company is entitled to the benefits of the EU Parent/Subsidiary Directive, so that the ownership structure qualifies and dividend payments to a UK holding company from an EU subsidiary may qualify for 0% withholding tax.

3.2 Case of Germany

The second biggest country in the European Union in terms of FDI flows from the USA is Germany. The trends shown here are based on the latest available statistical data. When a country is considering investing in an EU country, the taxation system of the host country has to be analyzed thoroughly because taxes differ in each EU Member State.

The corporate tax rate in Germany stands at 20%. In Germany, the corporate income tax is collected from companies and is based on the net income companies obtain while exercising their business activity, normally during one business year.

Table 2 The main taxes collected in Germany (shown as a %)

Taxation	Corporation tax	VAT (standard)	Personal income tax	Export tax
Rate	29.72	19	45	VAT payable on import from a non-EU country, import from EU countries subject to common EU VAT rules

Source: Trading Economics (2016)

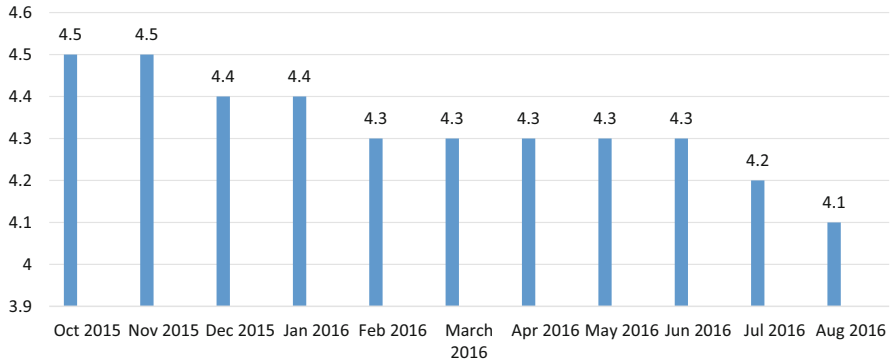


Fig. 4 Germany unemployment rate, %. Source: Trading Economics (2016)

The corporate tax rate in Germany averaged 39.78% between 1995 and 2015, reaching an all-time high of 56.80% in 1995 and a record low of 29.40% in 2009. Corporate tax revenues are an important source of income for the government of Germany. The lower the corporation tax applied, the better it is for investors because less taxes will be paid to the government of Germany (Table 2).

In regard to labour issues in Germany, investors also analyze the minimum monthly wage. Every area has to be discussed and evaluated before deciding to invest. According to the Department for Work and Pensions (2016), Germany’s national minimum wage is 8.5 EUR per h. The unemployment rate is also an important aspect for investors (Fig. 4). One of the outcomes of investing countries is creation of new jobs. In this case, according to statistics provided by Trading Economics (2016), every year more workers find jobs and the unemployment rate decreases.

Regarding transport-related aspects, roads in Germany form a network that varies in quality and capacity. According to the ITSD (2016), Germany has approximately 650,000 km of roads, of which 231,000 km are non-local roads. The autobahn is the German federal highway system. Germany’s autobahn network had a total length of about 12,949 km in 2015, which ranks it among the densest and longest systems in the world. Germany features a total of 43,468 km of rail, of which at least 19,973 km are electrified.

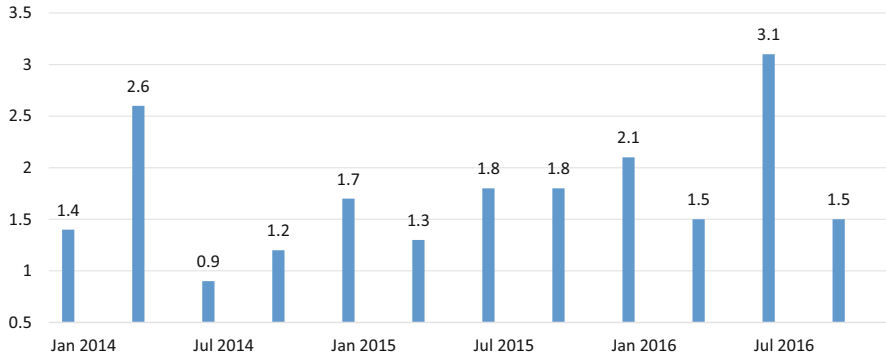


Fig. 5 Annual GDP growth in Germany. Source: Trading Economics (2016)

Germany has more than 80 airports and aerodromes of which 25 airports are the busiest. There are also more than 20 ports in Germany. The entire German transport system is well developed and this helps investors decide in favour of FDI. They can be sure that the transport sector in Germany works well in every area. Access to target markets is also important and as Germany is located in Western Europe, bordering the North Sea between France and Poland, its neighbours are large strong European countries. Therefore, the location of Germany is beneficial and target markets can be reached by road, sea or air. According to Trading Economics (2016), the German economy—the fifth largest economy in the world and Europe’s largest—is a leading exporter of machinery, vehicles, chemicals and household equipment, and benefits from a highly skilled labour force. The composition of GDP (Fig. 5) on the expenditure side can be divided as follows: household consumption (55%), gross capital formation (20%, of which 10% is in construction, 6% in machinery and equipment and 4% in other products) and government expenditure (19%).

According to the data provided by Trading Economics (2016), the inflation rate has varied greatly between January and October this year. At the beginning of the year, inflation varied between 0.4% and -0.1%, but since June it started to increase dramatically and reached 0.8% in October. Despite the main factors considered before making FDI, examples of the main areas of investment also have to be analyzed.

Common areas for investment in Germany according to recent data can be seen in Fig. 6 above. Germany has been one of the main destinations of US foreign direct investment (FDI). According to data provided by Germany Trade and Invest (2014), US direct investment stock in Germany was valued as the second most important recipient in Europe. Almost one-fifth of all US direct investment in Germany went to ICT and software (18%), automotive, industrial machinery and equipment (15%) and Business and Financial Services (15%). The smallest amount of investment went to renewable energy (2%), hotel, tourism and entertainment (3%) and energy, minerals and metals (4%) (Fig. 6).

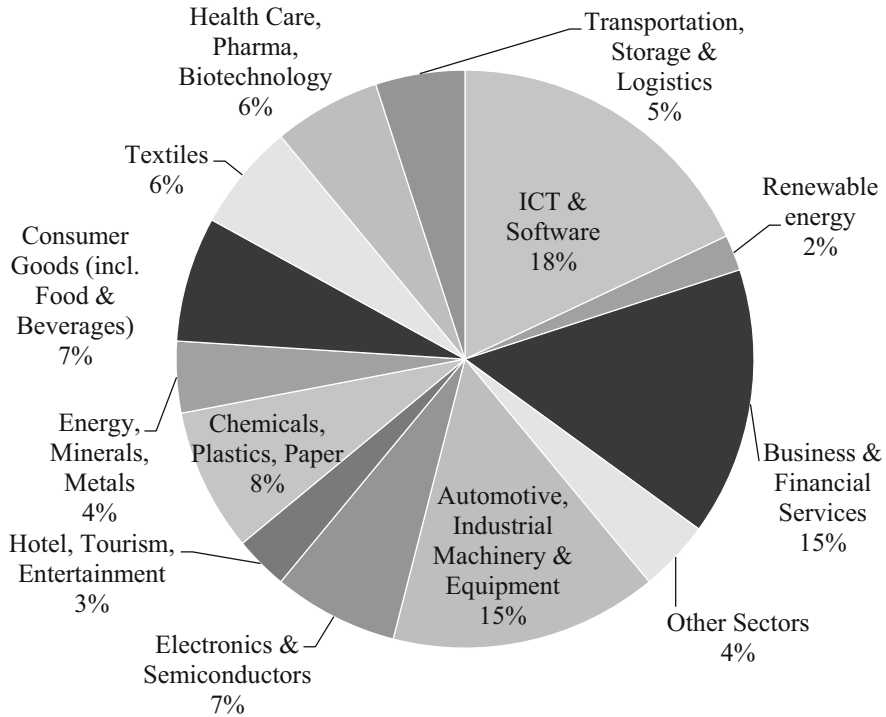


Fig. 6 US outward FDI stock to Germany, 2014. Source: Peterson Institute for International Economics (2016)

Table 3 The main taxes collected in Belgium (%)

Taxation	Corporation tax	VAT (standard)	Personal income tax	Export tax
Rate	33.99	21	50	VAT payable on import from a non-EU country, import from EU countries subject to common EU VAT rules

Source: Trading Economics (2016)

3.3 Case of Belgium

According to Trading Economics (2016), the corporate tax rate in Belgium stands at 33.99% (see Table 3). Corporate tax in Belgium has averaged 39.06% between 1981 and 2015, reaching an all-time high of 48% in 1982 and a record low of 33% in 2015.

Belgium collects corporate tax from companies based on the net income companies obtain while exercising their business activity, normally during one business year. The lower the corporation tax, the better it is for the investor because less taxes must be paid to the government of Belgium. In regard to labour issues in Belgium,

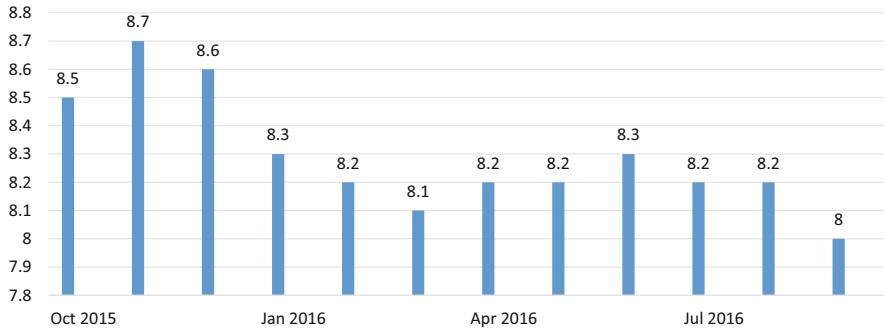


Fig. 7 Belgium unemployment rate, %. Source: Trading Economics (2016)

investors also analyze the minimum monthly wage. Every area has to be discussed and evaluated before deciding to invest. According to Trading Economics (2016), the minimum wage in Belgium increased to 1,531.93 EUR/month in the second half of 2016 from 1,501.82 EUR/month in the previous 6 months. It is higher than the average salary in the EU which stands at 1470 EUR/month (Reinis Fischer 2016). One of the drawbacks for investors is the high cost of salaries.

Unemployment is also an important aspect for investment. One of the outcomes of investing in countries is the creation of new jobs. According to Trading Economics (2016), FDI into Belgium helped reduce unemployment from 8.7% in October 2005 to 8% in October 2016 (Fig. 7). This means that more workers find jobs every year and the unemployment rate decreases.

Regarding transport in Belgium, there are 118,414 km of roads, of which 1747 km are motorways, 13,892 km are main roads and 102,775 km are other paved roads. According to the ITSD (2016), Belgium is among the best countries in the world for road safety and is still improving. The total length of highways in Belgium is about 3700 km. This means that despite the small area of Belgium, transport links are really well established helping to reach every corner of the country. This is an advantage for potential investors in the target country.

There is a total of 3536 km of rail, of which 2950 km are electrified. It is clear that the level of the development of rail in Belgium is extremely high, considering that the majority of the rail is electrified. Therefore, the rail system contributes greatly to the business sector. Belgium also has more than 6 airports (ITSD 2016). Although the number is not high, they are highly active hubs. One of the factors influencing the high volume of people travelling through Belgian airports are the European Parliament and that many members of Parliament and support staff use the airport services every day. The entire transport system in Belgium is highly developed and this helps investors decide in favour of FDI. They can be confident that the transport sector in Belgium will not pose a problem, but would contribute to future investments.

