Agnieszka Bem · Karolina Daszyńska-Żygadło · Taťána Hajdíková · Péter Juhász _Editors_

Finance and Sustainability

Proceedings from the Finance and Sustainability Conference, Wroclaw 2017

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Preface

The proceedings of Finance and Sustainability Conference cover a variety of issues related to recent financial problems among which are corporate finance, public finance, capital markets, monetary and fiscal policy issues, and risk management. In the sustainability field, we cover issues related to sustainable finance, corporate sustainability, sustainable banking, and sustainable development. This book contains a selection of the contributions presented at the conference and its satellite meetings. Its content reflects the extent, diversity, and richness of research areas in the field, both fundamental and applied.

Few papers discuss financial problems from the perspective of sustainability transition. The sustainability transition process has reached an unprecedented scale (planetary, global, and local) and involved many actors (international organizations, EU, national and local governments, enterprises, civil society, and universities). Financial crisis of 2008 was a turning point for EU strategy, recovery programs, and policies. New priorities are connected with the transformation toward smart, efficient, and low-carbon economy. The crisis made us aware that "business as usual" is not possible anymore. The real challenge of sustainable development, therefore, is to redesign our economic, technological, human, social, and ecological systems to be inclusive, efficient, and smart.

Sustainable finance facilitates and creates values, and transacts financial assets, in ways that shape real wealth to serve the long-term needs of an inclusive, environmentally sustainable economy. A sustainable financial system plays three key roles to enable transition to a low-carbon, climate-resilient economy: first, it effectively recognizes the costs and risks of high-carbon and resource-intensive assets; second, it allocates sufficient attractively priced capital to low-carbon, resource-efficient assets; and third, it ensures that financial institutions and consumers are resilient to climate shocks, including natural disasters.

New challenges of finance emerged, especially on capital markets and public finance. Problems of capital markets are discussed in articles about initial public offerings and Warsaw Stock Exchange. Although global equity listings grew significantly over the past 20 years, they reached record levels in 2008. The true

residual impact of global financial crisis is yet unknown. The crisis together with other factors has stopped the growth of public share listings. The study presented in this volume sheds new light on the financial performance of IPO companies.

Public finance has to deal with fiscal stability and sustainability, participatory budgeting, quality of life, and health issues. This area of long-term, purpose-oriented finance shows that in the time of greater exposure to global risks the need for risk management is present in the public sector as well. The new approach to public finance focused on its scope, on efficiency, as well as on risk is present in the volume. From this perspective, articles are dedicated to analyze and solve current problems in finance.

The target audience of these proceedings includes researchers at universities and research and policy institutions, students at graduate institutions, and practitioners in economics, finance, and international economics in private or government institutions.

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Concentration of Hospital Infrastructural Resources as a Source of Inequalities in Access to Health Care Benefits in Poland

Paulina Ucieklak-Jeż, Agnieszka Bem, Rafał Siedlecki, and Paweł Prędkiewicz

1 Introduction

Health care in Poland is financed from public sources and managed by a monopolistic payer. However, in order to promote the efficient use of financial resources, a split between the payer and the owners of health care institutions was introduced (Bem 2013). As a result, the impact of the payer on redistribution of financial resources is limited in this sense, that if, in certain regions, the density of medical institutions' network is lower, the allocation of funds is limited. In this context, the insufficient density of healthcare providers can be a source of significant geographic barriers in access to healthcare services.

This geographical distribution of infrastructure can affect both the competitiveness in the health sector, as well as stimulate inequalities in access to services. In economic theories a higher level of competition affects quality of goods and promote cost' reduction. Having more competition in the field of health care seems to be an appealing idea, suggesting that increased competition can provide more choice and improved performance. But health care is much more complex and, from the point of

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view of a patient, is characterised by important asymmetry of information and lack of repeatability in transactions, while a product is highly inhomogeneous.

The paper is a continuation of the previous work, whose aim was to study the relationship between non-financial health resources at regional level (voivodships) and a state of health of the population of women and men in Poland. In this study we propose to use concentration indexes as an alternative method which allow to measure regional redistribution of non-financial resources (infrastructural resources). We can assume that high concentration of healthcare providers, in certain areas (in geographical sense), lower potential access to healthcare benefits, particularly when the amount of services, provided by an individual institution, is limited. The distribution of non-financial resources should therefore reflect health needs of the population, what also means that greater health needs should enforce corrective actions, leading to improved access in the future (Wilson and Rosenberg 2004; Harding 1999; Dobrovič and Timková 2017; Tkacova et al. 2017; Michalski 2016a). Fair resource allocation should therefore be mirrored in the health indicators such as morbidity, mortality or life expectancy (Anselmi et al. 2015). That would allow to identify regions where more services should be provided (better availability) and those, where increased availability does not translate into improved health state of the population (Fransen et al. 2015). Capabilities for corrective action vary depending on employed healthcare financing system—it seems that budgetary financing system creates, in this aspect, the greatest opportunities, having means of a direct impact on healthcare providers.

The indicators of concentration are usually employed to measure a level of competiveness. That's way studies in this area focus, primarily, on the measurement and the analysis of a level of competition (Baker 2001), as well as on the study of an impact of competition on quality and costs' reduction (Gaynor and Town 2011; Halbersma et al. 2011; Ključnikov and Popesko 2017; Kozubíková et al. 2017; Simionescu et al. 2017; Blendinger and Michalski 2018; Michalski 2016b; Boutsioli 2007; Shiell 1991; Chen and Cheng 2010; Schmid and Ulrich 2013). This process of concentration can also be the result of mergers and acquisitions in the healthcare sector, which can also lead to restrictions in access to health benefits (Posnett 1999; Schmid and Ulrich 2013). The concept of this study is based on Bajo and Salas (2002) findings, who confirmed the relationship between concentration's indices and inequalities.

The aim of this study is to fill an important gap in the literature on health inequalities through empirical research on concentration of hospital infrastructural resources in Poland. Polish studies in this area are very limited. While there are relatively rich literature which show the uneven redistribution of healthcare resources (both financial and non-financial) among polish regions (Hnatyszyn-Dzikowska 2011; Strzelecka and Nieszporska 2015), Michalski (2016c), Merickova et al. (2017), Gavurova et al. (2017), Belas et al. (2017), Simo et al. (2016), Soltes et al. (2017), Benda-Prokeinova et al. (2017), (Bem et al. 2016; Ucieklak-Jeż and Bem 2015; Kautsch 2011; Kujawska 2016; Polak 2016) research which deal with a problem of resources' concentration are relatively scare. B. Lyszczarz (2014), using the same methodology, concludes, that the concentration of hospital beds in Polish

regions is uneven—the regions with the most concentrated markets are characterized by four times higher values of the Herfindhal-Hirschman Index (HHI) than regions characterised by the lowest level of concentration. J. Rój (2016), using HHI confirms, that a hospital market in Poland is moderately concentrated, but the level of concentration is slightly different in respective regions.

Employed measures, as well as obtained results, can form a base for future healthcare reforms, which should be focused on elimination of inequalities in access to healthcare system. This issue is particularly topical in the context of the creation of "the hospital network" in Poland, which can increase the concentration of the market.

At the designing stage of the study, the following research hypothesis is formulated:

(H1) the concentration of infrastructural resources increase and are uneven between voivodships. The hypothesis H1 assumes, that there is regional competitiveness in the healthcare system, which can be calculated using indicators of concentration. This implies, that there are voivodships deficient in resources and regions relatively well equipped in infrastructure and diagnostic equipment. The verification of the H1 hypothesis includes not only the analysis of concentration, estimated based on selected indicators, but also indicates the regions characterised by the lowest and the highest inequality of non-financial healthcare resources.

2 Methodology and Data

In this research we analyse the concentration of selected resources in the Polish healthcare system. The research method is based on the assumption, that regions characterized by similar values of the selected indicators are similar in terms of analysed variables. In this analysis selected indicators characterising the availability of infrastructure (e.g., number of beds, number of operating theatres) and diagnostic equipment (eg. CT scans, MRI scans) are employed. The set of variables is selected on the basis of previous studies indicating resources which most strongly affect the population's health status (Ucieklak-Jeż and Bem 2015; Ucieklak-Jeż et al. 2015a, b). Diagnostic variables, characterising availability of infrastructure, diagnostic equipment and medical personnel are as follow:

HOB—number of hospital beds;
ECHO—number of echocardiograph units;
PET—number of Pet scanning units;
MRU—number of MR units;
OPT—number of operating theatres.

Based on those variables we create a synthetic measure of health care accessibility as a sum of standardized indexes, describing selected healthcare resources.

We use the following measures of concentration:

- Herfindahl-Hirschman Index (HHI);
- Gini coefficient health inequality (GIH).

Herfindahl—Hirschman Index is the indicator of concentration of unmet health needs, described by the formula (Becker 2010):

$$HHI = \sum_{i=1}^{n} \left(\frac{i}{n}\right)^2 = \sum_{i=1}^{n} R_i^2 \tag{1}$$

The another measure of the concentration is the Gini coefficient (GIH). Originally used for the analysis of income inequality, it can also be applied to the study of concentration of other resources. Because the obtained data is presented in the form of associative arrays, in order to determine the Gini coefficient the following model must be employed:

$$GIH(x) = \frac{\sum_{i=1}^{n} (2i - n - 1)x_i}{n^2 \bar{x}} \tag{2}$$

Gini index values range from 0 to 1 and it is a relative measure that allows to compare easily a degree of inequality in populations characterised by different medical needs (Kennedy et al. 1998; Navarro et al. 2006).

The data comes from The Centre of Health Information Systems (in terms of non-financial resources). Data covers the period 2008–2016 for NTS1 and 2014–2016 for NTS2.

3   Results and Discussion

In the first step we analyse the level of concentration for individual resources using HHI. The interpretation of HHI is as follows:

- lower than 0.15—lack of concentration of analysed features;
- from 0.15 to 0.25—the analysed feature is moderately concentrated;
- 0.25 or more-feature is heavily concentrated (Becker 2010).

It can be observed, that the distribution of concentration of infrastructure resources in Poland, in the years 2008–2016, is in the range 0.08–0.26 (Table 1). According to the literature, if HHI is lower than 0.15 it shows the lack of concentration. We can also find that statistical features HOB, ECHO and OPT do not indicate any concentration, while the remaining features: PET and MRU are moderately concentrated. During the period 2008–2016 the level of concentration of variables ECHO and OPT slightly increases, while decreases for HOB, PET, and

Table 1 The value of HHI for selected healthcare resources in Poland, in the years 2008–2016

	2008	2009	2010	2011	2012	2013	2014	2015	2016
HOB	0.082	0.082	0.082	0.081	0.081	0.082	0.081	0.081	0.081
ECHO	0.083	0.084	0.081	0.084	0.086	0.083	0.096	0.085	0.085
PET	0.169	0.266	0.200	0.242	0.147	0.090	0.157	0.133	0.157
MRU	0.136	0.116	0.103	0.200	0.097	0.110	0.100	0.095	0.100
OPT	0.081	0.080	0.081	0.081	0.083	0.081	0.083	0.082	0.083

Table 2 The value of GIH for selected healthcare resources in Poland in the years 2008–2016

	2008	2009	2010	2011	2012	2013	2014	2015	2016
HOB	0.296	0.294	0.295	0.289	0.291	0.277	0.293	0.293	0.293
ECHO	0.290	0.300	0.288	0.312	0.317	0.301	0.374	0.313	0.310
PET	0.628	0.766	0.713	0.758	0.609	0.349	0.611	0.539	0.611
MRU	0.541	0.491	0.436	0.713	0.399	0.436	0.396	0.383	0.396
OPT	0.287	0.289	0.291	0.286	0.299	0.298	0.297	0.287	0.297

MRU. This suggests, that the inequality in access to hospital beds, Pet scanning units and MR units is lower for a potential patient in Poland.

Than we employ the second concentration's indicator—Gini coefficient. It's values can be, technically, divided into three ranges: <0–0.3>, <0.3–0.6> and <0.6–1>, which have, respectively, the following meaning: low, moderate and high levels of inequality (Baker 2001; Kurowska 2011).

In our study, Gini coefficient, for selected hospital resources, take values from 0.277 to 0.766. This confirms that, as in the case of HHI, between 2008–2016 the level of concentration of resources ECHO and OPT increase minimally, but decrease for resources HOB, PET and MRU (Table 2).

Presented results confirm, at least partially, the research hypothesis H1. Both HHI and GINI show moderate concentration of hospital infrastructural resources. However, in order to promote more potent conclusions, we propose the analogous analysis which is based on the data collected for counties, in the years 2014–2016, by voivodships. In this part of research we analyse HHI and GIH separately for every variable. Due to a lack of all required data, our study is limited to the following variables:

HOB—number of hospital beds;
ECHO—number of echocardiograph units
OPT—number of operating theatres

The values of HHI, estimated for HOB (*number of hospital beds*), is from the range 0.051 to 0.228. In the following voivodships: Dolnośląskie, Pomorskie, Lubelskie, Świętokrzyskie, Lubuskie, Warmińsko—mazurskie, Podkarpackie and Śląskie we do not observe the concentration of hospital beds. In the other provinces (Mazowieckie, Zachodniopomorskie, Podlaskie, Małopolskie, Wielkopolskie,

Table 3 HHI and GIH for HOB variable (number of hospital beds), in the years of 2014–2016, by voivodships

Voivodships	HHI			GIH		
	2014	2015	2016	2014	2015	2016
Dolnośląskie	0.145	0.146	0.147	0.571	0.578	0.584
Kujawsko-pomorskie	0.156	0.156	0.157	0.589	0.586	0.588
Lubelskie	0.133	0.132	0.132	0.482	0.479	0.480
Lubuskie	0.111	0.114	0.118	0.388	0.395	0.424
Łódźkie	0.227	0.219	0.228	0.620	0.613	0.627
Małopolskie	0.189	0.187	0.187	0.535	0.512	0.534
Mazowieckie	0.223	0.215	0.225	0.646	0.639	0.645
Opolskie	0.166	0.159	0.156	0.437	0.418	0.410
Podkarpackie	0.082	0.084	0.083	0.426	0.407	0.425
Podlaskie	0.205	0.194	0.198	0.515	0.505	0.513
Pomorskie	0.144	0.138	0.144	0.449	0.441	0.453
Śląskie	0.051	0.051	0.052	0.422	0.424	0.423
Świętokrzyskie	0.128	0.127	0.127	0.390	0.385	0.385
Warmińsko-mazurskie	0.110	0.112	0.110	0.504	0.505	0.500
Wielkopolskie	0.168	0.165	0.158	0.555	0.547	0.542
Zachodniopomorskie	0.203	0.204	0.212	0.562	0.570	0.577

Opolskie and Kujawsko-pomorskie) concentration indicators suggest the average concentration level (Table 3).

The values of HHI for ECHO (*number of echocardiograph units*) takes the values from 0.073 to 0.455. We can observe that, on average, the value of HHI is equal to 0.25 or more, that means the strong concentration in the following provinces: Małopolskie, Zachodniopomorskie, Mazowieckie, Podlaskie and Łódzkie. On average, we obtain the values of HHI—above 0.15 and lower than 0.25—in the following provinces: Pomorskie, Opolskie, Wielkopolskie, Lubuskie, Kujawsko—pomorskie, Świętokrzyskie, Lubelskie. We observe the lachk of concentration in Warmińsko-mazurskie, Podkarpackie and Śląskie (Table 4).

The values of HHI for OPT (*number of operating theatres*) takes the values from 0.070 to 0.385. In the following voivodships: Mazowieckie, Małopolskie, Łódzkie Zachodniopomorskie and Podlaskie, we observe the average value of HHI above 0.25, what means high concentration. We receive the average value of HHI above 0.15 and below 0.25 for the following provinces: Dolnośląskie, Pomorskie, Kujawsko—pomorskie, Wielkopolskie, Lubelskie, Świętokrzyskie, Podkarpackie and Opolskie. There is no concentration of OPT in Warmińsko-mazurskie, Lubuskie and Śląskie. Only in the case of the number of echocardiographs the level of concentration lowered in the period 2014–2016 (Table 5).

The analysis allows the partial acceptance of the H1 hypothesis, which assumes un uneven redistribution of hospital infrastructural resources in polish voivodships. This inequality may potentially lead to uneven access to health care benefits.

Table 4 HHI, GIH for ECHO variable—*number of echocardiograph units,* in the years 2014–2016, by voivodships

Voivodeships	HHI			GIH		
	2014	2015	2016	2014	2015	2016
Dolnośląskie	0.249	0.268	0.221	0.712	0.739	0.614
Kujawsko-pomorskie	0.185	0.201	0.195	0.597	0.602	0.616
Lubelskie	0.159	0.143	0.179	0.558	0.548	0.550
Lubulskie	0.333	0.132	0.119	0.786	0.421	0.395
Łódźkie	0.278	0.302	0.272	0.648	0.659	0.641
Małopolskie	0.455	0.390	0.301	0.897	0.693	0.640
Mazowieckie	0.347	0.313	0.225	0.699	0.690	0.645
Opolskie	0.183	0.130	0.334	0.451	0.400	0.719
Podkarpackie	0.096	0.086	0.183	0.525	0.472	0.451
Podlaskie	0.296	0.324	0.232	0.615	0.630	0.540
Pomorskie	0.241	0.235	0.175	0.596	0.554	0.527
Śląskie	0.090	0.103	0.073	0.567	0.591	0.484
Świętokrzyskie	0.191	0.171	0.163	0.530	0.468	0.458
Warmińsko-mazurskie	0.134	0.114	0.145	0.578	0.508	0.537
Wielkopolskie	0.209	0.255	0.180	0.632	0.530	0.559
Zachodniopomorskie	0.332	0.345	0.214	0.694	0.687	0.563

Table 5 HHI, GIH for OPT variable—*number of operating theatres*—in the years of 2014–2016, by voivodships

Voivodeships	HHI			GIH		
	2014	2015	2016	2014	2015	2016
Dolnośląskie	0.221	0.211	0.249	0.614	0.622	0.712
Kujawsko-pomorskie	0.195	0.193	0.185	0.616	0.615	0.597
Lubelskie	0.179	0.189	0.159	0.550	0.553	0.558
Lubelskie	0.119	0.115	0.117	0.395	0.394	0.366
Łódźkie	0.272	0.274	0.278	0.641	0.646	0.648
Małopolskie	0.301	0.304	0.385	0.640	0.631	0.683
Mazowieckie	0.334	0.322	0.347	0.719	0.711	0.699
Opolskie	0.140	0.176	0.140	0.411	0.469	0.411
Podkarpackie	0.150	0.155	0.150	0.531	0.531	0.525
Podlaskie	0.232	0.234	0.296	0.540	0.541	0.615
Pomorskie	0.175	0.175	0.241	0.527	0.552	0.596
Śląskie	0.073	0.070	0.090	0.484	0.491	0.567
Świętokrzyskie	0.163	0.166	0.191	0.458	0.462	0.530
Warmińsko-mazurskie	0.145	0.134	0.134	0.537	0.528	0.578
Wielkopolskie	0.180	0.176	0.209	0.559	0.567	0.559
Zachodniopomorskie	0.214	0.259	0.332	0.563	0.613	0.694

However we cannot fully confirm this hypothesis with respect to the increasing concentration of hospital resources, because our finding are partially unclear.

4 Conclusions

Inequalities in access to healthcare are a constant area of research, not only in Poland, but also in the world, and equal access to health benefits is one of the major objectives defined by World Health Organization.

Presented analysis clearly indicates, that there are several provinces characterised by the high level of concentration of three resources: *the number of hospital beds, the number of echocardiograph units* and *the number of operating theatres*. These are Mazowieckie, Małopolskie, Łódzkie, Zachodniopomorskie and Podlaskie what means, that these regions are strongly affected by the problem of unequal distribution of healthcare resources.

The important cause of the uneven distribution is the existence of large cities (capitals of provinces), which aggregate up to 40% of resources. On the other hand there are also regions characterised by the lack of concentration or where the concentration is relatively low, suggesting that, for example Śląskie and Podkarpackie offer relatively equal access to healthcare resources. What is also important, we prove that although the level of availability, in the analysed period, changes slightly, it doesn't, however, lead to compensation of existing inequalities.

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Supporting of Swiss Franc Borrowers and Sustainability of the Banking Sector in Poland

Michał Buszko

1 Introduction

Foreign currency loans (FCL) denominated in Swiss franc (SFL) were the main type of loans granted in Poland in years 2005–2009. In general, such loans were commonly used in many CEE countries and Austria for housing purposes. Apart from the mentioned regions, they were also popular among non-resident companies in Germany and Luxemburg. The considered type of financing was developing mainly due to low interest rates of Swiss currency, stable or increasing valuation of domestic currencies versus franc in period 2004–2008 as well as strong presence of foreign banks in the domestic banking systems of countries in transition. The foreign currency loans were driven also by a trust in the long-term stability of Swiss economy and strong promotion of such financing by commercial banks. Expectations of entering Eurozone and hence a reduction of fx risk were also stimulating factors in some countries.

The process of crediting in Swiss franc brought many challenges to the financial systems of several countries, including substitution of supply of domestic currencies as well as reduction of effectiveness of domestic monetary policies. The Swiss franc loans were also considered as the source of systemic risk in CEE and as a factor supporting the price bubble on the real estate market. Nonetheless, the overall influence of the SFL on the economic development of the individual countries has not been thoroughly investigated so far and in most cases just the negative aspects of fx risk affection are emphasized. In some countries, e.g. Poland, SFL stimulated fast growth of construction and the whole economy as well as were the source of

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increased tax incomes. They also allowed some part of borrowers to achieve long-term financial benefits.

In Poland during 5 years (from 2004 to 2008) Swiss franc loans had replaced Polish currency mortgages and created long-term systemic exposure to the foreign currency risk as well as risk of foreign interest rates. The dominance of SFL became correlated with depreciating valuation of Swiss currency in period 2004–2008 and substantial (2–6 pp.) surplus of WIBOR over LIBOR CHF rate. The benefits obtained from SFL for several years, especially low value of instalments, reversed after financial crisis 2008–2010 when the exchange rate of CHF/PLN rose significantly, pushing up the value of monthly repayments and total debt. Due to the domination of long-term foreign borrowings (mostly in CHF, and to the lesser extent in EUR) on the credit market in Poland, the threat of the systemic risk emerged. Such phenomenon led National Bank of Poland, Polish Financial Supervision Authority (PFSA), various Polish state authorities and, to the lesser extent, commercial banks to elaborate proposals to counteract the systemic risk as well as to reduce the costs of repayment of loans. There were proposed several instruments, initiatives and programs designated to unhedged borrowers in Poland. They had the regulatory, legal, financial as well as economic character.

The goal of the paper is to characterize SFL to unhedged borrowers and the conditions of their development as well as to evaluate and discuss the financial, legal as well as regulatory instruments proposed by various parties to solve partially or completely the problem of fx risk created by SFL in Poland. The paper contains also a discussion related to the fairness and the influence of supporting instruments onto sustainability of the banking sector in Poland.

The author puts forward two hypotheses:

1. The systemic support of CHF borrowers in Poland would negatively affect the banking sector sustainability.
2. As the strong affection of fx risk did not deteriorate the good quality of SFL in Poland, the systemic support of CHF borrowers is neither financially nor socially justified.

2 Literature Review

The problem of foreign currency lending is rather commonly known in the literature, however the loans taken by unhedged borrowers in Swiss franc in CEE countries is a quite new phenomenon. Due to the fact that it was developing mostly in years 2004–2008 and it relates to the very long-term loans, not all of the aspects and consequences of SFL were examined thoroughly so far. Nonetheless, one can find several important papers related to CHF lending in CEE. Brown et al. (2009) characterize Swiss franc lending by banks domiciled in Europe to their non-bank clients. They present a role of the Swiss financial sector in refinancing of the loans

and characterize the type of CHF borrowers in various countries. Brown and De Haas (2010) find that foreign currency lending is determined by macroeconomic environment. They also indicate that foreign owned banks do not expand their fx lending faster than domestic banks. Basso et al. (2007) prove that increasing access to foreign funds leads to increased usage of credit in foreign currencies and present the influence of interest differentials on substitution of loans. Brzoza-Brzezina et al. (2010) examine the impact of domestic monetary policy on development of FCL and the substitution between the domestic and FCL in terms of restrictive monetary policy. Brzoza-Brzezina et al. (2015) indicate the negative affection of the foreign currency loans onto the transmission of the monetary policy and present the impact of such loans onto welfare. Yesin (2012) analyzes the influence of FCL onto systemic risk indicating that such risk is substantial in non-euro area but not in euro area. The author finds that the systemic risk is coming primarily from other than CHF-denominated loans. Fidrmuc et al. (2013) evaluate factors stimulating the development of FCL loans emphasizing a lack of trust in the stability of the local currency and in domestic financial institutions as well as remittances and expectations of euro adoption. Considering Polish bank market, the detailed conditions and attitudes of banks toward lending Swiss francs to unhedged borrowers in Poland are presented in the White Book of The Franc Loans in Poland issued by The Polish Bank Association (ZBP 2015). The specificity of loans granted in Poland as well as comparison with loans given in Hungary is discussed by Buszko and Krupa (2015). Buszko (2016) also compares Polish zloty loans against Swiss franc and identifies the group of borrowers getting benefits due to taking SFL in Poland.

3   Data and Methodology

The paper was based on financial and banking sector data obtained from Polish Financial Supervision Authority (PFSA), National Bank of Poland (NBP), the interbank market as well as Central Statistical Office of Poland (CSOP). On the basis of the literature and the assessment of the economic and financial conditions in Poland in 2005–2008 the author presents factors that stimulated taking SFL, then he analyzes the development of the SFL and indicates their significance in Poland. The author also discusses a problem of quality of the SFL basing on PFSA, NBP, CSOP data as well as data obtained from the mathematical model of the repayment of SFL. The model assumes the monthly repayment of 20-years loan taken in July 2008, i.e. during the lowest valuation CHF/PLN in the history, indexed with CHF LIBOR 3 M + 1.4% margin. The amount of the loan is an equivalent of PLN 100.000 and the fx spread is +/− 3.5% of the average rate of NBP. The author lists and compares legal, economic and financial proposals of support of SFL borrowers in Poland as well as discusses their potential influence onto banking sector sustainability.

4   Research Results

Development of Swiss Franc Loans in Poland The SFL were developing in
Poland mainly from 2005 to 2009. They were a cheaper alternative to the domestic
currency mortgages. The development of foreign currency lending was observed at
that period in several countries of CEE, however in some of them (Baltic States,
Serbia, Croatia, Bulgaria, Romania) the prime currency was euro (Yesin 2013). The
process of crediting in foreign currencies was characteristic to almost whole region
and resulted from higher costs of financing in domestic currencies as well as broad
supply of euro and Swiss franc due to strong presence of foreign banks in CEE. As
the development of the foreign currency loans followed the entering EU by 10 new
countries of CEE, a perspective of joining Eurozone in the nearest future was also the
motivation to use such type of crediting. The detailed factors supporting develop-
ment of Swiss franc loans in Poland are as follows:

– significant savings on monthly CHF loan repayments (from 4% to 32% for
  20 years loans and from 8% to 41% for 30 years loans) from the moment of
  taking the loan,
– long-term (March 2004–July 2008) strong depreciation of foreign currencies
  against Polish zloty (EUR −34.8%, CHF −37.2%, GBP −45.1%, USD
  −50.2%),
– advantageous perspectives of development of Polish economy after joining EU in
  May 2004;
– belief of borrowers in Swiss economy potential and stability of exchange rate of
  Swiss franc;
– a perspective of quick joining Eurozone by Poland and the reduction of fx risk;
– lack of legal barriers of using foreign currencies in crediting of households;
– lack of consistent housing policy in Poland and hence lack of long-term financial
  solutions for housing purchases in PLN;
– active promotion of low cost foreign currency loans among banks in Poland;
– expectation of bull housing market in Poland in the long term;
– easy access to foreign currencies by banks operating in Poland;
– possibility of increasing bank profits through SFL selling (fx spreads, fees on
  insuring low LtV ratio, fees on currency bank transfers).

The development of the SFL proceeded from 2005 to its peak in 2008 and abrupt
fall in 2011 (Fig. 1). The highest volume of loans was observed in years 2006–2008
with 115.5, 97.0 and 162 thousand loans respectively (Próby... 2015).[1] Approxi-
mately 45% of all CHF loans considering volume and 63% considering value were
issued in years 2007–2008 (UKNF 2011). The loans denominated in Swiss currency
were granted even further but in a very limited volume and value. From 2012 new fx
loans became almost non-existent (less than 450 agreements per year).

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[1]The decrease of number of loans in 2007 was in general a consequence of implementing
Recommendation S by Polish Financial Supervision Authority (PFSA).
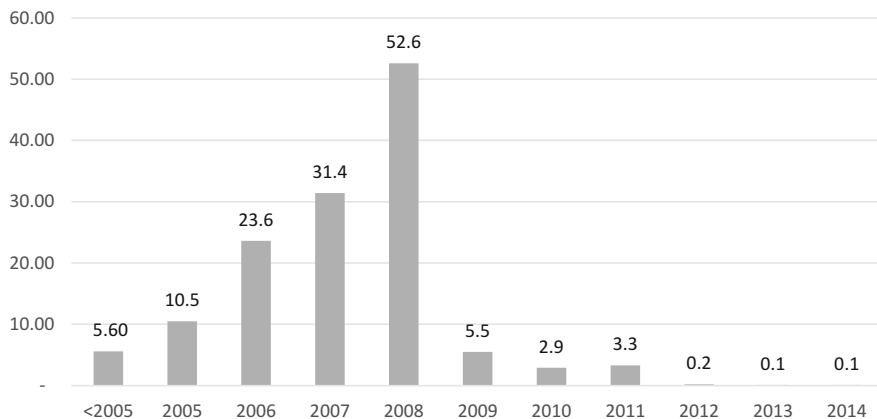
Fig. 1 Value of the new SFL granted in Poland (bn PLN). Source: Own work based on data of Polish Financial Supervision Authority
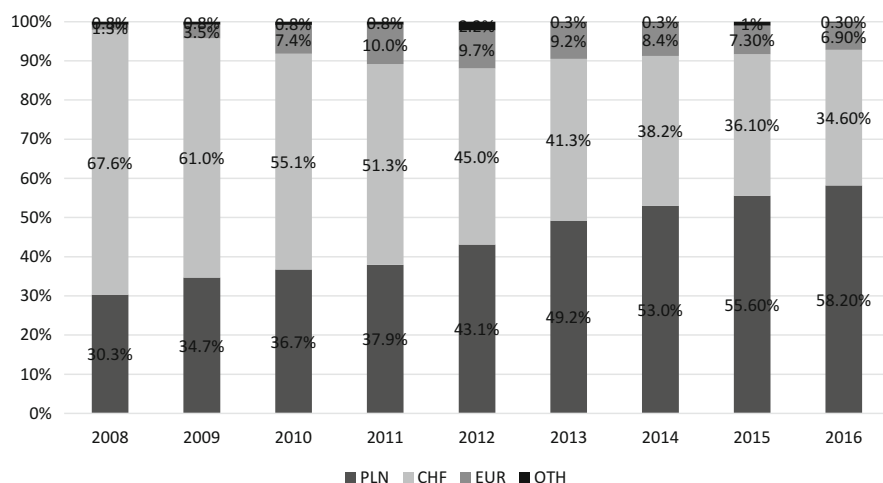
Fig. 2 Currency structure of the mortgage loans to HH in Poland (%). Source: Own work based on data of Polish Financial Supervision Authority

The total cumulated value of SFL reached its maximum of 163.5 billion zloty in 2011 what was a result of a high volume of loans given in years 2007–2008 and the very high pricing of the Swiss currency in the second half of 2011. Considering the share of SFL in the structure of total mortgages in Poland one may find the dominance of the loans under consideration in period 2008–2011. In 2009 the new CHF-denominated loans started to be replaced by the loans in euro and from 2014 Polish zloty mortgage loans regained the dominant share in financing of housing purposes of households (Fig. 2).

Quality of SFL When discussing the quality of SFL one should consider specific conditions related to the process of crediting borrowers in Poland. Firstly, loans granted in Poland were as a rule indexed by variable 3 M or 6 M LIBOR CHF rate with added fixed credit spread. Such indexation allowed banks to transfer the interest rate risk onto borrowers but at the same time it helped borrowers partially compensate foreign exchange risk. Such trend was clearly observable in case of Polish borrowers whose instalments of loans did not rise to the extent of appreciation of Swiss franc.[2] Secondly, simultaneously with Swiss franc appreciation, there was observed a steady increase of monthly average incomes (salaries) in Poland. Such increase has compensated the negative consequences of fx risk and the rise of the instalments. The systematic increase of incomes allowed to keep the purchasing power of the borrowers at relatively stable level, with the highest value of payments noted in September 2011.

Because the CHF loans were initiated in period 2005–2011 at varied CHF/PLN exchange rates, hence the financial burden of loans under consideration varies. The highest values of instalments are being repaid by the borrowers taking loans at the historical maximal pricing of PLN in July 2008, and the lowest by borrowers taking loans in February 2009. The repayment conditions are also dependent on maturity of the loan. In general, borrowers taking 30-years loans are more beneficial comparing to 20-years borrowings (Buszko 2016). The most problematic are then 20-years loans taken in July 2008 i.e. in the moment of the highest exposure to fx risk resulting from the historically high pricing of PLN.

Figure 3 shows a relative change of CHF in Poland against relative value of instalments (IN) and the value of instalments (IDIN) discounted by an average salary increase (SI) in Poland.[3] The data shows 20-Years SFL taken in July 2008.

The abrupt appreciation of franc in January 2015 due to ceasing of peg 1.20 franc to euro has not strongly affected the purchasing power of borrowers, keeping relative growth of instalments within 20% range assumed by the regulator in the Recommendation S. The confirmation of this statement is the fact, that despite the nominal appreciation of the mortgage related financial burden, i.e. nominal growth of instalments, it did not affect well-being or health outcomes (Białowolski and Węziak-Białowolska 2016).

One of the crucial aspects related to assessment of the quality of SFL is the general level of non-performing loans (NPL) in Poland. In general, since the beginning the foreign currency loans (FCL) in Poland have been identified as the debts of the best quality in the whole credit portfolio of the banking sector. Until 2015 the FC

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[2]The offset of the appreciation of franc by the reduction of LIBOR CHF for borrowers taking mortgages adjustable to LIBOR 3 M rate with the margin of 1.40%, in July 2008, i.e. during the historical maximal pricing of Polish currency versus Swiss franc, was 48.2% for 20-years and 63.0% for 30-years loans. The maximal nominal increase of instalments for loans taken in July 2008 due to affecting fx risk was 57.3% (20-years loans) and 40.9% (30-years loans).

[3]The calculation is based on the example of CHF-denominated mortgage loan amounting to 100.000 PLN taken in July 2008 and adjusting to CHF LIBOR 3 M + 1.4% of margin.
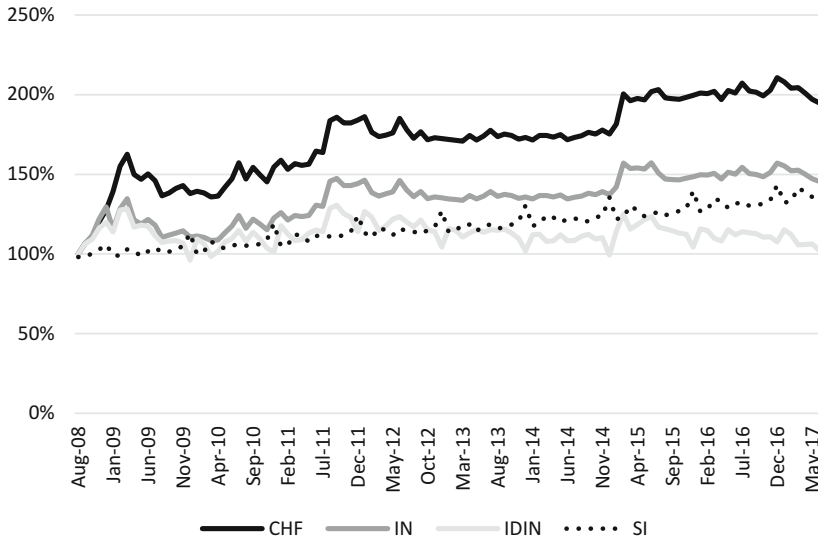
Fig. 3 Relative change of CHF/PLN rate, IN IDIN and SI (*August 2008 = 100%*). Source: Own work based on data of loan repayment schemes and Central Statistical Office of Poland
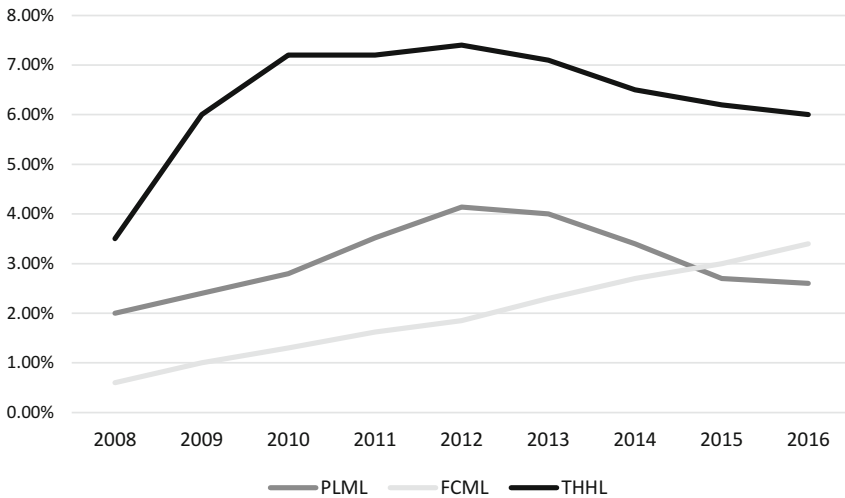
Fig. 4 NPL rate in Poland (%). Source: Own work based on data of Polish Financial Supervision Authority and Central Statistical Office of Poland

mortgage loans (FCML) were characterized by the lower NPL rate than mortgages in zloty (PLML), as well as total loans to households (THHL) (Fig. 4).

Since 2008 the NPL rate of foreign currency (mainly CHF) loans has been steadily increasing, however one should consider that this trend is derived from
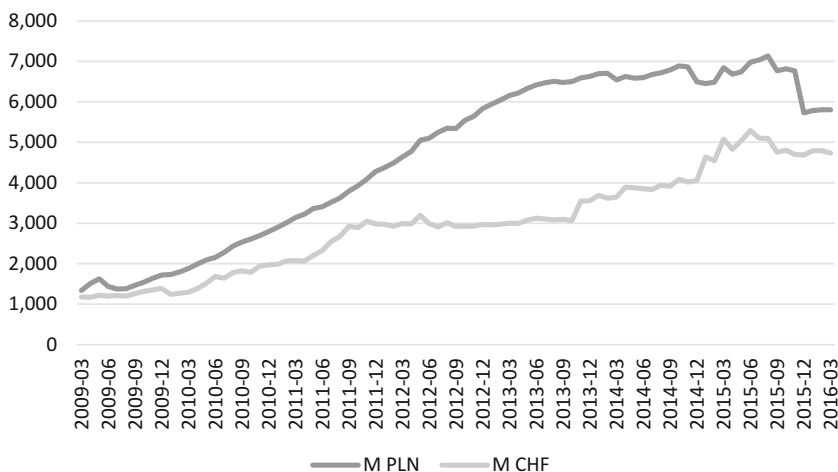
Fig. 5 Non-performing mortgage loans in PLN and CHF (mil. PLN). Source: Own work based on data of National Bank of Poland

the virtual lack of the new FCL to households since 2012. The deteriorating condition of the portfolio is then not balanced by the inflow of well-performing new loans, what is a characteristic feature of the portfolio of mortgages in PLN. The general level of NPL of mortgages denominated in foreign currencies remains low (3.4% in 2016) what differentiates Poland from Hungary, where rate of non-performing FCL was among the highest in the sector and higher than in Poland (Buszko and Krupa 2015).

The total value of non-performing mortgage loans in Swiss franc in Poland (M CHF) has remained stable since 2015 and below the value of impaired mortgage loans in PLN (M PLN) (Fig. 5). Such data may confirm that the general SFL quality is not deteriorating in a systematic way despite long-term elevated pricing of CHF.

In general, a major source of risk related to SFL loans in Poland is the elevated LtV ratio resulting from a high valuation of debt denominated in Swiss currency. Such ratio confirms inability of borrowers to cover total repayment of the loan from proceedings coming from the liquidation of the real estate. In case of loans taken in July 2008 the LtV ratio exceeds 100% in all the future periods and in all the periods it is higher than LtV for PLN-denominated loans (Fig. 6). Such results may indicate that the real danger for the economic stability of the borrowers is a termination of the loan before its maturity and immediate repayment of the amount exceeding the value of the collateral.

Supporting of CHF Borrowers in Practice The process of crediting of unhedged borrowers in Swiss franc was supervised and supported by various institutions in Poland before, during and after the financial crisis 2008–2010. In general, majority of the solutions and instruments influencing the risk and costs of foreign currency lending has been implemented after the outburst of the crisis and the appreciation of franc against Polish zloty (Table 1).
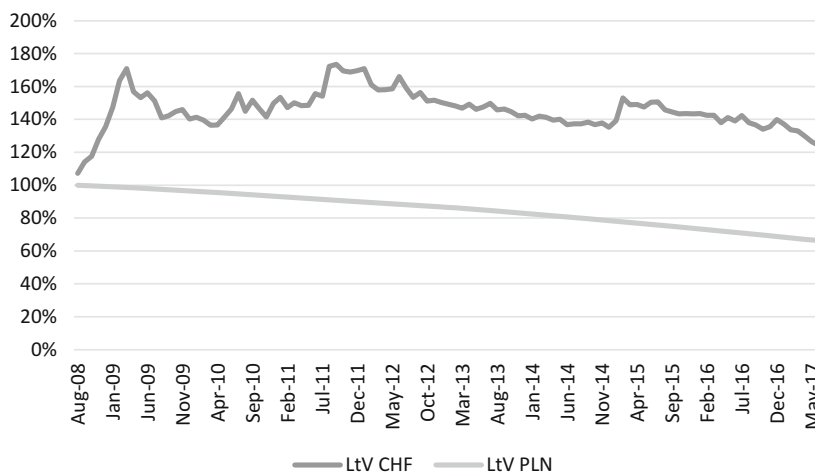
Fig. 6 LtV ratio of loans in CHF and PLN. Source: Own elaboration based on loan repayment schemes

Major Proposals of Supporting CHF Borrowers Among the instruments of support CHF borrowers there were several proposals of conversion of loans into PLN, which would pass most of the costs and risks of such process onto banking sector. Apart from it, there were political proposals of return of fx spreads, increasing the provisions and tax rate imposed on bank assets (Table 2). Most of those proposals were assessed by banks and PFSA as too risky, harmful for banks and legally (constitutionally) controversial.

The supporting of borrowers by conversion of SFL at the current market exchange rate would generate losses from 4 to more than PLN 100bn what would erase from 2% to 54% of the capital of the whole banking sector as on 31.12.2016. Such losses would significantly deteriorate the financial condition of the whole banking sector leading to financial distress of seven main banks and reducing its potential to finance the development of the economy. Because the losses could not be amortized in time, their influence would be substantial and has immediate effect on banks. In fact, the support of borrowers would cause the sustainability paradox, when searching for sustainability of the banking sector through conversion of currency supporting of would cause serious imbalances and the real danger of failure of the banking sector.[4]

Until 2018 the only implemented instruments of support of borrowers are PFSA recommendations which strictly limit access to the FCL by unhedged borrowers, legal possibility to repay the loan in the currency of the loan and the reduction of currency spreads by banks or through use of internet exchange offices. The elevated

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[4]The sustainability of CHF lending means to balance the social needs to support CHF borrowers (which strictly require the support) and maintaining at the same time safety, stability and development of the banking sector in the long-term.

Table 1 Main instruments of supporting of CHF borrowers implemented in Poland

Entity	Year	Instrument	Description
PFSA	2006	Recommendation S	First banking sector legal regulation that limited access to foreign currency loans by higher requirement of creditworthiness and more detailed investigation of the financial situation of the borrower. The foreign currency loan might be given if the assessment of creditworthiness proved the repayment of the loan with interest equal to PLN-denominated loan and the amount of loan higher by 20% than required in the loan application. The client should sign the document on acceptance of fx risk when choosing the SFL. PLN-denominated loan should be presented to the client as the first-choice loan
Banks	2008–2009	Currency conversion into PLN	Banks started to offer voluntary conversion of CHF loans into PLN
PFSA	2009	Recommendation SII	Recommendation allowed repayment of FC loans directly in the foreign currencies and required publishing transparent information about the currency spreads and the mechanisms of their calculation
Banks and private companies	2010	Internet foreign exchange platforms	Reduction of CHF exchange spread to approx. 0.5% and free transfer francs between bank accounts in Poland to repay the loans
Parliament	2011	"Anti-spread" act—amendment to the act on banking law of 1997 (Dz. U. Nr 165 poz. 984)	The first act (bill) supporting the foreign currency borrowers that allowed repayment of FCL in original currency with no additional costs for amending the loan contract. Banks were obligated to open free FC accounts for borrowers to repay the loans and they must not collect fees for using of such accounts. Borrowers were not obligated to buy FC in the bank that grants the loan
PFSA	2011	Recommendation SIII	FCL available only to the borrowers having incomes in currency of the loan. The 25 years of credit period used for investigating creditworthiness of clients
PFSA	2010, 2013	Recommendation T	Transparent policy of spreads in retail FCL. The DtI ratio should not exceed 50% (or 65%). For foreign currency loans, there are required safety buffers of 20% due to change of the exchange rate
Banks	2015	Acceptance of negative value of CHF LIBOR	Reduction of payments of instalments (return of a part of the principal repaid by the borrower in the instalment)
Banks	2015	Reduction of CHF spreads	Voluntary reduction of CHF/PLN exchange spread to approx. 1%

Source: Own work

Table 2 Major proposals of supporting CHF borrowers in Poland

Proposal	Year	Parties involved	Expected effect
Full conversion at the current exchange rate	2015	Single voluntary conversion. The conversion would be split into two parts: mortgage loans in PLN and non-mortgage loan with fixed interest of 1%. Banks and borrowers would pay back together the latter loan	Estimated costs PLN 30–60bn.
Full conversion at the exchange rate on the date of conversion	2015	Half of the difference between value after conversion and value of Polish zloty loan paid by bank, half by the client within 20 years	Conversion of the loans taken at the low pricing of CHF (especially in July–August 2008). Solution could lead to speculative profits of borrowers. Costs estimated at PLN 9–9.5bn. Conversion would be voluntary and solving problem of high LtV ratio
Full conversion of loans at the "fair" foreign currency rate and return of fx spreads on the loans in foreign currencies	2016	Banks would individually calculate the "fair" foreign exchange rate. There would be three types of restructurings: voluntary, obligatory and passing ownership of the property in exchange for debt	Initial costs estimated at PLN 30bn. Costs calculated by PFSA are PLN 66.9–103.4bn (4–7-year annual profit of the banking sector in Poland); 7 midsize and large banks would substantially lose capital, including the leading bank in Poland (PKO BP). Additional PLN 139bn. would be paid as guarantee of deposits
Return of fx spreads (also for loans already repaid or terminated)	2016	Banks would return fx spread on loans up to PLN 350.000 granted in period 2000–2011 and pay interest on spread to the borrowers to compensate the alternative costs. Return of spread valid also for loans completely repaid	Cost estimated at PLN 4–10bn covered by banks. The solution found as contrary to the rule that the low is not retroactive

Source: Own work

pricing of Swiss currency since 2009 has been counteracting the process of voluntary conversion of loans by borrowers and keeps banks exposed to credit risk resulting from fx risk. Moreover, the legal uncertainty of solving the SFL problem in Poland discourages sale, trading or securitization of the considered loans.

Banks with Substantial Share of SFL   The proposal of supporting of borrowers in form of conversion of mortgage loans would impact various banks and some of them would not be able to continue operations. Among the banks with the largest share of SFL in portfolios there were 6 from top 10 banks in Poland concentrating approx. 50% of assets and equity of the whole sector. Table 3 presents the list of banks which would be influenced the most severely by conversion of loans. Most of the banks are

Table 3 Banks with a substantial share of SFL in the portfolios (as on 31.12.2016)

Bank	Owner	SFL (PLN bn)	SFL as % of total loans	Total assets value (PLN bn)	Equity (PLN bn)	Equity to SFL (SFL coverage ratio)
PKO BP	State	30.3	14.5%	285.6	32.6	107.6%
mBank	Commerzbank (Germany)	19.1	23.3%	133.7	13.1	68.6%
Bank Millennium	BCP (Portugal)	18.3	37.8%	68.8	6.9	37.7%
Getin Noble	Private investor (Poland)	12.8	27.0%	66.9	5.1	39.8%
BPH[b]	General Electric (USA)	12.6	51.9%	31.2	3.56	28.3%
Raiffeisen Bank Polska[a]	Raiffeisen Bank International (Austria)	12.0	33.7%	53.3	6.4	53.3%
BZ WBK	Santander (Spain)	10.5	12.1%	131.4	19.0	181.0%
BGŻ BNP Paribas[a]	BNP Paribas (France)	7.1	12.6%	70.4	6.1	85.9%

Source: Own work based on data from financial statements of banks
[a]Gross value
[b]Gross value on 30.09.2016

foreign owned but there are also two entities owned by Polish investors, including the state-owned biggest bank in Poland (PKO BP).

Sustainability of Banking and SFL Sustainable finance can be defined as financial capital and risk management products and services which are provided in ways that promote or do not harm economic prosperity, the environment and social well-being (PwC 2012). Against this background, the author of the paper characterizes banking sustainability as a process of development of banks, banking products and services that is not distorted or do not implicate unexpected events, actions or changes which may destabilize as well as reduce safety and the trust to the banking sector and their clients. When analyzing the SFL, one may consider them as negatively influencing the sustainable growth of banks, because the fx risk is virtually affecting unhedged borrowers and their ability to repay the loans. The consequence of keeping the SFL is in fact also a reduction of dividend payment for banks with substantial share of SFL (according to individual assessment of PFSA), the necessity to keep extra buffer of capital (according to individual assessment of PFSA) as well as increased weights of risk for CET1 and TCR ratios calculation. The SFL are also negatively affecting bank reputation in scope of public activity of customers which have problems in repayment of loans.[5] On the other hand, the quality of loans, lack of new loans in

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[5]Nonetheless, the general trust to banking sector is high in Poland and it is also the highest among commercial financial institutions (Związek Banków Polskich 2016).

foreign currencies, the global financial results of the whole banking sector as well as the labor market conditions do not justify the systemic support of borrowers, especially by converting the SFL into PLN. Such support would bring some serious negative effects, destabilize fx market as well as whole banking sector. Converting the loans to domestic currency according to the proposals presented above would pass the costs from a narrow group of borrowers onto bank owners and deponents. The next group harmed by systemic solution of fx risk would be clients of all banks (due to increased guarantee fund provisions), the taxpayers (due to support of the state to the banks) and finally the whole domestic economy (due to decreased capitals of banking sector and limited growth of retail and corporate loans). The beneficiary of such support would be a single group of bank clients, i.e. approx. 908,000 people repaying 535,000 mortgage loans in CHF.[6] In fact, the real number of clients taking profits from such support would be considerably lower. As crediting in CHF in Poland was stretched over long period and the loans were granted at different exchange rates, just the group of borrowers taking loans in the summer 2008 can be considered as suffering due to the growth of instalments. Their effective support would socialize the costs of currency conversion and pass them onto other groups, including PLN-borrowers. The systemic support could potentially raise also another problem, i.e. claims of borrowers repaying mortgages in Polish zloty in terms of increasing interest rates in Poland. Moreover, the systemic conversion of CHF loans could also raise claims of CHF borrowers in terms of depreciation of Swiss currency against Polish zloty after the conversion. The proposal of return of spreads from past periods and completely repaid loans would break the rule that the low is not retroactive. Due to the potential serious negative effects, which could emerge after systemic conversion of SFL or systemic returning of spreads, the instruments of support should be individually adjusted and focused on:

– individual approach and negotiations in case of problems with loan repayment,
– increasing flexibility in scope of restructuring of loans or temporary supporting of borrowers (prolonging repayment periods, offering repayment holidays),
– adjusting temporarily the value of instalments to the incomes of the borrowers
– compensating negative interest rates with principal of the loans,
– resigning from insuring high LtV loans if the loans are paid regularly,
– converting the loans at an average exchange rate,
– offering complimentary or low cost credit support during particularly high valuation of Swiss currency,
– predicting future financial condition of the client and its potential problems with loan repayment,
– voluntary real property sale by the client if the loan agreement is terminated
– offering hedging instruments against the rise of LIBOR CHF interest rate.

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[6]About 50% of the borrowers live in 8 biggest agglomerations in Poland (18% lives in Warsaw agglomeration). 66% of CHF borrowers belong to the generation X (born between 1967 and 1981) and 25% is older (born between 1948 and 1966). Such data may confirm that the group of CHF borrowers has rather advantageous conditions of repay of loans due to their income and professional position.

The instruments which keep stability of banks as well as borrowers should be implemented individually and used specially to protect the clients against termination of loan agreement, which due to high LtV wouldn't be able to repaid debts.

5   Conclusions

Considering the changes of financial burden of the SFL repayment in terms of high valuation of Swiss franc, negative interest rate of LIBOR CHF, a change of average monthly salaries in Poland as well as a decrease of unemployment rate one may indicate that the systemic support of CHF borrowers is not justified form the point of view of macro as well as banking sector financial stability. The decreasing share of SFL in total loans in Poland as well as relatively narrow group of CHF borrowers which would benefit from systemic support are also factors against subsidizing of the people which took higher risk between 2005 and 2012 by current investors, deponents and finally all clients of banks and taxpayers. The support should take place only in case of borrowers that are unable to repay the loan, especially if the LtV ratio exceeds 100%. The role of the support would be then to protect the clients against early termination of the loan by banks and going bankrupt. The support solutions should be focused on individual evaluation of the situation of each client. Such approach would maintain the successful repayment of SFL and the sustainability of banking in Poland.

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How Does the Par Value of a Share Work?

Tadeusz Dudycz

1 Introduction

The concept of par value (hereinafter PaV) has a history of more than 200 years. Its beginnings are related to the exemption given to shareholders for liability for corporate debts. That exemption was extended to stockholders in manufacturing corporations in New York in 1811 and in Massachusetts in 1830, and in England the exemption was granted to stockholders in business and manufacturing companies in 1855 (Cook 1921a). This exemption of shareholders from personal liability for corporate debts was of fundamental importance, because until this time shareholders had been liable for all corporate debts (Cook 1921b). When such liability existed, members of the public did not dare to buy shares, because they would be liable for the corporate debts. The exemption from liability reduced the risk to the money actually paid for the share. However, the ease with which, because of this exemption from liability, shares can be sold to the public has given rise to abuse, namely, the issue and sale of 'watered stock', which is stock issued without a corresponding payment in of assets valued at the par value of the stock. The shares are issued not against assets but against water (Mwenda 1999). In order to protect buyers and lenders against this, the par value for each share was added, to denote that it represented that amount of money or property of the corporation (Shares without Par Value 1921). Par value represents the nominal value of the share that has been contributed by the shareholder (Ho and Lan 1999), and for this reason it is a convenient criterion for measuring the extent of liability of the shareholder.

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According to Hamilton (as cited in Mwenda 1999), the PaV paid by the shareholder for his share was the price exacted by the law for the corporate advantage of limited liability.

Although the concept of PaV has been criticised by a number of scholars since its birth, it has been accepted as one of the cornerstones of company law in many countries.

Under the par value regime, shares that represent a fraction of company ownership are ascribed an arbitrary value at the time of incorporation, which indicates that the PaV represents the value of share capital contributed at the time of incorporation of the company, and can be reflected as follows:

$$\text{Share capital} = \text{number of shares} \times \text{PaV.}$$

This capital is fixed and certain, because the company cannot return the capital to its shareholders while it is a going concern or issue shares at a discount. Share capital is the first of legal capital because it reflects the capital that companies have to maintain in order to secure creditors' claims. Every creditor may therefore look at this capital as his security. As mentioned, this concept was accompanied by controversy from its beginnings. Discussions about the advantages and disadvantages of the par value concept took place primarily among researchers in the field of law, particularly at the beginning of the twentieth century (e.g. Colton 1921; Dwight 1907; Morawetz 1913). One of the fundamental shortcomings of having a fixed share capital (hereinafter SC) is that it does not recognise the ever-changing intrinsic or market value of the share capital, and hence cannot be good security for creditors.

The contribution of this paper to the literature is to show that the PaV and the related number of outstanding shares interact with investor behaviour and can affect the results of new issues and the structure of the equity. The study is the first on the impact of PaV on investor behaviour.

The following hypotheses were verified:

1. Companies with lower SC are more likely to have a reduced PaV.
2. A lower PaV allows a company to obtain a higher relationship between the issue price and the PaV, so that more of the proceeds derived from the share issue is recorded as share premium.
3. Firms with a lower PaV have a lower SC in total equity.

2   Data, Definitions of Key Variables, and Research Method

The study was conducted on a sample of 261 companies that floated between the years 1998 and 2013 on the Warsaw Stock Exchange. The distribution of PaV in the sample is shown in Fig. 1.

The sample was arbitrarily divided into six groups on the basis of the PaV (Table 1).

For each company the following parameters were calculated: (Table 2).

For each group the basic statistics were calculated. To test the significance of the differences between means, the nonparametric multiple comparison Kruskal-Wallis test was used. In Tables 3 and 4 p-values less than 0.1 are bolded.
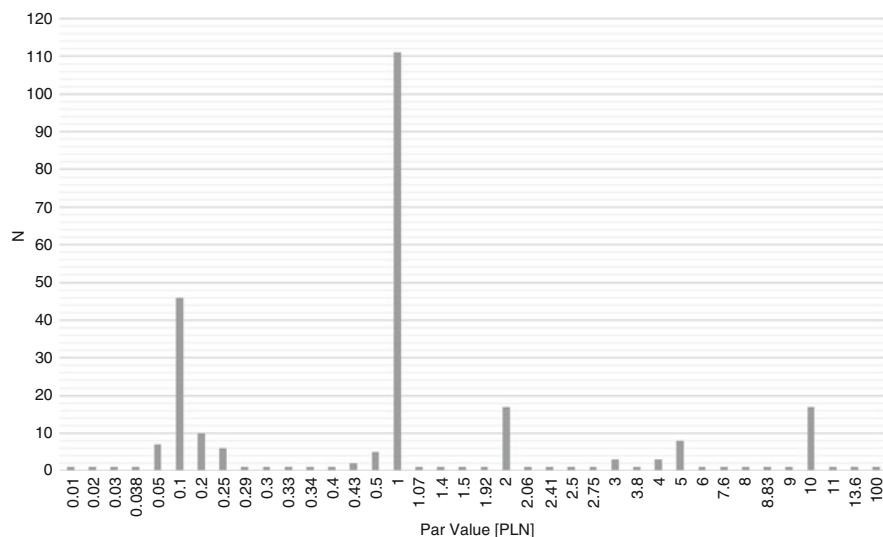
Fig. 1 The distribution of PaV

Table 1 Par value range

The number of the par value group	Range
1	<0.05
2	0.1–0.20
3	0.25–0.5
4	1–1.5
5	1.92–9
6	>10

Table 2 Variable definitions

Variable	Definition
SC	Share capital
IP/PaV	Ratio of issue price to par value
Retention ratio	Book value of shares after posting the new issue, divided by the issue price
SC/E t	Share capital divided by total equity in year t. t indicates the year in relation to the year of issue (and t = 0 is the year of issue)

3   Results and Discussion

Table 3 Panel A shows that PaV is associated with the amount of SC. Firms with lower SC are more willing to divide it into shares with a smaller PaV to obtain a suitable number of shares. We see that companies in groups 4, 5 and 6 (having a PaV greater than 1) have statistically significant differences from companies with PaV less than 1. This may suggest that a certain number of shares is expected to be

Table 3 Parameters associated with PaV

The number of the par value group	N	Mean	SD	Median	Trimmed mean 5.0%	Kruskal-Wallis test. p-value for multiple comparisons (bilateral)					
						1	2	3	4	5	6
Panel A			Share capital (mln. PLN)			R:26.5	R:68.2	R:92.8	R:153.2	R:161.3	R:208.4
1	11	0.66	0.25	0.51	0.63						
2	56	3.55	8.75	1.00	2.05	1.0000					
3	18	3.60	3.49	2.51	3.27	0.3273	1.0000				
4	114	68.86	470.31	6.24	14.83	**0.0000**	**0.0000**	**0.0241**			
5	42	27.49	48.42	5.82	19.61	**0.0000**	**0.0000**	**0.0191**	1.0000		
6	20	823.56	3271.46	26.00	97.93	**0.0000**	**0.0000**	**0.0000**	**0.0380**	0.3234	
Panel B			IP/PaV			R:243.3	R:208.8	R:184.2	R:108.3	R:78.1	R:43.7
1	11	455.28	501.63	226.67	350.45						
2	56	114.84	95.85	85.00	102.98	1.0000					
3	18	64.85	46.12	59.31	62.35	0.6092	1.0000				
4	114	20.41	35.29	10.40	14.78	**0.0000**	**0.0000**	**0.0011**			
5	42	10.37	16.87	4.25	7.56	**0.0000**	**0.0000**	**0.0000**	0.4011		
6	20	4.91	6.37	2.35	4.14	**0.0000**	**0.0000**	**0.0000**	**0.0062**	1.0000	
Panel C			Retention ratio			R:52.54	R:92.95	R:93.22	R:129.82	R:188.60	R:200.45
1	11	0.31	0.12	0.29	0.29						
2	56	0.43	0.27	0.36	0.40	1.0000					
3	18	0.42	0.18	0.39	0.40	1.0000	1.0000				
4	114	0.54	0.27	0.48	0.51	**0.0178**	**0.0413**	0.8386			
5	42	0.82	0.42	0.67	0.78	**0.0000**	**0.0000**	**0.0001**	**0.0002**		
6	20	0.91	0.38	0.85	0.90	**0.0000**	**0.0000**	**0.0002**	**0.0017**	1.0000	

P-values less than 0.1 are bolded

outstanding on a share issue. To ensure this, companies with a lower SC choose a lower value of PaV. In turn, a lower PaV contributes to the success of the share issue, because it helps to give a higher IP/PaV ratio at the time of the share issue.

From Panel B and Fig. 2, we see that the average IP/PaV ratio decreases with increasing PaV. New investors show a behavioural bias by evaluating the issue price in isolation from the PaV. This leads to issuers obtaining a higher share premium, which is the surplus of the issue price over the PaV. The premium is posted to the reserve capital account, and all shareholders have rights to it in proportion to the number of shares they hold. The consequence of obtaining a high share premium is that the retention ratio is low. The retention ratio is the relationship between issue price and book value after the posting the new share issue. If the book value of shares after posting the new issue is lower than the price the new shareholders have paid for their shares, this means that there has been a flow of rights to the capital obtained from the share issue from the new to the old shareholders. Therefore, the retention ratio tells us how the part of the capital contributed by the new shareholders will work for their shares (see Dudycz 2014). From Panel C and Fig. 2 we see that, in companies with the lowest par values, only 30% of the capital contributed by the new shareholders will, on average, be attributed to their shares, and this figure increases when the PaV rises.

Companies that have a low PaV and, as already mentioned, a low SC use equity other than SC to a greater extent than companies that possess a high PaV (Table 4, Fig. 3). This means that the amount of SC could be a part of the company's strategy
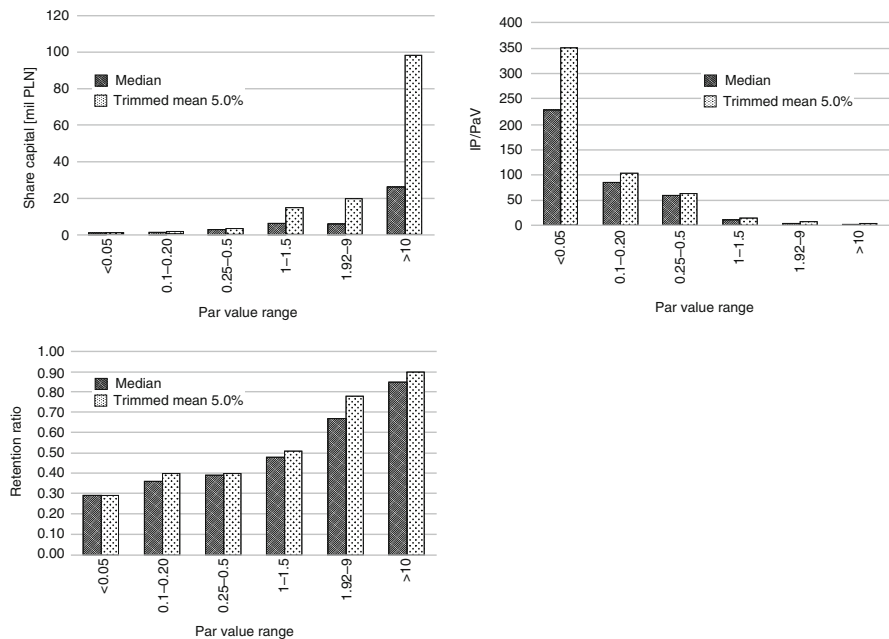
Fig. 2 Parameters associated with PaV

Table 4 The relationships between PaV and the equity structure

The number of the par value group	N	Mean	SD	Median	Trimmed mean 5.0%	Kruskal-Wallis test. p value for multiple comparisons (bilateral)					
						1	2	3	4	5	6
Panel A	SC/E − 1 [%]										
						R:29.09	R:63.70	R:86.72	R:162.21	R:156.64	R:183.55
1	11	4.56	5.94	2.17	3.16						
2	56	10.98	13.99	6.12	8.86	1.0000					
3	18	15.00	10.94	11.30	14.42	0.6909	1.0000				
4	114	92.69	388.65	41.78	46.95	**0.0000**	**0.0000**	**0.0012**			
5	42	45.41	35.58	36.55	42.70	**0.0000**	**0.0000**	**0.0151**	1.0000		
6	20	55.36	30.51	50.18	54.77	**0.0000**	**0.0000**	**0.0012**	1.0000	1.0000	
Panel B	SC/E 0 [%]										
						R:21.45	R:55.69	R:79.78	R:159.19	R:170.14	R:205.35
1	11	1.72	1.87	1.09	1.38						
2	56	4.70	4.99	3.31	3.85	1.0000					
3	18	6.97	5.10	4.65	6.54	0.6526	1.0000				
4	114	34.40	53.53	20.27	28.10	**0.0000**	**0.0000**	**0.0005**			
5	42	31.74	23.12	24.23	30.55	**0.0000**	**0.0000**	**0.0003**	1.0000		
6	20	47.38	24.45	40.87	46.92	**0.0000**	**0.0000**	**0.0000**	0.1748	1.0000	
Panel C	SC/E 1 [%]										
						R:24.00	R:55.16	R:80.29	R:151.97	R:169.54	R:197.90
1	11	1.66	1.78	1.27	1.42						
2	54	5.43	12.42	2.97	3.32	1.0000					
3	17	6.55	4.55	4.46	6.16	0.7152	1.0000				
4	111	31.77	37.59	17.27	26.42	**0.0000**	**0.0000**	**0.0027**			
5	41	35.60	32.29	23.97	32.83	**0.0000**	**0.0000**	**0.0004**	1.0000		
6	20	47.36	27.62	39.36	46.31	**0.0000**	**0.0000**	**0.0000**	0.1509	1.0000	

Panel D	SC/E 2 [%]					R:26.36	R:62.87	R:87.29	R:144.90	R:159.93	R:194.95
1	11	1.27	1.19	1.20	1.05	1.0000					
2	51	6.83	16.17	2.41	3.34	0.4416	1.0000				
3	17	6.67	4.41	4.67	6.42	**0.0000**	**0.0000**	**0.0336**			
4	110	32.94	95.50	16.49	25.84	**0.0000**	**0.0000**	**0.0075**	1.0000		
5	41	30.79	84.83	22.09	29.51	**0.0000**	**0.0000**	**0.0001**	**0.0661**	1.0000	
6	20	47.65	31.67	37.56	44.58						
Panel E	SC/E 3 [%]										
1	9	2.56	3.36	1.27	2.56	1.0000					
2	45	10.17	25.94	2.38	6.26	1.0000	1.0000				
3	15	6.61	4.14	4.79	6.49	**0.0013**	**0.0000**	0.1718			
4	101	31.03	153.21	13.26	23.47	**0.0001**	**0.0000**	**0.0179**	1.0000		
5	41	−9.24	257.16	27.84	30.73	**0.0000**	**0.0000**	**0.0006**	**0.0559**	1.0000	
6	20	54.92	53.32	38.98	48.76						

P-values less than 0.1 are bolded
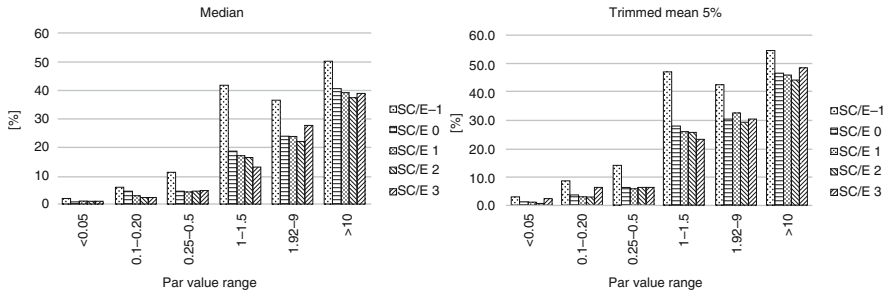
Fig. 3 The relationships between PaV and the equity structure

and not merely a result of its size. In Table 4 we see that, before the share issue, the companies with the lowest PaV have only about 3% of their total equity as SC, while those with the highest PaV have, on average, over 50%. After the share issue, therefore, which gives a high IP/PaV ratio, this proportion still falls to an average of less than 2% and remains fairly constant in the 3 years after the share issue.

4   Conclusions

The intention of the par value concept is to protect the public against frauds in the sale of stock (Cook 1921b). The corresponding share capital should be the financial base of the company and guarantee satisfaction of creditors' claims. Many critics of this concept suggest that it no longer meets these requirements. The PaV and, associated with this, the number of shares outstanding, have an influence on the behaviour of issuers and investors. The general trend is that a lower SC means a lower PaV, which may suggest that issuers expect a number of shares to be outstanding. A low PaV allows a higher share premium to be obtained and, related to this, a lower retention ratio, indicating the acquisition by the old shareholders of the right to a greater value of the capital contributed by the new shareholders. This has a large impact on the success of the issuance, because thanks to this phenomenon, the company can maximise the amount of capital raised selling limited number of shares and existing shareholders do not lose the control over the company (Brycz et al. 2017). The amount of SC not only depends on the size of the company but could be part of a strategy that is realised by the use of PaV.