Access to target markets is an important aspect when searching for a place to invest. That shows the level of GDP growth (Fig. 8). Belgium shares land borders with four large and powerful European countries including Germany, France,

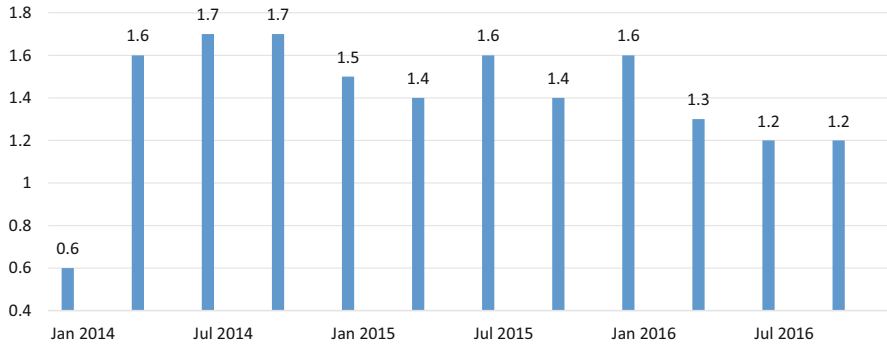


Fig. 8 Annual GDP growth in Belgium, %. Source: Trading Economics (2016)

Luxembourg and the Netherlands. This means that the geographical situation for Belgium is beneficial due to the fact that this country not only has a strong economy but is also safe between such powerful countries. Target markets can be reached by road, sea or air.

According to Trading Economics (2016), the most important category in the consumer price index in Belgium is Housing and Utilities (17.6% of total weight). Food and Non-Alcoholic Beverages accounts for 16.4%, transport for 15.9%, recreation and culture for 9.3%, miscellaneous goods and services for 9% and restaurants and hotels for 7.8%.

Furniture, household goods and maintenance; clothing and footwear; communication; health; alcoholic beverages and tobacco and education account for the remaining 24% of total weight. According to the data provided by Trading Economics (2016), the inflation rate has varied widely between January and October 2018. At the beginning of the year, the inflation rate varied from 1.52% to -1.74% , but since March it has increased dramatically and reached 2.24% and later 2.28% in July. It then decreased to 1.81% in October. Despite the main factors that are considered before making foreign direct investments, examples of the main areas of investment also have to be analyzed. All the following areas for investment in Belgium are common according to recent data (Fig. 9).

Belgium has also been one of the main destinations of US foreign direct investment (FDI). The US direct investment stock in Belgium was valued as the third largest US FDI recipient country in Europe. According to the data provided by the Embassy and Consulates of Belgium in the USA (2016), chemical manufacturing accounted for 33% of the US FDI stock in Belgium in 2015. About 32% went to other industries and 12% to wholesale trade. The smallest amount of investment was in services (3%), food manufacturing (3%) and computers and electronics manufacturing (8%) (Fig. 9). Although the market is mature, competitive and filled with international products, there are also good investment opportunities in some sectors in Belgium. There is significant growth in the service sector because the country switched from heavy production to light manufacturing and began

Fig. 9 US outward FDI stock to Belgium, 2015. Source: Peterson Institute for International Economics (2016)

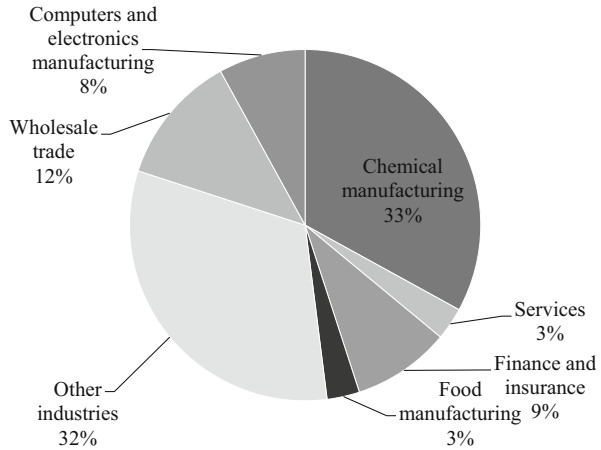


Table 4 The main taxes collected in Lithuania (%)

Taxation	Corporation tax	VAT (standard)	Personal income tax	Export tax
Rate	15	21	15	VAT payable on import from a non-EU country, import from EU countries subject to common EU VAT rules

Source: Trading Economics (2016)

producing finished products instead of steel, textiles and raw materials. Belgium has no significant natural resources.

3.4 Case of Lithuania

Although it is not at the top of the list of FDI flows from the USA, it has been chosen as a contrast to the largest and most powerful EU Member States. The trends shown here are based on the latest available statistical data. FDI flows to Lithuania are in third place in the European Union.

According to Trading Economics (2016), the corporate tax rate in Lithuania stands at 15% (Table 4). The corporate tax rate in Lithuania averaged 15.50% between 2006 and 2015, reaching an all-time high of 20% in 2009 and a record low of 15% in 2007. The corporate tax rate in Lithuania is reported by the State Tax Inspectorate. According to data provided by Trading Economics (2016), the corporate tax is collected from companies based on the net income companies obtain while exercising their business activity, normally during one business year. The benchmark we use refers to the highest rate for corporate income. Revenues from corporate tax are an important source of income for the government of Lithuania.

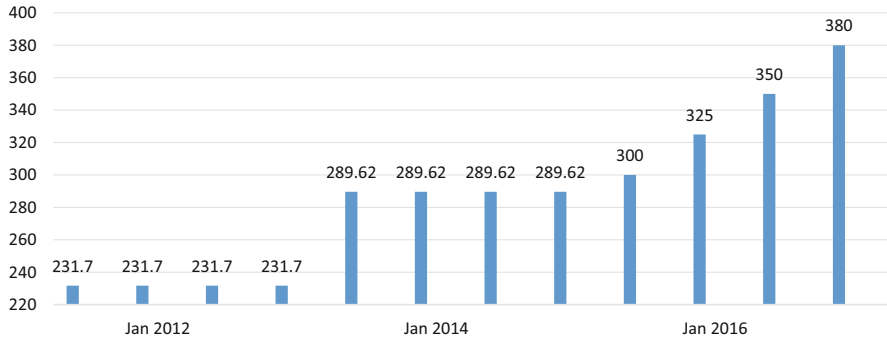


Fig. 10 Minimum monthly wages in Lithuania, EUR/month. Source: Lithuanian Statistics Department (2016)

In regard to labour issues in Lithuania, investors also analyze the minimum monthly wage (Fig. 10). Every area has to be discussed and evaluated before deciding to invest. According to Eurostat (2016), the minimum wage in Lithuania increased to 380 EUR/month in the second half of 2016 from 350 EUR/month in the previous 6 months. The minimum wage in Lithuania averaged 202.03 EUR/month between 1999 and 2016, reaching an all-time high of 380 EUR/month in December 2016 and a record low of 92.14 EUR/month in June 1999.

As the Lithuanian labour exchange (2016) states, unemployment in Lithuania decreased to 7.20% in September from 7.50% in August 2016. The unemployment rate in Lithuania averaged 8.50% between 1995 and 2016, reaching an all-time high of 15.30% in July 2010 and a record low of 2.70% in June 2007. Unfortunately, the percentage of unemployment in Lithuania varies every year and there is no constant increase or decrease in this area.

According to the ITSD (2016), Lithuania has one European route crossing it from the south to the north. It is known as the Via Baltica between Warsaw and Tallinn running from Prague in the Czech Republic to Helsinki in Finland by way of Poland, Lithuania, Latvia and Estonia. This road facilitates trade and communication for Lithuania with other European countries. The length of the highway in Lithuania is about 1748 km. There are 1998 km of rail in Lithuania. The railway system in Lithuania is small compared to the other and larger European countries. However, this system helps develop the internal market, as well as imports and exports. In Lithuania, there are four international airports that are sufficient to develop imports, exports and passenger flows in or out of Lithuania.

Access to target markets is an important aspect when searching for a place to invest. Lithuania is located in Northern Europe. As one of the three Baltic States, it is situated along the southeastern shore of the Baltic Sea, to the east of Sweden and Denmark. It is bordered by Latvia to the north, Belarus to the east and south, Poland to the south and Kaliningrad Oblast (a Russian exclave) to the southwest. All the main target markets can be reached by sea or air.

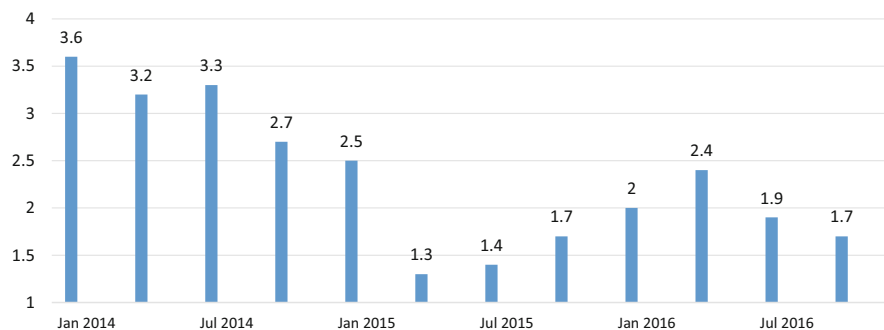


Fig. 11 Annual GDP growth rate in Lithuania (%). Source: Lithuanian Statistics Department (2016)

Gross Domestic Product (GDP) in Lithuania expanded 1.70% in the third quarter of 2016 compared to the same quarter in the previous year (Fig. 11). Annual GDP growth in Lithuania averaged 4.16% between 2001 and 2016, reaching an all-time high of 11.60% in the fourth quarter of 2003 and a record low of -15.80% in the second quarter of 2009. Lithuania joined the Euro Area in January 2015. The country was among the hardest hit by the global financial crisis in 2008, and GDP contracted by 14.8% in 2009. Since 2010, however, Lithuania has been ranked among the fastest growing economies in the EU. On the expenditure side, household consumption is the main component of GDP and accounts for 63% of its total use, followed by gross fixed capital formation (19%) and government expenditure (17%).

Consumer prices in Lithuania increased 0.9% in October 2016, following 0.8% growth in the previous period. This was the highest inflation rate since April, as prices fell at a slower pace for housing and utilities (-1.7% from -2.9% in September); transport (-1% from -2.2%); clothing and footwear (0.0% from -1.7%) and rose for recreation and culture ($+6.5\%$ from 6%); and education ($+3.1\%$ from $+2.8\%$). In contrast, inflation slowed for food (0.4% from 1.2%) and alcoholic beverages and tobacco (4 from 5.2%). On a monthly basis, prices went up 0.5%.

Investment from the USA to Lithuania does not seem to be very popular. The best known US investors in Lithuania include Philip Morris, Mars, Western Union, Nasdaq and Uber. The USA mainly invests in manufacturing and mining and quarrying. In regard to imports from the USA to Lithuania, the USA was not the main import market and was only in 20th place on the list as the main importers to Lithuania (319.1 million EUR). What is more, the data for 2014 shows that Lithuania mostly imported land vehicles and vehicle parts from the USA. A major share of imports (58.7%) was the import of mineral fuels (crude petroleum oils and heavy fuel oil). Major worldwide imports of machinery and mechanical equipment to Lithuania included turbojet engines (34%), and agricultural, horticultural and forestry machine parts (18.4%). Among electric vehicles and equipment imported from USA, mostly (25.7%) various electrical equipment (transmission apparatus, digital cameras, etc.) was imported.

In the agriculture and food sector, the most frequently imported product was surimi (33.2%), unmanufactured tobacco (31.3%). Chemical product imports from the USA accounted for 32%, which was for pharmaceutical products, while various chemical products (26.8%) included reaction initiators and accelerants. Among optical and similar devices, telescopes and astronomical instruments have mostly been imported (15.2%), while medical and surgical apparatus and instruments account for (13.2%). Textile and clothing imports include used clothing (48.9%) and chemical staple fibres (38.3%). Among timber and related products, timber was mainly imported in thicknesses exceeding 6 mm (60.9%). Metal imports consisted of iron and steel (41%) and also cutlery, spoons and similar tools (17.9%). In comparison with 2013, mineral fuel imports increased dramatically (141.8%) in 2014 due to the fact that importing crude oil commenced. There was a significant (46%) increase in machinery and mechanical equipment imports from the USA due to the increased imports of jet engines. In 2014, the imports of textile products (–33.8%) and vehicles and vehicle parts (–32.6%) decreased dramatically. This was caused by a decrease in imports of land vehicles, aircraft and their parts.