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Assessing the Financial Health of Hospitals Using a Financial Index

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1 Introduction

The first large-scale study of the use of indicators in the index has been developed by Beaver (1966), who used a dichotomous test. Altman and Hotchkiss (2006), whose Z-score index is world-renowned, used the discriminatory analysis. The popularity and usability of the first built indexes at that time meant the development of further studies leading to modification of indexes. Research in this area was led by Tamari (1966), Taffler and Tisshaw (1977), Deakin (1972), Zmijewski (1984), Werner and Weygandt (1970). Modern economies are characterized by dynamic changes and the prediction of financial difficulties has a deeper significance for all participants. A universal synthetic indicator continues to be the subject of the research, which, given the possibilities, can express the financial situation of the company in a short time. The indexes examined so far are representatives of a higher financial analysis.

The literature overview suggests that there are no universal indexes that can be used, without any restrictions, in all kinds of industries. Only very few studies deal with the hospital environment (Gautam et al. 2013). The Financial Strength Index (FSI), developed by Cleverley, is intended primarily for hospitals. It is based on four dimensions: profitability, liquidity, indebtedness and new fixed assets (Cleverley and Harvey 1992; Cleverley et al. 2011; Cleverley 1985, 1990, 2002). Cleverley provides a relatively straightforward interpretation of the FSI result. It means that companies with high profits, high liquidity, low levels of debt and new property carry an excellent financial situation. Koyuncugil and Ozgulbas (2012) have shown that warning signals can be generated by two parameters: service costs and operating profit. Another question is whether indexes developed for different countries can be effective for bankruptcy forecasting of companies operating in other countries.

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The healthcare market is strictly regulated by the country, and at the same time it is characterized by an increasing competitive pressure. The incidence of financial difficulties is usually associated with serious consequences for the local population and far exceeds the effects of the decline of an average company. Inability to continue providing health services leads to a reduction in access to health care or may result in its lower quality. In extreme cases, this leads not only to the absence of planned medical procedures, but also the possibility of treating patients whose health is at risk can be lowered (Pink et al. 2007; Noh et al. 2006; Zeller et al. 1996; Watkins 2000). In this context, a well set index acts as a warning signal. The results may be an opportunity to implement corrective actions that would not normally be taken by stakeholders.

The aim of this paper is to determine whether a financial index for hospital evaluation can be used. The working proposition is a comparison of the results achieved with previous assessments. No significant differences are expected.

2 Methodology and Data

In order to determine the assessment, it was necessary to obtain hospital data for a set period of 2015, which is the last properly closed period and also a period with possible publication of the financial statements in the required format according to legal standards in the Czech Republic. The specified data matrix was filled with secondary data that was obtained from the annual hospital reports found on hospital websites and financial statements (Ministry of Finance of the Czech Republic 2017).

There are 188 hospitals in the Czech Republic since 2012. In 2012–2013 there were 188, in 2014 their number grew to 189 and in 2015 it was reduced to 187 hospitals (ÚZIS, 2017). In spite of all the assumptions of data collection to the maximum extent, data from only 90 hospitals were collected for the period of 2015 (Table 1). Other hospitals did not publish their data or published data that did not match this research.

In order to assess the financial health, the index designed to determine the financial health of the hospitals by Hajdíková (Váchová and Hajdíková 2017) was used. The basic structure of the equation from which the index value is obtained for the given hospital is as follows:

$$H^{'} index = 0.8277 + 80.8714 U_1 + 9.5314 U_2 + 1.758 U_3 - 10.8281 U_4 \qquad (1)$$

There are weighing coefficients in front of individual indicators (U_i). The constant in the formula is 0.8277, which increases the sum of the weighted values of the indicators. Coefficients are the result of logite regression (Ohlson 1980). The indicators (U_i) that are included in the equation are as follows:

Table 1 Number of data obtained in regions for the period of 2015

Region	Number of hospitals	Data collected
Praha	27	6
Středočeský	27	9
Jihočeský	9	9
Plzeňský	11	6
Karlovarský	5	3
Ústecký	19	8
Liberecký	8	7
Královehradecký	8	7
Pardubický	9	3
Olomoucký	9	4
Moravskoslezský	18	12
Jihomoravský	21	6
Zlínský	10	7
Vysočina	6	3
Total	187	90

– U1 = EBIT/operating income
– U2 = Net profit + depreciation/total debt
– U3 = Operating income/total assets
– U4 = Cost of employee benefits/operating income

The probability (P) is calculated from the obtained H'index value.

$$P_i = \left(\frac{1}{1 + e^{-H}} \right) \quad (2)$$

3 Results

The indicators for each hospital were calculated for the period 2015 and subsequently the H'index was calculated. Financially unhealthy hospitals reached the negative values of the calculated H'index and the financially healthy reached its positive value. Table 2 lists ten selected positive-ranked hospitals ranked according to the H'index value; Table 3 lists ten selected hospitals with negative results.

From the previous research and ranking surveys using the financial indicators and the TOPSIS ranking method (Váchová and Hajdíková 2017) for the period of 2015 the Regional hospital Kolín, a. s. has placed on the first place. On the second place was the hospital in České Budějovice and the third place was occupied by ALMEDA a. s. Neratovice. On the opposite, the worst positions (ranked from worse to the worst) were occupied by T. Bata Regional Hospital, a. s., the second worst was Hospital Tišnov p. o. and the worst was the Hustopeče Municipal Hospital.

In both presented methods, an agreement was reached on the order and distribution of hospitals to financially healthy and financially unhealthy (Table 4).

Table 2 Hospitals with positive H'index value

Hospital	H'index
Nemocnice České Budějovice a. s.	4.816
Poličská nemocnice, s. r. o.	5.633
Nemocnice Boskovice	5.682
GynCentrum, spol. s. r. o.	5.913
Nemocnice Valtice, s. r. o.	6.305
Pardubická krajská nemocnice, a. s.	6.989
ALMEDA a.s Neratovice	8.186
P-P Klinika Kladno, spol. s. r. o.	11.501
Mediterra Sedlčany, s. r. o.	12.214
Hornická nemocnice s poliklinikou, spol s. r. o.	15.382
Nemocnice Podlesí a. s.	19.279

Table 3 Hospitals with negative H'index value

Hospital	H'index
Nemocnice Mariánské Lázně s. r. o.	-18.027
nemocnice sv. Zdislavy, a. s.	-13.647
Oblastní nemocnice Kladno, a. s.	-12.02
CLINICUM a. s.	-8.901
Nemocnice s poliklinikou Havířov, p. o.	-7.971
Krajská nemocnice T.BATI, a. s.	-5.129
Karlovarská krajská nemocnice	-5.004
Nemocnice následné péče Moravská Třebová, p. o.	-4.939
Městská nemocnice Hustopeče	-4.784
Nemocnice Tišnov p. o.	-4.394

Table 4 Financially healthy and unhealthy hospitals

Hospital	Financially healthy	Financially unhealthy
Nemocnice České Budějovice a. s.	x	
ALMEDA a. s. Neratovice	x	
Krajská nemocnice T. BATI, a. s.		x
Městská nemocnice Hustopeče		x
Nemocnice Tišnov p. o.		x

4   Conclusions and Discussion

The aim of the paper is to compare the order of hospitals surveyed from the financial health point of view in the given period for which the year 2015 was chosen. The ranking was compared after the initial allocation using different methods, namely the TOPSIS method and the financial H'index method. The results show that the order of hospitals has not changed significantly. Only financial indicators are examined for

hospitals. Other quantified data may affect the ranking of hospitals. However, these dimensions may be the subject of further research. Empirical findings can be refined by expanding the researched periods. More data cannot be provided under current legislation in the Czech environment. The amount of data is sufficient due to the number of all hospitals and the total sample.

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Competitive Regions, Competitive Firms? A Case Study on Hungary

Péter Juhász

1 Introduction

Reducing regional inequalities and enhancing local competitiveness is one of the key focus points of not only national development policies but also included in the main EU-targets. The website of EU (2017) states that "regional policy targets EU regions and cities, boosting economic growth and improving quality of life through strategic investment." To serve this aim, the European Commission developed a regional competitiveness index (European Commission 2017) to measure the performance of sub-national regions within the EU. The RCI index value is calculated based on three sub-indices that integrate eleven pillars (Table 1). These pillars are calculated based on altogether 78 individual measures (Annoni et al. 2017). The index values are available for 2010, 2013, and 2016.

Once such a sophisticated measure of regional competitiveness is available, the question raises whether it is enough for the economic policymakers to aim at maximising RCI index to get closer to the EU development targets and boost economic growth. This paper analyses whether RCI scores and its elements have a direct link to the competitiveness of firms operating in the given area. As a case study, Hungary and its seven regions were picked.

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Table 1 Factors of the EU regional competitiveness index

Sub-index	Pillars
Basic sub-index	Institutions, macroeconomic stability, infrastructure, health, basic education
Efficiency sub-index	Higher education and lifelong learning, labor market efficiency, market size
Innovation sub-index	Technological readiness, business sophistication, innovation

Source: European Commission (2017)

2 Differences in Regional Competitiveness in Hungary

Why are there economic differences across regions? There are various recent papers investigating the question and coming up with different relevant causes.

Some link existence of these differences mainly to the level of economic development of the given country (Chan et al. 2010) assuming these disparities would disappear with advancements. However, various papers found poof of sub-national differences even in developed countries [Germany: Blume (2006), Wagner (2008), Italy: Basile et al. (2014), UK: Webber et al. (2007), US: Chan et al. (2010), and the EU: Bosma and Schutjens (2011)]. At the same not all developing countries suffer for such inequalities: Demchuk and Zelenyuk (2009) found no difference between eastern (mostly Russian speaking) and western (mostly Ukrainian speaking) regions of Ukraine.

Though, many additional explanatory factors were recommended in the last decade. Among others predominance of agriculture, a high proportion of the rural population, weak transport and telecommunication infrastructure (Raluca et al. 2010); quality of human workforce (Neagu 2011); development of trade, industrial development and the quality transportation infrastructure (Jovanović et al. 2012) were listed to have significant effect. Others identified as explanatory factors cultural differences (Bardy 2010); public administration quality (Di Liberto and Sideri 2015); local economic policy, social welfare spending, general income level of the population (Blume 2006); historical economic path (Wagner 2008); level of urbanisation and geographical location (Kourtit et al. 2012); local networking opportunities (Gellynck and Vermeire 2009); local capability to generate new knowledge and start-up firms (González-Pernía et al. 2012); peripherality, transport infrastructure, e-mobility (internet access, computer literacy) (Webber et al. 2007); geographical proximity to more developed markets, firm size-structure of the local economy (Braun and Cullmann 2011); proximity to knowledge assets (e.g. biotech firms, universities) and the funding venture capital firms (Kolympiris et al. 2015); ethnic differences (Chan et al. 2010); business-government connection, and local tax regulation (Remington 2016).

Juhász (2017) offers a summary of those factors (Table 2). It seems that most but not all of these are integrated into RCI. Particularly proximity effects of more developed areas are missing.

Table 2 Factors behind regional differences in competitiveness

Factors	Major elements
Infrastructure	Transportation, telecommunication, utilities, e-mobility, level of urbanisation
Proximity to more developed areas	Competitive pressure, distance to markets, spillover effects, cultural similarities/differences
Regional public administration	Institutions, regulations, development policy, taxation, incentives, criminality, support to local networks
Workforce	Level of training, availability, wage level, culture, ethnic characteristics, entrepreneurial attitude, labour mobility
Local demand	Population trends, income level, size of shadow economy, residential mobility
Stimulating business environment	Concentration of large firms, existence of large enterprises with developed technology relying on local suppliers, vivid start-up activity, nearby venture capital companies and knowledge sources (universities, R&D centres), well-operating business networks

Source: Juhász (2017)

Fig. 1 Regions of Hungary. Source: KSH (2018)

Together with several countries in the CEE region, Hungary (Fig. 1) also suffers from regional economic differences. Katona (2014) underlines that Central Hungary region including the capital (Budapest) was above 160% of the national average GDP per capita in 2012 (Budapest alone showed a remarkable 217% value) while three of the other six regions did not even reach 70% of the Hungarian average.

Table 3 Competitiveness of the Hungarian regions

Region	Basic sub-index		Efficiency sub-index		Innovation sub-index		RCI 2016	
Central Hungary (Közép-Magyarország)	34.44	125%	60.85	129%	56.63	197%	49.09	174%
Central Transdanubia (Közép-Dunántúl)	29.81	108%	51.05	108%	27.62	96%	30.90	109%
Western Transdanubia (Nyugat-Dunántúl)	31.88	115%	49.56	105%	28.12	98%	30.58	108%
Southern Transdanubia (Dél-Dunántúl)	24.31	88%	43.31	91%	24.93	87%	22.89	81%
Northern Hungary (Észak-Magyarország)	23.06	83%	40.78	86%	21.91	76%	20.07	71%
Northern Great Plain (Észak-Alföld)	25.75	93%	39.71	84%	19.68	69%	19.77	70%
Southern Great Plain (Dél-Alföld)	24.19	88%	46.08	97%	22.18	77%	24.30	86%
National average	27.63	100%	47.33	100%	28.72	100%	28.23	100%
EU average	61.75	223%	61.27	129%	49.30	172%	53.38	189%

Source: European Commission (2017)

These significant differences are well reflected in the RCI (Table 3). Central Hungary (Közép-Magyarország) ranks first regarding all (sub-) indices, Central Transdanubia and Western Transdanubia always come second or third. The other four regions lag far behind.

With a more in-depth investigation of the factors, we may learn that Institutions are weakest in Central Hungary (EU-wide standardised score: 28.16), but the difference to the best regions, the whole Transdanubia area (32.22) is relatively small. At the same time, Infrastructure score of the laggard Southern Transdanubia (11.59) is just a third of that of the neighbouring leader, Western Transdanubia (31.44). The minimum Health score (25.60) registered belongs to Northern Hungary, the top performer in this regard was Central Hungary (51.46). We have the same regions at the bottom and the top also for Higher Education and Lifelong Learning (scores: 43.96 and 65.09), Technological Readiness (40.48/56.84), Business Sophistication (10.40/44.38), and Innovation (18.64/60.10). Central Hungary also scored best (28.40) in Market Size, where the lowest value (8.82) belonged to Southern Transdanubia. In Labor Market Efficiency the leader was Central Transdanubia (62.96), the weakest performance was registered in Northern Great Plain (44.87).

Based on the RCI data, we can expect to experience significant gaps in firm-level average competitiveness across these regions. Before starting investigating those, we have to note that two of the eleven pillars have the same value for all regions within Hungary: Macroeconomic Stability and Basic Education help only to explain disparities between regions are located in different countries, but are not expected to be useful for to analyse one single country.

3 Sample and Methodology

To measure the strength of the link between the regional competitiveness factors and the business performance of the local companies, a sample of firms was set up using data from the official financial reports supplemented with information on headquarter location and employment data for the period 2010–2014 (database received from Bisnode Hungary). Firms were linked to a region based on the site of their headquarters. The analysis used the EU regions as categorisation variable.

The sample includes all non-financial private business entities employing at least 20 people in 2010, which provided precise ownership information (no offshore firms) and published full annual reports according to Hungarian Accounting Standards. Only companies with ongoing operations and positive equity book value throughout the whole period were considered. Businesses that went through legal transformation (e.g. due to mergers and acquisitions) were excluded. Due to all these restrictions, the sample is very likely to significantly over-perform the average of the corporate sector.

After the above exclusions, 1522 companies remained in the sample, of which 717 were foreign-owned. In 2010, 17.6 (total Hungarian economy above 20 employees: 6.2) percent of the firms in the sample had more than 250 employees, while 57.4 (32.9) percent employed 50–249 people. Table 4 presents the overall economic importance of the sample, while Table 5 offers an overview of the sample structure.

Table 4 The share of the sample in the total Hungarian manufacturing industry in 2011 (percent)

Firm size (employees)	Number of firms		Number of employees		Added value	
	1–249[a]	250+	1–249[a]	250+	1–249[a]	250+
Central Hungary	2.06	71.43	27.87	42.15	34.31	36.70
Southern Transdanubia	2.12	75.56	30.67	57.62	47.34	40.77
Northern Great Plain	2.38	65.79	28.93	85.92	43.87	67.93
Southern Great Plain	2.61	66.67	31.20	65.39	46.13	64.89
Northern Hungary	2.82	77.92	37.31	70.53	48.42	71.90
Central Transdanubia	3.05	56.82	36.06	81.16	49.52	99.03
Western Transdanubia	3.15	73.44	36.84	78.70	51.28	85.74

Source of national data: KSH (2013)
[a]The sample includes only firms of at least 20 employees

Table 5 Sample structure (number of firms)

Employment (2010)	Foreign-owned	Locally owned	Total
20–49	121	260	381
50–249	393	480	873
250+	203	65	268
Total	717	805	1522

Source: Author's results

Table 6 Competitiveness measures used

Factor	Measure
Growth	Annual percentage change in employment, sales, EBIT[a], and profit after tax[a]
Export performance	Export/sales, growth of export income
Level of technology	Wage/employee
Productivity	Sales/employee, EBIT/employee, Added value/employee
Profitability	EBIT/sales, Added value/sales
Efficiency	EBITDA/invested capital (ROIC)[a], Profit after tax/equity (ROE)[a]

Source: Author

[a]To remove extraordinary effects values outside the range -100%–$+100\%$ were not considered

For to assure a multidimensional approach, competitiveness was measured using various yearly ratios listed in Table 6. Rates were calculated for each year from 2010 to 2014.

For to identify connections among firm-level and regional competitiveness measures, the standardised factor data of the EU index for both 2013 and 2016 were added to the database. The fact that 2013 index values mainly build on information from the years 2010–2012 while 2016 index was calculated based on 2013–2015 data explains this decision. Including EU index data from two different measurement period also allows for identifying existing connection even if factor values for specific regions changed over time.

To control for connections, first regional average of all performance measures were calculated. Then Spearman's bivariate rank correlation was calculated for all possible pairs of regional and firm-level ratios. As the paper examines only the seven regions of Hungary, Pearson correlation coefficient seemed not to be adequate as that assumes normally distributed data across the sample and that assumption was refused at all levels of significance.

Zero hypotheses state no connection between the ranks established based on a given pair of measures. When summarising results, the analysis considered only relationships (refused zero hypothesis) significant at least 5%.

Based on the literature, differences among firms may arise not only due to regional effects but also because of internal factors (e.g. culture, technology, size) and industry characteristics. For to evade distortions in the results caused by these other factors, the analysis controlled for the type of shareholders (foreign/Hungarian, a proxy for management culture), size (based on employment) and in one case even for sub-industry influence. A step-by-step analysis was performed in order to remove the possible distortions possibly caused by these factors.

As theoretically a regional effect should last for several years, only significant connections that appeared in at least three of the 5 years examined were identified to have a regional source. At the same time, it is essential to see, that regional effects may be defined in at least two ways. (1) We may look at all effects that are caused by

regions as regional (harder to separate statistically) (e.g. bigger firms or companies of a given industry prefer one region over the other). On other option is (2) to limit the definition to differences across regions that are to explain only by spatial variables (less exact) (e.g. firm of the same size, ownership, industry perform differently in one area).

The latter definition would neglect all regional factors that influence business behaviour by affecting the control variables. Former papers identified several regional characteristics changing the distribution of size, ownership or sub-sectors of the firms (e.g. preference of FDI, the concentration of large enterprises, sector-specific regulations). Thus, this paper reviews regional differences both with and without the control variables.

4 Primary Results

When considering the total sample of manufacturing firms, we can only find three firm-level performance measures with significant rank correlation with any of the regional factors. Average wage over a number of employees, added value per employee and return on invested capital (ROI) all seem to be linked to regional competitiveness (Table 7 lists all the significant connections).

Beside of a limited number of firm-level variables connected to regional competitiveness, it is surprising when checking results that only negative relationships were to measure. In other words, counterintuitively firms in regions that are more competitive from one point or the other seem to be underperforming those companies active in less competitive regions. It is tough to reason why better health tends to decrease average wage or better technological conditions and a higher level of innovation decrease labour efficiency (added value/employee).

One possible explanation is that there are too many factors influencing the competitiveness of firms, for example, there was some restructuring within the manufacturing industry blurring the real connections. Therefore as a next step, the database was separated into two sub-samples based on the majority ownership. This variable should help us to see more clearly how different management culture was supported by regional factors.

For foreign-owned entities, four business performance ratios had significant connections with regional measures (Table 8). ROI does not appear here anymore, but two more efficiency measures appeared on the list: sales/employee and added value per sales.

As for wage per employee and added value per employee the same regional factors showed a connection with the same negative direction. Sales/employee ratio was negatively linked to labour market efficiency in 2016, but the added value content of sales showed positive link with the same regional measure.

When considering locally owned firms only, we receive a slightly different picture (Table 9). There are three firm-level competitiveness measures with significant connections: export intensity (Export/Sales), wage/employee, and Sales/

Table 7 Significant links for the total of the sample

Firm-level ratio	Regional measure	2010	2011	2012	2013	2014
Wage/ employee	Health 2013	−0.821*	−0.821*	−0.821*	−0.821*	−0.964**
	Labour market efficiency 2013	−0.821*	−0.821*	−0.821*	−0.821*	−0.893**
	Labour market efficiency 2016	−0.929**	−0.929**	−0.929**	−0.929**	−0.857*
	Technological readiness 2013	−0.893**	−0.893**	−0.893**	−0.893**	−0.964**
	Technological readiness 2016	−0.893**	−0.893**	−0.893**	−0.893**	−0.964**
	Efficiency sub-index 2016	−0.857*	−0.857*	−0.857*	−0.857*	−0.929**
	Innovation sub-index 2016	−0.857*	−0.857*	−0.857*	−0.857*	−1.000**
	RCI 2016	−0.857*	−0.857*	−0.857*	−0.857*	−0.929**
Added value/ employee	Labour market efficiency 2013		−0.821*		−0.857*	−0.821*
	Labour market efficiency 2016	−0.857*	−0.929**	−0.857*	−0.893**	−0.929**
	Technological readiness 2013	−0.893**	−0.929**	−0.893**	−0.857*	−0.929**
	Technological readiness 2016	−0.893**	−0.929**	−0.893**	−0.857*	−0.929**
	Efficiency sub-index 2016	−0.821*	−0.893**	−0.821*	−0.821*	−0.893**
	Innovation sub-index 2016	−0.786*	−0.857*	−0.786*	−0.821*	−0.857*
	RCI 2016	−0.821*	−0.893**	−0.821*	−0.821*	−0.893**
	Health 2016	−0.786*	−0.857*	−0.786*	−0.821*	−0.857*
ROI	Innovation 2013	−0.893**	−0.821*	−0.786*		

Source: Author's results
*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

employee. Wage/employee ratio has significant negative relationship to nearly all regional factors, thus it seems that people working in less competitive regions earn more. Export intensity appears to be negatively connected to the quality of regional infrastructure indicating accessibility of motorway, railways and airports. Sales/ employee appears to be adversely linked to institutions (government effectiveness, low level of crime and corruption, ease of doing business) while the quality of the latter proved in earlier research to be a booster a competitiveness in other countries. Thus, it is doubtful that these connections would be casual and may signal that other factors not yet included in the investigation play a significant role in the competitiveness of the locally owned enterprises.

Table 8 Significant links for foreign-owned companies

Firm-level ratio	Regional measure	2010	2011	2012	2013	2014
Wage/ employee	Health 2013		−0.786*	−0.786*	−0.857*	
	Labour market efficiency 2016	−0.893**	−1.000**	−0.893**	−0.964**	
	Technological readiness 2013	−0.821*	−0.929**	−0.929**	−0.964**	
	Technological readiness 2016	−0.821*	−0.929**	−0.929**	−0.964**	
	Efficiency sub-index 2016	−0.857*	−0.964**	−0.857*	−0.929**	
	Innovation sub-index 2016		−0.857*	−0.821*	−0.893**	
	RCI 2016	−0.857*	−0.964**	−0.857*	−0.929**	
Added value/ employee	Labour market efficiency 2016	−0.857*		−0.821*	−0.857*	−0.821*
	Technological readiness 2013	−0.857*		−0.821*	−0.786*	−0.821*
	Technological readiness 2016	−0.857*		−0.821*	−0.786*	−0.821*
	Efficiency sub-index 2016	−0.821*		−0.786*	−0.821*	−0.786*
	RCI 2016	−0.821*		−0.786*	−0.821*	−0.786*
Sales/ employee	Labour market efficiency 2016	−0.893**	−0.893**	−0.821*	−0.821*	−0.821*
Added value/sales	Labour market efficiency 2016	0.929**	0.929**	0.821*		

Source: Author's results
*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

As presented in Table 5 it is the middle size (50–249 employees) category that has the highest number of firms. That is why as a next step mid-sized foreign and locally owned companies were separately analysed (Tables 10 and 11).

For foreign enterprises wage/employee and sales/employee showed significant connections once again, but for this sub-sample also the growth of employment and Export/Sales appeared to be linked to regional competitiveness. At this step, we first receive positive connections in line with theoretical expectations. Mid-sized foreign manufacturers in more competitive, innovative and efficient regions increased employment faster, while export intensity was higher in areas with more efficient labour market and employees also received a higher wage there. Sales/employee correlations are even at this level counterintuitive.

In case of the locally owned mid-sized firms, unfortunately, it still looks like the regional indices would measure precisely the opposite of what the companies

Table 9 Significant links for locally owned companies

Firm-level ratio	Regional measure	2010	2011	2012	2013	2014
Wage/employee	Basic sub-index 2013	−0.821*	−0.786*	−0.821*		−0.786*
	Efficiency sub-index 2013	−0.857*	−0.857*	−0.857*	−0.786*	−0.857*
	Efficiency sub-index 2016	−0.857*	−0.857*	−0.857*	−0.821*	−0.857*
	RCI 2013	−0.857*		−0.857*	−0.786*	
	RCI 2016	−0.857*	−0.857*	−0.857*	−0.821*	−0.857*
	Health 2013	−0.929**	−0.786*	−0.929**	−0.857*	−0.786*
	Health 2016	−0.857*		−0.857*	−0.786*	
	Labour market efficiency 2013	−0.929**	−0.929**	−0.929**	−0.893**	−0.929**
	Labour market efficiency 2016	−0.821*	−0.893**	−0.821*	−0.857*	−0.893**
	Technological readiness 2013	−0.893**	−0.821*	−0.893**	−0.857*	−0.821*
	Technological readiness 2016	−0.893**	−0.821*	−0.893**	−0.857*	−0.821*
	Innovation sub-index 2016	−0.964**	−0.857*	−0.964**	−0.893**	−0.857*
Sales/employee	Institutions 2013		−0.810*	−0.926**	−0.926**	−0.810*
	Institutions 2016		−0.810*	−0.926**	−0.926**	−0.810*
Export/sales	Infrastructure 2016			−0.929**	−0.857*	−0.857*

Source: Author's results
*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

experience. At the same time, it becomes evident that competitiveness of the locally owned businesses is influenced by different regional forces than that of the foreign-owned firms. It seems that local entities operate separately from the foreign counterparts, a signal for the existence of the dual-economy phenomenon. This finding is in line with results of several earlier investigations (Lengyel and Szakálné Kanó 2014; Gál and Juhász 2016; Juhász and Reszegi 2017; Lux et al. 2017).

When focusing on big (250+ employees) foreign-owned firms only, Export/Sales showed strong positive connections among others with RCI, Efficiency sub-index, Health, Technological Readiness, and Labor Market Efficiency for both 2013 and 2016. Both the Basic sub-index and Infrastructure from 2013 had a significant positive connection with ROE for the period 2010–2012. Though, all the numerous significant relationships of Wage/Employee ratio had a negative sign. As for big locally owned companies, Export/Sales showed significant positive link to Institutions from both 2013 and 2016 for the years 2012–2014.

Table 10 Significant links for mid-sized foreign-owned companies

Firm-level ratio	Regional measure	2010	2011	2012	2013	2014
Wage/employee	Labour market efficiency 2016	−0.857*		−0.857*	−0.964**	−0.893**
Sales/employee	Market size 2016	−0.786*	−0.821*	−0.786*		
	Innovation 2016	−0.821*	−0.786*	−0.821*		
Change in employment	Basic sub-index 2013		0.786*	0.893**		0.929**
	RCI 2013		0.857*	0.821*		0.857*
	RCI 2016	0.786*	0.857*			0.857*
	Efficiency sub-index 2016	0.786*	0.857*			0.857*
	Innovation 2016		0.857*	0.786*		0.857*
Export/sales	Labour market efficiency 2016			0.786*	0.821*	0.786*

Source: Author's results

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

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

We may conclude based on these results that size and ownership need both to be controlled for first before any economically reasonable connections could be identified. Still, the links that were not only statistically but also theoretically acceptable show that the same firm-level variables are connected to different regional measures in case of the various sub-samples. Due to this, economic policy should focus on developing different fields to boost the business performance of a specific group of firms. For example, the export intensity of big locally owned firms needs well-functioning institutions to grow, while for big and mid-sized foreign-owned companies we should enhance the efficiency of the labour market to support the same measure.

The fact that even after controlling for size and ownership, we found no significant positive links for mid-sized locally owned entities may be the result of both the heterogeneity of the manufacturing industry and that of the business trends and effects that have a massive influence on these firms but were not involved in the analysis yet. Thus, as the last step, the industry was further narrowed to limit distortions due to foreign and local manufacturing firms having different sub-sectoral structure. For to keep sample size at maximum, the sub-sector "Manufacturing of Fabricated Metal Products" was chosen. There were 78 foreign and 82 locally owned mid-sized entities form this sub-sector in the sample. Due to this, the number of foreign or locally owned companies from a given region ranged from 6 to 19, what raises a severe limitation to the correct estimation of regional averages of the firm-level competitiveness measures.

For foreign-owned companies within the chosen sub-industry, there were no connections between firm-level and regional variables statistically significant for at

Table 11 Significant links for mid-sized locally owned companies

Firm-level ratio	Regional measure	2010	2011	2012	2013	2014
Wage/employee	Basic sub-index 2013	−0.893**	−0.929**	−0.786*	−0.786*	−0.786*
	Basic sub-index 2016			−0.857*	−0.857*	−0.857*
	Efficiency sub-index 2013	−0.964**	−0.964**	−0.893**	−0.893**	−0.893**
	Efficiency sub-index 2016	−0.964**	−0.857*	−0.929**	−0.929**	−0.929**
	RCI 2016	−0.964**	−0.857*	−0.929**	−0.929**	−0.929**
	Health 2013	−0.893**		−0.821*	−0.821*	−0.821*
	Health 2016	−0.821*		−0.893**	−0.893**	−0.893**
	Labour market efficiency 2013	−0.929**	−0.821*	−0.964**	−0.964**	−0.964**
	Labour market efficiency 2016	−0.893**	−0.786*	−0.857*	−0.857*	−0.857*
	Technological readiness 2013	−0.929**	−0.750	−0.893**	−0.893**	−0.893**
	Technological readiness 2016	−0.929**	−0.750	−0.893**	−0.893**	−0.893**
	Higher education and lifelong learning 2016	−0.857*	−0.750	−0.893**	−0.893**	−0.893**
Added value/ employee	Basic sub-index 2016	−0.857*	−0.786*	−0.857*		
	Efficiency sub-index 2013	−0.821*		−0.821*		−0.786*
	Efficiency sub-index 2016	−0.893**		−0.786*		−0.821*
	RCI 2013	−0.929**	−0.893**	−0.929**	−0.821*	
	RCI 2016	−0.893**		−0.786*		−0.821*
	Health 2013	−0.964**	−0.929**	−0.964**	−0.857*	−0.857*
	Health 2016	−0.821*	−0.857*	−0.821*	−0.786*	−0.929**
	Higher education and lifelong learning 2013	−0.893**	−0.929**	−0.893**	−0.857*	
	Technological readiness 2013	−0.964**	−0.786*	−0.857*		−0.857*
	Technological readiness 2016	−0.964**	−0.786*	−0.857*		−0.857*
	Innovation sub-index 2016	−0.929**	−0.857*	−0.929**	−0.786*	−0.929**
	Business sophistication 2016	−0.821*		−0.786*		−0.786*
Export/sales	Higher education and lifelong learning 2016		−0.786*	−0.786*	−0.786*	

Source: Author's results

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

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

Table 12 Significant links for mid-sized locally owned companies in the sub-sector sub-sector of "Manufacturing of Fabricated Metal Products"

Firm-level ratio	Regional measure	2010	2011	2012	2013	2014
Added value/ employee	Basic sub-index 2013		−0.929**	−0.929**	−0.893**	
	Efficiency sub-index 2013		−0.857*	−0.857*	−0.857*	
	RCI 2013		−0.893**	−0.893**	−0.857*	
	Infrastructure 2013		−0.893**	−0.893**	−0.857*	
	Health 2013		−0.786*	−0.786*	−0.786*	
	Higher education and lifelong learning 2013		−0.821*	−0.821*	−0.786*	
	Market size 2016		−0.786*	−0.786*	−0.821*	
	Innovation 2016		−0.821*	−0.821*	−0.857*	
Change in profit after tax	RCI 2013	−0.929**	−0.821*	0.857*		
	Higher education and lifelong learning 2013	−0.964**	−0.857*	0.821*		

Source: Author's results
*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

least 3 years of the 5-year period investigated. Results for locally owned firms are summarised in Table 12. Once again we see no positive connections except in case of the change in profit after tax for which signs of correlation coefficients change in 2012. This phenomenon could also be caused by noise coming from the estimation error of regional average for firm-level performance measures due to the low number of companies in this subsample.

5 Summary and Conclusion

This paper investigated the connection between regional competitiveness measures of the EU Commission and the firm-level competitiveness measures used in the literature. Ratios were calculated using a company database that covers 28–99% of people employed and added value created in the Hungarian manufacturing sector in the seven regions of the country respectively. To identify significant links Spearman's rank correlation coefficient was used at a minimum of 5% significance. Results are often counterintuitive, but support earlier research results on the structure of the Hungarian economy. The key conclusion could be summed as follows.

1. While regional competitiveness is measured in a very sophisticated way (11 factors, three sub-indexes, and an overall main index) none of the significant connections had the expected positive sign when considering the manufacturing industry in general. This result implies that an economic policy that does

only concentrate on boosting the regional competitiveness factors cannot be successful.

2. Controlling for the potential influence of ownership type and size, the list of the significant connections between regional factors and firm-level competitiveness measures changes radically. This means that to enhance the competitiveness of firms of different ownership and/or size economic policy has to use tailor-made tools, as there is no "one-size-fits-all" target to follow.

3. Connections with a sign in line with the theoretical expectations were only to find in case of big locally owned companies and foreign-owned entities when also controlled for size. This result suggests that the EU competitiveness factors have either very different or no effect at most of the locally owned firms. This phenomenon could be a sign of the existence of dual economy where the success of some players depends on another factor than that of the rest of the economy.

4. We could not identify any significant connections with a sign in line with the theory in case of locally owned mid-sized entities, not even when controlled for belonging to a specific sub-sector. Thus, we may suggest, that success of these firms is weakly connected to the factors that were controlled for, and other omitted variables (e.g. management style, personal connections, innovation) are more important. This result is particularly important as the Hungarian economic policy targets mainly the strengthening of SMEs.

Due to these findings, economic policymakers have to be more careful when selecting target variables to focus on, and should not just automatically aim at scoring better at the EU-wide regional competitiveness index. It seems that analysing why a country or a region is less competitive based on a specific measure will not necessarily offer a mean to figure out how to boost the business performance of the companies in the given area.

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A Size of a Company as a Determinant of Capital Structure: Comparison of Listed Companies in the European Union

Aneta Kalisiak

1 Introduction

The construction sector is a very significant part of the national economy as well as for European Union countries as a whole. The construction sector in the European Union in 2016 has generated about 9% of gross domestic product (GDP) and has provided 18 million direct jobs (European Commission 2016).[1] It also creates new jobs, drives economic growth and delivers buildings, roads, bridges and another infrastructure needed by the rest of economy and society. According to the Statistical Classification of Economic Activities in the European Community a construction sector is divided into three subsectors: construction of buildings, civil engineering and specialised construction activities. A construction sector impacts many other economic sectors. Firstly, this sector is a major consumer of services and intermediate products, e.g. raw materials, chemicals and electrical equipment (European Commission 2017).[2] Moreover, the projects implemented by the companies of this sector are multi-layered therefore it requires cooperation of many partners from different areas of construction, as well as representatives of other sectors of industry.

The capital structure as one of the most important areas in corporate finance has attracted significant attention in the literature. Research on the theory of capital structure was pioneered by the work of Miller and Modigliani (Modigliani and Miller 1958). The authors showed that a company's value does not depend on the financing

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decisions. Over the past several years, numerous researches have been conducted to investigate and evaluate the determinants of capital structure choice.

The article analyses an impact of a company size as a determinant of capital structure. The study was conducted among construction companies listed on capital markets in the European Union.

This paper is organized as follows. The second section briefly reviews a literature on capital structure and its determinants, discussing the theoretical background and prior research in the area. The third section presents the data sources, the methodology of the research and the study period. The fourth section reports and interprets the empirical results of conducted studies and finally the fifth section summarizes findings and presents the concluding remarks.

2 Review of Literature

The capital structure of a company is a mix of debt and equity that a firm deems as appropriate to enhance its operations (Bokpin 2009). The capital structure decision has a strategic importance for a company's management. It is one of the most important decisions made by financial management. The capital structure decisions are at the centre of many other decisions concerning a financial area of a firm, e.g. dividend policy, project financing, issue of long-term securities, financing of mergers (Shah and Khan 2007). The capital structure also affects the cost of capital, net profit, earning per share and liquidity position of the firm (Dhankar and Boora 1996). Furthermore, a wrong decision in the selection between the funds could have a detrimental effect on a firm's survival (Ismail et al. 2016). Financial decisions leading to an optimal capital structure are very important, since they must ensure financial continuity essential for the growth of enterprises and for maintaining their competitiveness (Harc 2015).

Modern theories of capital structure demonstrate that the selection of financing sources is determined by a large number of factors. The factors that influence this selection have been examined extensively both in theoretical and empirical research. As macroeconomic factors recognized as highly significant are accepted economic conditions, inflation, interest rates and tax rates (Rzeszowski and Sierpińska 2012). Other macroeconomic determinants of capital structure are the development of capital markets (Lemma and Negash 2014), the legal system (Cotei et al. 2011) and political system (Stryckova 2015).

Empirical results indicate that the main microeconomic factors, which determine the selection of financing sources, are structure of firm's assets (Li et al. 2015), business risk (Prasad et al. 2001), growth of company (Alipour et al. 2015), liquidity (Aulova and Hlavsa 2013) and profitability (Chen and Chen 2011). Aggarwal argues that both country and industry classification are significant factors of capital structure decisions. The author's analysis indicates that the country factor is even more

important determinant than is a sector of industry (Aggarwal 1981). Additionally, a size of a company is a factor very frequently indicated as an important determinant of a selection of financing sources.

There are some studies that try to explain the relationship between firm size and debt level. Rajan and Zingales state that "the effect of size on equilibrium leverage is more ambiguous" (Rajan and Zingales 1995). Several empirical studies have found a positive relationship between these two factors (Psillaki and Daskalakis 2008). However other papers have observed a negative one. In the literature the authors indicate that there exist differences in the determinants of capital structure among small and medium-sized enterprises (SMEs) and large-sized enterprises (LSEs). The findings also suggest that there are also similarities—for both SMEs and LSEs debt increases with size (Voulgaris et al. 2004).

"Large companies present less asymmetric information problems; thus they could have more equity that debt. Consequently, they could have lower leverage" (Acedo-Ramirez and Ruiz-Cabestre 2014). Larger firms are more likely to have a credit rating, which makes them able to have access to non-bank debt financing. It is usually unavailable to smaller companies (Bevan and Danbolt 2002). Moreover, larger companies have easier access to capital markets (González and González 2012) and are expected to have a high debt capacity. They are also able to reduce transaction costs of issuing long-term debt (Li et al. 2015). The relative cost of issuing equity is higher for smaller companies, because of that they may borrow more than bigger firms. Wahome et al., citing Marsh (1982) indicate that small firms more often chose short-term debt while large companies prefer long-term debt (Wahome et al. 2015). Titman and Wessels examined the relationship between the size of a company and its capital structure. The authors assumed that large firms should be more highly leveraged (Titman and Wessels 1988). This assumption was based on the evidence provided by other authors who claimed that relatively large firms tend to be more diversified and less prone to bankruptcy. Titman and Wessels's (1988) research results suggest that short-term debt ratios were negatively related to firm size. According to what Krishnan and Moyer suggest larger companies should be able to borrow more. That is because "potential bankruptcy costs make up a smaller proportion of value for larger firms, due to the fixed cost nature of many of these costs" (Krishnan and Moyer 1996). Interestingly, preferences of a financing source during the initial stage of a company are not affected by the size of a firm (Karadeniz et al. 2011).

3 Methodology of Research

This paper examines the role of a company size as a determinant of debt structure among capital markets with higher and lower capitalization in relation to the gross domestic product (GDP). Hypotheses of the research are:

H1: The development of capital markets differentiates the size and the determinants of a capital structure of construction companies.

H2: The indicators of a capital structure of companies vary significantly between developed and emerging markets.

The analytic section of the paper is based on the data of construction companies listed on the stock exchanges in 28 European Union's countries. The data about examined companies were collected from the annual reports provided by the EMIS Intelligence database and from the websites of companies. The data about market capitalization in EU's countries was obtained from the Thomas Reuters database and the data about GDP of analysed countries from the Eurostat. Only those firms which were listed for the whole duration of the study and for which requisite financial data are available for all period have been considered. Applying these criteria, the final sample comprises of 897 firms. The period of a study covers 2010–2015.

Companies from construction sector were chosen on the basis of the statistical classification of economic activities in the European Union—NACE (*Nomenclature statistique des activités économiques dans la Communauté européenne*). A construction is in section F, this item includes general and specialised construction activities for buildings and civil engineering works (European Commission data base). To assess the capital structure of examined companies there were used different measures: debt ratio, long-term debt to total assets ratio and long-term debt to total debt ratio. Another indicators of a capital structure of analysed companies include indicators based on EBIT, EV and statistical methods.

Countries in the sample were divided into two groups. They were classified on the basis of the development of their capital markets. An indicator used to make this division is the relation of a market capitalization to the gross domestic product of every examined country. Capital markets with the indicator relation higher than the median were categorized as developed markets while the ones with a lower relation as emerging markets. The median of the indicator was 57.3% of GDP. The first group—emerging markets—consists 15 countries for which the indicator was lower than the median, i.e. Latvia, Czech Republic, Slovakia, Lithuania, Bulgaria, Estonia, Slovenia, Romania, Hungary, Greece, Portugal, Italy, Austria, Poland and Croatia. The second group consists of countries with a higher than the median capitalization to GDP ratio. Capital markets of these countries are classified as developed and include Germany, Spain, Belgium, France, Malta, Finland, United Kingdom, Denmark, Netherlands, Sweden, Ireland, Cyprus and Luxembourg. The size of a company was described as a natural logarithm of the assets.

Firstly, the data were analysed using descriptive statistics. This helped to find the main differences or similarities in capital structure of tested firms and to point out the basic regularity within the examined group of companies. In order to determine the dependency of variables the Spearman's regression analysis were applied. For a further analysis the U Mann-Whitney test has been performed.

4   Results

This chapter covers research findings and discussion of the results of the study. Descriptions of the indicators used in assessing the capital structure of construction companies in the European Union and the impact of their size on these indicators have been provided in the successive tables below. Table 1 presents a descriptive statistics of a capital structure of the sample broken down into emerging and developed markets.

The data indicate that the share of total debt in total assets, expressed as a percentage, is smaller of almost 2% points for the companies noted on developed than on emerging markets. The standard deviation for these indicators was similar on emerging and developed markets.

Both on emerging and developed markets the skewness of every chosen indicator is positive. On emerging markets the skewness values are higher for every examined indicator. The highest values of skewness are for a total debt to EBIT ratio. It means that the majority of the data about capital structure ratios is below average. The distribution is asymmetrical.

On emerging markets there is a significantly smaller share of a long-term debt. On developed markets a mean of the long-term debt to total assets indicator equals 16.11% while on emerging markets the indicator equals 11.39%. The standard deviation of this indicator for companies noted on emerging markets was 13.02% while for companies from developed markets was 16.01%. It means that companies listed on developed markets have greater opportunities of indebtedness.

The analysis shows a large difference—more than 18% points—in the size of an indicator expressed as a ratio of total debt to earnings before interest and tax (EBIT). While the minimum value equals zero for both indicators, there is a significant

Table 1 Capital structure ratios of construction companies

Indicator	Mean	Standard deviation	Skewness	Perc. 10	Median	Perc. 90
Emerging markets						
Total debt/total assets (%)	24.93	21.23	1.52351	1.020300	22.53770	51.24830
Long-term debt/total assets (%)	11.39	13.02	2.95008	0.000000	8.26700	24.98200
Total debt/EV	0.57	0.47	3.15611	0.030300	0.56340	1.00120
Total debt/EBIT	28.76	262.77	18.56110	0.162300	5.50475	24.32490
Developed markets						
Total debt/total assets (%)	23.08	18.75	1.38515	0.740400	20.91740	45.94220
Long-term debt/total assets (%)	16.11	16.01	1.91783	0.000000	13.62241	35.51425
Total debt/EV	0.38	0.32	0.65876	0.002100	0.32210	0.84140
Total debt/EBIT	10.49	41.79	10.20482	0.032200	3.38150	41.78650

Source: own elaboration

Table 2 The linear correlation analysis of chosen variables of construction companies

Variables	Total debt/total assets	Long-term debt/total assets	Total debt/ EV	Total debt/ EBIT
Emerging markets N = 373				
Ln assets	0.159210*	0.322683*	0.182401*	0.089650
Developed markets N = 524				
Ln assets	0.378780*	0.420213*	0.307492*	0.032046
Capital markets in total N = 897				
Ln assets	0.276561*	0.401151*	0.165391*	0.038778

Source: own elaboration

difference between their maximum values. For developed companies the maximum value of a total debt to EBIT ratio was only 618.37 but for emerging markets it was as much as 5147.06.

Operating performance is a key to engage more external capital while debt level on developed markets is not so strongly attached to the enterprise value (EV)[3] and the earnings before interest and tax (EBIT).

The data provided in Table 2 allow the assessment of a correlation between chosen variables of companies' capital structure and their size. The "*" sign indicates the data statistically significant at the 5% level of significance.

The results of this research indicate a positive relationship between all of the chosen variables and the size of examined companies. However the correlation between a size and a total debt to EBIT ratio is not statistically significant. The results indicate that a size of a company is an important determinant of a capital structure of construction companies.

Long-term debt to total assets ratio is more important determinant in relation to a size of a company than a total debt to total assets ratio for both emerging and developed markets. It means that a determinant like a size of company has a greater impact on a debt structure than on the capital structure in general, regardless of the stage of capital market's development. According to the results, changes in a company's size significantly affect the share of long-term debt in a capital structure. The total amount of debt is more strongly connected with an enterprise value.

Table 3 presents results of the U-Mann Whitney test for the examined companies. The test was conducted to find which of the examined indicators and determinants had the biggest impact on the capital structure of the construction companies in the European Union noted on the stock exchanges in the years 2010–2015.

The most important determinants of differentiation between emerging and developed markets are the natural logarithm of assets, which describes a size of a company and a long-term debt to total assets ratio.

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[3]Enterprise Value is calculated as market capitalization minus cash and equivalents plus preferred equity, minority interest and total debt

Table 3 The U-Mann Whitney test of construction companies

	Sum of ranks Group 1	Sum of ranks Group 2	U	Corrected Z	p	N1	N2
Ln assets	300,925.0	479,700.0	121,225.0	−11.5333	0.000000	599	650
Total debt/EV	365,732.0	305,329.0	123,223.0	7.7601	0.000000	555	603
Total debt/EBIT	217,022.0	258,778.0	95,472.0	4.5882	0.000004	404	571
Long-term debt/ total assets	340,969.5	439,655.5	161,269.5	−5.2505	0.000000	599	650
Total debt/total assets	381,007.5	399,617.5	188,042.5	1.0416	0.297596	599	650
Net debt/equity	348,618.0	387,673.0	181,270.0	0.3318	0.740053	571	642
Net debt/capital	387,111.5	393,513.5	181,938.5	1.9999	0.045517	599	650

Source: own elaboration

5 Summary and Conclusions

The capital structure of companies represents one of the most important areas in corporate finance both on theoretical and practical level. A fundamental issue in this area of finance is also associated with determinants of a capital structure. Many researchers have examined the factors that influence the selection of financing sources extensively. The results of the studies are ambiguous.

The objective of this research was to determine the role of a company size as a determinant of a debt structure among construction companies noted on the European Union's capital markets with a higher and lower capitalization in relation to the gross domestic product (GDP) within the period of the years 2010–2015. Capital markets with the indicator relation higher than the median were categorized as developed markets while the markets with a lower indicator relation as emerging markets.

The assessment was performed by analyzing the capital structure of examined companies and the relationship of chosen determinants to their debt structure. The structure of financing sources was described by different indicators counted separately for emerging and developed markets. The effect of the size of a company as a determinant of capital structure was quantified by way of the linear correlation analysis, whereby only one of the examined indicators of a debt structure was confirmed as statistically insignificant.

The study indicated that there is a statistically significant difference of the examined relationship between emerging and developed markets. The size of a company differentiates the relationship between a capital structure and the growth of debt much stronger on emerging than on developed markets.

The performed research contributed to the development of a study in the field of a capital structure of companies noted on emerging and developed capital markets. The review of literature showed that the debt increases with the size of a company. The performed research confirmed this statement. What is more, the authors (Titman

and Wessels 1988) found that short-term debt ratio was negatively related to a firm size while the study conducted in this paper indicated that a long-term debt is strongly connected with the size of company.

The characteristic feature of companies from a construction sector is a high level of debt. Moreover, construction companies show a high share of fixed assets involved in their activities. These characteristics make a size of company very important determinant that strongly affects a structure of financing sources of construction businesses.

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How Do Household Characteristics Determine the Levels of Saving Deposits in the Euro Area?

Katarzyna Kochaniak

1 Introduction

One of the problems that emerged during the global financial crisis was the reliance of credit institutions on unstable funding. Its consequences have raised the need for harmonisation of the principles of identification, classification and definition of funds available for the EU entities. The post-crisis regulations (Commission Delegated Regulation 2015/61; Regulation 575/2013 of the European Parliament and of the Council) distinguished retail deposits as relatively stable under idiosyncratic and market-wide stress. Thus, access to such funding appears essential for the fulfilment of liquidity standards and business development. The above issue provides an incentive to analyse household saving deposits. This paper aims to identify the determinants of their levels in households residing in 14 euro area countries in the period of economic and financial market downturn. It answers the following research questions:

1. Does households' wealth influence the levels of saving deposits in the euro area? In the case of its influence, what dimension of wealth (accumulated assets or incomes) is of priority importance?
2. Does households' activity on the financial market affects the levels of their saving deposits in the countries analysed? In the case of its significance, which financial services and products can be perceived as positive and which as negative determinants of the issue analysed?
3. Do the socio-demographic profiles of households affect the levels of saving deposits in the countries analysed? In the case of their significance, which household features are key determinants?

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4. Do household subjective beliefs and opinions regarding future incomes, saving aims, and financial risk attitudes affect the levels of saving deposits in the countries analysed?
5. Do the levels of household saving deposits in the euro area remain under the primary influence of national or common factors?

The following hypothesis is tested:

From the broad set of determinants of the levels of household deposits, it is possible to indicate the ones of supranational significance in the group of heterogeneous countries of the euro area. However, the primary importance in this regard should be assigned to household's wealth and its country of residence.

The paper consists of the following sections: Section 2 contains an overview of the literature related to household deposits. Section 3 presents the data and methodology. Section 4 discusses the results of empirical analysis on the impact of households' characteristics on the levels of saving deposits in the euro area. Section 5 contains conclusions.

2   Literature Review

In the period of the financial market development, retail deposits were outside the mainstream literature, due to their simplicity and the availability of wholesale funding for credit institutions. The global financial crisis and post-crisis regulations brought changes in this regard due to their relatively stable nature. The current studies concerning the topic analysed are linked to the discussion on both household financial investment choices (Cussen et al. 2012; Brandmeir et al. 2012; Kochaniak 2017b) and bank funding (McQuinn and Woods 2012; Bologna 2011).

Despite the limited interest in household deposits, a lot of studies were devoted to household savings. Their results may be valuable for the problem analysed because the deposits represent the main component of financial asset portfolios of the euro area households (Kochaniak 2016c). The literature consider the determinants of household savings at the micro (household) and macro (national) levels (Cichowicz and Nowak 2016; Wołoszyn and Głowicka-Wołoszyn 2015; Gatt 2014; Frączek 2012; Krupa et al. 2012; Harasim 2010; Rytelewska and Kłopocka 2010; Bańbuła 2006; Rószkiewicz 2008; Szopa et al. 2007; Masson et al. 1998; Callen and Thimann 1997). One of them is the economic condition of a country, described by its GDP or unemployment rate. It is emphasised that the economic prosperity favours saving, however not in the case of households' focus on consumption. The condition of the financial market is assessed as one of the major determinants. The availability of loans, as well as other retail financial products, is recognised decisive for savings. A separate group of determinants refers to socio-demographic features of households and their members, such as: household's size and structure, respondent's age (young and elder people hold relatively low savings, while middle-aged have them relatively high), incomes (levels and types), educational level, country of residence, labour status and kind of work.

The literature verifies the significance of non-economic factors as well, such as religious, geographical, ideological or cultural ones (Kessler et al. 1993). However, they are of secondary importance for the problem analysed. Selected studies are exclusively dedicated to households' saving motives and saving habits. Some of them are devoted to one motive, mostly the precautionary one (Carroll 1997; Gourinchas and Parker 2002; Palumbo 1999), while the others analyse the significance of their specific sets (Horioka and Watanabe 1997; Schunk 2009). In most studies, household incomes emerge as the main, but not the sole determinant of the studied phenomenon.

The above results have determined the selection of independent variables to the models presented in this paper.

The paper fills the gap in the literature regarding the significance of households' characteristics for the levels of saving deposits in the euro area under destabilisation. It identifies similarities and dissimilarities in this regard among the countries, which appear essential due to the harmonisation of the EU regulations. It presents selected results from the vast research related to the role of household deposits for funding stability of credit institutions. The analyses so far were dedicated to sight deposits in the euro area households (Kochaniak 2017a), their propensity to possess managed accounts (Kochaniak 2016a), the occurrence of high-value deposits (Kochaniak 2016b), as well as guaranteed deposits and very high-value deposits (Kochaniak 2017c).

3 Data and Methodology

The study is based on household-level data from the Eurosystem Household Finance and Consumption Survey (first wave). It uses information regarding 50,456 households who declared the possession of saving deposits and resided in the following euro area countries: Austria, Belgium, Cyprus, France, Germany, Greece, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain. It should be noted that this study does not refer to the entire group of the euro area countries, but to 15 of them which participated in the survey. Only Finland became omitted due to the lack of data on household saving deposits. The database provides information regarding the distribution of household characteristics in individual populations in the period of economic and financial market downturn. However, its constraint may appear in cross-country analyses due to the institutional and macroeconomic heterogeneity of the member states (ECB 2013). In individual countries, the surveying periods were designated by national central banks and in total related to the years 2008–2011.

The study is based on econometric modelling. Taking into account the complexity of the problem analysed, five variants of the model are proposed with the sets of independent variables. Their selection was conditioned by the aim of the study and it was based on results of research presented in the literature. They provide the profiles of households that may represent the targeted providers of funding for credit institutions.

It should be noted that households' decisions regarding the levels of deposits held are under the influence of internal (domestic) and external factors, due to the

macroeconomic and institutional heterogeneity of the euro area countries. For that reason, all the models contain the dummies identifying the country of residence of a household. These dummies inform about the average differences between the levels of deposits in a given country and the levels of deposits placed in Germany (the basis for comparison), assuming the constancy of the remaining characteristics.

Variant 1 considers the impact of a household's wealth on the levels of saving deposits. The wealth can be described by the values of assets accumulated throughout life and obtained from gifts and inheritances as well as recent annual gross incomes. Due to its broad information content, the independent variables which entered the model refer to: total real assets (*TRA*); total financial assets (*TFA*); net wealth[1] (*NW*), and annual gross income (*GI*). Such a selection of variables allows the verification of the importance of the overall material and financial situation of a household for the level of its saving deposits as well as the identification of its dimensions of the greatest influence.

Variant 2 refers to the possible impact of a household's activity on the financial market on the level of its saving deposits. This activity is expressed by the set of dummies denoting the possession of financial assets, such as mutual fund units (*F_MF*), bonds (*F_B*), shares (*F_S*), managed accounts (*F_MA*), public pension plan (*F_PP*), voluntary pension plan (*F_VP*), occupational pension plan (*F_OP*), other assets (*F_O*), as well as financial liabilities from leasing contracts (*F_L*), non-collateralised loans (*F_N*), and overdraft balance (*F_OB*). The model also includes the dummy which relates to credit card possession (*F_C*). Thus, this variant allows the identification of the financial products which favour and disfavour deposit accumulation. It should be assumed that households may perceive saving deposits as an alternative or complementary to selected financial assets. For example, the possession of a credit card could be a form of protection against liquidity shortage and could favour the maintenance of relatively high saving deposits. On the other hand, a credit card could be actively used to increase consumption of a household that tended to limit its saving deposits. Similar scenarios should be considered regarding the availability of other forms of household debt.

Variant 3 recognises the impact of selected socio-demographic characteristics of a household on the level of its saving deposits. They refer to the respondent's marital status,[2] labour status,[3] level of education completed,[4] and gender,[5] as well as the household's size (*H_M*) and number of members in employment (*H_E*).

Variant 4 includes a set of explanatory variables referring to the subjective opinions and beliefs of a household. It verifies the importance of household

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[1]The sum of real and financial assets less debt from loans.

[2]Dummies: single (*MS_S*), married (*MS_M*), in consensual union (*MS_CU*). Basis for comparison: widowed and divorced.

[3]Dummies: doing regular work for pay (*LS_RW*), retiree (*LS_R*). Basis for comparison: the remaining labour statuses.

[4]Dummies: lower secondary (*E_LS*), upper secondary (*E_US*), tertiary (*E_T*). Basis for comparison: primary or below.

[5]Dummy identifying a female respondent (*G_F*). It takes the value of 1 if the respondent is a female, otherwise—0.

expectations regarding future incomes,[6] savings aims,[7] and attitudes to financial risks[8] for the level of saving deposits placed with credit institutions.

In variants 1–4, attention is paid to certain kinds of household features which may influence the level of savings deposits. Due to the complex nature of the problem analysed, *Variant 5* is based on a comprehensive set of determinants and allows an assessment of their combined effects. The model adopts selected variables of the greatest impact in variants 1–4. These are the following: annual gross incomes (*GI*) and net wealth (*NW*); dummies referring to the possession of shares (*F_S*), mutual fund units (*F_MF*), voluntary pension plans (*F_VP*), and non-collateralised loans (*F_N*); dummies referring to the respondent's marital status—married (*MS_M*), tertiary education completed (*E_T*), and the status of retiree on the labour market (*LS_R*); variable relating to the number of household members in employment (*H_E*); dummies identifying the following saving aims: purchase of financial assets (*S_FA*), old-age provision (*S_OA*), and bequest (*S_B*).

The regression models in variants 1–5 can be described as:

$$Y = f(X_1, \ldots, X_k, \varepsilon), \tag{1}$$

where: *Y*—dependent variable referring to the level of saving deposits in a household, $X_1, \ldots, X_k$—set of explanatory variables, ε—random component, and *f*—the analytical form of the model. The best results in the statistical sense were obtained from the exponential and power-exponential models.[9]

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[6]Dummies referring to the household's expectations regarding its future incomes (in next 12 months): they will increase more than prices (*I_M*), they will increase less than prices (*I_L*). Basis for comparison: they will remain at the same as prices.

[7]Dummies: purchase of home (*S_P*), other major purchases (*S_OP*), invest in financial assets (*S_FA*), provision for unexpected events (*S_UE*), paying off debts (*S_PD*), old-age provision (*S_OA*), travels/holidays (*S_TH*), education or support of children and grandchildren (*S_ES*), bequest (*S_B*), taking advantage of state subsidies (*S_SS*).

[8]Dummies: not willing to take any risk (*R_N*), take average financial risks expecting to earn average returns (*R_A*). Basis for comparison: take at least above average financial risks to earn at least above average returns.

[9]The Akaike and Schwartz-Bayes information criterions are applied to validate the selection of independent variables for models and compare the goodness-of-fit of the models to empirical data (Gorecki 2010, pp. 40–41). For verification of collinearity of the independent variables, the variance inflation vector is used (Kufel 2013, pp. 64–65). The homoscedasticity of variance is examined by White test (Kufel 2013, pp. 60–61). For all the models, this problem is identified, thus, the structural parameters of the models are estimated according to the Heteroscedasticity Consistent Covariance Matrix (HCCM) (Kufel 2013, pp. 136–137). The significance of the structural parameters of the models is verified by Student's t-test while the residual normality by Doornik-Hansen test (Kufel 2013, pp. 117–118). It should be explained that due to the use of household-level data the coefficients of determination (R2) are relatively low (Gorecki 2010, p. 40, 43). The primary criterion for the selection of independent variables for the models is their merit, referring to the objective of the study. The formal and statistical criteria regarding two basic assumptions are considered (Kufel 2013, pp. 54–55), i.e. that the independent variables are uncorrelated or poorly correlated in the model and the independent variables are relatively highly correlated with the dependent variable.

4 Results

The results obtained from the power-exponential model in variant 1 (Table 1) indicate that all the variables referring to the wealth of a household statistically significantly influenced the level of its saving deposits. It should be noted that a positive effect was observed regarding three out of four determinants—annual gross income, net wealth, and total financial assets. A negative effect was identified for total real assets. The impact of net wealth was the strongest. Its increase by 10% resulted in an increase in the level of saving deposits on average by 3.8%, assuming the constancy of the remaining variables. Regarding the annual gross incomes, the same scale of growth led to an increase in the deposit level on average by 2.6%. The impact of the two remaining independent variables was considered significantly weaker. In the case of a doubled value of financial assets, an increase in the level of saving deposits would be equal on average to 11%. The same change in total real assets resulted in the decline of deposits possessed on average by 3.4%. Assuming the constancy of the financial situation of the euro area households described by the above variables, the residents of individual countries significantly differed in terms of their preferences regarding the sums of deposits held. Attention should be drawn to Austria, Malta, and the Netherlands, where households maintained higher saving deposits than in Germany (the basis for comparison). The highest deposits (on average by 254.7% from the basis) were declared by Austrians, assuming *ceteris paribus*. In Malta and the Netherlands, the deposits were higher on average by

Table 1 Parameter estimates of the model in variant 1

Variable	Coef.	Std. error	Statistics t	p-value
Constant	0.155490	0.166985	0.9312	0.35177
ln_NW	0.381364	0.009246	41.2479	0.00000
ln_GI	0.264785	0.015622	16.9499	0.00000
ln_TFA	0.111648	0.003925	28.4422	0.00000
ln_TRA	−0.034029	0.008099	−4.2015	0.00003
AT	1.233170	0.083736	14.7269	0.00000
BE	−0.336579	0.096607	−3.4840	0.00049
CY	−4.345800	0.145091	−29.9523	0.00000
FR	−0.046546	0.063207	−0.7364	0.46149
GR	−6.049670	0.075177	−80.4727	0.00000
ES	−4.525790	0.083862	−53.9673	0.00000
NL	0.432988	0.111473	3.8843	0.00010
LU	−0.807805	0.146864	−5.5004	0.00000
MT	0.455545	0.131387	3.4672	0.00053
PT	−2.476190	0.090003	−27.5122	0.00000
SK	−4.228630	0.101890	−41.5018	0.00000
SI	−4.323120	0.216729	−19.9471	0.00000
IT	−5.106770	0.074270	−68.7598	0.00000

R-squared = 0.41; AIC = 278,238; SBC = 278,397; Std. dev. of residual comp. = 3.6208; F (17; 51,397) = 3186.81 (p < 0.00001)

57.7% and 54.2% respectively. In almost all the remaining countries, negative differences were identified. It should be noted that the deposits held by Greek and Italian households were the lowest in the group and accounted for on average 0.24% and 0.6% of the deposits possessed by Germans. Similarly, in Cyprus, Slovakia, Slovenia, and Spain the levels of deposits ranged on average from 1.1% to 1.5% of German deposits. The results obtained for France did not allow a conclusion about the statistically significant differences between the levels of saving deposits in this country and the basis for comparison. All the above results demonstrate that the financial situation of households did not influence the allocation of saving deposits in the same way in the analysed countries.

Table 2 presents the results from the exponential model in variant 2, in which the set of independent variables referred to household activities on the financial market and country of residence. The largest saving deposits were declared by households that allocated their funds in stocks, mutual fund units, and voluntary pension

Table 2 Parameter estimates of the model in variant 2

Variable	Coef.	Std. error	Statistics t	p-value
Constant	6.256690	0.086363	72.4467	0.00000
F_S	1.232210	0.053878	22.8703	0.00000
F_MF	1.176850	0.053482	22.0045	0.00000
F_B	0.508915	0.076292	6.6706	0.00000
F_MA	0.571287	0.124760	4.5791	0.00000
F_O	0.754732	0.076405	9.8780	0.00000
F_PP	−0.087522	0.045189	−1.9368	0.05277
F_OP	0.366436	0.067842	5.4013	0.00000
F_VP	1.114460	0.041823	26.6470	0.00000
F_L	0.259710	0.067882	3.8259	0.00013
F_C	0.567326	0.046640	12.1638	0.00000
F_OB	−0.056550	0.052220	−1.0829	0.27885
F_N	−0.639876	0.039600	−16.1586	0.00000
AT	1.390820	0.093885	14.8141	0.00000
BE	−0.210979	0.106778	−1.9759	0.04818
CY	−3.851600	0.152481	−25.2596	0.00000
FR	0.468109	0.089761	5.2150	0.00000
GR	−5.960030	0.088819	−67.1029	0.00000
ES	−4.058710	0.102764	−39.4954	0.00000
NL	0.484039	0.120121	4.0296	0.00006
LU	−0.182777	0.155470	−1.1756	0.23974
MT	0.907434	0.149585	6.0663	0.00000
PT	−2.537290	0.104730	−24.2269	0.00000
SK	−4.349660	0.108705	−40.0133	0.00000
SI	−4.406390	0.215421	−20.4548	0.00000
IT	−4.615580	0.088518	−52.1429	0.00000

R-squared = 0.36; AIC = 282,120; SBC = 282,350; Std. dev. of residual comp. = 3.7528; F (25; 51,424) = 2088.98 (p < 0.00001)

schemes. They exceeded the deposits of non-involved households on average by 242.9%, 224.4% and 204.8% respectively. The holders of bonds, sums on managed accounts, and other financial assets[10] allocated more saving deposits as well. The type of pension plan was also found significant in this analysis. Participation in voluntary and occupational pension plans had a positive impact on deposit levels while in public pension schemes—slightly negative. The above results allow the conclusion that households that possessed risky financial assets held more saving deposits as well. Saving deposits could be perceived as a counterbalance for risky involvements. An interesting finding is that credit card holders' deposits were higher on average by 76%. This suggests that credit cards might play an important role as a tool protecting households against liquidity shortage. Similar conclusions could be formed regarding leasing contracts. However, the use of non-collateralised loans appeared as a feature negatively affecting the levels of saving deposits. Households that declared such debt had them lower on average by 47.3%. Assuming the constancy of the variables relating to households' activity on the financial market, the results displayed significant cross-country differences in the levels of saving deposits. The greatest interest in their allocation was recognised among Austrian households, where allocated sums were higher on average by 301.8% from those placed by Germans. Subsequently, positive differences could be recognised in Dutch, French, and Maltese households (62.3%, 59.7%, and 147.8% respectively). In the remaining member states, an interest in deposit allocation was weaker than in Germany, assuming *ceteris paribus*. The lowest deposit levels were recorded for Cyprus, Greece, Italy, Slovakia, Slovenia, and Spain, which accounted for on average 0.3–2.1% of the deposits placed in Germany.

According to variant 3, the exponential model was used to analyse the impact of selected socio-demographic characteristics of a household together with its country of residence on the problem analysed. The statistical significance was assigned to the number of household members (Table 3). In the case of its increase by one person the level of the deposits decreased on average by 7.0%. However, the increase in the number of the members in employment should be recognised as positively influencing deposit allocation. In this case, with every additional working person in a household deposit levels increased on average by 49.2%. The results obtained also demonstrate the importance of education completed by a respondent. The higher its level, the higher the deposits declared. Compared to the deposits of respondents who at most graduated primary school, the deposits of respondents with lower secondary education exceeded them on average by 55.9%, and those with upper secondary education by 190.5%, and tertiary by 564.1%. From five considered categories of the marital status of respondents, only the variables identifying singles, married, and in consensual union entered the model. However, the deposits of married were the sole subset which statistically significantly differed from the basis for comparison (the deposits of widowed and divorced). They exceeded it on average by 107.2%. From

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[10]They relate to, e.g., options, futures, index certificates, precious metals, oil and gas leases, future proceeds from a lawsuit or real estate that is being settled, and royalties.