4 Conclusions

The analysis of bilateral partnerships between the EU and the USA shows that political, economic and cultural relations play an important role not only for each other, but also the rest of the world. The analysis of the EU–USA partnership allows us to draw the following conclusions. Investments between the EU and the USA require different political and legal procedures. Although trade between the EU and the USA is not new, there is progress in bilateral negotiations in the WTO. TTIP is a trade agreement that resulted in negotiations between the USA and the EU. The decision to launch such negotiations was influenced by such factors as the grid-locked multilateral negotiations in the WTO, the global economic crisis, which negatively influenced the economies of both the USA and the EU, the strengthening influence on global trade of growing economies (China, India, etc.), and the aim of reducing mutual trade costs between the USA and the EU. One of the main aspects of the US–EU negotiations regarding the TTIP agreement is convergence of the regulatory system in order to simplify trade conditions between the USA and the EU. The most important US–EU agreements in the regulatory field include the EU–US Veterinary Equivalency Agreement, 1999; The Mutual Recognition Agreements (MRAs) between the USA and the EU, 1998; and the EU–US Organic Equivalency Cooperation Arrangement, 2012.

The analytical part of this study demonstrated the main fields of investment flows from the USA to selected EU Member States. The United Kingdom has been a major destination for US FDI. The main markets for US direct investment in the United Kingdom are holding companies, finance and insurance. Less investment went to mining, wholesale trade and depository institutions. The study helped identify that the US direct investment stock in Germany was valued as the second largest FDI

recipient in Europe. American companies invest in such markets as ICT and software, automotive, industrial machinery and equipment, business and financial services. Less investment went to renewable energy, hotels, tourism and entertainment, and energy, minerals and metals. What is more, the US direct investment in Belgium mainly went to other industries and to wholesale trade. Less investment went to services, food manufacturing, computers and electronics manufacturing. As for Lithuania, its economy is developing fast being ranked among the fastest growing economies in the EU. It offers investors a diversified economy, a skilled workforce, low corporate taxation and a well-developed road network in the region.

The investigation of the main investment fields reveals that investments from the USA to the EU Member States are pursued after considering factors related to taxes (corporation tax, VAT, personal income tax), living standards (minimum wage, unemployment rate, GDP growth rate, inflation), availability of transport infrastructure (roads, airports, railways, ports) and neighbouring countries that might benefit economic or business relations. All these fields have to be considered in great detail before deciding to invest.

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Rational Choice and Market Behavior



Truong Hong Trinh

Abstract This chapter explores the value concept that is much important to define market equilibrium and explain market behaviors in the economy. Marginal principle is used to determine supply functions in the market structure that provide rational choices in production and consumption. However, rational behaviors are criticized on its being of the underlying assumptions, in which the neoclassical theoretical models cannot justify and describe actual market behaviors. For that reason, endogeneity and exogeneity are considered in the market equilibrium model that provides a better explanation on market behaviors in reality. The chapter contributes to the theory of market equilibrium and provides a testable theoretical framework on market behaviors.

Keywords Value concept · Market equilibrium · Marginal principle · Rational choice · Market behavior

1 Introduction

The value concept is the base in the formulation of value theories. Classical economists argued that value comes from production process, price is determined upon input factors and production conditions (Smith 1776; Ricardo 1821). Neoclassical economists argued that value comes from its utility in consumption process (Bentham 1789; Dupuit 1844), price is determined upon demand and supply (Marshall 1890). The utility concept (Bentham 1789) and marginalist revolution (Jevons 1871; Menger 1871; Walras 1874) had transformed classical economics into neoclassical economics from the 1870s on.

In literature, there are many debates on the utility concept and marginal principles in explaining market behaviors. Most critics on the utility concept are mainly its

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utility measurement and its explanation on market demand. Since value is better than utility to explain value creation and value distribution in today's economy, the value concept needs to be redefined and value theory should be constructed upon a law of diminishing marginal value. The concepts of value and price are essential to explain value creation and value distribution in the market, in which value is created in the consumption process and price plays a role of value distribution in the exchange process (Trinh 2018). The theory of value explains the value concept and equilibrium mechanism that should originate from the facts of reality. Market equilibrium presents behaviors of both producers and consumers, in which value and price are determined upon market equilibrium. Rational choice theory has been applied in many disciplines of the social science to model and understand market behaviors (Sugden 1991), in which marginal principle is a cornerstone of neoclassical economics.

The main critics of the rational choice theory are that the discipline is built on untestable assumption foundation (Simon 1955, 1979; Plott 1986). The individual choices often appear to be highly situational or context-dependent (Levin and Milgrom 2004). While the rational choice theory provides a very useful set of general principles with underlying assumptions, the behavioral researches provide insightful explanations in actual situations with disparate empirical observations (Mathis and Steffen 2015). The big challenge is the extension of the rational choice model with incorporation of these realistic features that provides a better understanding on market behaviors. In this chapter, the supply functions are determined upon the logic of maximizing behaviors, the market supply depends on both market demand and marginal cost. Market equilibrium model is extended with rational decisions in production and consumption. Moreover, the market equilibrium model considers endogeneity and exogeneity that provide a testable theoretical framework for empirical researches on market behaviors.

2 Market Equilibrium

The value concept has been debated in a long history, Aristotle (4th century BC) stated the value is driven by certain needs that create the basis of exchange (Aristotle 1959). Classical economists argued that value is created in the production process, where production input factors and production conditions have influence on the value of a commodity and bring it to market for exchange (Smith 1776; Ricardo 1821). Neoclassical economists argued that the value depends on its utility that comes from exchange and consumption (Bentham 1789; Dupuit 1844). The utility concept and marginal analysis are cornerstones of neoclassical economics to explain customer choice and market demand (Jevons 1871; Menger 1871). Later, Marshall (1890) explains price mechanism in terms of both supply (cost of production) and demand (utility). However, market equilibrium in neoclassical economics explains market price of a commodity determined by supply and demand, the explanation on value of a commodity is still a big challenge.

Fig. 1 Market demand for a commodity. Source: Based on Trinh (2014, 2018)

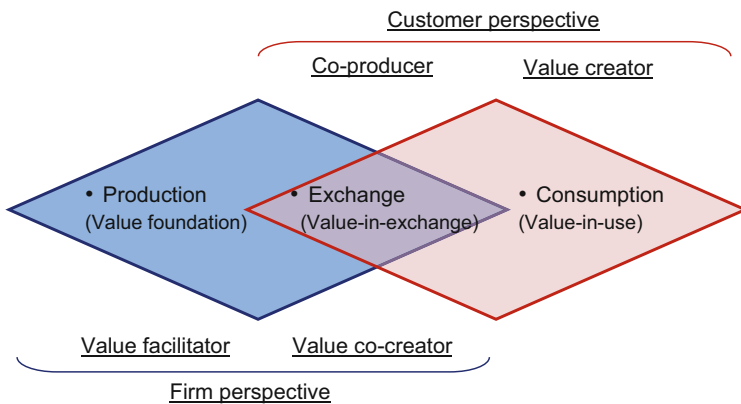
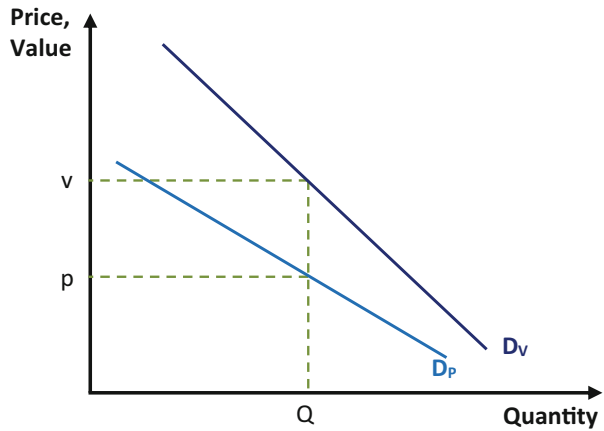
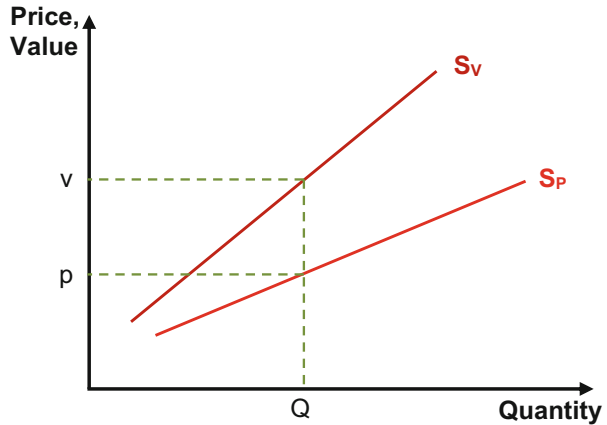


Fig. 2 Value creation system. Source: Based on Grönroos and Voima (2012) and Trinh (2018)

In fact, there is a common understanding that value of a commodity is evaluated and created in the consumption process (Wikström 1996; Vargo and Lusch 2004; Grönroos 2011; Grönroos and Voima 2012; Trinh 2014, 2018). Since the value of a commodity (v) is created in the consumption process, and the price of commodity (p) is determined in the exchange process, the theory of value should construct upon a law of marginal diminishing value, in which the utility of commodity (u) is defined as the difference between value (v) and price (p). The law of demand states that marginal value and marginal utility declines as quantity consumed increases. Trinh (2014) defines demand for a commodity includes not only the existing relationship between price and quantity demanded, but also the existing relationship between value and quantity demanded in a given time period, *ceteris paribus*. Figure 1 illustrates demand for a commodity that includes both price demand (D_p) and value demand (D_v).

Figure 2 illustrates a value creation system in which a firm uses production factors to create value foundation for a commodity in the production process. Then, the

Fig. 3 Market supply for a commodity. Source: Based on Trinh (2014, 2018)



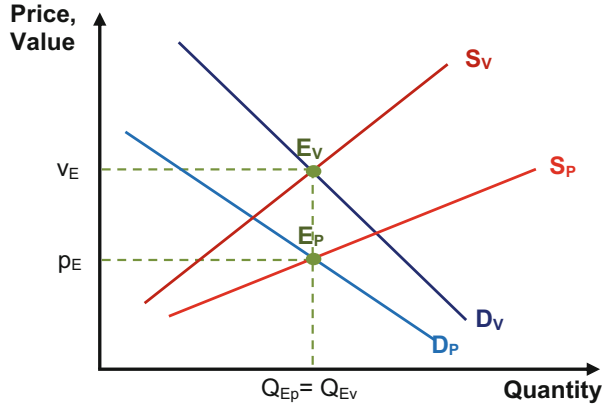
commodity is exchanged at the price (value-in-exchange) in the market. Customers will add consumption factors and creates value (value-in-use) during the consumption process.

Since the market, a place for exchange of a commodity, determines production surplus, and consumption surplus, market supply for a commodity includes both price supply (S_P) and value supply (S_V) as illustrated in Fig. 3. The price supply presents for the relationship between price and quantity supplied in production, the value supply presents for the relationship between value and quantity supplied in consumption.

In the value creation system, firm, and customer make their choices in production and consumption to achieve their goals (firm profit and customer utility). Trinh (2014) defines the utility function in the consumption that incorporates both the value (v) and the price (p) of a commodity. In addition, the value balance between firm profit and customer utility in the value creation system is a necessary condition for market equilibrium in which it also exists the balance between production surplus and consumption surplus in the market (Trinh 2019). Figure 4 illustrates the market equilibrium (E_P and E_V) that includes both price equilibrium (E_P) and value equilibrium (E_V).