Table 3 Parameter estimates of the model in variant 3

Variable	Coef.	Std. error	Statistics t	p-value
Constant	4.832840	0.104310	46.3314	0.00000
MS_S	−0.065155	0.056391	−1.1554	0.24792
MS_M	0.728622	0.050405	14.4552	0.00000
MS_CU	0.210337	0.137974	1.5245	0.12740
E_LS	0.443814	0.058929	7.5314	0.00000
E_US	1.066280	0.050164	21.2558	0.00000
E_T	1.893270	0.055427	34.1579	0.00000
H_M	−0.072750	0.017538	−4.1481	0.00003
H_E	0.400027	0.032260	12.4000	0.00000
G_F	−0.042369	0.036787	−1.1517	0.24944
LS_RW	0.346366	0.060360	5.7384	0.00000
LS_R	1.488650	0.056859	26.1814	0.00000
AT	0.944398	0.093183	10.1348	0.00000
BE	0.035393	0.106227	0.3332	0.73899
CY	−3.951030	0.150323	−26.2836	0.00000
FR	0.441664	0.069665	6.3398	0.00000
GR	−6.516520	0.075290	−86.5525	0.00000
ES	−3.857500	0.090004	−42.8594	0.00000
NL	0.727510	0.118808	6.1234	0.00000
LU	−0.014240	0.152865	−0.0932	0.92578
MT	1.057330	0.140519	7.5244	0.00000
PT	−2.620980	0.099336	−26.3850	0.00000
SK	−5.069750	0.102819	−49.3077	0.00000
SI	−4.772040	0.219065	−21.7837	0.00000
IT	−4.868080	0.078864	−61.7277	0.00000

R-squared = 0.35; AIC = 283,136; SBC = 283,358; Std. dev. of residual comp. = 3.79008; $F_{(24; 51,425)}$ = 1874.69 ($p < 0.00001$)

the variables relating to the respondent's labour status, regular work for pay (including self-employment and working in a family business) as well as being retired entered the model. Therefore, the basis of comparison comprised all the remaining statuses. It should be noted that in the entire euro area sample, the highest deposits were held by retired respondents. They were higher on average by 343.1% from the basis, while the deposits of respondents doing regular work were only 41.4% higher, assuming the constancy of the remaining variables. The results of the study did not confirm the significance of the respondent's gender for the analysed phenomenon. Assuming the constancy of the variables referring to the socio-demographic characteristics of households, the results allowed the identification of the countries whose populations were the most involved in deposit allocation, like Austria, France, Malta, and the Netherlands. In these countries households declared saving deposits higher on average by 157.1%, 55.5%, 107.0%, and 187.9% respectively, in comparison to the basis. On the other hand, Greece, Slovakia, Slovenia, and Italy formed a subgroup in which deposit levels were the lowest (up to 0.8% of the basis). The

results did not allow a conclusion about the significant differences between German deposits and those placed in Belgium and Luxembourg, assuming *ceteris paribus.*

In variant 4, attention was paid to the importance of households' subjective opinions and beliefs regarding saving aims, future incomes, and attitudes to financial risks. From all the dummies identifying various saving targets, the model emphasised the significance of planned purchases of financial assets for the analysed issue (Table 4). Saving deposits of households that declared this aim were higher on average by 434.2% from the deposits of the remaining respondents. Secondly, the impact of saving for old-age provision and bequest should be discussed. Households that declared such aims were characterised by deposits higher on average by 170.4% and 138.9% respectively. Also, saving for unexpected events, education or support

Table 4 Parameter estimates of the model in variant 4

Variable	Coef.	Std. error	Statistics t	p-value
Constant	6.167740	0.108865	56.6547	0.00000
S_P	0.063065	0.092331	0.6830	0.49459
S_OP	0.493999	0.067803	7.2858	0.00000
S_FA	1.675660	0.136389	12.2859	0.00000
S_UE	0.546652	0.052435	10.4254	0.00000
S_PD	−0.646239	0.082368	−7.8454	0.00000
S_OA	0.994774	0.054124	18.3797	0.00000
S_TH	0.087570	0.608527	1.4391	0.15014
S_ES	0.422086	0.059866	7.0505	0.00000
S_B	0.870829	0.097388	8.9419	0.00000
S_SS	0.656453	0.113928	5.7620	0.00000
I_M	−0.278883	0.071978	−3.8745	0.00000
I_L	−0.005618	0.045990	−0.1222	0.90277
R_N	0.232116	0.077255	3.0046	0.00266
R_A	0.891336	0.081889	10.8848	0.00000
AT	0.389571	0.096123	4.0528	0.00000
BE	−0.272287	0.110317	−2.4682	0.01358
CY	−3.839700	0.152112	−25.2425	0.00000
FR	1.314330	0.112535	11.6793	0.00000
GR	−6.902380	0.079576	−86.7391	0.00000
ES	−3.793890	0.096766	−39.2069	0.00000
NL	−0.632064	0.130121	−4.8575	0.00000
LU	−0.457952	0.158786	−2.8841	0.00393
MT	−0.133466	0.150817	−0.8850	0.37618
PT	−3.317780	0.101060	−32.8297	0.00000
SK	−5.482940	0.103305	−53.0755	0.00000
SI	−4.718880	0.218985	−21.5489	0.00000
IT	−4.474200	0.089653	−49.9059	0.00000

R-squared = 0.33; AIC = 284,516; SBC = 284,764; Std. dev. of residual comp. = 3.84113; $F_{(27;\,51,422)}$ = 1584.61 ($p < 0.00001$)

of children and grandchildren, advantages of state subsidies,[11] and other aims positively influenced the levels of deposits held, which were higher on average by 72.7%, 52.5%, 63.9% and 92.8% respectively. The results of the study did not confirm the significance of saving for home purchases or travels and holidays for the discussed issue. On the other hand, households that were saving for debts pay-offs held deposits lower on average by 47.6% in comparison to the deposits of non-indebted households. Also, a belief in the increase of future incomes (in the next 12 months) should be considered as negatively influencing deposit accumulation. Households representing this attitude possessed deposits lower on average by 24.3%, in comparison to households that believed in the stability of their future incomes. The parameter estimates of the variables related to financial risk attitudes show that the least interested in deposit accumulation were the respondents who preferred above average and substantial risk exposures. The risk-averse respondents had deposits higher on average by 26.1% in comparison to that sub-group, and the respondents accepting average risk—by 143.8%, assuming *ceteris paribus*. In the case of the constancy of all the above independent variables, the preferences of individual populations regarding deposit levels appeared heterogeneous. The largest amounts were held by French households whose deposits exceeded the basis on average by 272.2%. A positive difference (47.6%) could also be identified in Austria. Regarding the remaining countries, the levels of saving deposits were on average lower than in Germany. The lowest ones equal to 0.1% of the basis, were noted for Greece. Similarly, in Italy, Slovakia, and Slovenia households held deposits amounting on average to 1.1, 0.4, and 0.9% of the deposits placed in Germany. Low levels of deposits were also recognised in Cyprus, Portugal, and Spain (2.2–3.6% of the basis). Malta was the only country in which the level of deposits did not statistically significantly differ from the basis.

In variant 5, the power-exponential model was used to assess the contemporaneous influence of the features analysed in variants 1–4. From each variant, there were selected independent variables which explained the volatility of deposit levels to the utmost (Table 5). All of them except for the Netherlands statistically significantly affected the analysed phenomenon. Evaluation of the structural parameters of the model remained in a logical relation to the direction of interactions described by the former models. Thus, here attention was focused on the order of impact of individual features on the level of saving deposits. For this purpose, the parameter estimates for standardised variables were introduced. They allowed a comparison of the effects of independent variables of different titres and scales. Thus, the higher the coefficient B_j regarding the module, the stronger the influence of the j-th variable on the levels of saving deposits (Podolec 2014, p. 59). The country of residence appeared in this variant as of priority importance. This referred especially to Greece, Portugal, Slovakia, and Spain. From the remaining variables, net wealth (*NW*) was worth noting. It should be emphasised that annual gross incomes (*GI*) were linked to a lesser degree with the explained phenomenon. From the remaining variables,

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[11]For example, a subsidy to building society savings.

Table 5 Parameter estimates of the model in variant 5

Variable	B_j	Coef.	Std. error	Statistics t	p-value
Constant	–	0.549739	0.168021	3.2718	0.00107
ln NW	0.202	0.323597	0.005952	54.3675	0.00000
ln GI	0.052	0.197032	0.016345	12.0543	0.00000
F_S	0.048	0.635930	0.053054	11.9865	0.00000
F_MF	0.053	0.760203	0.052395	14.5091	0.00000
F_VP	0.065	0.698492	0.040621	17.1955	0.00000
F_N	−0.019	−0.224780	0.039222	−5.7309	0.00000
MS_M	0.010	0.093716	0.034847	2.6894	0.00716
E_T	0.038	0.418491	0.041071	10.1894	0.00000
LS_R	0.060	0.589695	0.046029	12.8114	0.00000
H_E	0.033	0.169997	0.025183	6.7505	0.00000
S_FA	0.035	1.074760	0.130281	8.2495	0.00000
S_OA	0.053	0.648418	0.051003	12.7133	0.00000
S_B	0.028	0.632491	0.092266	6.8551	0.00000
AT	0.052	1.172850	0.083296	14.0804	0.00000
BE	−0.023	−0.512869	0.096006	−5.3420	0.00000
CY	−0.144	−4.406470	0.144365	−30.5230	0.00000
FR	0.014	0.146844	0.066196	2.2183	0.02654
GR	−0.305	−6.153440	0.073175	−84.0804	0.00000
ES	−0.308	−4.451120	0.084133	−52.9059	0.00000
NL	–	−0.025557	0.113677	−0.2248	0.82212
LU	−0.024	−0.083486	0.146236	−5.7090	0.00000
MT	0.009	0.352976	0.134313	2.6280	0.00859
PT	−0.187	−2.696410	0.089350	−30.1781	0.00000
SK	−0.184	−4.427690	0.101160	−43.7691	0.00000
SI	−0.078	−4.541240	0.209891	−21.6361	0.00000
IT	−0.077	−4.813560	0.075888	−63.4296	0.00000

R-squared = 0.42; AIC = 277,487; SBC = 277,726; Std. dev. of residual comp. = 3.58828; F (26; 51,419) = 2285.12 (p < 0.00001)

attention could be drawn to the importance of respondents' participation in a voluntary pension plan and mutual funds, the status of a retiree, and saving for old-age.

5   Conclusions

The results obtained allow conclusions to be drawn about the significance of various kinds of characteristics of households for the levels of their saving deposits in the euro area countries.

The analysis led to conclusions on the positive impact of household financial situation, most of all net wealth and annual gross incomes, for the studied

phenomenon. Moreover, larger deposits were recognised among households that maintained risky financial assets and participated in voluntary and occupational pension plans. The same can be stated regarding the importance of selected saving aims. Households that saved for, for example, investments in financial assets, old-age, bequests, unexpected events, education and support of children and grandchildren tended to hold more deposits. Also, selected socio-demographic characteristics proved to influence saving deposits positively. Households with more members in employment, represented by persons who were well-educated, married, doing regular work or on retirement declared larger sums on saving accounts. However, their gender was statistically insignificant for the analysed phenomenon. It should be noted that the results also allowed the identification of household features which negatively influenced the amounts of deposits possessed. These were a focus on investments in real assets, reliance on public pension plans, the need to pay-off debts, positive perceptions of future incomes, and a declared willingness to take above-average financial risks. Moreover, household size emerged as a feature of negative impact.

However, assuming the constancy of the above characteristics, deposit accumulation was under evident influence of households' country of residence, which emphasises the importance of domestic circumstances for the analysed phenomenon. The results distinguished Austrians who were focused the most on deposit accumulation, while the least interested in this regard were households in peripheral countries like Greece, Italy, Spain, Cyprus, Portugal and the post-communist ones—Slovakia and Slovenia.

The last model, which included the combined effect of the variables from all sets pointed at two major features shaping the studied phenomenon—the country of residence and the financial situation of a household, described by net wealth. It emphasises that the levels of saving deposits in the euro area remained first under the influence of domestic conditions prevailing in Greece and Spain, Cyprus, Portugal and Slovakia, but their impact was negative. As it was concluded from the model in variants 1–4, households from these countries possessed relatively low saving deposits, assuming the constancy of the remaining independent variables.

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Fiscal Equalisation in Polish Municipalities (Example of Lower Silesian Voivodship)

Paweł Kowalik and Marek Kustosz

1 Introduction

The basis for the proper realisation of tasks by local government units (LGU) is to ensure durability and adequate efficiency of sources of financing their activities. The reform of the local government administration of 1999, which is a continuation of the changes initiated at the commune level in 1990, can be considered successful. The financial system of LGU changed many times, but not always in their interest. Also, the provisions that were to be in force temporarily became solutions that would shape the LGU financial system for many years. Particularly, noteworthy is the introduction to the finances of local government horizontal compensation system, whose task is to compensate for differences in LGU revenues, in particular, to ensure a minimum level of public services throughout the country. A dispute has been going on for a dozen or so years, which revives from time to time, whether it was purposeful, based on the act of 13 November 2003 on the Incomes of Local Government Units, to create a horizontal solidarity mechanism between LGUs. More often, disputes concern the scale of payments made by entities with higher income potential, less often—a way of income redistribution. Corrective and compensatory payments were the subject of decisions of the Constitutional Tribunal. The ongoing discussion around this mechanism results from the dysfunction of the correction and compensation payment system signalled both in the literature on the subject, and by LGUs obliged to pay them (Kowalik and Kwiedorowicz-Andrzejewska 2015).

The income equalisation systems and their analysis are the subjects of research all over the world. It is implemented both in international [World Bank—Shah (1994)] and domestic [e.g. in Canada—Boadway (2006), Germany—Spahn (2007),

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Switzerland—Dafflon (2006)] institutions. In Poland, these issues have been
discussed by Podstawka (2012), Patrzałek (2010), Olejniczak (2010, 2014, 2015,
2016), Olejniczak and Bednarska-Olejniczak (2013), Wyszkowska and Poniatowicz
(2014), Kańduła (2014, 2015a, b, 2016, 2017), Kowalik and Kwiedorowicz-
Andrzejewska (2015) and Bogucka-Felczak (2014).

This paper aims to show corrective flows in local government units in 2018[1] and
to calculate the share of payments in total incomes or a total expenditure of
communes in the Lower Silesian Voivodship (Dolnośląskie) in 2017.

The methods of statistical data analysis, descriptive and comparative analysis are
used in this paper.

2 Models of Fiscal Equalisation

Globally, countries use the following income equalisation systems (Table 1):

- vertical,
- horizontal,
- mixed (vertical and horizontal).

H. Blöchliger states that there is a vertical fiscal equalisation model in Poland[2]
(Table 1).

The simplest compensatory systems, including Poland, are limited to equalising
the income base.[3] There are two primary systems (Kowalik and Kwiedorowicz-
Andrzejewska 2015; Wyszkowska and Poniatowicz 2014):

Table 1 Fiscal equalisation models

Country	Model
Federal states	
Australia, Austria, Canada	Vertical
Germany, Switzerland	Horizontal and vertical
Unitary states	
Denmark, Finland, Norway, Sweden	Horizontal
Poland	Vertical
Portugal, United Kingdom, Turkey, Greece	Vertical

Source: Blöchliger (2014)

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[1]The values of cash flows in the financial year 2018 is a forecast, while the values of factors for the
determination corrective and compensatory payments in 2018 are already known.

[2]It is because the horizontal compensation occurs via the central budget and not directly between the
units of the same level, although payments at a given level are transferred to subsidies for the units
of the same level.

[3]Swianiewicz (2003, pp. 106–107) indicates that the diversification of spending needs of large cities
or sparsely populated areas should be taken into account, as well as the differentiation of unit costs
of services performed.

- *Vertical equalisation*, where in fact local governments with the lowest financial (income) potential are supported by funds provided by higher-level authorities (usually from the central budget)—in Poland it is implemented with the use of educational and compensatory subsidies,
- *Horizontal equalisation* whereby the most affluent councils share their income with weaker units. This method of levelling is referred to in the literature as the "Robin Hood Tax", and the Polish term is "Janosikowy tax" or "Janosikowe"—in Poland implemented using a balancing subsidy in the case of communes and poviats and regional subsidy in the case of provinces.

The need to create a system for compensating LGU revenues results from the difference in own revenues in various territorial units. L. Patrzałek points out the following arguments for introducing levelling mechanisms (Patrzałek 2010):

1. Equalizing territorial disproportions in the distribution of the LGU's own revenue sources, resulting from:

   - natural conditions (location, climate, natural resources),
   - differences in the degree of industrialisation,
   - differences in the consumption of fixed assets.

2. The need to maintain a minimum standard of public and social services implemented by LGUs.
3. The elimination of individuality in the infrastructure condition.
4. The need to finance investments related to the implementation of critical pro-development projects, prior from the "central" point of view.

It should be emphasised that regardless the manner of constructing the income alignment system, the diversification of the income potential of LGUs, being the original reason for the differentiation of LGU revenues, continue to occur.

3   Premises for the Functioning of the Solidarity Mechanism in Poland

The income differentiation of LGUs has caused the necessity to introduce the obligation to make payments by communes, poviats and voivodships. This was done by the Act of 13 November 2003 on the Incomes of Local Government Units and its subsequent amendments.

According to art. 29.1 and 30.1 of this Act, these payments are made by:

- communes where the income per capita is higher than 150% of the average income per capita of the country,
- poviats in which per capita income is higher than 110% of the average income per capita of the country,

Horizontal fiscal equalisation instruments are:

- the balancing part of the general subsidy in the case of communes and poviats,
- the regional part of the general subsidy in the case of voivodships.

G, P and W factors are calculated by dividing the amount of tax revenue of communes, poviats and voivodships respectively for the year preceding the base year by the appropriate number of inhabitants, where the base year is the year preceding the budget year. The average value of tax income per capita for communes (Gg) in 2018 amounted to PLN 1688.68, the value for poviats (Pp) was PLN 232.60, while for voivodships (Ww) PLN 159.41 PLN. The highest value of the G factor was obtained in the commune of Kleszczów (PLN 31,962.75), and the lowest occurred in Przytuły commune (PLN 390.29). This means a disproportion regarding the tax revenues between the richest and the poorest communes in Poland in 2018 at the level of 81.9:1. This value in 2011 even reached the level of 129:1. In the case of poviats, the lowest value of P factor was recorded in the poviat of Kazimierz (PLN 74.66), and the highest in the poviat of Warsaw Capital City (PLN 625.08), which gives a disproportion in 2018 at the level of 8.4:1. In the case of voivodships, the undisputed leader is Mazowieckie Voivodship (the W factor for 2018 is PLN 324.90), while the lowest value of W factor was established for Świętokrzyskie Voivodship (PLN 75.46). This gives a disproportion at the level of 4.3:1 in 2018 (Tables 2 and 3).

The subsidy amounts for communes are calculated according to the algorithms contained in art. 29 of the Act on Revenues of Local Government Units (Table 4).

In 2018, the total amount of transfers under the horizontal fiscal equalisation is expected to amount to almost PLN 2262.5 million. Deposits of the richest communes amount to PLN 613.9 million (they constitute over 27% of all payments),

Table 2 The highest and the lowest values of G, P, W factors (in PLN) for the financial years 2011, 2015 and 2018

Unit	2011	Ratio	2015	Ratio	2018	Ratio
Commune	Łukownica 258.73	129:1	Przytuły 343.97	108:1	Przytuły 390.29	81.9:1
	Kleszczów 33,455.43		Kleszczów 37,119.57		Kleszczów 31,962.75	
Poviat	Chełmski 47.31	10.8:1	Kazimierski 61.70	8.2:1	Kazimierski 74.66	8.4:1
	M. st. Warszawa 512.15		M. st. Warszawa 505.48		M. st. Warszawa 625.08	
Voivodship	Warmińsko-mazurskie 62.53	5.2:1	Świętokrzyskie 68.69	3.8:1	Świętokrzyskie 75.46	4.3:1
	Mazowieckie 327.10		Mazowieckie 258.29		Mazowieckie 324.90	
	Dolnośląskie 154.58		*Dolnośląskie 202.29*		*Dolnośląskie 186.02*	

G, P, W—tax income per capita (respectively: communes, poviats, voivodships)
Source: Own study based on data from the Ministry of Finance

Table 3 Values of *Gg*, *Pp*, *Ww* factors (in PLN) for the financial years 2011–2018

Factor	2011	2012	2013	2014	2015	2016	2017	2018
Gg	1180.20	1195.67	1276.32	1358.98	1435.18	1514.27	1596.67	1688.68
Pp	160.18	157.69	170.79	177.70	185.45	199.59	216.38	232.60
Ww	138.60	126.97	140.10	139.86	132.90	137.78	150.75	159.41

Gg, *Pp*, *Ww*—average tax income per capita (respectively: communes, poviats, voivodships)
Source: Own study based on data from the Ministry of Finance

Table 4 Algorithms for calculation of the commune payment amount

	Value of factor	Algorithm
Value of *G* factor with reference to the *Gg* factor	150–200% *Gg*	$20\% \cdot (G - 150\% \, Gg) \cdot Lmg$
	200–300% *Gg*	$[10\% \cdot Gg + 25\% \cdot (G - 200\% \, Gg)] \cdot Lmg$
	Over 300% *Gg*	$[35\% \cdot Gg + 30\% \cdot (G - 300\% \, Gg)] \cdot Lmg$

Lmg—number of inhabitants of the commune
Source: Article 29.2 of the Act of November 13, 2003, on Revenues of Local Government Units

Table 5 The forecast of payments for the balancing part (communes and poviats) and regional (voivodships) of the general subsidy in 2018 (in million PLN) and the number of units making payments

	Communes	Poviats	Voivodships	Total
Payment	613.9	1272.2	376.4	2262.5
Number of units/total number of units	94/2478	54/380	1/16	

Source: Own study based on data from the Ministry of Finance

poviats PLN 1272.2 million and Mazowieckie voivodship PLN 376.4 million (Table 5).

For comparison, in 2014, similarly sized total amounts of payments related to communes (PLN 512.7 million) and poviats (PLN 1077.6 million). On the other hand, the value of voivodships' payment was much higher, i.e. PLN 914.7 million, when two voivodships made payments: Mazowieckie and Dolnośląskie. The observed decrease in the value of voivodships' contribution results from the changes in the Act on the Income of Local Government Units introduced by the amendment of 13 November 2014.

4 The Situation of Lower Silesia (Dolnośląskie) Voivodship

Disproportions between the richest and the poorest communes in Lower Silesia are large in comparison with other voivodships. In 2018, it will amount to almost 7.9:1. It places Lower Silesian Voivodship on the sixth place in the country, after the

Table 6 Disproportions between the richest and poorest commune in voivodships in 2015 and 2018

Voivodship	Financial year	
	2015	2018
Dolnośląskie	*9.47*	*7.9*
Kujawsko-pomorskie	6.11	5.5
Lubelskie	8.97	8.5
Lubuskie	4.42	3.6
Łódzkie	69.3 (without the richest commune—9.81)	51.1 (without the richest commune—13.8)
Małopolskie	5.65	5.6
Mazowieckie	10.96	11.9
Opolskie	5.82	5.1
Podkarpackie	5.40	5.4
Podlaskie	17.06	14.8
Pomorskie	5.62	4.9
Śląskie	4.18	3.65
Świętokrzyskie	8.11	7.5
Warmińsko-mazurskie	3.90	3.8
Wielkopolskie	9.32	8.7
Zachodniopomorskie	7.20	6.7

Source: Own study based on data from the Ministry of Finance

voivodships: Łódzkie, Podlaskie, Mazowieckie, Wielkopolskie and Lubelskie. In comparison with 2015, the disproportion in Lower Silesia Voivodship decreased (Table 6).

The income potential per capita of the communes of Lower Silesia Voivodship in 2018 is in the range of PLN 735.49–5808.52. 116 communes were located below the average for the country (PLN 1668.68), and below the level of PLN 1000, there were 15 communes. The following communes had the lowest income potential (Fig. 1):

- Lubomierz   PLN 735.49,
- Dziadowa Kłoda   PLN 831.06,
- Głuszyca   PLN 841.56,
- Międzylesie   PLN 907.43,
- Marciszów   PLN 909.08,
- Boguszów-Gorce   PLN 913.00,
- Malczyce   PLN 825.05.

In 2018, 53 municipalities will be above the average for the country, and there will be 30 communes above the ceiling of PLN 2000. The highest income potential was recorded in the following communes (Figs. 1 and 2):
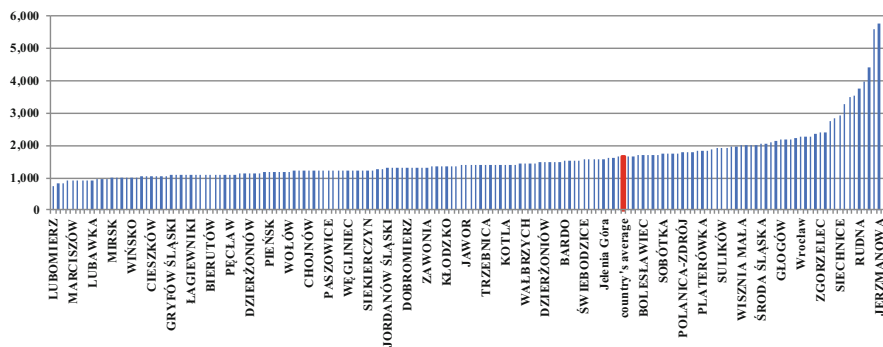
Fig. 1 The value of G factor for the communes of Lower Silesia Voivodship in 2018. Source: own study based on data from the Ministry of Finance
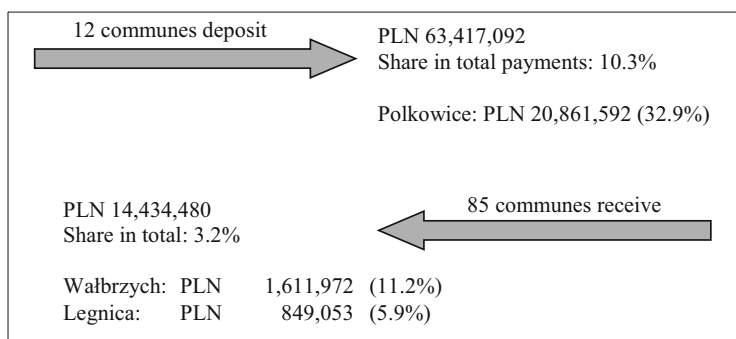
Fig. 2 Payments as part of a balancing subsidy at the level of municipalities of the Lower Silesian Voivodship. Source: own study based on data from the Ministry of Finance

- Kobierzyce   PLN   5808.52,
- Jerzmanowa   PLN   5753.53,
- Polkowice   PLN   5593.17,
- Bogatynia   PLN   4419.12,
- Grębocice   PLN   3990.28,
- Rudna   PLN   3774.25.

In Lower Silesian Voivodship in 2018, 12 communes will pay over PLN 63 million, and 85 communes will receive PLN 14.4 million. Therefore, the communes of Lower Silesian Voivodship are net payers—the value of payments made by 12 communes will exceed almost three and a half times the value of funds received by 85 municipalities under the horizontal system of financial equalisation. Among these 12 communes, there are four urban-rural, seven rural and one urban.

The share of payments under the balancing part of the general subsidy for communes in expenditures in 2017 was as follows:

1   Urban communes:
    –   Karpacz   2.5%,
    –   Lubin   0.8%,
2   Rural communes:
    –   Kobierzyce   9.2%,
    –   Grębocice   0.7%,
    –   Radwanice   0.3%,
    –   Lubin   3.6%,
    –   Rudna   6.5%,
    –   Jerzmanowa   6.8%,
3   Urban-rural communes:
    –   Bogatynia   5.8%,
    –   Polkowice   18.4%,
    –   Jelcz Laskowice 0.3%,
    –   Siechnice   0.5%.

Apart from the five communes (Polkowice, Kobierzyce, Jerzmanowa, Rudna, Bogatynia), the share of payments in total expenditure is not large. The share of the balancing subvention in the total revenues of the communes of Lower Silesia Voivodship did not exceed 1.4% in 2017. The highest share was in the following communes:

1   Urban:
    –   Boguszów-Gorce   1.1%,
    –   Kowary   0.9%,
    –   Lubań, Duszniki-Zdrój, Kudowa-Zdrój   0.5%,
2   Rural:
    –   Walim, Lewin Kłodzki   1.1%,
    –   Marciszów   0.9%,
    –   Jemielno   0.8%,
3   Urban-rural:
    –   Leśna, Głuszyca   1.4%,
    –   Lubomierz, Bystrzyca Kłodzka, Nowogrodziec   1.3%,
    –   Lubawka, Mieroszów, Wąsocz, Chocianów   0.9%.

As one can see, the share of the balancing subvention in total revenues is not high.

5   Conclusion

The analyses conducted so far shows that nowhere has it been possible to develop such a system of horizontal income equalisation that would not be controversial, either politically or technically. This issue is probably unsolvable neither on the scientific ground or by expert considerations. Entities obliged by law to pay fees may feel aggrieved by depriving them of the possibility to use the income generated by their residents for local community purposes, and LGUs subsidised from the

payments provided by more opulent units without such support would not be able to secure a minimum level of services to their residents. The subject matter of the income equalisation system on a national scale is the concept of solidarity that has a normative character, both political and ethical. M. Poniatowicz indicates the following disadvantages of this system (Poniatowicz 2011):

- constitutes excessive interference in the financial autonomy of LGUs, not meeting the principle of adequacy,
- "bad balance" of the mechanisms introduced not only distorts but also destroys the idea of financial solidarity,
- weakens the stimulative nature of LGUs' own revenues,
- is (perceived as) a form of punishment for good results, weakening the motivation of local government authorities to act to increase the efficiency of sources of own income,
- should be temporary, additional, complementary in the situation when vertical compensation mechanisms fail, i.e. from the central budget, becoming a permanent element of the LGU finance system instead,
- takes into account only the diversification of the income potential of LGUs,
- ignores the problem of the diversification of spending needs (e.g. it does not take into account the specific nature of expenses related to Warsaw's capital functions),
- the method of calculating the income potential of communes omits significant categories of own income, such as inheritance and donation tax, local and market fees, incomes from municipal assets,
- temporary shift and related historical mechanism as the method of diagnosing the current financial situation of LGUs (based on the data from the year preceding the base year).

The implemented mechanism of horizontal income redistribution undoubtedly requires changes. At present, it does not meet the principle of financial adequacy for communes with the highest income potential. The following changes should be considered:

- verification of methods for calculating the actual income potential,
- supplementing the horizontal compensation mechanism with elements that take into account the financial needs of individual LGUs,
- the introduction of a ceiling, beyond which the payers would cease to make payments,
- introduction of a local personal income tax or leaving communes with tax revenues within the first threshold of the progressive tax scale,
- diversification of the amount of property tax, depending on the size of the commune,
- introduction of a mechanism for the transfer of VAT paid from local government's investments to increase the balancing subsidy pool,
- the division of VAT into the so-called resident, paid by residents and held by the individual; and non-resident, paid by non-residents and disbursed to the central budget.

In addition, attempts to introduce specific changes must be preceded by an analysis of the effects, caused by the income compensation system in its current form. The results of the relevant research will answer the questions which elements of the system determine its effectiveness, where the amounts of co-financing amounts (both for the payers and the beneficiaries) alone are the issue, and in which these cash flows cause specific, measurable benefits and costs.

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Can Local Authorities Shape the Quality of Life?

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1 Introduction

The concept of the "quality of life" is a notion, that emerged after The II World War in the United States. Initially was considered only in the context of consumption—as a measure of the material, or rather social status. In the second half of the twentieth century the perception of this concept vitally expanded—it included not only "to have" dimension, but also "to be" dimension. "To be" was characterized by values such as: education, personal freedom or happiness (Tobiasz-Adamczyk 1996). Since then, the meaning of the "quality of life" has evolved. Some countries, recognizing the role of this social aspect, began to fund national research in this area, like Denmark, where, in 1994, "The Quality of Life Research Centre" was constituted. Also in Canada, The Ministry of Health funded nationwide surveys on the wellbeing of canadian citizens (Smith 2000).

Nowadays, the quality of life is perceived as an interdisciplinary phenomenon, which can be analysed in various aspects (Wnuk and Marcinkowski 2012). Income, consumption, or other indicators, characterising the material situation of individuals are no longer a reliable measure determining prosperity or well-being. We can say, that in a broad sense, the term "quality of life" is determined by factors that make life better. It includes issues related to conditions, in which people live, but also their

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needs and requirements. This concept was developed to facilitate the evaluation and measurement of people's well-being, satisfaction and happiness (Fadda 2003).

In the literature, the term "quality of life" is often equated with the concept of "well-being" (Theofilou 2013). Well-being reflect the level of people's satisfaction, not only with material aspects, but also with a spiritual dimension or health (Worach-Kardas and Kostrzewski 2014). That's way the analysis of this concept require much more complex, multidimensional approach. The main reason for this is that early, simple theories are usually unable to describe the society in sufficient way, but also, that in relation to the previous years, today we have much more reliable data (Miranda and Hojman 2018; Blendinger and Michalski 2018; Dobrovič and Timková 2017; Tkacova et al. 2017; Michalski 2016c; Ključnikov and Popesko 2017; Kozubíková et al. 2017; Simionescu et al. 2017; Soltes et al. 2017; Benda-Prokeinova et al. 2017).

Currently, there are two types of indicators, describing human well-being: objective measures, which are based on the resources and capabilities, to which people have access, and subjective ones, based on individual assessment of the circumstances of each person (Gilbert et al. 2016).

Public sector policy is rooted in such spheres as: social services, economic development and planning, taking into account environmental effects and management. In any case, local authorities focus on the protection and development of the quality of life of individuals and communities, by creation of places, in such a way, that would heighten the quality of life or wellbeing of citizens (Massam 2002), Michalski (2016a, b), Merickova et al. (2017), Gavurova et al. (2017), Belas et al. (2017), Simo et al. (2016)). As the literature study suggests, the diversity of subjective assessment of individual welfare is strongly affected by gender, age and a place of residence (Gilbert et al. 2016). In fact, cities have the potential to solve many everyday problems—both environmental, economic and social ones. Well designed and organised agglomerations can create sufficient conditions for a healthy and fulfilling life. On the other hand, poorly designed and organised cities, cannot provide a safe space, by generating air pollution and consuming a huge amount of energy. The impact of individual citygenic factors is significant from the point of view of the creation of city's strategy and policy, in such a way, which would allow the sustainable growth and the modernisation of cities in the turbulent times of climate change, pollution, increasing human populations and decreasing natural resources (Cloutier et al. 2014).

The role of the place of residence, as well as gender and age, in the creation of the quality of life, or well-being, of the residents is examined by OECD, within the framework of the initiative "Regional Well Being" (which is part of the "A Better Life" initiative). This research examine and compare the quality of life of 362 regions in 34 countries (OECD 2016). Creating the regional quality of life index, OECD propose the following categories (fields of assessment): education, work, income, safety, health, environment, civic engagement, access to public services and housing.

The aim of this research is the analysis of factors that affect the quality of life in terms of local conditions. In this study we employ a simplified assumption, that quality of life can be measured using a life expectancy (LE) at the age of 60 and 65.

We assume, that LE at the age of 60 or 65 is a cumulative effect of the good quality of life in an earlier period. *We formulate the research hypothesis (H1), which assumes that local governments, through employed policy, can influence the quality of life, measured by LE—by organizing such spheres as: education, work, health, the environment, or housing.*

Data is obtained from Regional Atlas, which is a separated part of activity of General Statistic Office, covering the years 2010–2016. The analysis is carried out at the level of voivodeships (regions—NUTS2).

2 Methodology and Data

Every year, the average life expectancy, in all continents, extends (Global Health Observatory Data Repository 2018). We can observe, that the state of health has a direct impact on longevity. On the other hand, health is one of components of quality of life or wellbeing. Since health is a multidimensional concept, also the quality of life in health is one of the components of quality of life. It is also important, that, in the context of health, quality of life should be seen, again, as a multidimensional notion—including issues of physical, mental, emotional and social wellbeing (Ferrans 2005). All above factors are influenced by the environment. P. Lalonde (1974), who created the concept of "fields of health", emphasises, that the state of health is strongly influenced by our lifestyle (50%) and environment (20%). More-over, this state of health can be exemplified by LE. The life expectancy (LE) is one of the key indicator of population's quality of life, which allows the analysis of health status both on the basis of gender and place of residence. We also assume, that the LE at the age of 60 and 65, for a given social group is the result of the total LE obtained by individuals.

Dependent variables in estimated econometric models are life expectancies for women and men aged 60 (LEF_60; LEM_60) and 65 years (LEF_65; LEF_60). We decide to use life expectancies for people in a middle age, taking into account, that the life expectancy of 0-year-old is strongly affected by perinatal mortality due to, for example, genetical disorders. This approach assumes that the health of people in the middle age, expressed by the LE_60, the LE_65, is largely related to environ-mental factors. Explanatory variables represent spheres of life, that can be created, or stimulated, by local authorities (Table 1). All analysed variables have normal distribution (Shapiro-Wilk test).

Variables representing financial resources (EXP, INC, INC_M) are very impor-tant from the point of view of local governments' potential to provide essential public goods and investments in social infrastructure. This impact can be described both from the revenue and spending side. Other variables represent infrastructural resources, for example a number of pre-school centres (PSC),[1] the number of ambulatory health care centres (AMC), or housing conditions (FLA,UFA). The

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[1]Pre-school centres are financed from local government funds. Other levels of education, even there are owned by local authorities, are state-subsidized.

Table 1 Explanatory variables (candidates)

Variable	Description
EXP	Expenditure of municipalities and county cities per capita
INC_P	Budgetary income of provinces per capita
UNE	Unemployment rate (registered)
EMG	Emission of gaseous pollutants
AMC	Ambulatory clinics per 10,000 citizens
BIM	Balance of internal migration, per 1000 population
FLA	Flats put into use, per 10,000 population
UFA	Usable floor area of one flat put into use
PSC	Pre-school centres
INC_M	Income of the budgets of the municipalities and county cities per capita
DOP	Density of population
STU	Students per 10,000 population
EXP_P	Expenditure of provinces per capita
RNW	Part of renewable energy in total electricity production
SWE	Sewage system utilisation (% of population)
PLM	Plumbing system utilisation (% of population)
AUF	Usable floor area per person
IEP	Investment expenditure per capita
RDE	Expenditure on R&D per capita
REG_N	Enterprises newly registered in the REGON system per 10,000 working-age population
REG	Enterprises registered in the REGON system per 10,000 population
PRO	Sold production of industry per capita
GDP	Gross domestic product per capita
GAP	Global agricultural production per 1 ha of agricultural land
EDU	Part of people aged 25–64 studying and training (% of population at the same age group)
MSW	Population using municipal sewage treatment plants (% of total population)
WBB	Wastewaters treated biologically and with increased biogen removal in total wastewaters
MWC	Mixed municipal waste collected from households per one inhabitant
GAR	Share of green areas in total area
EDP	Emissions of dust pollution
PRH	Public roads with a hard surface of 100 km^2
PRH_I	Public roads with a hard surface improved for 100 km^2
PCR	Passenger cars registered per 1000 population
NBH	Average number of people in the household
DIH	Average monthly disposable income per person in a household
GWG	Average monthly gross wages in relation to the national average (excluding economic entities employing up to nine people)
RPP	The average gross monthly retirement pay and pension for people from non-agricultural social security system
SAB	People using social assistance benefits for 10 thousand population

Table 1 (continued)

Variable	Description
CCN	Percentage of children aged up to 3 years covered by care in nurseries
BGH	Population per one bed in general hospitals
SWH	Places in social welfare homes
APC	Advice provided in primary care

Table 2 Model 1—LS estimation, using 112 observations

	Coefficient	Standard error	t-student	p-value
const	15.3701	0.84781	18.1291	<0.0001
EXP	0.000864883	8.58E-05	10.0859	<0.0001
INC	0.000558934	0.000267051	2.093	0.0388
UNE	−0.0475301	0.00905469	−5.2492	<0.0001
EMG	−3.95E-08	3.82E-09	−10.333	<0.0001
AMC	0.122484	0.0367377	3.334	0.0012
FLA	0.033096	0.00594357	5.5684	<0.0001
UFA	0.0387555	0.00462579	8.3781	<0.0001
BIM	−0.268495	0.0407333	−6.5915	<0.0001
PSC	2.15E-06	1.11E-06	1.9413	0.055

unemployment rate (UNE), as well as the balance of migration (BIM), describe social environment, while the emission of gaseous pollutants (EMG), emissions of dust pollution (EDP), wastewaters treated biologically and with increased biogen removal (WBB) allow to assess the general state of biological environment.[2]

In this analysis we employ the tools of econometric modelling, above all, the method of least squares (LS) as well as fitting model measures, such as: the Akaike information criterion, the Hannan-Quinn criterion, as well as the Schwarz-Bayes criterion. Calculations are supported by Statistica 10 Package.

3   Results and Discussion

Model 1. Life expectancy is an endogenous variable that allows the quantitative assessment of the quality of life. In the model 1 the expected life expectancy for women at the age of 60 years (LEF_60) is a dependent variable. The estimated model indicates, that variables EXP, INC, UNE, EMG, AMC, FLA, UFA, BIM, PSC explain in 82.97% the state of women's health in the age of 60 years (Tables 2 and 3).

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[2]This variable is selected due to a "SMOG problem".

Table 3 Fitting measures (model 1)

Average value of dependent variable	23.86946
Residual sum of squares	104.5268
Coefficient of determination R-squared	0.829739
F(8, 103)	55.23131
Credible interval	−155.054
Schwarz'Bayes—criterion	357.293
Standard deviation of the dependent variable	0.55077
Final prediction error	0.312597
Adjusted R-squared	0.814716
p value for test F	3.06E-35
Akaike information criterion	330.108
Hannan-Quinn criterion	341.1379

Table 4 Model 2—LS estimation, using 112 observations

Name	Coefficient	Standard error	t-student test	p-value
const	11.7548	0.701508	16.7565	<0.0001
EXP	0.000852533	7.18E-05	11.8733	<0.0001
INC	0.000542583	0.000232253	2.3362	0.0214
UNE	−0.0327022	0.00795473	−4.111	<0.0001
EMG	−2.99E-08	2.73E-09	−10.939	<0.0001
AMC	0.0987877	0.0310219	3.1845	0.0019
FLA	0.0325393	0.00479094	6.7918	<0.0001
UFA	0.0347226	0.00377492	9.1982	<0.0001
BIM	−0.238989	0.0372696	−6.4124	<0.0001

Assuming the stability of others factors we can suppose, that the increase in per capita spending of one thousand PLN is accompanied by an increase in LEM_60 of 0.865 year, as well as the same growth of revenue of province's budgets would extend the life of women by 0.559 year. The increase in unemployment rates by 1 percentage point, would shorten the length of women's life by about 0.0475 year. The higher emission of gaseous pollutants (one million tonnes per year) would shorten the average lifetime of women by 0.039 years.

The model 1 is characterised by a very good fit to empirical data ($R^2 = 0.8297$; $F_{(8,103)} = 55.2313$; $p < 0.0001$). Additionally, the rests are characterised by normal distribution ($\chi^2_{(2)} = 1.4216$; $p = 0.4913$).

Model 2. The analogous estimation is carried out for LEF_65. The dependant variable is explained using eight explanatory variables: EXP, INC, UNE, EMG, AMC, FLA, UFA, BIM (Tables 4 and 5).

We can observe that, assuming a stable character of other variables, almost the same pattern as in the case of LEF_60. We can also indicate, cognately, the positive relationship between the expected length of life and variables describing housing conditions (UFA, FLA) and the availability of health care services (AMC).

Table 5 Fitting measures (model 2)

Average value of dependent variable	19.77732
Residual sum of squares	7.177267
Coefficient of determination R-squared	0.836802
F(8, 103)	66.01696
Credible interval	−157.162
Schwarz'Bayes—criterion	356.7904
Standard deviation of the dependent variable	0.476551
Final prediction error	0.263974
Adjusted R-squared	0.824127
p value for test F	4.31E-37
Akaike information criterion	332.3239
Hannan-Quinn criterion	342.2507

Table 6 Model 3—LS estimation, using 112 observations

Name	Coefficient	Standard error	t-student test	p-value
const	12.185	0.670149	18.1825	<0.0001
FLA	0.0137922	0.00380576	3.624	0.0004
UFA	0.0379588	0.00428215	8.8644	<0.0001
PSC	2.99E-06	8.11E-07	3.6821	0.0004
INC_M	0.000759429	5.42E-05	14.005	<0.0001
UNE	−0.0368538	0.0089179	−4.1326	<0.0001
EMG	−4.02E-08	2.94E-09	−13.6554	<0.0001

This model is characterised by a very good fit to empirical data ($R^2 = 0.8368$; $F_{(8,103)} = 66.01696$; $p < 0.0001$) and the rests have normal distribution ($\chi^2_{(2)} = 2.08281$; $p = 0.352959$).

Model 3. In the model 3, the dependant variable is further life expectancy for men aged 60 years (LEM_60). We demonstrate that men's quality of life can be (in 87.13%) explained using six variables (FLA, UFA, PSC, INC_M, UNE, EMG) (Table 6).

The analysis indicate that the quality of life of men (LEM_60) is influenced, partly, by other variables than in the case of women. Housing conditions seem to play an important role, as well as availability of pre-schools. As in the case of women, an increase in unemployment rates, as well as an increase in the emission of gaseous pollutants are associated with some decrease in the quality of life (respectively 0.0368 and 0.040 years shorter life expectancy) (Table 6).

This model is also characterised by a very good fit to empirical data ($R^2 = 0.8714$; $F_{(8,103)} = 118.5618$; $p < 0.0001$) and the rests have normal distribution ($\chi^2_{(2)} = 5.8008$; $p = 0.0550$) (Table 7).

Model 4. Model 4, where the dependent variable is LEM_65, using six variables, explains, in 87.77%, the quality of life of men at the age of 65 years (FLA, UFA, PSC, INC_M, UNE, EMG) (Tables 8 and 9).

Table 7 Fitting measures (model 3)

Average value of dependent variable	18.71223
Residual sum of squares	9.679261
Coefficient of determination R-squared	0.871382
F(6, 105)	118.5618
Credible interval	−156.6912
Schwarz'Bayes—criterion	346.412
Standard deviation of the dependent variable	0.573886
Final prediction error	0.303617
Adjusted R-squared	0.864032
p value for test F	1.93E-44
Akaike information criterion	327.3825
Hannan-Quinn criterion	335.1033

Table 8 Model 4—LS estimation, using 112 observations

Name	Coefficient	Standard error	t-student test	p-value
const	9.93507	0.613966	16.1818	<0.0001
FLA	0.0120906	0.00342913	3.5259	0.0006
UFA	3.09E-02	3.92E-03	7.8833	<0.0001
PSC	2.34E-06	7.21E-07	3.2429	0.0016
INC_M	0.000678294	4.95E-05	13.7108	<0.0001
UNE	−3.37E-02	8.19E-03	−4.1101	<0.0001

Table 9 Fitting measures (model 4)

Average value of dependent variable	15.45973
Residual sum of squares	7.363668
Coefficient of determination R-squared	0.877719
F(6, 105)	125.6134
Credible interval	157.2004
Schwarz'Bayes—criterion	34.4303
Standard deviation of the dependent variable	0.486468
Final prediction error	0.264821
Adjusted R-squared	0.870732
p value for test F	1.38E-45
Akaike information criterion	328.4008
Hannan-Quinn criterion	336.1216

The results indicate that the factors that affect the quality of life of men do not change with age. A similar pattern can be observed in the case of women—increase in age does not change the set of explanatory variables in estimated models (Table 8).

The model 4 is also characterized by very good fit to empirical data ($R2 = 0.8777$; $F(8,103) = 125.6134$; $p < 0.0001$) and the rests are characterised by normal distribution ($\chi2(2) = 2.14002$; $p = 0.3430$) (Table 9).

The results presented above allow us to adopt the research hypothesis (H1). We can conclude that local authorities can affect the quality of life, expressed by further

life expectancies of middle aged women and men, by creating the favourable environment.

4 Conclusions

Presented research suggests, that local authorities can affect local quality of life by creating and stimulating the beneficent environment. Regardless of gender and age, the quality of life represented by life expectancies is determined by several factors, among all: housing conditions, unemployment rates and the level of emission of gaseous pollutants, when the first factor is a stimulant and others have a detrimental impact. We can also observe that the quality of life of women is affected by more factors than in the case of men, for example the availability of ambulatory care which is insignificant from the point of view of men. We can also conclude, that the set of explanatory variables doesn't change with age—the gender seems to be the most important factor.

This problem—important from the point of view of sustainable development—requires, certainly, further analysis. While the impact of some factor seems to be undisputable, like the emission of pollutants, in some cases it is not so obvious—for example in the case of the availability of pre-schools.

Limitations of the analysis are related to the choice of dependent variable—the adoption of another dependent variable, which illustrate the quality of life, could affect importantly obtained results. We should also note that the quality of life at local level is affected by factors, which are beyond the control of the local authorities (e.g. expenditure on health services)—those dimensions are not analysed as candidate variables. Apart from that, this study allow us to identify, at least to a certain extent, the policy areas which are important from the point of view of the local quality of life.

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Participatory Budgeting in Polish Cities: Funds' Allocation Mechanism

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1 Introduction

Participatory budgeting (PB) is a local policy instrument aimed at activating the inhabitants through their direct involvement in the process of deciding on how to allocate public funds. The PB idea was born in the Brazilian city of Porto Alegre in the late 1980s (Bhatnagar and Rathore 2003). It was supposed to include the excluded (poorer) groups of the local community in the process of deciding on public tasks. In Poland, the first PB was introduced in Sopot (2011), then in Elbląg, Gorzów Wielkopolski, Poznań and Zielona Góra (2012). In 2017, over 97% of cities with district rights in Poland have PB. The elevated profile of PB in Polish cities seems to be a result of increasing awareness among Polish citizens on the potential benefits arising from PB (cf. Introduction). Indeed, as noticed by Kraszewski and Mojkowski (2014), PB's popularity in Poland is the effect of the growing awareness of residents about the potential benefits of PB, including building a civil society and better spending efficiency. Especially the latter, i.e. better spending efficiency, is often indicated as a key factor that increases PB popularity (Wampler 2012). In addition, factors such as the copying ("imitation") of other cities' activities, the interest of the media and, during the election period, the populist activities of local authorities determine the popularity of PB. These findings are coherent with international trends, which clearly indicate that PB has globalized lately (Grillos 2017; Uddin et al. 2018).

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PB is a new model for managing public funds, where citizens have the ability to influence the priorities for local activities. In Poland, projects financed under PB are characterized by considerable variation in: (a) the type of investment (social, infrastructural), (b) coverage (citywide, "local") and (c) size of funds (small, large). This paper aims to show the variance in funds allocation mechanisms within PB in cities with district rights in Poland in relation to project types, taking into account PB's overarching objective of involving citizens in the process of deciding on the allocation of scarce public resources for city tasks in a way that corresponds with their needs reported under PB.

2 Conditions of Participatory Budgeting in Polish Cities

Each local government unit (LGU), including a city with district rights, has a legally defined directory of tasks (Act on Commune Self-Government 1990) and the sources of funding assigned to them. LGU runs its own financial business and its primary focus is budget. Public tasks are defined as expenditures, while the sources of their funding—as income. In Polish systemic regulations, the local government budget is an annual financial plan adopted in the form of a resolution (Public Finance Act 2009). By treating PB as a multi-stage decision-making process for allocating funds within the local government budget, some authors point out the erroneous nature of calling this process a "participatory budget" (Drozdowski 2014). Hence, it is expedient to define PB as a financial plan separated from the LGU budget for the performance of tasks resulting from the citizens' participation in the process of budget funds allocation, in accordance with the principles set out in the ordinance of the executive bodies of the LGU.

PB should be considered in its social, political and economic aspects. In the social dimension, PB can be encompassed within the concept of local governance (Bovaird 2002). This concept refers to the building of a system of links between different levels of power (the citizens of local government units, the powers within the local government units, councils representing local communities), each with different tasks, but pursuing common or similar goals (Wiktorska-Święcka 2014), including shaping civic attitudes and responsibility for the common good (Kębłowski 2003).

In the political dimension, PB is the result of a compromise between local authority and the electorate. Some authors point out that the introduction of PB by local authorities increases the probability of re-election of the mayor or president. Hence, it can be concluded that PB also influences the legitimacy of power. There is an improvement in communication between local authorities and residents, which results in increased confidence (Dolewka 2015). PB is defined as a flexible decision-making model based on informal links between local government and the local community (Łukomska-Szarek 2014). It is therefore one of the mechanisms for involving local communities in the redistribution of local government funds (economic dimension (Dworakowska 2014). As Wampler (2012) notes, the growing interest in the PB formula is due to the fact that the instrument fulfills two complementary functions:

firstly, PB contributes to increasing the efficiency of public spending (for socially desirable projects—contributing to improving the living conditions of the local community) and secondly, it strengthens grassroots movements by giving residents the opportunity to decide how their living space will be shaped (social dimension).

PB rules are not systematically regulated. There's an ongoing discussion within the literature on the subject; and, on the one hand, proposals are being made to create uniform legal solutions (Kajdanek 2015), and on the other hand, there are suggestions that the existence of an "additional" budget would violate the principle of unity and completeness of the budget (Czarnecki 2014). There is, therefore, a certain collection of features set by practice, that characterize PB (Jastrzębska 2014; Standardy procesów (...) 2014; Kajdanek 2015; Sześciło 2013). The basic principle is public dialogue between the residents and the city authorities. The amount of financial resources allocated to PB, the rules for their division, evaluation and selection of projects must be defined and known to the population. Care must be taken to ensure that the PB rules are sustainable and that the PB implementation is carried out with the participation of residents and the whole area of the city. In addition, the PB results must be binding for the city authorities.

The majority of PB in Poland do not meet the above mentioned characteristics (Kębłowski 2014). According to Kębłowski (2014) 90% of them. This is also confirmed by research carried out within the Stefan Batory Foundation, presented in the publications of Kraszewski and Mojkowski (2014). Furthermore, literature highlights that the actual degree of local community participation in the process of shaping PB's urban policy is meager. Szaranowicz-Kusz (2016) argues that the influence of residents on the redistribution of public funds is irrelevant. They decide, on average, about 0.5% of the municipality budget (funds' redistribution factor). In literature, the question is whether one can ever talk about the existence of a universal PB structure (Sintomer et al. 2008; Dolewka 2015). This is primarily due to the fact that there are many different mechanism, procedures and institutions under the concept of "participative budgeting" (Sintomer et al. 2008).

3   Data and Methods

The research procedure allows three main stages to be distinguished: (1) identifying the subjective and temporal scope of the study; (2) identifying source of data; and (3) systematizing the collected data, and their quantitative and qualitative analysis. The scope of the conducted research covered all cities with district rights in Poland. The choice of the cities with district rights in Poland was deliberate, and was due to the fact that under Polish conditions the vast majority of PB is being implemented in the largest urban centers (i.e. cities with district rights), with a small (municipalities) or marginal (rural communes, voivodships) interest in the PB formula in other types of local government. Of the 66 cities with district rights in Poland, 64 have PB. Selective targeting of a homogeneous group of LGUs in terms of administrative division allows: (a) to increase the representativeness of the conducted research, and

(b) to make comparisons between individual cities. At this point it should be made clear that the district rights are granted to cities which on 31st December 1998 had more than 100,000 inhabitants, cities which ceased to act as voivodship cities on that day, and those who were granted the district rights in the first administrative division of the country into districts (Act on Powiat Self-government 1998). The period of the analyzed documents covered the year 2016 (i.e. the year of preparation of the analyzed documents), while their content concerned PBs carried out in 2017.

To collect data, a method of documentary research (Scott 1990) was used for documents on establishing PBs in cities with district rights in Poland. Three types of documents were analyzed: (1) decrees of city presidents on PB; (2) city council resolutions on PB; and attachments to the aforementioned documents in the form of (3) PB regulations. The entire documentation was taken from the Public Information Bulletin of individual cities. Examination of documents was both quantitative and qualitative. At the quantitative level, information was obtained on the size of PB in individual cities, the funds allocation algorithms used between individual parts (e.g. districts) of the city, as well as arbitrary divisions (quota thresholds) into large and small projects. The qualitative aspect was aimed at obtaining information on the conditions that the projects should meet in order to be funded under PB.

Systematization of the collected data consisted of their tabulation and quantitative and qualitative analysis. Within this task, and based on the collected data, all cities were classified in terms of the division of projects due to:

– Type of investment to be implemented, i.e. investment projects ("hard") and social projects ("soft")—see Fig. 1.
– Scope of the project's impact, i.e. citywide and "local" (neighborhood) projects—see Fig. 2; as a part of this task, special emphasis was put on the presentation of the percentage of funds allocated to PB for both types of projects—see Fig. 3.
– The distribution of funds allocated to PB, i.e. the arbitrary (rigid) and proportionate distribution—see Fig. 4. In addition, for those cities where there is a
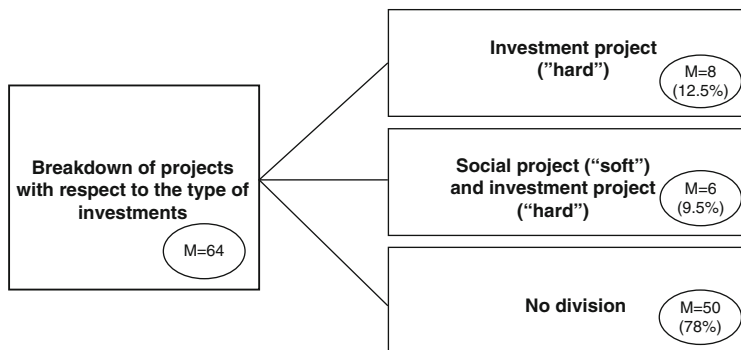

Fig. 1 Breakdown of projects implemented within PB in cities with district rights in Poland due to the type of investment to be undertaken. Note: M—the number of cities with district rights that implement the division
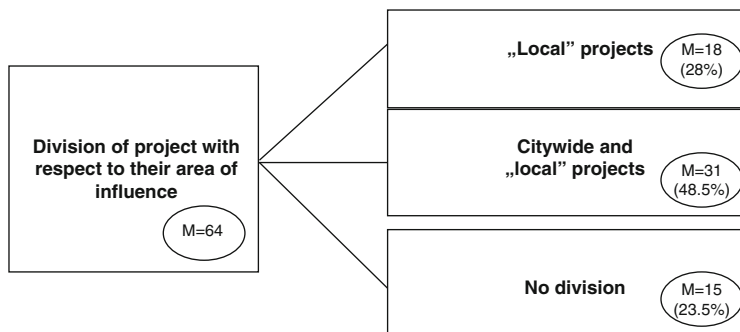
Fig. 2 Division of PB projects realized in cities with district rights in Poland with respect to their area of influence. Note: M—the number of cities with district rights that implement the division
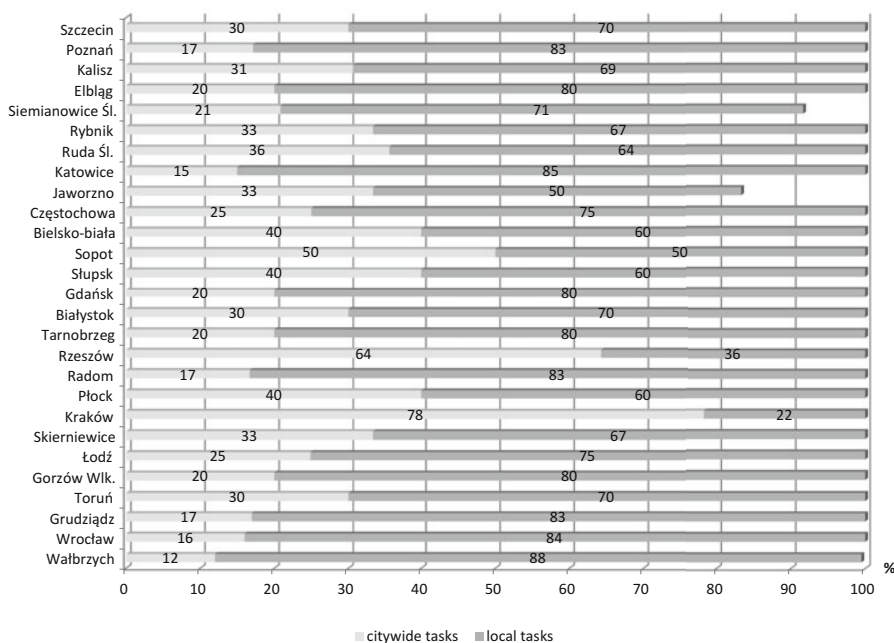
Fig. 3 Share of funds allocated from PB to citywide and local tasks in cities with district rights in Poland. Note: In the cities of Jaworzno and Siemianowice Śląskie, the share of funds allocated to PB for individual tasks does not add up to 100%, as part of the budget is dedicated to maintaining the quality of the facilities created under the PB and the Youth Civil Budget. The following cities are not included in the figure: Nowy Sącz, Warszawa, Piekary Śląskie and Olsztyn, due to the lack of data concerning the allocation of funds for citywide and local tasks

proportional distribution, the criteria to be taken into account in setting the PB-amount were presented, see Table 1.

– The amount of funds allocated, i.e. small and large projects—see Table 2.

ARBITRARY DIVISION	PROPORTIONAL DIVISION
Uniform division of funds for individual ancillary unit (17 cities)	**Division of funds according to the adopted algorithm taking into account the number of inhabitants and area of the auxiliary unit (11 cities)**
	Division of funds according to the number of inhabitants of each unit (8 cities)
Division of funds carried out by each district board (2 cities)	

Fig. 4 Funds allocating mechanism for the implementation of "local" projects in auxiliary units in cities with district rights in Poland

Table 1 Distribution of funds for the implementation of local projects in cities with district rights in Poland

City with district rights	Funds distribution mechanism for realization of local project in particular auxiliary unit
Grudziądz	50% of funds equally for each of the districts; 50% of funds in proportion to the number of inhabitants of each district. The amount of funds allocated to a particular district cannot be less than 100,000 PLN
Toruń	50% of funds divided equally in all 13 districts; 25% of the funds distributed between districts in proportion to the number of inhabitants in each constituency; 25% of funds divided between districts in proportion to the area of each district
Łódź	The amount for a given district is the sum of the fixed amount of 200,000 PLN and the amount directly proportional to the number of inhabitants of this settlement; the sum is rounded to the nearest PLN 10,000
Częstochowa	10% is the base amount—the same for each district; 20% is the amount proportional to the district's share of the city's area; 45% represents the share of the population of the district in relation to the population of the city
Katowice	40% of the pool is divided in equal parts between all auxiliary units (representing the base amount); 60% of the pool is shared in proportion to the population of each ancillary unit

Table 1 (continued)

City with district rights	Funds distribution mechanism for realization of local project in particular auxiliary unit
Piekary Śląskie	a fixed amount of 50 thousand PLN per county; Variable amount—being the product of the population of the given district and the amount of 29 PLN
Siemianowice Śląskie	a fixed amount of 50 thousand PLN per county; Variable amount—being the product of the population of the given district and the amount of 12.37 PLN
Sosnowiec	60% of the remaining funds will be distributed among local consultation zones in proportion to the number of inhabitants of the local consultation zones; 30% of the remaining funds will be distributed among the local consultation zones in proportion to the area of the local consultation zones; 10% of the remaining funds will be distributed among the local consultation zones in proportion to the turnout in the second edition of the civic budget in each local consultation zone; 1% of the funds are donated to promotional activities for the civic budget
Gliwice	40% of the amount is divided equally between all settlements, and 60% of the amount is divided proportionally to the number of people registered in each housing estate Amount for each neighborhood = 40% of the amount/21 + [(number of people registered in the neighborhood/number of people registered in the city) * 60% of the amount]
Jastrzębie Zdrój	40% of the base amount is divided into each ancillary in the same amount; 30% of the base amount is allocated to each ancillary unit in proportion to its area; 30% of the base amount is divided into each ancillary unit in proportion to the number of its inhabitants
Poznań	70% of the amount divided by the number of inhabitants of the area; 30% of the quota divided by area of the district in km^2

Table 2 Division of projects based on amount thresholds

City	Amount thresholds for each project type [in million PLN]	
	Large	Small
Wrocław	Up to 0.75	Up to 0.25
Lublin	From 0.5 to 1.2	From 0.05 to 0.5
Zielona Góra	Over 0.15	Up to 0.15
Opole	Over 0.1	Up to 0.1
Suwałki	Up to 0.7	Up to 0.1
Zabrze	No data	No data
Kielce	Over 0.15	Up to 0.15
Elbląg	–	Up to 0.025
Konin	From 0.1 to 1.0	Up to 0.09
Koszalin	From 0.05 to 0.5	Up to 0.05
Leszno	From 0.15 to 0.4	From 0.01 to 0.15

4 Results and Discussion

4.1 Investment ("Hard") and Social ("Soft") Projects

The results show that in the vast majority of examined cities (78% of all cities analyzed), no detailed conditions were set for PB-funded projects. Nevertheless, the projects submitted should be within the limits of the city' tasks and its competences. No restrictions on the possibility of submitting projects in these cities should be considered a positive phenomenon. This is due to the fact that excessive interference by the local authorities in civic initiatives can lead to the distortion of bottom-up ideas that underpin PB. Furthermore, as for example Wampler (2012) notes, inhabitants know the problems of their city (district) best and thus can better define the type of the needs reported in civic initiatives. However, it is also important to note that some other authors claim, that PB is unnecessary because local authorities already represent citizen's point of view (Cabannes 2004; Kębłowski 2014; Schimanek 2015; Pedersen and Johannsen 2016; Williams and Bristow 2017).

The nature of the implemented projects was determined in 14 cities (22% of the total analyzed cities), where six cities divided the projects into investment and social ones, while in the other eight cities it was indicated that the projects should be of an investment character. Investment projects are the so-called "hard" projects of development or modernization significance, resulting in the creation of new fixed assets, purchase of equipment, renovation, modernization or adaptation of already existing facilities. In five cities (i.e. Przemyśl, Szczecin, Jaworzno, Zabrze, Świnoujście) the characteristics of investment projects were specified. For example, in Przemyśl and Szczecin, investment tasks should involve the creation or purchase of new fixed assets, or the modernization, overhaul or adaptation of existing infrastructure with a unit value of over 3500 PLN (Regulamin Budżetu Obywatelskiego Miasta Przemyśl (. . .) 2016). In Jaworzno, these tasks should be related to technical infrastructure or sports and recreation, excluding their placement in educational facilities and communal buildings, except in the absence of such investments in the immediate vicinity (Uchwała nr XVIII/263/2016 (. . .) 2006).

In Zabrze, an investment project is considered to be a project that is a complex of activities resulting in the creation of a fixed asset as meant by the Accounting Act of 29 September 1994. The effect of a modernization project implemented in this city should be the improvement of an object (device, building or parts thereof), which results in its better usable value, while renovation projects are projects that result in renovation, consisting in restoring the value (technical, economic) of an object (a device, building or parts thereof) (Regulamin wyboru projektów (. . .) 2016). In Świnoujście, investment purchases are made under PB, which cover fixed assets not included in the first equipment and whose initial value is higher than the amount specified in art. 16f of the Corporate Income Tax Act of February 15, 1992, and where depreciation write-offs on these fixed assets are not made at one time, or no depreciation deductions are made from them in the cases specified in the Act (Regulamin Budżetu Obywatelskiego Gminy Miasto Świnoujście (. . .) 2016). In Rzeszów,

investment projects were designated as Category I and Category II projects. They concern the construction, modernization or repair of urban infrastructure, as well as the construction, modernization or repair of housing infrastructure. Their estimated value may not exceed 1,500,000 PLN for urban infrastructure and 150,000 PLN for residential infrastructure (Uchwała nr XXIII/505/2016 Rady Miasta Rzeszowa (. . .) 2016). The second group of projects eligible for PB funding are non-investment projects, so called "soft" ones. These are social projects in the fields of education, culture, health, sport, ecology and the environment, including activities such as workshops, training, courses, activities, concerts, etc. Only two cities have defined the maximum value of social projects—Rzeszów, where the estimated value of the task cannot exceed 100,000 PLN (Uchwała nr XXIII/505/2016 Rady Miasta Rzeszowa (. . .) 2016) and Słupsk, where the value of a single social task of a social character cannot exceed 25,000 PLN (Regulamin Słupskiego Budżetu Partycypacyjnego (. . .) 2016).

4.2 Citywide and "Local" (Neighborhood) Projects

Another element that differentiates the functioning of PB in the analyzed cities is their division in terms of their range of influence. Under this criterion, citywide projects and "local" projects can be distinguished. The first serve the needs of the community of the whole city, while the other are directed to the residents of one or several settlements, neighborhoods or districts or parts thereof, e.g. streets. At this point, it should be noted that in several cities, citywide projects have been identified as "urban projects" (Rzeszów), "supralocal projects" (Piekary Śląskie), "integrated projects" (Olsztyn) or "district-wide projects" (Warszawa).

The division into city and local projects occurs in 48.5% of the analyzed cities (Fig. 2). In 28% of the analyzed cities, PB's tasks are local, i.e. they serve the needs of the residents of one auxiliary unit. Some cities (e.g. Przemyśl, Biała Podlaska) allow performing tasks on several auxiliary units. In the remaining 23.5% of the analyzed, civic projects must meet above all the requirement of universal accessibility.

The division of PB funds into citywide and "local" projects should primarily serve to ensure equal access to PB resources as well as to level the quality of life between different parts of the city. The introduction of quotas allocated to individual districts (neighborhoods/boroughs) reduces the situation in which the largest quarters receive the majority of the funds, while marginalizing the smaller districts. Therefore, it is important to assign an appropriate amount from the PB budget to carry out the tasks for the inhabitants of the area. The analysis showed that in the analyzed cities with the division of tasks into citywide and local tasks, on average 70% of PB funds are allocated to local tasks. In 75% of cities the amount allocated to local tasks is no more than 80% PB, whereas in 25% of cities the amount is larger than 80%. The amount of funds for the implementation of "local" tasks in individual cities with district rights is characterized by high volatility (the coefficient of variation is 121%). The largest part of PB funds for local tasks was allocated in

Wałbrzych (88%) and Katowice (85%), whereas the lowest in Kraków (22%) and Rzeszow (36%) (see Fig. 3). On average 30% of the total funds are allocated to tasks carried out in more than one auxiliary unit of importance to the general population. In 25% of cities, the amount allocated to citywide tasks is no more than 20% of the total PB, and 75% is equal to or greater than 20%. Similarly to the amount allocated to "local" projects, it is characterized by high volatility (the coefficient of variation of 104%).The largest part of the civic budget allocated to citywide tasks was seen in Kraków (78%) and Rzeszow (64%), while the lowest in Wałbrzych (13%) and Katowice (15%). The minimum amount allocated for citywide tasks was 0.4 million PLN (Tarnobrzeg), while the maximum amount of 9.9 million PLN (Łódź).