Price equilibrium (E_P) occurs at the price that the price's quantity demanded equals the price's quantity supplied, *ceteris paribus* (Trinh 2014). Utility equilibrium (E_U) occurs at the utility that the utility's quantity demanded equals the utility's quantity supplied, *ceteris paribus*. While price equilibrium presents for production choice in the market, utility equilibrium presents for consumption choice in the market. Value equilibrium (E_V) occurs at the value that the value's quantity demanded equals the value's quantity supplied, *ceteris paribus* (Trinh 2014). Value equilibrium presents for both production and consumption choices in the market.

Fig. 4 Market equilibrium for a commodity. Source: Based on Trinh (2014, 2018)



3 Logic of Maximizing Behaviors

The rational choice approach is discussed by many economists (Plott 1986; Sugden 1991; Becker 2013). Rational choice is defined as the process of determining the most preferred option according to some consistent criterion (Levin and Milgrom 2004). The logic of maximizing behaviors relies on rational choice theory, in which individuals always make logical decisions with the greatest benefit or satisfaction under marginal decision rules. The marginal decision rule is a powerful tool for the analysis of choice in production and consumption in the market. Marginal analysis is used to determine if any activities (production or consumption) maximizing its net benefit (firm profit or customer utility) at the point where marginal benefit (marginal revenue or marginal utility) equals marginal cost.

The firm’s marginal revenue (MR) is the first derivative of the firm’s total revenue (TR) as follows:

$$MR = TR'(Q) = p'(Q_D) \times Q + p(Q_D) \tag{1}$$

From Eq. (1), the relationship between the price’s demand function ($p(Q_D)$) and marginal revenue (MR) is expressed as follows:

$$p(Q_D) = MR - p'(Q_D) \times Q \tag{2}$$

Firm will produce at the quantity where $MR = MC_1$ to maximize firm profit in production. The price’s supply function $p(Q_S)$ intersects the price’s demand function ($p(Q_D)$). By replacing $p(Q_S) = p(Q_D)$ and $MR = MC_1$ into Eq. (2), the price’s supply function is determined as follows:

$$p(Q_S) = MC_1 - p'(Q_D) \times Q \tag{3}$$

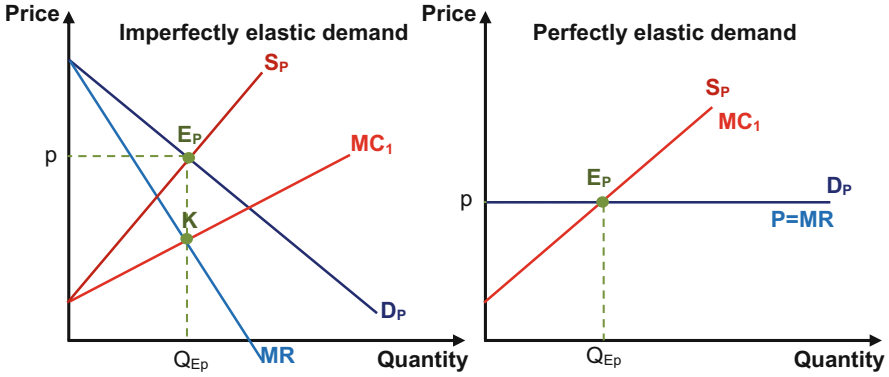


Fig. 5 Logic of profit maximizing behavior. Source: Author’s own study

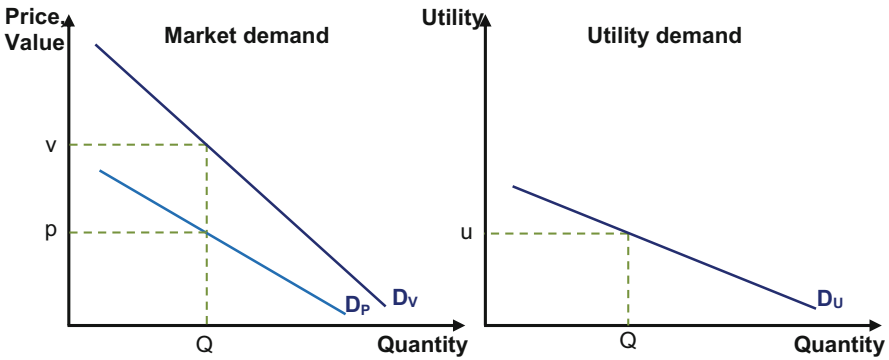


Fig. 6 Derivative of utility demand. Source: Author’s own study

The price’s supply function relies on both firm’s marginal cost function and the price’s demand function. Whenever there are changes in the price’s demand function or firm’s marginal cost function, the price’s supply function will change in responding to Eq. (3).

When the price’s demand function is perfectly elastic, marginal revenue (MR) is identical to the price’s demand function ($p(Q_D)$), and the price’s supply function ($p(Q_S)$) will be identical to the firm’s marginal cost (MC_1). From the logic of profit maximizing behavior, the price’s supply function ($p(Q_S)$) under imperfectly and perfectly elastic demands are illustrated in Fig. 5.

Market demand for a commodity includes price demand (D_p) and value demand (D_v). Utility demand (D_U) is derived from value demand (D_v) and price demand (D_p) as illustrated in Fig. 6.

The customer’s total utility (TU) is defined with incorporation of value (v) and price (p) as follows:

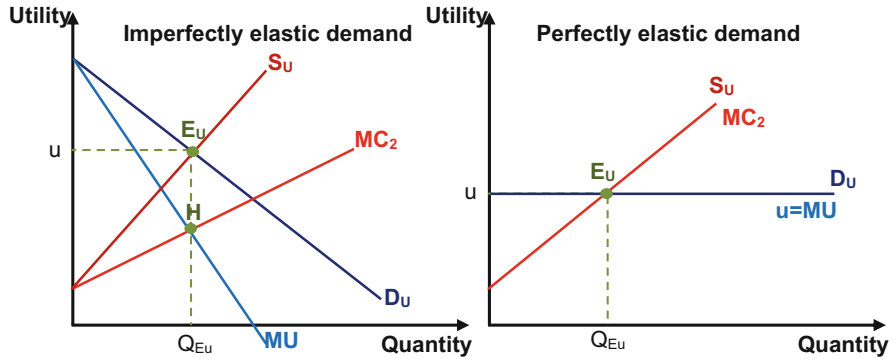


Fig. 7 Logic of utility maximizing behavior. Source: Author’s own study

$$TU = (v - p) \times Q = u \times Q \tag{4}$$

The customer’s marginal utility (MU) is the first derivative of the customer’s total utility (TU) as follows:

$$MU = TU'(Q) = u'(Q_D) \times Q + u(Q_D) \tag{5}$$

From Eq. (5), the relationship between the utility’s demand function ($u(Q_D)$) and marginal utility (MU) is presented in the following formula:

$$u(Q_D) = MU - u'(Q_D) \times Q \tag{6}$$

Customer will consume at the quantity where $MU = MC_2$ to maximize customer utility in consumption. The utility’s supply function ($u(Q_S)$) intersects the utility’s demand function ($u(Q_D)$). By replacing $u(Q_S) = u(Q_D)$ and $MU = MC_2$ into Eq. (6), the utility’s supply function is determined as follows:

$$u(Q_S) = MC_2 - u'(Q_D) \times Q \tag{7}$$

When the utility’s demand function is perfectly elastic, marginal utility (MU) is equal to the utility’s demand function ($u(Q_D)$), and the utility’s supply function ($u(Q_S)$) is equal to the customer’s marginal cost (MC_2). From the logic of utility maximizing behavior, the utility’s supply function ($u(Q_S)$) under imperfectly and perfectly elastic demands are illustrated in Fig. 7.

The supply functions are determined upon maximizing behaviors of the firm and the customer that provide a theoretical model of rational decisions in production and consumption in market structure. Moreover, market supply relies on both marginal cost and market demand that explains behaviors between rational choices and market equilibrium.

4 Endogeneity and Exogeneity

Neoclassical market equilibrium presents endogenous variables in models of supply and demand. In the model of price demand, price (p) and quantity demanded (Q_D) are endogenous variables, in which values of the endogenous variables are determined in the model. Determinants of price demand are exogenous variables, in which values of the exogenous variables are determined outside the model. When exogenous variables are considered in the market equilibrium model, it will provide a better explanation on market behaviors.

$$p = f(Q_D); Q_D = g(p) \tag{8}$$

In the above model of price demand, price (p) and quantity demanded (Q_D) are endogenous variables. When exogenous variable of consumer’s disposable income is considered in the model of price demand, and effect of the income on price demand assumes to be linear, the price demand under changes of income variable is as follows:

$$p = \alpha_I + \beta_I \times f(Q_D) \tag{9}$$

The price demand would be parallel upward shift when $\alpha_I > 0$, the price demand would stretched upward vertically when $\beta_I > 1$ as illustrated in Fig. 8. When $\alpha_I = 0$ and $\beta_I = 1$, there is no influence of the income on the price demand in a given time period, *ceteris paribus*.

It assumes that the price demand is given under the following form:

$$p = f(Q_D) = a + b \times Q_D \tag{10}$$

The exogenous effect of income variable (I) on the price’s demand function assumes to be linear as follows:

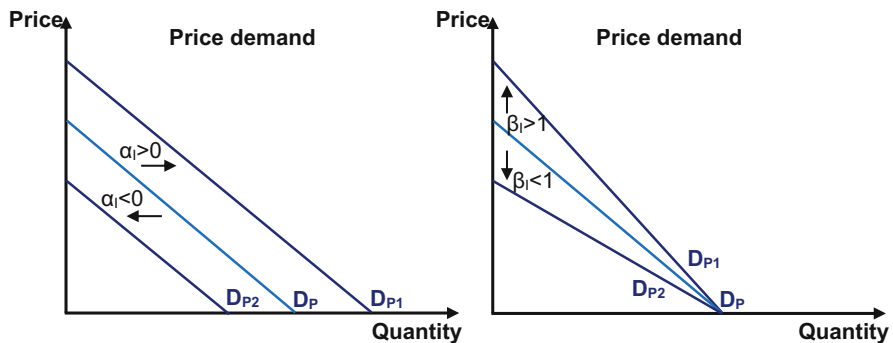


Fig. 8 Income effects on price demand. Source: Author’s own study

$$p = c_1 + d_1 \times I \quad (11)$$

$$Q_D = c_2 + d_2 \times I \quad (12)$$

From Eqs. (11) and (12), the price's demand function is reformulated under the changes of income variable (I).

$$p = \frac{c_1 \times d_2 - c_2 \times d_1}{d_2} + \frac{d_1}{d_2} \times Q_D \quad (13)$$

From Eqs. (9) and (10), the price's demand function is rewritten as follows:

$$p = \alpha_I + \beta_I \times (a + b \times Q_D) = \alpha_I + \beta_I \times a + \beta_I \times b \times Q_D \quad (14)$$

From Eqs. (13) and (14), the effect of the income variable on the price's demand function in a given time period is determined as follows:

$$\beta_I = \frac{d_1}{d_2} \times \frac{1}{b} \quad (15)$$

$$\alpha_I = \frac{c_1 \times d_2 - c_2 \times d_1}{d_2} - \frac{a}{b} \times \frac{d_1}{d_2} \quad (16)$$

When exogenous variables are considered in the model of the price's demand function, the price's demand function in a given time period under the effect of exogenous variables is given as follows:

$$p = \sum_{i=1}^m \alpha_i + \prod_{i=1}^m \beta_i \times f(Q_D) = A + B \times f(Q_D) \quad (17)$$

where $A = \sum_{i=1}^m \alpha_i$ and $B = \prod_{i=1}^m \beta_i$.

m : the number of exogenous variables.

α_i, β_i : are parameters that indicate the effect of exogenous variable i on the price's demand function.

A, B : are parameters that indicate the aggressive effect of all exogenous variables on the price's demand function.

In the model of price supply, the price's supply function relies on firm's marginal cost (MC_1) and the price's demand function ($p(Q_D)$) as in the following formula.

$$p = f(Q_S) = MC_1 - p'(Q_D) \times Q_S \quad (18)$$

Price (p) and quantity supplied (Q_S) are endogenous variables, in which values of the endogenous variables are determined in the model. Determinants of the firm's marginal cost and price demand are exogenous variables, in which values of the exogenous variables are determined outside the model.

When exogenous variables are considered in the model of the firm's marginal cost ($MC_1 = h(Q)$), the effects of exogenous variables on the firm's marginal cost function in a given time period is given as follows:

$$MC_1 = \sum_{i=1}^m \lambda_i + \prod_{i=1}^m \gamma_i \times h(Q) = C + D \times h(Q) \quad (19)$$

where $C = \sum_{i=1}^m \lambda_i$ and $D = \prod_{i=1}^m \gamma_i$.

m : the number of exogenous variables.

λ_i, γ_i : are parameters that indicate the effect of exogenous variable i on the firm's marginal cost function.

C, D : are parameters that indicate the aggressive effect of all exogenous variables on the firm's marginal cost function.

From the logic of profit maximizing behavior, the price's supply function relies on changes in the price's demand function and the firm's marginal cost function. As a result, the price's supply function depends on determinants of both the price's demand function and firm's marginal cost function. From the logic of utility maximizing behavior, the utility's supply function relies on changes in the utility's demand function and the customer's marginal cost function. From the logic of value maximizing behavior, the value's supply function relies on changes in the value's demand function and the total marginal cost function.

A numerical example assumes the price's demand function in the following form:

$$p = a + b \times Q_D = 28 - 0.2 \times Q_D \quad (20)$$

The price's supply function is determined by the following formula:

$$p = MC_1 - p'(Q_D) \times Q_S \quad (21)$$

where $p'(Q_D)$ is the first derivative of the price's demand function, and MC_1 is the firm's marginal cost.

The firm's marginal cost is assumed as $MC_1 = 8$. Since $p = 28 - 0.2 \times Q_D$, so $p'(Q_D) = -0.2$. The price's supply function is determined as follows:

$$p = MC_1 - p'(Q_D) \times Q_S = 8 + 0.2 \times Q_S \quad (22)$$

Fig. 9 Price's supply function and price equilibrium. Source: Author's own study

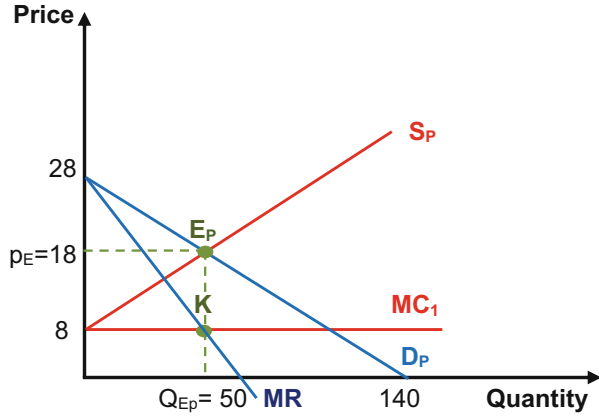


Figure 9 presents the price's supply function and price equilibrium for the above example.

In order to conduct the effects of exogenous variables on the market equilibrium, it assumes there is only exogenous variable of income (I) being consideration in the market equilibrium model. The effect of income variable (I) on the price's demand function in a given time period assumes to be linear as follows:

$$p = c_1 + d_1 \times I = 30 - 5 \times I \tag{23}$$

$$Q_D = c_2 + d_2 \times I = 40 + 20 \times I \tag{24}$$

The effect of the income variable on the price's demand function is determined as follows:

$$\beta_I = \frac{d_1}{d_2} \times \frac{1}{b} = \frac{-5}{20} \times \frac{1}{-0.2} = 1.25 \tag{25}$$

$$\begin{aligned} \alpha_I &= \frac{c_1 \times d_2 - c_2 \times d_1}{d_2} - \frac{a}{b} \times \frac{d_1}{d_2} = \frac{30 \times 20 - 40 \times (-5)}{20} - \frac{28}{-0.2} \times \frac{-5}{20} \\ &= 5 \end{aligned} \tag{26}$$

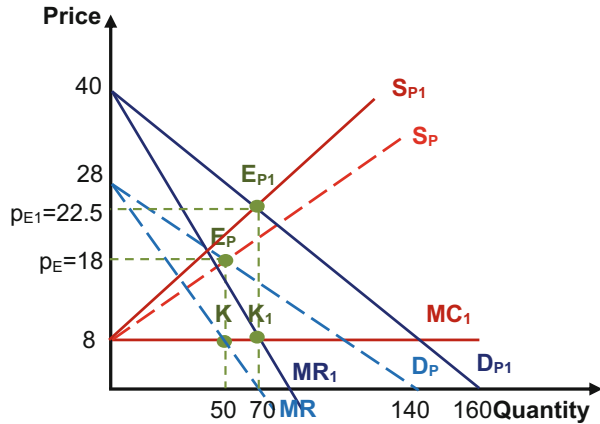
The new price's demand function under income effect is determined as follows:

$$p = \alpha_I + \beta_I \times f(Q_D) = 5 + 1.25 \times (28 - 0.2 \times Q_D) = 40 - 0.25 \times Q_D \tag{27}$$

The price's new supply function relies on the price's new demand function and firm's marginal cost (MC_1), the new price equilibrium is illustrated in Fig. 10.

When market equilibrium model is to be evaluated, all endogenous and exogenous variables need to be observed and sometimes controlled. If a variable cannot be

Fig. 10 Income effect on price equilibrium. Source: Author's own study



observed directly, the model itself does not fit the data. While variables of price and quantity present endogenous relationship in demand and supply functions, exogenous variables have influence on the demand function and supply function, so the market equilibrium has been changed under the exogenous effects that provide a better explanation on market behaviors in real world.

5 Conclusions

The value concept is the base to form the theories of value that explain where the value comes from and how price is determined in the market. By exploring the value concept, this paper extends the theory of market equilibrium that explains how price and value of a commodity are determined in the market. In addition, the marginal principle under the logic of maximizing behavior is used to determine the supply functions that rely on marginal cost and market demand. These findings are much important in understanding on what drives market behaviors that explain on the mechanism of market equilibrium.

The rational choice model is mostly criticized with questionable assumptions of rational choices in efficient market that cannot be testable in reality. Since endogeneity and exogeneity are considered in the market equilibrium model, the underlying assumptions are relaxed for testable empirical research that deals with the big challenge in the neoclassical theoretical models. The neoclassical equilibrium model presents endogenous variables, while exogenous variables hold being constant. When these exogenous variables are considered in the market equilibrium model, it allows understanding the role of endogeneity and exogeneity in such model. The extension of the rational choice model with incorporation of these inherent features provides a better understanding on market behaviors.

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The Composition of the European Parliament During the 2019–2024 Term in Light of Legal Provisions and the Rules of Fair Distribution



Janusz Łyko and Ewa Łyko

Abstract When legal or social norms allow for more than one way of distributing benefits or obligations, there emerges a problem in practical applications of how to choose one solution from a large number. Depending on the adopted solution, some agents participating in the distribution can enjoy a privilege at the cost of others. This problem has become considerable in practice since the Treaty of Lisbon introduced the principle of degressively proportional allocation of seats in the European Parliament. This regulation allows many feasible solutions, while no precise and transparent method of allocation has been developed depending on the numbers of populations in member states. The currently proposed apportionment of seats in the 2019–2024 term emerged as a result of consultations and the ensuing decision of the European Council. Therefore, a question emerges whether this allocation is fair, and if not, how much particular states are privileged. The chapter aims to answer these questions. It turns out that in many practical cases the computational complexity of the problem allows to develop algorithms indicating all feasible solutions. Hence, the intervals of potential shares can be determined for all contenders. A numerical analysis of the set of all legally feasible solutions and defining on the basis of the theory of preferences the term of agent's privilege will make it possible to assess the proposed composition of the European Parliament for the next term. In view of the criteria presented in the Chap. 1 may argue that proposed allocation favors the countries with medium populations.

Keywords Brexit · Degressively proportional allocation · Fair division · European Parliament · Preference

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1 Introduction

The principle of degressively proportional allocation of seats in the European Parliament was legally outlined in the Treaty of Lisbon signed in 2007. A respective provision declares that the European Parliament shall be composed of representatives of the Union's citizens. They shall not exceed 750 in number, plus the President. Representation of citizens shall be degressively proportional, with a minimum threshold of six members per Member State. No Member State shall be allocated more than 96 seats. However, the notion of degressive proportionality was not precisely defined in the Treaty. Such definition was partly included in the resolution adopted also in 2007 by the European Parliament which states that the larger the population of a country, the greater its entitlement to a large number of seats and the larger the population of a country, the more inhabitants are represented by each of its Members of the European Parliament (Committee on Constitutional Affairs 2007).

A short history of the principle of degressive proportionality demonstrates the difficulties of its practical applications. Although the principle was defined in 2007, but the second condition will be satisfied for the first time in the term of 2019–2024. Noncompliance with the Treaty conditions in the 2009–2014 term can be justified by the fact that its ratification by all member states was not accomplished before the election for this term. Seeking the justification of noncompliance in the next term must be assessed as a supremacy of political bargaining over legal regulations (Committee on Constitutional Affairs 2013; Moberg 2012).

The basic problem with using the principle of degressive proportionality is its ambiguity which allows political negotiations. It turns out that legal interpretation of this principle may be ambiguous and also based on the same interpretation there may be many solutions in compliance with the principle. As a consequence, many solutions of the same allocation problem (Cegiełka et al. 2017; Dniestrzański 2014b; Florek 2012; Haman 2017; Serafini 2012; Słomczyński and Życzkowski 2012) can be indicated, as well as discussing premises of the choice of a particular solution is possible along with its assessment in the light of principles of fair distribution.

The main goal of the work is to assess the proposed composition of the European Parliament for the 2019–2024 term presented by the Committee on Constitutional Affairs. First, the justification of the reduction in total number of representatives was tackled following the exit of the United Kingdom from the European Union, and it was indicated that the allocation supposed to be valid in next term is not optimal considering the criteria presented by the Committee. Next, an assessment of the proposal of the Committee was attempted with regard to selected criteria of fair distribution. The analysis was aimed at examining whether the proposed allocation favors any countries according to this criterion and if so, which countries can be considered as privileged. In view of the fact that a group of such countries does exist, further possible allocations were indicated which can be seen as neutral, in a

specified sense, for all members of the community, i.e., which do not favor any country.

2 Literature Review

The idea of degressive proportionality introduced in the Treaty is actually represented by two inequalities, i.e., a division $S = (s_1, s_2, \dots, s_n)$ is degressively proportional with respect to $P = (p_1, p_2, \dots, p_n)$ when

$$\text{For every } 1 \leq i < n \quad s_i \leq s_{i+1} \tag{1}$$

and

$$\text{For every } 1 \leq i < n \quad p_i/s_i \leq p_{i+1}/s_{i+1}, \tag{2}$$

where a sequence of positive numbers P is the sequence of populations of n member states, and a sequence of natural numbers S represents the number of seats allocated to member states. In addition, the Treaty determined the total number of all seats to be distributed, i.e.,

$$s_1 + s_2 + \dots + s_n = H = 751 \tag{3}$$

The condition (2) significantly distinguishes a standard problem of proportional allocation from degressively proportional allocation. A total number H of goods is an essential element of any problem of division. Likewise, the condition (1) is also common, but in the case of condition (2) equality is postulated instead of inequality. Therefore, a division S of H goods is proportional with respect to P when conditions (1), (2'), and (3) are satisfied, where (2') means that

$$\text{For every } 1 \leq i < n \quad p_i/s_i = p_{i+1}/s_{i+1}. \tag{2'}$$

In practice, the principle of proportionality almost always leads to an empty set of admissible solutions. Finding a sequence of natural numbers S which satisfies the condition (2'), given a sequence of positive numbers P , is possible only for properly chosen values of H . Therefore, a concrete, practical solution of proportional, integer allocation is merely a certain approximation of a sequence of quotas $Q = (q_1, q_2, \dots, q_n)$, where $q_i = p_i H / (p_1 + p_2 + \dots + p_n)$ that is unambiguously based on the principle of proportionality. Hence, as regards the level of the principle, the problem is uniquely solved by the sequence Q of quotas, while the ambiguity of practical solutions is a result of unavailability of integer realization of the principle. This ambiguity implies typically the choice of various types of rounding of the sequence Q .