The mechanism for allocating funds for the implementation of "local" projects (regardless of whether citywide tasks are differentiated) is varied. In 17 cities with district rights (e.g. Wrocław, Gorzów Wielkopolski, Skierniewice, Radom, Tarnobrzeg, Bialystok, Sopot, Bielsko-Biała, Jaworzno, Ruda Slaska, Świętochłowice, Żory, Szczecin, Chełm, Zamość, Piotrków Trybunalski and Chorzów) it was assumed that funds allocated to local tasks will be the same for each auxiliary unit (Fig. 4). Depending on the city, this amount accounted for 3% of the total budget allocated to local projects per each estate or area (e.g. Bielsko-Biała, Jaworzno) to 7% of the total budget for local projects in each region (e.g. Wrocław). In Kraków, neighborhood authorities decided on the amounts allocated for each district tasks. The largest quota allocated for the implementation of local tasks amounted to PLN 0.4 million (17% of the total budget for local projects). In Warszawa, the overall amount allocated for PB implementation in the district is determined by the District Board, within the limits specified by the President of Warszawa, considering the financial possibilities of the district. In Wałbrzych, Rybnik, Przemyśl, Bytom, Dąbrowa Górnicza, Tychy, Biała Podlaska and Zabrze, the amount allocated to local projects depends on the number of inhabitants of a given auxiliary unit.

In some cities with district rights (11), the distribution of funds from the local pool is done according to an algorithm that takes into account, among other things, the amount equal to all ancillary units and the amount calculated in proportion to the number of inhabitants and the area of each auxiliary unit. In addition, in Sosnowiec, in calculating the share of resources allocated to "local" tasks, the turnout of the previous PB in individual city areas is taken into account (Table 1). Such activities can have a positive impact on increasing the citizen participation in the implementation of civic budgets in the future. In addition, the use of algorithms and the dependence of the distribution of PB funds on specific areas is in pursuit of social justice in the distribution of public funds between individual areas of the city.

4.3 "Small" and "Large" Projects

Under PB, in some cities with district rights (11 cities, 17%) projects are differentiated by their size i.e. the quota thresholds for single task are set (Table 2). Projects

are defined as so-called "small" projects or "large" projects. The quota rates are individually defined in each city.

The introduction of amount thresholds may lead to competition among residents and the reporting of large numbers of small projects that will not actually reinforce the belief that civic budget is a valuable tool for making a difference in the city, as these projects will primarily address the problems or needs of a narrow population. The same may result from a situation of limiting funds for large projects, i.e. setting the upper limit of spending (Wrocław, Suwałki, Lublin, Konin, Koszalin). Such practices lead to the reduction of projects that are important for improving the quality of life of the population (e.g. the construction of new sports facilities) and thus undermining the importance of PB for society.

5   Conclusion

The conducted research aimed at analyzing the mechanisms of allocation of funds within PB in cities with district rights in Poland and an attempting to outline the existing differences and similarities in this area among 64 analyzed entities. According to the conclusions presented below, under Polish conditions, PB is a very differentiated local policy instrument aimed at activating the local community. Probably the existing diversification of the allocation mechanisms within PB is due to the lack of systemic regulation in this area and the fact that the instrument is relatively new, which in turn may favor the search for optimal solutions by individual cities. Undoubtedly, further research is needed, which should aim to be a comprehensive analysis of the functioning of PB in Poland, both from the point of view of local governments and residents. It is also opportune to create a set of "good practices" that could be used to promote decent solutions.

Literature and empirical studies have led to the following general conclusions:

- In Poland, PB is a new local policy instrument aimed at strengthening social participation in the process of deciding the allocation of limited financial resources of local government units.
- Approximately 97% of Polish cities with district rights had PB in 2017, what can suggest that PB became a popular tool for residents' co-management of public funds. Furthermore, it strengthens residents' active role in public life. However, the conducted research also provided evidence on PB shortcomings that, in turn, suggest that the whole PB process does not work optimally. In most cities, the final decision regarding the allocation of PB resources is often made by representatives of local authorities, that is contrary to the spirit of PB.
- Despite the increased interest in the PB formula in Poland, up to now no systemic regulations have been developed concerning the principles of PB operation in Poland.
- In most cities with district rights, no detailed conditions have been laid down for projects financed under PB

- The allocation mechanism for PB funds in cities with district rights varies, and the distribution of funds may be dependent on three factors: the type of investment to be implemented, the extent of its impact, and the amount of funds allocated.
- The most commonly used division of civic projects is the division into projects based on the range of impact, i.e. citywide and "local" projects. This division exists in nearly half of the analyzed cities. Taking into account the amount of funds transferred to both types of projects, it can be said that in the vast majority of cities (95.5%) using this mechanism, more funds are allocated to "local" projects than citywide ones (3%). This mechanism fosters the strengthening of "local" (district) social initiatives, and therefore this solution should be considered desirable. In the rest of the cities there is an equal division, i.e. 50% of the total amount of PB is spent on citywide projects and another 50% on "local" projects. In addition, the analysis showed that different allocation mechanisms were used for the allocation of citywide and local projects. The first mechanism for allocating funds is arbitrary, i.e. for all city auxiliary units the same amount of PB is set. This solution is used in half of the cities in which there is a division into citywide and local projects. Arbitrary division of funds may weaken the ability to meet the needs of those parts of the city where the density of population is lower. The second mechanism is proportional division, which most often depends on the number of inhabitants of the auxiliary unit and/or its surface area. It should be added that in the case of proportional division, the number of criteria taken into account varies from two to four, which may complicate understanding of the mechanism of allocation of resources by the citizens.
- In 21.2% of analyzed cities, there is a breakdown by type of investment to be implemented, i.e. for investment and social projects. However, only a few of these cities have introduced transparent rules regarding the definition of both these types. The division into investment and social projects, without their clear definition, may result in unnecessary complication of the PB procedure and, consequently, the resignation of some residents from the participation in PB formula.
- In almost one in five of the analyzed cities, the projects are differentiated due to the amount of financial resources allocated for their implementation, i.e. small and large projects. The amount thresholds for individual types of projects show considerable variation between cities.

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Earnings Management and the Long-Term Market Performance of Initial Public Offerings in Poland

Joanna Lizińska and Leszek Czapiewski

1 Introduction

Reported earnings are the kind of fundamental information about a company that is regarded as very important both for researchers as well as practitioners. Market reaction to announcements connected with a firm's profitability is usually strong (e.g. Hotchkiss and Strickland 2003; Francis et al. 2002; Bernard and Thomas 1989).

Earnings are very closely related to company growth prospects and their predictive power for future market equity prices is supposed to be quite strong (Chan et al. 2001). However, the quality of reported earnings differs significantly across companies. Many studies for developed markets have concluded that companies often report earnings in excess of cash flow as a consequence of accruals or real activities.

Along with various stringent accounting rules, managers are allowed to use their judgement to some extent in reporting company activities. Regulators leave considerable room for managerial discretion to make financial statements more informative. But such discretion also enables managing for the moment and thus misleading some groups of stakeholders. Window-dressing practices seem to be especially significant around important corporate events when firms are strongly motivated to boost their earnings. One such milestone in the corporate lifecycle is going public. IPO companies usually have a short financial history and suffer from scarcity of information about the issuer's intrinsic value. Following this, key accounting prospectus numbers such as earnings have a relatively strong influence on IPO pricing. On the other hand, monitoring procedures for public companies seem to be more efficient, making aggressive earnings management more difficult.

IPO firms commonly face closer scrutiny of reputation during the first period on the aftermarket. Bearing this in mind, aggressive around-IPO earnings management

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resulting in earnings reversals could undermine post-IPO performance. What is more, boosting earnings in one period, drains possible sources of earnings management in the future and positive accruals must ultimately reverse, which usually lowers reported profits thereafter. Hence, the consequences of earnings management around initial public offerings of equity (IPOs) for the long-term market value of equity are not obvious. The study discusses the ability of accruals to predict long-term stock underperformance after IPO for Poland, as an example of an emerging market.

The study was financed by the National Science Centre, Poland as a research project (2015/19/D/HS4/01950). The rest of the paper is structured as follows. In the following section, previous literature is discussed. Then, the sample and research methods are described with the emphasis on earnings management proxies and long-term performance measures. Section 4 concentrates on the pervasiveness of earnings management around IPO as discretionary accruals are tested. Section 5 discusses the explanatory power of earnings management for the long-term underperformance of IPO companies. The last section states the conclusions.

2   Literature Review

Previous studies for developed markets report that managers opportunistically manage earnings to influence IPO pricing (Friedlan 1994; Teoh et al. 1998a, b). On the other hand, Burgstahler et al. (2006) report that private firms exhibit higher levels of earnings management. Armstrong et al. (2015) find that discretionary accruals in the IPO year are not statistically different from zero. Ball and Shivakumar (2005 and 2008) and Venkataraman et al. (2004) argue that companies are supposed to report more conservatively around the IPO date because of better monitoring which increases the possibility of penalties for misreporting.

The discussion about the predictive power of accruals for returns is more general, not only connected with equity issuance. Sloan (1996) reported that companies with high accruals, experienced lower returns and underperformed companies with more conservative accruals. The discussion was then continued by Collins and Hribar (2000 and 2002), Xie (2001), Desai et al. (2004), and Francis et al. (2005).

Along with the discussion on earnings quality, the IPO long-term underperformance has been investigated. It appears to be an international phenomenon. It has been also well explored for Poland (Mizerka and Lizińska 2017; Lizińska and Czapiewski 2016). The explanation for the long-term underperformance is still discussed as started by Ritter (1991). One of the possible reasons of IPO underperformance in the aftermarket relates to earnings management by inflating accruals prior to the offer (Rangan 1998; Shivakumar 2000; Teoh et al. 1998a, b).

The relation between earning management and post-IPO equity returns was investigated for both initial (Teoh et al. 1998b) and seasoned equity offerings (Teoh et al. 1998c). Teoh et al. (1998a–c) reported a negative correlation between earnings management and post-issue equity performance. Fan (2007) reports that companies with low discretionary accruals at IPO have higher stock returns than aggressively managed earnings.

Armstrong et al. (2015) find no evidence for the relation between discretionary accruals (approximated by several measures) and post-IPO equity values, similarly to Ball and Shivakumar (2008). This was examined for emerging markets as well, e.g. Shen et al. (2014) examined the links between earnings management and Chinese IPO anomalies and find that firms with larger managed accruals tended to perform worse over a 3-year horizon.

Studies on earnings management by Polish companies without any connection to equity offerings include Gajdka (2012), Wyrobek and Stańczyk (2013), Wójtowicz (2010, 2015) and Piosik (2016). Only one piece of research for Poland relates earnings quality and initial public offerings but it concentrates on information risk (Truszkowski 2013).

The importance of country-specific factors emphasized by e.g. Burgstahler et al. (2006) and the contradictory results of prior studies on the relation between earnings quality around IPO and future stock returns makes empirical research for capital market in Poland interesting and results in a research contribution.

3 Sample and Methodology

The research sample involves equities listed on the Warsaw Stock Exchange (WSE), which is the main stock exchange in Poland. The data source was Ceduła, Notoria Serwis, the official site of the WSE (http://www.gpw.pl) and www.gpwinfostrefa.pl. The data allowed a comprehensive database with all the necessary data to be constructed, as the existing solutions did not have the satisfactory quality and comprehensiveness. The authors' own database covers financial statements and daily close prices with the necessary adjustments (dividends, splits and preemptive rights) for all WSE companies, also including delisted firms.

The sample encompassed non-financial initial public issues (IPOs) offered in the period 2000–2012 on the main Polish stock market. Only offerings completed by companies without a prior trading history on alternative markets were included. As some of the data were sometimes incomplete, IPOs with missing data were also excluded to fulfil the models' requirements. IPOs completed before 2000 were excluded as no reliable financial statements could be retrieved from the database, likewise equities offered after 2012 were omitted, as the aftermarket period was necessary to observe long-term performance. Market prices and financial statement data covered a longer period from 1998 to the middle of 2015 because of the models requirements.

Quality of earnings cannot usually be observed directly as firms do not boast about inflating earnings artificially. Earnings management proxies have to be involved instead. Companies use real activities manipulation and accrual-based techniques in managing earnings. We follow the earnings management definition of Healy and Wahlen (1999). Real activities manipulation is achieved by changing the execution of a given transaction. Accrual based management concerns presenting a given transaction in financial statements in a particular way (for definitions see e.g. Zang 2011, Cohen et al. 2008, Cohen and Zarowin 2010). Accruals are the difference between a

firm's accounting earnings and its cash flow. This paper presents the research results for the accrual-based approach surrounding IPO issues with a set of existing models. Following the literature, total accruals (*TACC*) were decomposed into discretionary and non-discretionary accruals (as in Jones 1991):

$$TACC_{it} = NDACC_{it} + DACC_{it}, \tag{1}$$

where: *NDACC*—non-discretionary ("normal") accruals; *DACC*—discretionary (abnormal) accruals.

The initial estimations of accruals proposed in the literature assumed that non-discretionary accruals are firm-specific and that the fluctuating level of total accruals is a result of the changing level of discretionary accruals (see DeAngelo 1986). Jones (1991) proposed a model that made it possible to check controlling for the changes in economic circumstances. She argued that the level of non-discretionary accruals can also vary over time. We apply the cross-sectional version of this model (see DeFond and Jiambalvo 1994; Subramanyam 1996; DuCharme et al. 2001) and non-discretionary accruals in the Jones model are as follows:

$$NDACC_{it}^{J} = \alpha_{i1}\left(\frac{1}{A_{i,t}}\right) + \alpha_{i2}\Delta REV_{i,t} + \alpha_{i3}PPE_{i,t} + \varepsilon_{i,t}, \tag{2}$$

where: *A*—total assets; ΔREV—change in revenues; *PPE*—gross property, plant and equipment; *t* all components are scaled by lagged assets.

The traditional Jones model may underestimate discretionary accruals if companies manage earnings by the time location of revenues. Hence, a modified estimation of accruals was proposed in an attempt to adjust for growth in credit sales and to reduce Type II errors. Non-discretionary accruals according to the modified Jones model are as in Dechow et al. (1995):

$$NDACC_{it}^{mJ} = \alpha_{i1}\left(\frac{1}{A_{i,t}}\right) + \alpha_{i2}(\Delta REV_{i,t} - \Delta REC_{i,t}) + \alpha_{i3}PPE_{i,t} + \varepsilon_{i,t}, \tag{3}$$

where: ΔREC—change in receivables; all components are scaled by lagged assets. The cross-sectional version of the modified Jones model was applied by i.a. Subramanyam (1996) or Guidry et al. (1999).

Another approach was proposed by Dechow and Dichev (2002) and modified by McNichols (2002). She argued that adding operating cash flow variables to the cross-sectional Dechow-Dichev regression significantly reduced measurement error. McNichols combines the determinants from both the Jones and the Dechow-Dichev models:

$$\begin{aligned} NDACC_{it}^{McN} = \alpha_{i1}\left(\frac{1}{A_{i,t}}\right) + \alpha_{i2}CFO_{i,t-1} + \alpha_{i3}CFO_{i,t} + \alpha_{i4}CFO_{i,t+1} \\ + \alpha_{i5}\Delta REV_{i,t} + \alpha_{i6}PPE_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{4}$$

where: *CFO*—cash flow from operating activities; all components are scaled by lagged assets.

Some other studies also controlled for cash from operations in a different way to the McNichols model (see e.g. Rees et al. 1996; Hansen and Sarin 1996). As a result, we also incorporate operating cash flows in the variant proposed by Ball and Shivakumar (2005, 2006, and 2008) and estimate normal accruals as:

$$
\begin{aligned}
NDACC_{it}^{BS} = {} & \alpha_{i1}\left(\frac{1}{A_{i,t}}\right) + \alpha_{i2}\Delta REV_{i,t} + \alpha_{i3}FAsset_{i,t} + \alpha_{i4}CFO_{i,t}, \\
& + \alpha_{i5}DCFO_{i,t} + \alpha_{i6}CFO_{i,t} \cdot DCFO_{i,t} + \varepsilon_{i,t}
\end{aligned}
\tag{5}
$$

where: *FAssets*—book value of fixed assets; *DCFO* takes the value 1 if $CFO < 0$; all components are scaled by lagged assets.

We run cross-sectional regressions for the four mentioned models for each of the industry groups on the Warsaw Stock Exchange. In all of the models, α_{i1}, α_{i2}... are firm-specific parameters estimated according to the ordinary least square regression. We get a_{i1}, a_{i2}... as the estimates of α_{i1}, α_{i2}... according to each of the models. A minimum of five companies was required to run the industry regression for IPO i in year t and get estimates based on the cross-sectional version. Besides, each IPO company was excluded from the industry group in regressions for other companies in that sector during the 2-year period after going public.

Abnormal (discretionary) accruals ($DACC_{i,t}$) for IPO firm i in year t were calculated as the difference between the real (actual) accruals and the estimated accruals ($NDACC_{i,t}$). Total real accruals were measured as the change in non-cash net working capital less the depreciation for company i in year t (as in Jones 1991 and Sloan 1996):

$$
TACC_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - \Delta CL_{it} - Depr_{it},
\tag{6}
$$

where: *TACC*—total accruals for company; ΔCA—change in current assets, $\Delta Cash$—change in cash; ΔCL—change in current liabilities; *Depr*—depreciation; the change (Δ) is computed between time t and $t - 1$. Lagged assets are used as the deflator to reduce heteroscedasticity in residuals for accruals and their components (Ronen and Yaari 2008).

Earnings management was approximated with discretionary accruals around the time of initial public offering, mainly for the year of going public (Y_0), for the two preceding years ($Y - 2$ and $Y - 1$) and for the consecutive years ($Y + 1$ and $Y + 2$).

Next, buy-and-hold abnormal returns (BHARs) were calculated to observe long-term IPO price behavior up to the fifth year after the offering and to simulate a real investing situation with buying a security at IPO date, holding it for a specified period of time and selling it afterwards.

The buy-and-hold return for IPO i for selected event windows ($BHR_{i,T}$) was defined as:

$$
BHR_{i,T} = \prod_{t=1}^{T}(1 + R_{i,t}) - 1
\tag{7}
$$

where R was the daily return in trading day t, and T was the trading session number with 1 assigned to the first day after going public. A year was assumed to have 252 trading days. The benchmark buy-and-hold return for IPO i ($BHR_{i,T}^B$) was defined as:

$$BHR_{i,T}^{WIG} = \prod_{t=1}^{T} \left(1 + R_{i,t}^B\right) - 1 \tag{8}$$

where $R_{i,t}^B$ was the daily return on the benchmark portfolio in trading day t for IPO i. The benchmark was the main market index for the Warsaw Stock Exchange, mainly the WIG index.

The buy-and-hold abnormal return for each IPO i and the selected event window ($BHAR_{i,T}$) was given by:

$$BHAR_{i,T} = BHR_{i,T} - BHR_{i,T}^{WIG} \tag{9}$$

The outliers of BHARs and DACCs were eliminated to minimize the potentially detrimental effect of extreme values. Outliers were found with the interquartile range (IQR). The lower bound was set as $Q_1 - 1.5 \cdot IQR$ and the upper bound as $Q_3 + 1.5 \cdot IQR$. The Cramér von Mises test was used to test the distribution normality of discretionary accruals and abnormal returns. Both a parametric and non-parametric tests were employed (Student t-test and Wilcoxon signed-rank test).

We then checked whether discretionary accruals were good predictors of subsequent equity performance in the aftermarket. IPO firms were divided into two groups based on IPO-year discretionary accruals. The subsample with DACCs below or equal to the median value of discretionary accruals was called "conservative" in comparison to the subsample with DACCs above the median value that was supposed to manage earnings "aggressively". Then, buy-and-hold abnormal returns were compared for both groups.

4   Earnings Management

Our findings suggest that accruals around initial public offerings in Poland were systematically opportunistic. As managers inflated earnings above cash flow around IPO, accruals rose. We find across multiple models that discretionary accruals in the IPO year were statistically different from zero.

The estimates of discretionary accruals are detailed in Table 1. The median values are presented on Chart 1. Positive and relatively high issue-year discretionary accruals indicate that earnings were much higher than cash flows. The level of abnormal accruals in the year before IPO was also relatively less negative in comparison to those reported 2 years before first public equity offering. It could suggest

Table 1 Earnings manipulation around IPO

	t-2	t-1	t0	t+1	t+2	t+3	t+4	t+5
Panel A: Jones model								
Mean [%]	-0.0814	-0.0575	0.0595	-0.0274	-0.0298	-0.0186	-0.0123	-0.0138
Significance	*	*	*	*	*	*	*	*
Median [%]	-0.0380	-0.0193	0.0526	-0.0236	-0.0271	-0.0218	-0.0108	-0.0095
Significance	*	*	*	*	*	*	*	*
Normality	*	*						
% > 0	36	42	63	42	39	43	44	45
N	164	187	188	201	201	183	165	155
Panel B: Modified Jones model								
Mean [%]	-0.0728	-0.0371	0.0611	-0.0236	-0.0265	-0.0206	-0.0135	-0.0163
Significance	*	*	*	*	*	*	*	*
Median [%]	-0.0341	-0.0203	0.0584	-0.0159	-0.0312	-0.0199	-0.0134	-0.0099
Significance	*	*	*	*	*	*	*	*
Normality	*	*	*		*	*	*	*
% > 0	40	43	66	42	40	42	41	43
N	161	183	186	201	199	182	163	154
Panel C: McNichols model								
Mean [%]	-0.0628	-0.0258	0.0624	-0.0275	-0.0175	-0.0151	-0.0246	-0.0290
Significance	*		*	*	*		*	*
Median [%]	-0.0405	-0.0182	0.0461	-0.0156	-0.0171	-0.0165	-0.0212	-0.0194
Significance	*		*	*	*		*	*
Normality	*		*				*	*
% > 0	42	45	65	48	42	46	42	43
N	72	177	178	197	180	166	149	138

(continued)

Table 1 (continued)

	t-2	t-1	t0	t + 1	t + 2	t + 3	t + 4	t + 5
Panel D: Ball-Shivakumar model								
Mean [%]	0.0099	0.0285	0.0734	−0.0086	−0.0158	−0.0195	−0.0029	−0.0057
Significance		*	*			*		
Median [%]	0.0198	0.0237	0.0854	0.0086	−0.0053	−0.0105	0.0013	−0.0041
Significance		*	*			*		
Normality	*		*	*	*		*	
% > 0	56	56	67	55	48	47	50	49
N	152	179	184	200	195	182	167	148

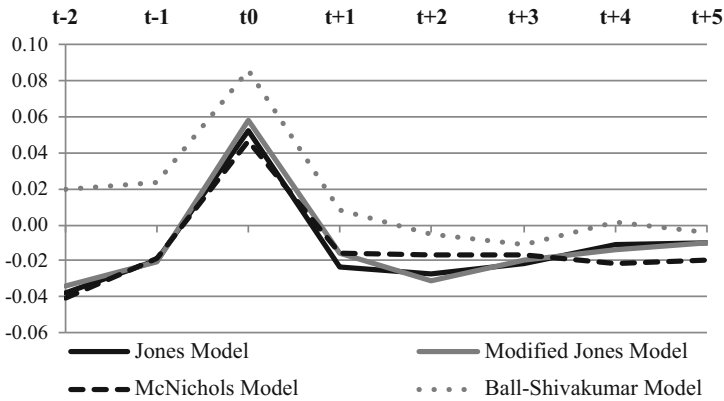Note: Significance at a 10% (*) level

Chart 1 Earnings manipulation around IPO—comparison of models

that some companies inflated earnings much earlier. Positive accruals were followed by negative abnormal accruals in subsequent years.

The results are coherent with those of Friedlan (1994), Teoh et al. (1998a, b) that managers use accruals to inflate earnings around equity offerings. They are not in line with Armstrong et al. (2015) who find that abnormal accruals in the IPO year are not statistically different from zero and Ball and Shivakumar (2008) nor with Venkataraman et al. (2004) who argue that IPO firms report more conservatively.

5 Long-Term Market Performance

IPO companies were divided according to median value of abnormal accruals in the IPO year. Those with relatively low discretionary accruals are supposed to represent companies that didn't manage earnings or at least managed earnings more conservatively. Companies with high discretionary accruals are perceived as those that managed earnings more aggressively and boosted their accounting profits. Abnormal long-term market performance of IPO firms was observed for both groups.

Detailed results are given in Table 2. Chart 2 plots median values of discretionary accruals for both subsamples. Firms with higher IPO-year discretionary accruals earned more negative abnormal long-term returns. However, the difference between both subsamples was not immense. The research results for Poland may be interpreted as supporting the thesis about the predictive power of discretionary accruals around IPO for stock returns in the aftermarket.

Table 2 Long-term market performance according to earnings manipulation propensity

	Y1		Y3		Y5	
	Conservative	Aggressive	Conservative	Aggressive	Conservative	Aggressive
Panel A: Jones model						
Mean [%]	−11.29	−9.46	−26.77	−30.47	−37.85	−41.33
Significance	*	*	*	*	*	*
Median [%]	−14.26	−9.36	−27.79	−36.11	−50.04	−52.87
Significance	*	*	*	*	*	*
Normality	*			*	*	*
N	85	92	83	85	67	67
Panel B: Modified Jones model						
Mean [%]	−10.20	−10.92	−28.83	−31.09	−41.27	−39.52
Significance	*	*	*	*	*	*
Median [%]	−13.85	−9.85	−30.57	−36.40	−55.73	−51.87
Significance	*	*	*	*	*	*
Normality	*			*	*	*
N	86	90	82	84	65	69
Panel C: McNichols model						
Mean [%]	−10.20	−8.96	−26.29	−28.46	−34.21	−44.02
Significance	*	*	*	*	*	*
Median [%]	−14.50	−9.01	−28.55	−31.08	−45.77	−54.28
Significance	*	*	*	*	*	*
Normality	*			*	*	*
N	82	86	79	82	67	59

Panel D: Ball-Shivakumar model

Mean [%]	−10.13	−9.67	−29.42	−26.53	−37.48	−42.59
Significance	*	*	*	*	*	*
Median [%]	−12.41	−9.93	−31.46	−29.04	−50.69	−52.13
Significance	*	*	*	*	*	*
Normality				*	*	*
N	87	87	81	83	63	67

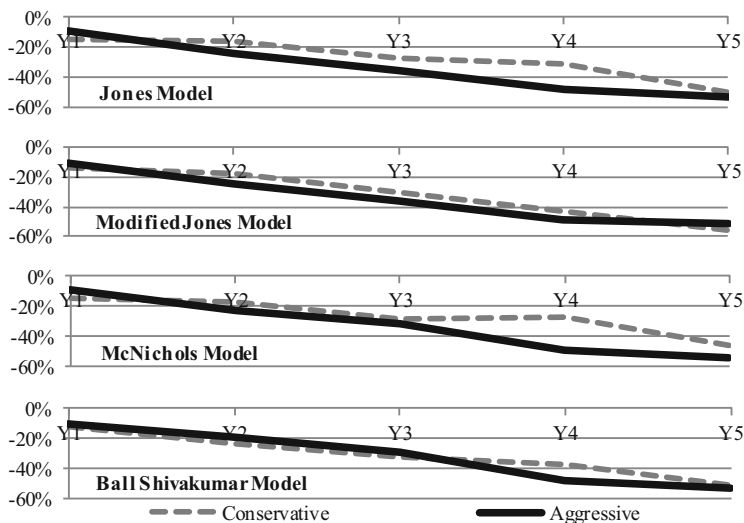Note: Significance at a 10% (*) level

Chart 2 Long-term market performance according to earnings quality—comparison of models

6 Conclusion

The research focused on earnings that attract very intense attention among capital market participants. Quality of earnings has also been one of the most hotly discussed problems in the contemporary research on finance and accounting. IPO firms have a strong motivation to inflate earnings when they go public. They usually have short financial history and suffer from scarcity of information about financial fundamentals. In consequence, key accounting prospectus numbers such as earnings seem to have a strong influence on the IPO market pricing. On the other hand, public firms have to meet higher reporting standards and they face better monitoring and closer scrutiny pf reputation during the first period in the aftermarket. These are the arguments against boosting earnings artificially and attempting to mislead investors around the time of going public.

The research results reported for the Polish capital market suggest that firms engaged in more aggressive income-increasing earnings management in the IPO year and some companies inflated earnings with accruals even for the year prior to going public. IPO companies that managed earnings more aggressively reported more negative abnormal long-term returns according to the buy-and-hold strategy. However, the difference between abnormal returns between firms with lower and higher discretionary accruals was not immense in many investment periods.

The research results for Poland may be interpreted as supporting the thesis about the predictive power of discretionary accruals around IPO for stock returns in the aftermarket. However, the results on the market consequences of earnings management for the Polish capital market are of a preliminary nature and need to be continued. One of the future research directions may be checking if the differences

between long-term abnormal accruals are IPO-specific in Poland or whether it is an expression of a broader market anomaly and a more general question about the predictive power of earnings quality and cash flow for future equity prices.

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Determinants of Dividend Smoothing: The Case of the Turkish Stock Market

Sabina Nowak, Magdalena Mosionek-Schweda, Urszula Mrzygłód, and Jakub Kwiatkowski

1 Introduction

This study aims to investigate the occurrence of the dividend smoothing phenomenon in the non-financial companies listed on the Istanbul Stock Exchange (ISE) that follow stable dividend policy. To this end, we raise and verify the research hypothesis that companies listed on the ISE smooth their dividends. Additionally, we attempt to select the factors related to the individual companies which can influence the speed of dividend adjustment (SOA) coefficient. In doing so, we employ a sample of 49 non-financial Turkish companies listed on the ISE in the period of 1996–2015. Considering the ambiguous research results on dividend smoothing determinants described in the literature, we are aware of the ISE unique functioning conditions that may affect the obtained results.

The rest of this paper is organised as follows: Section 2 provides a brief review of the literature on dividend smoothing in Turkey and a summary of the dividend smoothing determinants. Section 3 delivers basic information on the ISE and its history. The data and methodology are described in Sect. 4, and the results of the empirical research are presented in Sect. 5. Section 6 concludes.

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2   Literature Review

2.1   *Dividend Smoothing on the Turkish Capital Market*

Factors affecting companies' dividend policy have been questioned for decades. Due to variety of determinants influencing managers' decisions on dividend payouts, the issue has been named 'the dividend puzzle' (Black 1976). The meaningful contribution to solving the problem has been made by Lintner (1956) who introduced the concept of dividend smoothing. The author interviewed 28 managers of publicly listed companies and concluded that managers prefer to maintain stable dividend payments over time and avoid dividend's cuts (in other words, they smooth dividends). Furthermore, Lintner (1956) suggested that companies have their own long-term payout ratios and changes in earnings do not fully explain the level of dividend. Lintner (1956) introduced also an empirical model (partial-adjustment model of dividend payout) which has been widely utilized in the literature concerning dividend policy and smoothing.

The literature on the dividend policy and dividend smoothing in the Turkish capital market can be divided into two streams: studies devoted only to the Turkish stock exchange and studies that include Turkey as part of a larger set of countries. The latter stream is represented by the following studies. Aivazian et al. (2003) examined the determinants of dividend policies in eight emerging markets and found that companies listed on these markets follow unstable dividend policies. As far as only Turkey is considered, the coefficient estimates on lagged dividends amounts to 0.120 (for 290 only dividend-paying observations) which is the lowest value in the analysed group of countries. Shinozaki and Uchida (2014) investigated the relationship between the SOA coefficient, corporate ownership structure, and tax regime by using approximately 6000 companies from 28 countries. Their findings confirm that the concentration of shareholders' structure is positively (negatively) associated with the SOA (dividend smoothing). Secondly, tax regime is an important factor affecting smoothing behavior. The SOA coefficient calculated for Turkey was the highest in the whole sample, i.e. equal to 0.894 (mean value) and 0.950 (median value). Comparing to countries with the same tax regime (partial imputation), these values are at much higher than average (0.618 mean, 0.602 median). In their later study, Shinozaki and Uchida (2015) investigated the relationship between ownership structure and dividend smoothing behaviours using a broader sample of 44 countries and confirmed that companies characterised by concentrated ownership structures smooth dividends less than others. However, in this study, the authors did not publish detailed outcomes obtained for the particular countries.

Conversely, the results of studies devoted solely to the Turkish market are not consistent. Adaoğlu (2000) found that companies listed on the ISE follow an

unstable dividend policy and that the value of dividend payments strictly depends on the earnings of the year they could be paid. Therefore, the instability in earnings causes the instability in dividends. The obtained speed of adjustment coefficients are at the maximum level of indicating that the ISE companies do not smooth dividends. In a later study, Adaoğlu (2008) discussed the disappearance and concentration of dividends and revealed that in 1986–2007, the number of companies paying dividends decreased while the level of dividend payments increased. Moreover, he analysed the size effect and stated that the payout ratio increased with the size of the company. A different methodological approach in the analysis of the dividend policy of Turkish companies was applied by Baker et al. (2017). The authors conducted a survey on managers of Turkish companies listed on the ISE to investigate the validity of cash dividend theories and factors influencing dividend policy decisions. They confirmed that the level and stability of the current and expected future earnings are the most important factors affecting dividends. Managers pursue stable dividend policies and tend to smooth dividends. These empirical results are contradictory to Adaoğlu's (2000) findings. However, the similar conclusion to Baker et al.'s (2017) is found in Kilincarslan's (2015) survey. The author indicated that ownership structure influences the target payout ratio and dividend smoothing. The SOA obtained in his study (0.34 based on the pooled OLS and 0.31 based on the system GMM) is only a little higher than the value of 0.30 obtained by Lintner (1956). However, in a later study of Al-Najjar and Kilincarslan (2017) the authors confirmed the higher level of the SOA coefficient: 0.59 (0.55) in the period of 2003–2008 and 0.53 (0.51) in the period of 2009–2012 basing on the pooled OLS (system GMM) estimation. A survey study on managers of Turkish companies was also conducted by Kuzucu (2015). His results suggest that earnings are the most important factor affecting the payout decision. A positive correlation between dividends and earnings was also proved by Kirkulak and Kurt (2010). The authors showed that the Turkish companies are more willing to omit dividends than reduce these payments.

2.2   Dividend Smoothing Determinants

An indispensable element of recent studies on dividend smoothing is the analysis of factors determining its intensity. Most of these studies are related to theoretical concepts derived from the classical dividend policy literature (signalling theory, agency theory, etc.). The most evident determinants, namely, size and age of a company, were investigated by Jeong (2013) and Chen et al. (2012), respectively. The authors suggested that larger and older companies tend to smooth dividends to a larger extent. Conversely, Javakhadze et al. (2014) disclosed that in the case of younger and smaller companies, dividends could be used as a signalling device that implies stronger smoothing.

As dividend payments lower the level of a company's free cash resources, the role of cash flows and financial leverage has been examined by many authors. However, the results are ambiguous. Leary and Michaely (2008) and Svensson and Müller (2014) confirmed the positive relation between leverage and speed of dividend adjustment, but Shinozaki and Uchida (2015) found this factor to be insignificant. Moreover, Svensson and Müller (2014) argued that cash-abundant companies exhibit higher agency costs and therefore should adjust dividends slower than those that are not. Jeong (2013) suggested that excess free cash flows (financial slack) could influence divergent dividend behaviours. First, companies with large cash resources can afford to pay smoothed dividends in the case of less favourable financial results (cushion effect). Second, excess cash lowers the need for external financing. Therefore, managers have low incentives to use dividend smoothing as a signalling device (information effect). Despite the interesting theoretical predictions in both studies, the obtained results were either statistically insignificant or inconclusive. Moreover, free cash flow was insignificant in Javakhadze et al.'s (2014) study.

Asset tangibility is one of the factors that have gained statistical significance in explaining dividend smoothing. As Svensson and Müller (2014) suggested, dividend smoothing decreases in companies that face low information asymmetry associated with large values in net property, plant and equipment (tangible assets). The reasoning behind this finding is that valuing tangible assets in comparison with intangible ones is easier for market participants.