When dealing with the principle of degressive proportionality, there emerges another type of difficulty. The principle itself very often does not allow to determine a unique solution. It may happen that, given the sequence P , there are many sequences S satisfying the conditions (1)–(3), therefore, one has to choose one concrete solution out of many admissible allocations. Some limits here are given by an additional condition adopted in the Treaty that restricts a minimal and maximal representation of the least and the most populated country (Łyko 2012). These conditions were given as inequalities, but the practice supported by judicial interpretation of this provision implies its less general understanding, i.e.,

$$m = s_1 = 6, \quad M = s_n = 96. \quad (4)$$

Still, without additional rules, the choice of one solution remains an arbitrary decision whose rightness can be disputed. One is able to meet the basic condition of allocation and, consequently, to respect the principle of division, but its realization is no longer unique, thus complicating practical applications to a greater degree than in case of the principle of proportionality.

The initial approaches to find a practical solution to this problem are surprising as experts in the area of fair distribution proposed such methods as shifted proportionality, parabolic method, or best known Cambridge Compromise (Martinez-Aroza and Ramirez-Gonzalez 2008; Pukelsheim 2010; Grimmett 2012). All these proposals are based on implementing similar techniques as those used by proportional allocation. In fact, one specifies a certain function $f: [p_1, p_n] \rightarrow [m, M]$ whose values $f(p_i)$ satisfy the conditions (1) and (2), and properly rounded represent a concrete allocation. If the condition (4) is not imposed as a condition of division, then obviously one can assume in a general case that the set of the values of allocation function is the set of real nonnegative numbers. Hence, it is evident that the allocation function is a generalization of the idea of divisor methods known in case of proportional divisions, where the allocation function is a linear function $f(x) = ax$.

It is easy to notice that although the sequence $f(p_i)$ satisfies the condition (2), it does not have to be so after rounding. This is fully analogous to proportional division, when the sequence of quotas Q meets the condition (2'), but not after rounding, unless Q is the sequence of integers. The approximation of the sequence of quotas as a realization of the principle of proportionality is completely reasonable, because except for the mentioned case it is not possible to find an integer realization of this principle. Degressively proportional allocations are different. For every sequence P , given properly selected conditions (3) and (4), the set $DP(P, H, m, M)$ of all sequences of natural numbers S satisfying the conditions (1)–(4) is nonempty and therefore, it is possible to find an allocation directly complying with the provisions of the Treaty of Lisbon. There is no need to seek over-interpretation of legal provisions and requesting that the condition (2) is merely satisfied before rounding, what happened twice when respective statements were included in two resolutions of the European Parliament in 2007 and 2013 (European Parliament 2007, 2013). Such a standing presented in the resolutions was followed by the emergence in the

Table 1 Composition of the European Parliament in terms of 2009–2014 and 2014–2019

Country	2009–2014			2014–2019		
	<i>P</i>	<i>S</i>	<i>P/S</i>	<i>P</i>	<i>S</i>	<i>P/S</i>
Germany	82002356	99	828307	81843743	96	852539
France	64350226	72	893753	65397912	74	883756
United Kingdom	60045068	72	833959	62989550	73	862871
Italy	61595091	72	855487	60820764	73	833161
Spain	45828172	50	916563	46196276	54	855487
Poland	38135876	50	762718	38538447	51	755656
Romania	21498616	33	651473	21355849	32	667370
Netherlands	16485787	25	659431	16730348	26	643475
Belgium	10753080	22	488776	11290935	21	537664
Greece	11260402	22	511836	11041266	21	525775
Czech Republic	10627250	22	483057	10541840	21	501992
Portugal	10467542	22	475797	10505445	21	500259
Sweden	10030975	22	455953	9957731	21	474178
Hungary	9256347	18	514242	9482855	19	499098
Austria	8355260	17	491486	8443018	19	444369
Bulgaria	7606551	17	447444	7327224	17	431013
Denmark	5511451	13	423958	5580516	13	429270
Finland	5326314	13	409716	5404322	13	415717
Slovakia	5412254	13	416327	5401267	13	415482
Ireland	4450030	12	370836	4582769	11	416615
Croatia				4398150	11	399832
Lithuania	3349872	12	279156	3007758	11	273433
Slovenia	2261294	8	282662	2055496	8	256937
Latvia	2032362	7	290337	2041763	8	255220
Estonia	493500	6	82250	1339662	6	223277
Cyprus	1340415	6	223403	862011	6	143669
Luxembourg	796875	6	132813	524853	6	87476
Malta	413609	5	82722	416110	6	69352
Total		736			751	

Source: Based on AFCO data

Note: *P* population, *S* allocation

literature (Ramirez-Gonzalez 2012; Delgado-Márquez et al. 2013; Cegiełka et al. 2018) of the so-called rounded degressive proportionality (RDP) where the condition (2) is limited to the sequence $f(p_i)$, in contrast to unrounded degressive proportionality (UDP), where the sequence S , i.e., the actual allocation, must satisfy the condition (2) as required by the Treaty (Table 1).

One has to emphasize that in spite of understanding this problem demonstrated by many works in this area, such as the conference in Cambridge or the workshop entitled “The Composition of the European Parliament” in 2017, no transparent, reproducible method of establishing the composition of the European Parliament has been specified so far. No algorithm has been accepted leading to the actual

degressively proportional representation in either the UDP or the RDP variant. Further, even in the term 2019–2024, there will be a certain political compromise, this time may be easier to accomplish due to Brexit and subsequent opportunity to reallocate the seats now held by British MEPs. In the 2019–2024 legislature there will be 705 deputies, i.e., the condition (3) is now of the form (3') $H=705$.

3 Methodology

The proposed allocation of seats in the European Parliament for the 2019–2024 term satisfies the conditions (1), (2), (3'), and (4). One may, therefore, look at it from the viewpoint of distribution fairness. It is possible to abandon current reflections that actually evaluate the modifications of proportional distribution (Dniestrzański 2014a; Łyko 2013) and to approach the problem from the viewpoint of the choice of one solution from the finite number of admissible solutions. Under current demographic conditions, the set $DP(P, H, m, M)$ has got 122656052 elements and its numerical analysis is possible (Łyko and Rudek 2013).

First, for every member state, one can indicate a minimal and maximal number of seats following degressively proportional allocation, i.e., the numbers s_i^{\min} and s_i^{\max} , $i = 1, 2, \dots, n$. In doing so, one obtains information whether the allocation S^C proposed by the AFCO favors or disregards a given country by assigning it, respectively, the maximal or minimal number of possible seats. Second, one gains knowledge about the range of admissible changes in numbers of seats held in future terms, assuming some minor changes in populations of member states.

The absolute differences $s_i^{\max} - s_i^C$ or $s_i^C - s_i^{\min}$ are less informative because they relate neither to a proposed number of seats for a given country nor to the range of potential allocations. Hence, one may consider a problem of favoring as expressed by the relationship between relative differences and, say, differences $s_i^{\max} - s_i^{\min}$, in other words, consider the values $(s_i^{\max} - s_i^C)/(s_i^{\max} - s_i^{\min})$ and $(s_i^C - s_i^{\min})/(s_i^{\max} - s_i^{\min})$. In order to establish the allocations, which are the fairest ones in this sense, one may exploit the concept from the area of cost allocation, a so-called nucleolus-based approach. Then one would seek such allocations whose maximal losses comprehended as the quotients $(s_i^{\max} - s_i^C)/(s_i^{\max} - s_i^{\min})$ are as small as possible or, using a dual approach, such allocations whose gains comprehended as the quotients $(s_i^C - s_i^{\min})/(s_i^{\max} - s_i^{\min})$ are as large as possible. In view of the fact that both approaches yield the same solution, the calculations were performed for the quotients $(s_i^{\max} - s_i^C)/(s_i^{\max} - s_i^{\min})$ only.

It is worth emphasizing that a comprehensive numerical analysis of the set of all possible allocations is a new, original approach that has not been presented so far in the subject literature. Its undeniable advantage is a possibility to compare and also to assess individual proposals of allocations against all feasible solutions. For this reason, the presented study is a new research stream that is separate from other inquiries into the problems of degressive proportionality.

4 Results

The reduced number of seats is a natural solution in view of Brexit, as British MEPs held a significant number of 73 mandates in the current legislative term. By reducing the size of the assembly now, a sort of reserve is created in case of prospective new accessions. However, the number of 705 seats can be debatable, because it is not a result of subtracting of 73 British mandates from the current total size of the European Parliament. The discussion about this issue included also other solutions. In addition to a self-evident number of 678 seats, alternative numbers of 701 or 723 deputies were also considered (Policy Department 2017). A line of argument in favor of 705 as the size of the assembly can be found in the report on the composition of the European Parliament prepared by the Committee on Constitutional Affairs (AFCO). The explanatory statement of this report reads that the new size and composition S^C for the 2019–2024 parliamentary term is based on three principles (European Parliament 2018):

1. Respect for the principle of degressive proportionality, as required by Article 14 TEU.
2. No loss of seats for any Member State.
3. A minimal redistribution of the seats vacated by the UK's exit from the EU.

This statement can be comprehended as a desire to find such allocation, and as a result, a total size of the assembly, so as to maintain at least the *status quo* of each member state and to redistribute the minimal number of seats vacated by the United Kingdom in compliance with conditions (1), (2), and (4).

Principle one is a declaration that the practice of establishing the composition not in line with the Treaty of Lisbon will be abandoned. Thus, the RDP interpretation of degressive proportionality is no longer valid. In other words, the condition (2) has to be satisfied by any sequence S that is an actual allocation. Willingness to allocate each country the number of seats that is not smaller than in previous, 2014–2019 term, as written in point two, is not a new idea. The Resolution of 2013 on establishing the composition of the European Parliament (2013) included a similar wording. It was then a case that nobody gains and nobody loses more than one as willingness to maintain a political *status quo* in regard to the 2009–2014 term. It is easier to accept a new solution when no representation is decreased. At that time, however, nobody cared about complying with condition (2). It was merely declared that this solution is far closer to complying with the degressive proportionality rule than any other based on the model with no gains and no losses of more than 1. Nevertheless, this declaration was not confirmed by the concluding proposal of the composition. One can prove that there are other allocations, in line with the postulate “nobody gains and nobody loses more than one” and in a very natural sense much closer to a degressively proportional solution than the allocation for the 2014–2019 term (Łyko and Rudek 2016; Łyko et al. 2017).

Principle 3 implies a declaration to employ a minimal number of seats added as a result of Brexit so as to ensure the proposed allocation for the 2019–2024 term

Table 2 Proposed allocations of seats in the European Parliament in the 2019–2024 term

Country	P	S^C	P/S^C	S^M	P/S^M
Germany	82064489	96	852539	96	854838
France	66661621	79	827822	78	854636
Italy	61302519	76	800273	73	839761
Spain	46438422	59	782988	56	829258
Poland	37967209	52	741124	51	744455
Romania	19759968	33	647147	32	617499
Netherlands	17235349	29	576909	28	615548
Belgium	11289853	21	537664	21	537612
Greece	10793526	21	525775	21	513977
Czech Republic	10445783	21	501992	21	497418
Portugal	10341330	21	500259	21	492444
Sweden	9998000	21	474178	21	476095
Hungary	9830485	21	451565	21	468118
Austria	8711500	19	444369	19	458500
Bulgaria	7153784	17	431013	17	420811
Denmark	5700917	14	398608	14	407208
Finland	5465408	14	386023	14	390386
Slovakia	5407910	14	385805	14	386279
Ireland	4664156	13	352521	13	358781
Croatia	4190669	12	366513	12	349222
Lithuania	2888558	11	273433	11	262596
Slovenia	2064188	8	256937	8	258024
Latvia	1968957	8	255220	8	246120
Estonia	1315944	7	191380	6	219324
Cyprus	848319	6	143669	6	141387
Luxembourg	576249	6	87476	6	96042
Malta	434403	6	69352	6	72401
Total		705		694	

Source: Author's own study based on AFCO data

Note: P population, S^C allocation proposed by the AFCO, S^M minimal allocation under given conditions

satisfying the conditions (1), (2), and (4). Again, the idea itself is not controversial, as its realization guarantees a maximal possible reserve for potential future enlargements of the European Union. Considering the populations of countries-candidates, the size of the Parliament may become constant for many years and not exceeding the original number of 751 seats. However, the presented proposal is problematic because it violates principle three. Table 2 presents in column S^M a distribution in line with the principles included in the resolution, whose total number of seats is smaller than the declares 705 seats and equals 694. Thus, a question remains open as to what members of the Committee on Constitutional Affairs exactly mean by “minimal redistribution.”

Table 3 Proposed allocation by the Committee on Constitutional Affairs versus a fair distribution problem

Country	S_{2014}	S^C	S^{min}	S^{max}	S^1	S^2	S^3
Germany	96	96	96	96	96	96	96
France	74	79	78	96	85	85	85
Italy	73	76	72	91	80	80	80
Spain	54	59	55	77	64	64	64
Poland	51	52	45	65	53	53	53
Romania	32	33	24	40	29	29	29
Netherlands	26	29	21	35	26	26	26
Belgium	21	21	16	25	18	18	18
Greece	21	21	16	24	18	18	18
Czech Republic	21	21	16	24	18	18	18
Portugal	21	21	16	24	18	18	18
Sweden	21	21	16	24	18	18	18
Hungary	19	21	16	24	18	18	18
Austria	19	19	15	24	18	18	17
Bulgaria	17	17	14	22	16	15	16
Denmark	13	14	12	20	14	14	14
Finland	13	14	12	20	14	14	14
Slovakia	13	14	12	20	14	14	14
Ireland	11	13	11	19	13	13	13
Croatia	11	12	10	19	12	13	13
Lithuania	11	11	7	18	11	11	11
Slovenia	8	8	6	17	11	11	11
Latvia	8	8	6	17	11	11	11
Estonia	6	7	6	15	10	10	10
Cyprus	6	6	6	10	8	8	8
Luxembourg	6	6	6	7	6	6	6
Malta	6	6	6	6	6	6	6
Total	678	705	616	879	705	705	705

Source: Author’s own study based on AFCO data

Note: S_{2014} allocation for 2014–2019 term of office, S^C allocation proposed by the AFCO, S^{min} minimal number of possible allocated sits under given conditions, S^{max} maximal number of possible allocated sits under given conditions, S^1, S^2, S^3 allocations that do not favor any country

When analyzing data presented in Table 3 one can notice that except for Malta and Germany whose numbers of seats are strictly defined by condition (4) no state was allocated the maximal potential number of additional seats, and the minimal number was given to Luxemburg and Cyprus. Whereas this result in case of Luxemburg can be justified because the alternative solution is unique and consists of allocating seven, i.e., maximal number of seats, but in case of Cyprus the range of possible allocations is wider and consists in five values. It is also worth noticing that France was allocated only 1 seat more than their minimum and as much as 17 seats less than their maximum.

Looking at the proposal of the AFCO from the viewpoint of differences versus sequences $S^{\min} = (s_1^{\min}, s_2^{\min}, \dots, s_n^{\min})$ and $S^{\max} = (s_1^{\max}, s_2^{\max}, \dots, s_n^{\max})$, it is easy to notice that there is a group of countries with medium populations such as Hungary, Sweden, Portugal, the Czech Republic, Belgium, The Netherlands, and Romania, where $s_i^{\max} - s_i^C < s_i^C - s_i^{\min}$. This can be seen as a form of favoring these countries at the expense of countries such as France, Spain, Italy, Slovenia, Latvia, and Estonia, where the inequality is reversed and moreover, the difference $(s_i^{\max} - s_i^C) - (s_i^C - s_i^{\min})$ is substantial, from 7 to 16.

To analyze relative differences, the values of $(s_i^{\max} - s_i^C)/(s_i^{\max} - s_i^{\min})$ were calculated for every allocation $S \in DP(P, H, m, M)$ to obtain the sequences $S_R = (s_{R1}, s_{R2}, \dots, s_{Rn})$. These sequences were arranged from smallest to largest and the largest element $S_R^{\text{MAX}} = (s_{R1}^{\text{MAX}}, s_{R2}^{\text{MAX}}, \dots, s_{Rn}^{\text{MAX}})$ in the lexicographic order was selected. It turns out that in the set $DP(P, H, m, M)$ there three such allocations $i \in \{1, 2, 3\}$ which yield $S_R^i = S_R^{\text{MAX}}$ after increasing the arrangement. Therefore, they can be considered the least favoring each of the countries from the viewpoint of satisfying their claims as regards the number of deputies versus the whole range of possible solutions imposed by the Treaty of Lisbon. However, these allocations do not obey the rule two established by the AFCO, namely no loss of seats for any Member State. The group of countries with medium populations, i.e., Austria, Bulgaria, Hungary, Sweden, Portugal, Czech Republic, Belgium, and Romania, i.e., mostly the countries mentioned above as favored ones, would have to pass some currently held seats on to other member states.

5 Conclusion

The composition of the European Parliament proposed for the 2019–2024 term meets the conditions provided by the Treaty of Lisbon. It was pledged that condition (2) will be satisfied for the first time since the announcement of the Treaty and that condition (3) will be again comprehended as inequality. Moreover, the explanatory statement to this modification includes an imprecise clarification as regards “a minimal redistribution of the seats vacated by the UK’s exit.” Therefore, the total size of the assembly equal 705 adopted in the Resolution has to be assessed as an arbitrary political arrangement.

Satisfying the condition (2) by the proposed allocation was practically ensured only because of Brexit, since one of the principles adopted by the Committee on Constitutional Affairs underlying the composition proposed for the next term was: “no loss of seats for any Member State.” It was predominantly willingness to continue maintaining the numbers of seats in the European Parliament held by every country on a level not smaller than in prior term that obstructed earlier adjustment of allocations to meet condition (2). As a result, also parties pre-agreed politically were passed on subsequent terms. In view of criteria presented in the paper, which assess the fairness of distribution, one may argue that these

parities favor the countries with medium populations at the expense of those which are at the top and at the bottom of the list ordered by increasing populations.

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Long Cycles Versus Time Delays in a Modified Solow Growth Model



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Abstract In this work, we study the dynamics of Solow's economic growth model assuming that the labor force growth rate function, $n(t)$, is a solution of a delay differential equation. This approach is motivated by the fact that there are delays in entering and retiring an individual from the labor force, relative to its birth date. Maintaining the fundamental equation of the Solow model, which describes the dynamics of capital accumulation over time, and changing the hypothesis about the evolution of labor force growth rate, we intend to evaluate the effects on capital accumulation when taking into account labor life cycles. This means that we assume $n(t)$ does not respond instantaneously to variations, but it is a function of previous states. For this, we introduce a time delay pattern in the labor force growth rate, by considering that a normalized labor force growth rate is a solution of a delay differential equation. We show that a cyclic behavior of $n(t)$ can be generated endogenously by an economic model. Although in a previous work, we have already observed that if $n(t)$ is assumed to be a T -periodic function then the solution of Solow equation is also T -periodic, the truth is that these two functions present a phase difference. Note that, this lag can readily be generated in a regular ordinary differential equation model, since it is a necessary consequence of the slow adjustment rates. In this present work, we show that the introduction of time delays in modelling $n(t)$ generates endogenous cycles for the economy.

Keywords Solow growth model · Delay differential equation

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1 Introduction

Many real-life phenomena, both in economics and in demographic studies, can be modeled by delay differential equations (DDEs) in order to make the theory more consistent with observations. The introduction of time delays also brings in a richer long-run dynamic behavior to economic models. For example, the classical Malthus equation, an ordinary differential equation (ODE),

$$\begin{cases} P'(t) = kP(t) \\ P(t_0) = P_0 \end{cases}$$

produces the solution $P(t) = P_0 e^{k(t-t_0)}$, whose exponential behavior is well known and is uniquely determined by the sign of k . However, if we simply modify the right-hand side of the equation to include the dependence of the derivative P' on past values of the state variable, P , we obtain a more detailed demographic description of the adult population,

$$\begin{cases} P'(t) = kP(t-r), & t \geq 0 \\ P(t) = P_0, & t \in [-r, 0] \end{cases}$$

where the positive parameter r is the delay, and can be considered as the size (in units of time) of a generation. From this apparent simple change in the model, it arises the possibility of having oscillating solutions, and this is now related to the sign of the product between k and r (see Brauer and Chavez 2001). Some kind of delays originates cyclic behavior and the correspondent oscillatory solutions can converge to a periodic solution. Sufficient conditions for the oscillatory behavior of the solutions of these types of equations are given in Ladas and Stavroulakis (1982).

The economic growth theory deal with a very large class of mathematical instruments for modeling economic growth. According to Solow (1994, p. 45), “There have been three waves of interest in growth theory during the past 50 years or so. The first was associated with the work of Harrod (1948) and Domar (1947). [...] The second wave was the development of the neoclassical model. [...] The third wave began as a reaction to omissions and deficiencies in the neoclassical model, but now generates its own alternation of questions and answers.” Over the past 25 years, we have seen a growing interest in modeling the labor force growth rate.

Under the neoclassical assumption on the labor force, $L(t)$, population workers follow an exponential law, $L'(t)/L(t) = n(t)$. For this case, the Solow (1956) equation admits an equilibrium solution that is asymptotically stable, meaning that all solutions starting in a neighborhood of the steady-state solution, converge to it as t converges to infinity. Actually, when the labor force growth rate, $n(t)$, is constant, this qualitative behavior of the model remains, and varying the parameters or the production function results solely in different steady states.

Some work has been done when other hypotheses on labor force growth rate were considered, such as assuming it to be a regular bounded decreasing function of t (Guerrini 2006), or satisfying the Logistic equation (Ferrara and Guerrini 2009). Periodic solutions for the Solow equation were also obtained, when a positive and periodic function for $L'(t)/L(t)$ was considered (Fabião and Borges 2010). Asfiji et al. (2012) show an identic result as that of the Solow's economic growth for a population growth rate based on the frequencies inherent in the population growth equation in accordance with cycles. There are several approaches that show how a delay parameter in production can cause cycles in the economy. Asea and Zak (1999) introduce a delay parameter between investment and production, the so called "time to build," and they reinforce the idea that delays induce cyclical behaviors. The relationship between cycles and delays is well illustrated in a concise survey of some economic growth models (Ferrara et al. 2013). One of the pioneering works considering the effect of the delay in the production of capital goods is Kalecki (1935), where business cycles are obtained and their mechanism are explained. Although he was not the first author to propose an economic dynamical model based on a DDE, Kalecki was the first one to show that delays lead to endogenous cyclical fluctuations. It should be noted that Frisch and Holme (1935), presented a detailed analysis of the characteristic solutions of the Kalecki's equation.

In this work, we want to understand how the empirical data on the labor force growth rate of the US economy can be endogenously explained. For this purpose, we will define $\sigma(t)$ as a normalized labor force growth rate function, and we assume that it satisfies a delay differential equation. With this new assumption, we prove the existence of endogenous cycles in the economy. We believe that this new result may contribute to a better understanding of the effect of introducing delays in economic growth models.

2 An Economic Growth Model with Time Delays

Fabião et al. (2015) show that the Solow fundamental equation with a generic production function satisfying the Inada conditions, has a T -periodic solution. The existence of long cycles was predicted from empirically measured oscillations in the labor force growth rate. Also in Fabião et al. (2015), it was proved that a 50-year periodic oscillation on the labor force growth rate implies the existence of long cycles of the same period in the economy.

We use the Solow growth model, taking a neoclassical production function of the Cobb–Douglas form. The Solow capital accumulation equation is written in terms of capital per effective labor, $k(t)$, is

$$k' = sk^\alpha - (\delta + g + n(t))k, \quad (1)$$

where the positive constants s , δ , and g are, respectively, the saved output, the depreciation rate and the technological progress growth rate, $g = \frac{A'(t)}{A(t)}$, and $\alpha \in (0, 1)$.

Given an initial condition $k(0) = k_0$, since the equation is of Bernoulli type, the exact solution can be written as

$$k(t) = e^{-\int_0^t (\delta+g) u \, du} \left[k_0^{1-\alpha} + s(1-\alpha) \int_0^t e^{(1-\alpha) \left[(\delta+g)l + \int_0^l n(u)du \right]} dl \right]^{\frac{1}{1-\alpha}} \quad (2)$$

We want to show that if a normalized labor force growth rate function, $\sigma(t)$, satisfies a delay differential initial value problem for some periodic initial value function, then $\sigma(t)$ will also be a periodic function, and it generates endogenous cycles in the economy. One way to solve an initial value delay problem is by applying the classical method of step algorithm, which is described below. The main results about existence and uniqueness of DDEs solutions can be seen in Hale and Lunel (1993).

3 The Method of Step Algorithm (MSA)

The Method of Step Algorithm (MSA) simply consists in extending forward the initial conditions in the direction of increasing t . So the equation is solved, explicitly or numerically, for each interval $[(n - 1)r, nr]$ for $n \in N$, based on the solution obtained in the previous interval. The computational process is described following Fabião et al. (2008).

Consider the first-order linear DDE

$$\begin{cases} x'(t) = Bx(t - r), & t \geq 0 \\ x(t) = \varphi(t), & t \in [-r, 0] \end{cases}$$

with $B \in \mathfrak{R}$, and $r > 0$ is the delay. Given $\varphi(t)$ a continuous function on $[-r, 0]$, and considering $x'(t) = f(x(t - r))$, we denote by $x_1(t)$ the solution defined on the interval $[0, r]$, obtained by solving the ODE

$$\begin{cases} x'(t) = f(\varphi(t - r)) \\ x(0) = \varphi(0) \end{cases}$$

By induction, for each integer $n \geq 2$, let $x_{n-1}(t)$ be the solution defined on $[(n - 2)r, (n - 1)r]$. The solution $x_n(t)$ defined on the interval $[(n - 1)r, nr]$, is determined by solving the ODE

$$\begin{cases} x'(t) = f(x_{n-1}(t-r)) \\ x((n-1)r) = x_{n-1}((n-1)r) \end{cases}.$$

Finally, we can define the solution of

$$\begin{cases} x'(t) = f(x(t-r)), & t \geq 0 \\ x(t) = \varphi(t), & t \in [-r, 0] \end{cases},$$

on each interval $A_n = [(n-1)r, nr]$ for $n \geq 1$, by

$$x_n(t) = x_{n-1}((n-1)r) + \int_{(n-1)r}^t f(x_{n-1}(s-r))ds,$$

where $x_0 \equiv \varphi$ when $n = 1$.

4 Existence of Endogenous Cycles in an Economic Model

We assume that the labor force growth rate does not respond instantaneously to variations, but it is a function of previous states. For this, we will consider that a normalized labor force growth rate is a solution of a DDE, and observe that it generates a periodic solution.

Let

$$\sigma(t) = n(t) - n_0$$

be the displacement of the labor force growth rate, $n(t)$, from its average value n_0 , and $\frac{L'(t)}{L(t)} = n(t)$ as usual.

We propose the following model, where σ verifies the delay differential initial value problem

$$\begin{cases} \sigma'(t) = \frac{1}{4}\sigma(t-6\pi), & t \geq 0 \\ \sigma(t) = 0.0064 \sin\left(\frac{t}{4}\right), & t \in [-6\pi, 0] \end{cases}. \tag{3}$$

A periodic solution of Eq. (3) is

$$\sigma(t) = 0.0064 \sin\left(\frac{t}{4}\right).$$

Fig. 1 Solution $\sigma(t)$ in an 100 years period. Note: This graph was obtained by plotting the function $\sigma(t)$ in an Excel spreadsheet, using as grid points $t_0 = 0$ and $t_{i+1} = t_i + 0.5$, with $1 \leq i \leq 100$ for an integer i . Source: Authors' own calculation

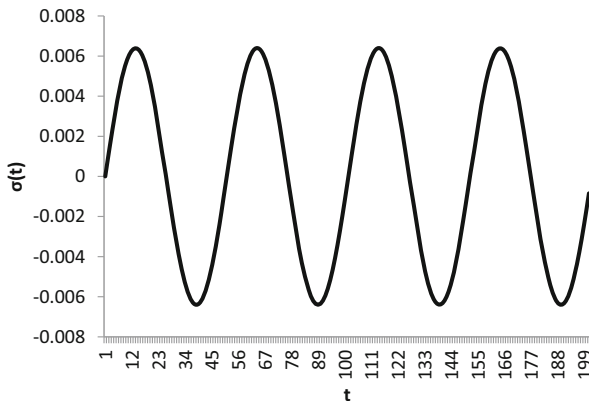
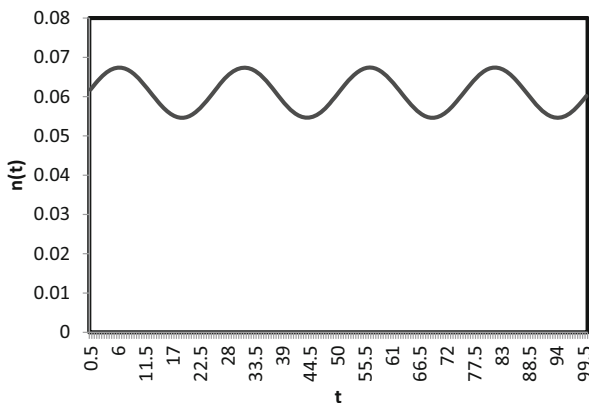


Fig. 2 $n(t) = \sigma(t) + 0.0161$ in an 100 years period. Note: This graph was obtained by plotting the function $n(t)$ in an Excel spreadsheet, using as grid points $t_0 = 0$ and $t_{i+1} = t_i + 0.5$, with $1 \leq i \leq 100$ for an integer i . Source: Authors' own calculation



This is a periodic function of period 8π , approximately 25 years, a value that is half of the period found in real data for the US economy, see US Department of Labor (2018). This can be seen in Fig. 1. Notice that the delay $r = 6\pi$ is approximately 19 years, which corresponds to the average age that an individual enters the labor force. For $n_0 = 0.0161$, we obtain the graph of $n(t)$, see Fig. 2.

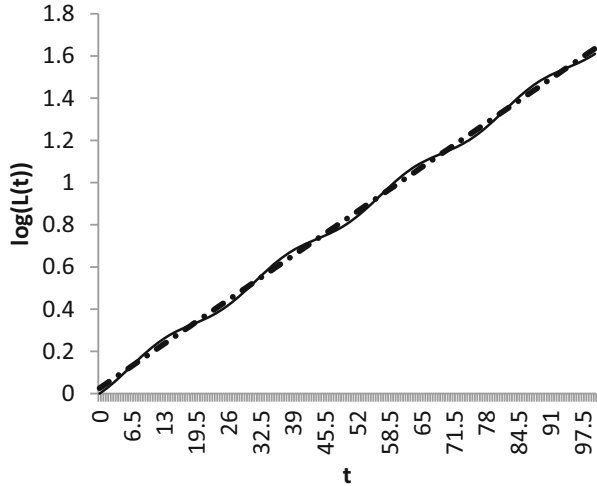
In order to obtain the value for $L(t)$, we now have the initial value problem

$$\begin{cases} \frac{L'(t)}{L(t)} = n(t), \\ L(0) = L_0 \end{cases},$$

where $n(t) = \sigma(t) + n_0 = 0.0064 \sin\left(\frac{t}{4}\right) + 0.0161$. The solution is

$$L(t) = L_0 e^{-0.0256 \cos\left(\frac{t}{4}\right) + 0.0161 t + 0.0256}.$$

Fig. 3 $\log(L(t))$ in an 100 years period. Source: Authors' own calculation



The logarithm graph of $L(t)$ is presented in Fig. 3. The data used for $\log(L(t))$ was produced by a Python program using the existing data from the US Department of Labor (2018). We can observe the oscillation of $\log(L(t))$ around the dashed line that is obtained by considering the average value $n_0 = 0.0161$.

Fabião et al. (2015) prove that if $n(t)$ is a T -periodic function, then there exists a T -periodic solution, $k(t)$, for the Solow equation. As an example, using a Cobb–Douglas production function, $f(k) = k^{1/3}$, and the parameters values $s = 0.2$ and $\delta = 0.05$, the Solow Eq. (1) takes the form

$$k' = 0.2k^{1/3} - \left(0.0661 + 0.0064 \sin\left(\frac{t}{4}\right)\right)k.$$

We notice that any solution of this equation with initial condition, $k(0) = k_0$, in the interval $[4.58, 6.1]$, will remain in this interval for all positive t . The function $\underline{k}(t) \equiv 4.58$ is the steady state of the equation

$$k' = 0.2k^{1/3} - 0.0725k,$$

where $0.0725 = \max_{t>0} [\delta + g + n(t)]$. On the other hand, the function $\bar{k}(t) \equiv 6.1$ is the steady state of the equation

$$k' = 0.2k^{1/3} - 0.0597k,$$

where $0.0597 = \min_{t>0} [\delta + g + n(t)]$. Moreover, for the initial value $k_0 \approx 5$ we obtain a periodic solution for the Solow equation. Using Euler's method we plot its graph in Fig. 4.

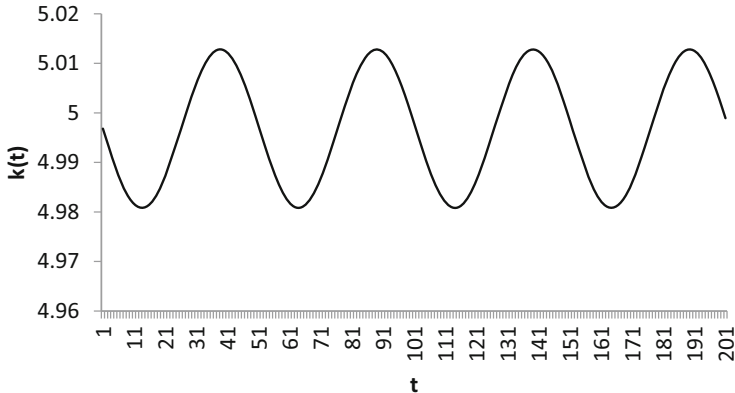


Fig. 4 $k(t)$ in an 100 years period. Note: This graph was obtained by plotting the function $k(t)$ in an Excel spreadsheet, using as grid points $t_0 = 0$ and $t_{i+1} = t_i + 0.5$, with $1 \leq i \leq 100$ for an integer i . Source: Authors' own calculation

5 Conclusions

In this work, we analyzed the dynamics of the Solow growth model introducing a time delay in the labor force growth pattern. Fabião and Borges (2010) and Fabião et al. exogenously introduce the labor force growth rate in the Solow model, as a periodic function. In our point of view, this is a natural condition following from available US data in the US Department of Labor (2018). However, some criticism may be drawn from extrapolating these data.

This work attempts to show that a cyclic behavior of the labor force growth rate can be generated endogenously by a model that couples a delay differential equation (for the labor force growth rate), with the Solow equation. It is shown that our proposed DDE produces a periodic solution for $n(t)$. By imputing this periodic $n(t)$ into the Solow equation, we can endogenously show the existence of 25 years period cycles in the US economy. It is to be expected that further introducing a retirement age effect, could lead to the observed 50 years labor force growth cycles in the US economy.

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