The profitability ratios and company risk measures have also gained attention in explaining the smoothing behaviour. Shinozaki and Uchida (2014) revealed the positive (negative) relationship between a company's profitability (risk) and the speed of dividend adjustment. Conversely, Leary and Michaely (2011) and Svensson and Müller (2014) found the positive role of risk in the speed of adjustment behaviour.

The length of investment horizon of shareholders (measured by stock turnover) was analysed by Svensson and Müller (2014). According to this study, the longer the horizon is, the lesser the smoothing. Leary and Michaely (2011) investigated the role of the growth potential of a company and proved that firms with greater potential of growth smooth dividends less than other companies. Note that one of the employed proxies of growth potential in empirical studies is market-to-book ratio.

According to Shinozaki and Uchida (2015), companies with a more concentrated ownership structure smooth dividends on average less than companies with a more dispersed structure. Similar studies questioning the effect of government on ownership structure were published by Gugler (2003) and Bremberger et al. (2013). Both studies highlighted that state-owned enterprises smooth dividend more than others. The effect of institutional investors was analysed by Al-Najjar (2009), who concluded that dividend smoothing is a positive function of the presence of institutional investors. Leary and Michaely (2008) found that companies with a high level of corporate governance are less vulnerable to the dividend smoothing behaviour.

3 Basic Information on the ISE

The current capital market structure in Turkey was adopted in April 2013 as a result of the merger of all the Turkish stock exchanges under one roof of the Istanbul Stock Exchange (Borsa Istanbul 2017). The ISE is one of the largest regional stock exchanges, but it is seriously affected by strong political pressure. In mid-2013, the ISE suffered great deterioration triggered by the outbreak of mass anti-government protests and the corruption scandal that forced the resignation of several ministers. In the first half of 2014, when the situation settled down, the ISE statistics began to improve but was halted in 2015 because of parliamentary elections, investors' doubts about the independence of the Turkish central bank and the strengthening of the US dollar. In 2016, the deteriorating situation of the ISE was caused by a 'palace coup', in which President Erdogan revamped the government by switching to a leadership held by a prime minister, and a failed military coup, which resulted in personnel changes in public administration. As a consequence of these political events, the ISE situation became volatile. The BIST100 (the most important index for the ISE) changed in a wide range of 60,000–90,000 points in 2013–2016. The market capitalisation of the ISE amounted to USD 195,746 million in 2013 and USD 157,702 million (a 20% decrease) in 2016. The value of share traded declined from USD 419,362 million in 2013 to USD 327,117 million in 2016 (more than 23% decrease). However, during this time, the number of listed companies increased from 236 to 381. A large drop in the turnover was also observed in debt financial instruments traded on the ISE. In 2013, the total turnover of bonds exceeded the turnover of shares and amounted to USD 521,137 million. Three years later, it was only USD 218,823 million (a 58% decrease) (World Federation of Exchanges 2017).

Despite the significant deterioration in the capitalisation and turnover of the ISE, the Turkish stock exchange remains one of the largest and most liquid markets in the region according to the classification of the World Federation of Exchanges. In 2016, it ranked 12th in terms of capitalisation, 9th in terms of share turnover and 7th in terms of bond turnover.

Note that the ISE expands by acquiring a stake in the stock exchanges located in the neighbouring region. Foreign expansion involves the purchase of shares in the Kyrgyz Stock Exchange (24.51%), Montenegro Stock Exchange (24.39%), Baku Stock Exchange (4.76%) and Sarajevo Stock Exchange (9.89%). The ISE has representatives in the board of directors of these exchanges, and it is also active in supporting the development of capital markets in countries where they operate (Borsa Istanbul 2016).

4 Data and Methodology

4.1 Data

The initial research sample comprised 395 companies listed on the ISE in the period of 1996–2015. The final research sample consisted of 49 non-financial and non-insurance companies that paid cash dividends for at least six consecutive

years. The limited size of the conclusive sample was due to the exclusion of financial and insurance companies (143 firms) and firms that did not follow the regular dividend policy and paid only extra or special dividends and to the lack of financial and accounting data for several companies in certain years. Following the reasoning of Jeong (2013), we also excluded the observations with non-positive earnings per share ratio and (or) with dividend payouts that equal to zero.

The time series of data reflecting the history of dividend payouts (dividend per share and earnings per share ratios) and the financial data on the research sample companies were retrieved from the Thomson Reuters Eikon 4 database under the partnership agreement between the University of Gdansk and the Thomson Reuters company.

4.2 Methodology

We began the analysis by calculating the levels of the individual speed of adjustment (SOA) coefficients for each company from the research sample based on the dividend partial adjustment model introduced by Lintner (1956). In doing so, we used the formula adopted by Fama and Babiak (1968):

$$\Delta D_{i,t} = \alpha_i + \beta_{1i}D_{i,t-1} + \beta_{2i}E_{i,t} + \epsilon_{i,t}, \tag{1}$$

where $D_{i,t}$ is the dividend per share ratio for firm i in year t; $E_{i,t}$ is firm i's earnings per share in year t; α_i, β_{1i}, β_{2i} are the parameters; and ϵ_{it} is the error term. The SOA coefficient reflecting the changes in the dividend level within a 1-year span as a result of a change in earnings is estimated as $-\beta_{1i}$. To estimate the parameters of Eq. (1), we used the ordinary least squares (OLS) method with the Newey-West standard errors.

In the second stage of the research we aimed to reveal the determinants of the SOA coefficient level. On the basis of the methodology employed by Al-Najjar (2009), Leary and Michaely (2011), Jeong (2013), Javakhadze et al. (2014), Svensson and Müller (2014), Younis and Javid (2014), Shinozaki and Uchida (2015), among others, we initially assumed eight groups of the possible determinants of the SOA coefficient, referring respectively to the company's size, age, shareholders' structure, profitability, liquidity, debt, valuation and growth as well as risk proxies. In the latter case the authors of the former studies concentrated only on the risk associated with the profitability side of the company's operations and therefore used the standard deviations of ROA or EBITDA margin. We argue however that risk associates also with the company's liquidity. Companies that do not maintain stable levels of the liquidity ratios are prone either to experience cash shortage or abundance. Both cases reveal the company's inefficiency. Therefore, except the standard deviations of ROA and EBITDA margin in our study we decided to include the standard deviation of quick ratio as an additional measure of risk.

Table 1 Potential determinants of the SOA coefficient

Group	Determinants (factors)
Size	Total assets in thousands of USD, market capitalisation in thousands of USD
Age	Number of years the company is listed on the stock exchange
Shareholders' structure	Percentage of stocks held by the largest shareholder (one top), percentage of shares held by top five strategic shareholders (top five), percentage of stocks available for public offer (free float)
Profitability	Revenue to assets ratio[1], ROA[2], ROE[3], EBITDA margin[4]
Liquidity	Quick ratio[5], current ratio[6]
Debt	Debt to equity ratio[7], leverage[8]
Valuation and growth	Asset tangibility[9], earnings retention ratio[10], enterprise value (EV) to revenue ratio[11], financial slack[12], payout ratio[13], price to book value ratio (PB), price to equity ratio (PE), price to revenue ratio[14], reinvestment rate[15]
Risk	Standard deviation of EBITDA margin, standard deviation of ROA, standard deviation of quick ratio

Determinants (factors): [1]revenue to assets ratio—total revenue divided by total assets; [2]ROA—return on total assets, income after tax divided by the average total assets; [3]ROE—return on common equity, net income available to common shareholders excluding extraordinary items divided by the average common equity; [4]EBITDA margin—annual earnings before interest, taxes, depreciation and amortization expressed as a percentage of the annual total revenue; [5]quick ratio—total current assets minus total inventory divided by total current liabilities; [6]current ratio—total current assets divided by total current liabilities; [7]debt to equity ratio—total debt as of the end of the fiscal year divided by common shareholders equity for the same period; [8]leverage—total assets divided by the common shareholders' equity; [9]asset tangibility—the sum of total net property, plant and equipment divided by total assets; [10]earnings retention ratio—retained earnings (equal to income available to common shareholders excluding extraordinary items minus gross dividends on common stocks for the fiscal year) divided by income available to common shareholders excluding extraordinary items; [11]EV to revenue ratio—enterprise value (equal to the sum of market capitalisation, total debt and minority interest reduced by cash and cash equivalents) divided by total revenue; [12]financial slack—retained earnings (calculated in the same way as for earnings retention ratio) scaled by total assets; [13]payout ratio—dividend per share ratio divided by earnings per share ratio; [14]price to revenue per share ratio—market capitalisation divided by total revenue; [15]reinvestment rate—retained earnings (calculated in the same way as for earnings retention ratio) divided by the average common shareholders' equity

The 26 potential determinants of the SOA coefficient considered within eight groups mentioned above are summarised in Table 1.

Finally, using the OLS with the robust (Newey-West's) standard errors, we estimated the parameters of the linear factor model illustrating the effect of the determinants on the level of SOA coefficient:

$$SOA_i = \gamma_0 + \sum_{j=1}^{k} \gamma_j F_j + \varepsilon_i, \qquad (2)$$

where SOA_i is the SOA coefficient estimated for the ith firm based on Eq. (1); $i = 1, 2, \ldots, 49$, F_j are the factors (determinants) affecting the SOA calculated as the

median estimates over the analysed period[1]; $\gamma_0, \gamma_1 \ldots, \gamma_k$ are the parameters; and ε_i is the error term.

5 Results

Most of the potential SOA determinants considered in the research and described in Table 1 turned out to be statistically insignificant as explanatory variables used in Eq. (2). The descriptive statistics of all the determinants are summarised in Table 2.

The obtained levels of SOA were generally high, with the mean (median) value being equal to 0.95 (0.93). As only 8% of the SOA results were lower than 0.50 and almost 37% were higher than 1.00, we concluded that the Turkish stock market companies did not smooth their dividends in the analysed period. This result is in accordance with those of other published research (Adaoğlu 2000, 2008). Thus, we rejected the research hypothesis that companies listed on the ISE tend to smooth their dividends.

One can notice that most of the distributions of variables summarized in Table 2 are positively skewed and highly leptokurtic. Only in the case of 8 of them (i.e.: SOA, age, asset tangibility ratio, earnings retention ratio, one top, top five, payout ratio and size of a company, the latter expressed as a natural logarithm of total assets in thousands of USD) we confirmed the normality of distributions. Therefore, in the further analysis we used the logarithmic transformations for all variables with the skewed and (or) leptokurtic distributions.

The results of estimation and validation model described in Eq. (2) are summarised in Table 3. In columns (a)–(g) we present seven different specifications including statistically significant determinants of the SOA coefficient.

Considering a wide range of potential factors, we determined only seven statistically significant determinants. Five of them (i.e. current ratio, earnings retention ratio, leverage, payout ratio and quick ratio) had a positive effect on the estimated SOA level, while the remaining two (debt to equity ratio and standard deviation of quick ratio) negatively affected the SOA coefficient. Majority of the mentioned factors were statistically significant at the 5% significance level.

Although the coefficients of determination for all the specifications are considerably low (adjusted R-squares varied from 0.024 for specification (c) to 0.161 for specification (f)), results of the post-estimation analysis indicate that the classical linear regression model assumptions are fulfilled in the case of all seven specifications.

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[1]The length of the time series of the data was not equal for all the companies included in the sample. The shortest time span equal to 6 years was considered for 10 companies, and the longest one equal to 20 years was available for only one firm. The median (mean) of the number of years considered in the research was 9.0 (9.89).

Table 2 Descriptive statistics of the SOA coefficient and its potential determinants

Variable	Min	Median	Max	Mean	St. dev.	Skew.	Kurt.	JB stat
SOA	0.123	0.931	1.743	0.950	0.351	0.033	−0.195	0.087
Total assets[b]	10.848	12.863	15.980	13.002	1.427	0.393	−0.785	2.520
Market capitalisation[a]	41.018	398.000	17.9×10^3	1.8×10^3	3.4×10^3	3.054	9.996	280.140
Age	4.000	16.000	27.500	16.367	7.795	−0.017	−1.468	4.400
One top	6.840	49.420	95.070	49.755	20.686	0.275	−0.183	0.685
Top five	10.560	68.130	95.070	65.259	18.445	−1.020	1.117	0.685
Free float	4.930	31.870	100.000	35.794	19.556	1.188	1.649	17.070
Revenue to assets ratio	0.513	1.026	5.319	1.334	0.852	2.472	8.120	184.515
ROA	0.027	0.092	0.480	0.111	0.076	2.702	9.906	259.990
ROE	0.056	0.148	0.573	0.189	0.108	1.693	2.819	39.626
EBITDA margin	0.025	0.157	0.727	0.172	0.129	1.915	5.352	88.433
Quick ratio	0.210	1.240	4.700	1.600	0.907	1.721	3.307	46.505
Current ratio	0.900	1.800	5.570	2.220	1.159	1.275	0.831	14.693
Debt to equity ratio	0.010	0.160	1.370	0.313	0.333	1.491	1.423	22.292
Leverage	1.155	1.640	5.130	1.916	0.755	1.930	4.982	81.099
Asset tangibility	0.019	0.382	0.713	0.339	0.157	−0.118	−0.588	0.822
Earnings retention	0.060	0.470	0.820	0.445	0.228	−0.063	−1.189	2.921
EV to revenue ratio	0.104	0.774	3.315	0.880	0.616	1.587	3.461	45.025
Financial slack	0.101	0.305	0.668	0.313	0.141	0.431	−0.595	17.070
Payout ratio	0.183	0.573	0.919	0.562	0.230	−0.007	−1.260	3.243
PB	0.421	1.202	11.674	1.599	1.663	4.725	25.820	1.5×10^3
PE	3.264	8.024	25.413	9.515	5.117	1.427	1.742	22.812
Price to revenue ratio	0.073	0.643	4.003	0.842	0.655	2.429	9.148	219.050
Reinvestment rate	0.015	0.055	0.438	0.077	0.068	3.234	14.150	494.179
Sd. EBITDA	0.004	0.032	0.164	0.041	0.031	1.766	4.173	61.012
Sd. ROA	0.009	0.038	0.140	0.043	0.027	1.386	2.372	61.012
Sd. quick ratio	0.049	0.409	5.104	0.568	0.758	4.570	24.440	1.4×10^3

Explanations: Age—number of listing years on the ISE (other variables—compare explanations of Table 1); JB stat—Jarque-Bera statistic under H_0 normally distributed as $\chi^2(2)$, crit. value $\chi^2_{0.05}(2) = 5.99$; [a]In thousands of USD, [b]Expressed as natural logarithm of total assets (in thousands of USD)
Source: Author's own calculation

Table 3 Model (2) estimation and validation results

Models	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Variable	Coefficient [p-value]						
Const	0.820 [0.000]	0.776 [0.000]	0.904 [0.000]	0.767 [0.000]	0.382 [0.052]	0.449 [0.005]	−0.114 [0.662]
Current ratio	0.190 [0.061]				0.226 [0.064]	0.295 [0.031]	0.183 [0.083]
Debt to equity ratio		−0.098 [0.025]			−0.112 [0.015]	−0.084 [0.045]	
Earnings retention							0.926 [0.001]
Leverage					0.364 [0.038]		
Payout ratio							0.938 [0.001]
Quick ratio			0.139 [0.087]	0.248 [0.009]			
Sd. quick ratio				−0.098 [0.083]		−0.148 [0.020]	
Df.	47	47	47	46	45	45	45
R^2	0.065	0.120	0.045	0.087	0.188	0.213	0.093
$\overline{R^2}$	0.045	0.101	0.024	0.047	0.134	0.161	0.033
V	36.11%	35.03%	36.49%	36.07%	34.38%	33.85%	36.34%
AIC	36.162	33.175	37.188	36.977	33.215	31.695	38.636
SBC	39.946	36.959	40.972	42.652	40.782	39.262	46.203
White	0.293 [0.864]	1.423 [0.491]	0.657 [0.720]	4.450 [0.487]	4.627 [0.866]	6.930 [0.644]	7.633 [0.572]

JB stat.	0.347 [0.841]	0.151 [0.927]	0.259 [0.879]	0.631 [0.730]	0.399 [0.819]	0.372 [0.830]	0.278 [0.870]
Reset	0.422 [0.519]	1.003 [0.322]	0.051 [0.823]	0.523 [0.473]	0.806 [0.374]	1.242 [0.271]	2.563 [0.117]

Variables: compare Tables 1 and 2; Df.—degrees of freedom; R^2—coefficient of determination; $\overline{R^2}$—adjusted coefficient of determination; V—coefficient of variation; AIC—Akaike information criterion; SBC—Schwarz (Bayesian) information criterion; White—White test statistic under H_0 (the disturbance term is homoskedastic) distributed as $\chi^2(.)$; JB stat—Jarque-Bera statistic under H_0 (the disturbance term is normally distributed) distributed as $\chi^2(2)$; Reset—Ramsey's test statistic under H_0 (no neglected nonlinearities are found in the choice of a functional form) distributed as $\chi^2(1)$. P-values are given in brackets

Source: Author's own calculation

6 Conclusions

The obtained levels of the speed of adjustment coefficients were mostly high, thus leading to the conclusion that the companies listed on the ISE generally did not smooth their dividends in the period of analysis (1996–2015). These findings are consistent with the results published by Shinozaki and Uchida (2014) as well as Adaoğlu (2000). However, the SOA value obtained in our study are contradictory to Kilincarslan's (2015) findings who revealed these coefficients at a very low level close to these reached by Lintner (1956). Differences between the obtained results may arise from different time periods adopted in the study, changes in the regulations governing the compulsory dividend payments, as well as the occurrence of the financial crisis or economic downturn. More importantly, we argue that the differences between our results and Kilincarslan's (2015) findings are connected with the companies selection into the underlying sample. The major difference comes from the fact that we concentrate solely on the dividend paying companies, whereas Kilincarslan (2015) also includes non-dividend paying firms. Moreover, we decided to remove companies without positive earnings from the research sample. The differences in the selection procedure lead to higher SOA coefficients in our case. Our reasoning is justified by the results obtained by Al-Najjar and Kilincarslan (2017) who conducted the survey separately for all companies and for dividend paying ones.

In our study the SOA level was significantly affected by the factors related to a company's liquidity, debt, risk as well as valuation and growth. Company's liquidity, as reflected by the quick and current ratios, and its valuation and growth, as expressed by the earnings retention and payout ratios, had a positive effect on the SOA coefficient level. Thus, the more liquid and more valuable companies tend to smooth their dividends less. On the contrary, financial ratios related to firm's debt (debt to equity ratio) and risk (standard deviation of quick ratio reflecting the risk of illiquidity) had a negative influence on the SOA level. Thus, Turkish companies with high levels of these ratios smoothed their dividends more than those with low levels. However, one may notice that another factor related to debt—the leverage—positively affected the speed of dividend adjustment.

Given the mixed and ambiguous results of previous studies that explored the significant determinants of dividend smoothing, we can cautiously argue that our findings are partially consistent with those obtained by Leary and Michaely (2008) and Svensson and Müller (2014). In both research papers the authors found the positive relation between the leverage and the SOA level, which stays in line with our results. On the contrary, our finding related to the role of risk in the speed of dividend adjustment behaviour appears to be contradictory to Leary and Michaely's (2011) and Svensson and Müller's (2014) conclusions. The authors indicated that the proxy of company's risk positively affected the speed of dividend adjustment, whereas our results reveal the opposite pattern.

Surprisingly, we did not find an evidence that the factors related to firm's size, age, shareholders' structure and profitability had a significant effect on the level of

dividend adjustment. Those factors were extensively investigated in the previous research and frequently confirmed to affect the SOA coefficient significantly [Al-Najjar (2009), Jeong (2013), Chen et al. (2012), Shinozaki and Uchida (2015), among others]. However, it is pertinent to note that results in this research area are predominantly dependent on the underlying country, sample size, period of analysis and methods of measuring the potential determinants.

The obvious limitation of the study is the small size of research sample (mainly caused by the sample selection criteria and gaps in the financial and accounting data for several Turkish companies in certain years in the period analysed, 1996–2015) whereas its contribution to the existing literature consists of demonstration the significant relationship between the liquidity (quick and current) ratios as well as the standard deviation of the quick ratio and the speed of dividend adjustment coefficient, which is a novel result in the literature related to the dividend smoothing determinants on the Turkish market.

It is worth adding that the results of research on the dividend smoothing may also have practical applications. Such information may be useful for investors who attach great importance to receiving dividends. In the case of companies smoothing the dividend, investors may expect stable and regular dividend payments even in the period of deterioration of the financial results of the company. However, according to findings published by Rangvid et al. (2014), predictions of dividend growth would be difficult if companies smooth dividends because no connection exists between the fluctuations of dividend yields and the expected increase in dividend.

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Components of the Effective Spread: Evidence from the Warsaw Stock Exchange

Joanna Olbryś

1 Introduction

There has been growing interest in issues related to the microstructure of stock markets since the nineteen seventies. Specifically, the spread as the difference between the ask and the bid quotes has been of interest to traders, regulators and researchers since the nineteen eighties. Further, bigger effort has been made to decompose the bid/ask spread into various components due to the importance of understanding spread formation, also in the context of liquidity measurement.

The goal of this paper is to investigate the effective spread and its two components complementing each other: (1) the realized spread and (2) the price impact component, using intraday data on the Warsaw Stock Exchange (WSE). Estimated liquidity measures are derived from high-frequency data 'rounded to the nearest second'. Daily proxies of percentage effective spread, percentage realized spread, and percentage price impact values for 53 WSE-traded companies divided into three size groups are analysed. The dataset covers the period from January 3, 2005 to June 30, 2015. Although the WSE is classified as an order-driven market with an electronic order book, information of bid and ask prices is not publicly available. As the dataset does not identify the trade direction on the WSE, the trade classification Lee and Ready (1991) algorithm is employed to infer trade sides and to distinguish between the so-called buyer- and seller-initiated trades. Moreover, the paper provides a robustness analysis of the obtained results with respect to the whole sample and three adjacent sub-samples, each of equal size: pre-crisis, crisis, and post-crisis periods. The Global Financial Crisis (GFC) on the WSE is formally set based on the papers (Olbrys and Majewska 2014, 2015), in which the Pagan and Sossounov (2003) method for formal statistical identification of market states was

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employed. The empirical results reveal that values of liquidity proxies rather do not depend on firm size and turn out to be robust to the choice of the period. Furthermore, the hypothesis concerning the statistical significance of correlation coefficients between daily values of three estimated measures used in the study is tested.

The remainder of the study is organized as follows. Section 2 describes the methodological background concerning the measurement of the effective spread and its components utilized in the study. Section 3 discusses the empirical results on the WSE. The last section summarizes the main findings with the conclusion.

Nomenclature	
WSE	Warsaw Stock Exchange
GFC	The 2007–2009 Global Financial Crisis
LR	The Lee and Ready (1991) trade side classification algorithm
%ES	Percentage effective spread
%RealS	Percentage realized spread
%PI	Percentage price impact

2 Measuring the Effective Spread and Its Components Using Intraday Data

There is a growing body of empirical literature concerning direct measurement of liquidity based on intraday high-frequency data. Specifically, there has been quite extensive research on various versions of the bid/ask spread. The related literature indicates that different versions of the bid/ask spread are proper measures for stock illiquidity because they approximate the cost of immediate execution of a trade. In this research, percentage effective spread is employed as a proxy of the bid/ask spread. It is worth to note that the nomenclature concerning the same spread measure is not unambiguous. For example, in his seminal work Roll (1984) introduces the estimator of effective bid/ask spread in an efficient market, but he does not utilize intraday data. Moreover, there are at least two basic versions of an effective spread derived from intraday data. One of them is calculated using a quote midpoint in the denominator, e.g. Corwin (1999), Finucane (2000), Theissen (2001), Korajczyk and Sadka (2008), while the second is computed using a transaction price, e.g. Chordia et al. (2000), Peterson and Sirri (2003), Chakrabarty et al. (2007).

However, there is no unanimity in determining the components of the bid/ask spread among the researchers. Moreover, conclusions from empirical studies estimating magnitudes of spread components have been mixed. In his seminal paper, Glosten (1987) points out that the bid/ask spread can be decomposed into two parts: one part due to asymmetric information and second part due to other factors. Similarly, Glosten and Harris (1988) decompose the spread into two components, one due to asymmetric information and one due to inventory costs, specialist monopoly power, and clearing costs. The authors introduce two-component

asymmetric information spread model with the buy-sell trade indicator variable. Stoll (1989) analyses the quoted spread and he emphasises that the quoted spread must cover three costs faced by a dealer: order processing costs, inventory holding costs, and adverse information costs. Huang and Stoll (1997) propose alternative extensions of basic two-component spread model that provide three-way decomposition of the spread. George et al. (1991) introduce a new approach that provides unbiased and efficient estimators of the spread components. The authors use a model similar to the one presented in Glosten and Harris (1988). They decompose the quoted spread into an order-processing cost component and an adverse-selection component. Madhavan et al. (1997) advocate that the costs of trading, as represented by the effective bid/ask spread, consist of three components: asymmetric information costs, inventory carrying costs, and order processing costs. Porter and Weaver (1996) use the model derived by George et al. (1991) to test two competing hypotheses concerning adverse selection costs on multiple market maker (NASDAQ) versus specialist dominated exchange (NYSE-AMEX). The results suggest that spread components might differ across exchanges. Lin et al. (1995) explore empirically the relation between the components of the spread and trade size using the spread decomposition into adverse information and dealer gross profit components. Menyah and Paudyal (2000) estimate three spread components on the London Stock Exchange: the order processing, inventory, and asymmetric information costs. Theissen (2001) decomposes the spread into two components: the realized spread and the adverse selection component, employing a method similar to that used by Huang and Stoll (1996). McInish and Van Ness (2002) concentrate their study on two components of the spread: the order-processing and asymmetric information costs. They use the techniques of George et al. (1991) and Madhavan et al. (1997) to investigate whether the variables measuring activity, competition, risk, and information, proposed by McInish and Wood (1992), explain the behavior of the spread components over the trading day. Angelidis and Benos (2009) estimate the adverse selection and the order handling component of the spread using the Madhavan et al. (1997) model on the Athens Stock Exchange. Ryu (2011) extends the structural model of Madhavan et al. (1997) and he develops a cross-market model that can decompose spread into the permanent and transitory components on derivative market.

In this paper, two components of the effective spread are employed: (1) the realized spread and (2) the price impact component. The realized spread is a temporary component of the effective spread and it is defined as the amount earned by a dealer or other supplier of immediacy, e.g. Huang and Stoll (1996). The realized spread is sometimes referred to as a price reversal component since a dealer takes profits only if price reverses. Subtracting the realized spread from the effective spread at the moment when the transaction occurred yields an estimate of the amount lost to informed traders (Theissen 2001, p. 159). The second component of the effective spread is a price impact estimate. According to the literature, a proxy of price impact measures the sensitivity of a stock's price to trades (Stoll 2000, p. 1495), and most of researchers derive price impact from intraday transaction data, e.g. Chakrabarty et al. (2007), von Wyss (2004), Coppejans et al. (2004). Kyle

(1985) provides a theoretical model for such a measure based on the adverse information conveyed by a trade. Price impact could be defined as the increase (decrease) in the quote midpoint over a time interval beginning at the time of the buyer- (seller-) initiated trade. This is the permanent price change of a given transaction, or equivalently, the permanent component of the effective spread, e.g. Goyenko et al. (2009, p. 156).

2.1 The Lee-Ready Trade Side Classification Algorithm

To calculate some liquidity proxies using intraday data it is essential to recognize the side initiating the transaction and to distinguish between the so-called buyer- and seller-initiated trades. The initiator of a transaction is the investor (buyer or seller) who placed his/her order last, chronologically. In other words, the initiator is the person who caused the transaction to occur (Odders-White 2000, p. 262).

The WSE is classified as an order-driven market with an electronic order book, but information of the bid and ask price is not publicly available. As a consequence, the researchers rely on indirect trade classification rules to infer trade sides. There are some trade classification procedures described in the literature, but the Lee and Ready (1991) algorithm (LR) remains the most frequently used (Chakrabarty et al. 2012, p. 468). The LR algorithm proceeds in three steps (Theissen 2001, p. 148):

1. Transactions that occur at prices higher (lower) than the quote midpoint are classified as buyer-initiated (seller-initiated) trades
2. Transactions that occur at a price that equals the quote midpoint but is higher (lower) than the previous transaction price are classified as being buyer-initiated (seller-initiated)
3. Transactions that occur at a price that equals both the quote midpoint and the previous transaction price but is higher (lower) than the last different transaction price are classified as buyer-initiated (seller-initiated) trades.

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

2.2 Measuring the Effective Spread and Its Components

In this research, we utilize the high-frequency data 'rounded to the nearest second'. The dataset contains the opening, high, low, and closing (OHLC) prices and volume for a security over one unit of time.

The midpoint price P_t^{mid} at time t is calculated as the arithmetic mean of the best ask price $P_t(a)$ and the best bid price $P_t(b)$ at time t. Considering that the bid and ask

prices are not made public on the WSE, the midpoint price at time t is rounded by the arithmetic mean of the lowest price P_t^L and the highest price P_t^H at time t, which approximate the best ask price and the best bid price, respectively (Olbryś and Mursztyn 2015, p. 43):

$$P_t^{mid} = \frac{P_t^H + P_t^L}{2}. \tag{1}$$

The transaction price P_t at time t is approximated by the closing price.

Percentage Effective Spread The percentage effective spread value is obtained by relating the transaction price to the midpoint of the bid and ask quote and it is given by Eq. (2):

$$\%ES_t = \frac{200 \cdot \left(P_t - P_t^{mid}\right)}{P_t^{mid}}, \tag{2}$$

where the midpoint price P_t^{mid} at moment t is given by Eq. (1), while the transaction price P_t at moment t is approximated by the closing price. Percentage effective spread is in fact an illiquidity measure. A wide percentage effective spread value denotes low liquidity. Conversely, a narrow percentage effective spread value denotes high liquidity. %ES at moment t is equal to zero when $P_t = P_t^{mid}$. Daily percentage effective spread value is calculated as a volume-weighted average of percentage effective spreads computed over all trades within a day.

To compute two components of the effective spread it is essential to distinguish between the buyer- and seller-initiated trades. Both the realized spread and price impact proxies are calculated over a time interval beginning at the moment of the buyer- or seller-initiated transaction. For example, Goyenko et al. (2009, p. 156) employ a 5-min interval and the subscript $t + 5$ means the trade 5 min after the trade t. Chakrabarty et al. (2007, p. 3820) use the subscript $t + 10$ which means the trade 10 min after the trade t. Theissen (2001, p. 159) proposes more general approach and the subscript $t + \tau$. In this study, the subscript $t + 5$ means the fifth trade after the trade t. Such framework is more appropriate on the WSE as Nowak and Olbryś (2016) documented that a large number of the WSE-listed companies exhibit substantial non-trading problem, i.e. the lack of transactions over a particular period when the WSE is open for trading. The non-trading problem may be treated as a special case of the "nonsynchronous trading effect I" which occurs when the analysis of one selected domestic market is conducted (Olbrys 2013).

Percentage Realized Spread The percentage realized spread value, which is a temporary component of the effective spread, is given by Eq. (3):

$$\%RealS_t = \begin{cases} 200 \cdot ln \dfrac{P_t}{P_{t+5}}, when\ the\ trade\ t\ is\ classified\ as\ buyer - initiated \\ 200 \cdot ln \dfrac{P_{t+5}}{P_t}, when\ the\ trade\ t\ is\ classified\ as\ seller - initiated \end{cases}, \quad (3)$$

where the transaction price P_t at moment t is approximated by the closing price. The price P_{t+5} is the closing price of the fifth trade after the trade t. %RealS at moment t is equal to zero when $P_t = P_{t+5}$. The post-trade revenues earned by the dealer (or other supplier of liquidity) are estimated on the basis of actual post-trade prices. Daily percentage realized spread value is calculated as a volume-weighted average of percentage realized spreads computed over all trades within a day. Moreover, daily percentage realized spread value is defined as equal to zero when all transactions within a day are unclassified.

Percentage Price Impact The proxy of price impact focuses on the change in a quote midpoint after a signed trade and it is given by Eq. (4):

$$\%PI_t = \begin{cases} 200 \cdot ln \dfrac{P_{t+5}^{mid}}{P_t^{mid}}, when\ the\ trade\ t\ is\ classified\ as\ buyer - initiated \\ 200 \cdot ln \dfrac{P_t^{mid}}{P_{t+5}^{mid}}, when\ the\ trade\ t\ is\ classified\ as\ seller - initiated \end{cases}, \quad (4)$$

where the midpoint price P_t^{mid} at time t is given by Eq. (1), while P_{t+5}^{mid} is the quote midpoint of the fifth trade after trade t. Price impact could be defined as the increase (decrease) in the midpoint over a five trade interval beginning at the time of a buyer- (seller-) initiated transaction. %PI at moment t is equal to zero when $P_t^{mid} = P_{t+5}^{mid}$. The proxy for daily percentage price impact is calculated as a volume-weighted average of the estimates of percentage price impact computed over all the trades within a day. Moreover, the value of the daily percentage price impact is defined to be equal to zero when all of the transactions within a day are unclassified.

3   Data Description and Empirical Results on the WSE

As mentioned in the previous section, we utilize the database containing the high-frequency data 'rounded to the nearest second' (available at www.bossa.pl) for 53 WSE-traded stock divided into three size groups, in the period from January 3, 2005 to June 30, 2015. When forming the database, we included only those securities which existed on the WSE for the whole sample period since December 31, 2004, and were not suspended. All companies entered into the database (147) were sorted according to their market capitalization at the end of each year. Next, the stocks were divided into three size groups based on the breakpoints for the bottom 30% (small companies), middle 40% (medium companies), and top 30% (big companies) (Fama and French 1993). The companies that remained in the same

group during the period investigated were selected. Finally, the 53 WSE-listed companies were gathered into separate groups, specifically: 27 firms into the BIG group, 18 firms into the MEDIUM group, and 8 firms into the SMALL group (Nowak and Olbryś 2016).

As the intraday dataset is large, special programs in the C++ programming language have been implemented to reduce the time required for calculations.

To verify the robustness of the obtained empirical results, the research is provided over the whole sample (2626 trading days) and three adjacent sub-samples each of equal size (436 trading days): (1) the pre-crisis period September 6, 2005 to May 31, 2007, (2) the crisis period June 1, 2007 to February 27, 2009, and (3) the post-crisis period March 2, 2009 to November 19, 2010 (Olbryś and Mursztyn 2015). The Global Financial Crisis on the WSE is formally set based on the papers (Olbryś and Majewska 2014, 2015), in which the Pagan and Sossounov (2003) method for formal statistical identification of market states was employed.

3.1 Empirical Results of the Effective Spread and Its Components on the WSE

Table 1 presents summarized empirical results of the average daily values of percentage effective spread (%ES), percentage realized spread (%RealS), and percentage price impact (%PI) for each WSE-traded company entering the size group (i.e., BIG, MEDIUM, or SMALL, respectively). The results are worth a comment. In general, the values of all liquidity estimates rather do not depend on firm size and turn out to be robust to the choice of the period. Moreover, we observe the lower values of the effective spread (as illiquidity proxy) for the most liquid big companies with the largest market capitalization (namely KGH, OPL, PEO, PKN, PKO), regardless of the subsample choice. Moreover, the evidence is that average daily estimations of realized spread (%RealS) are positive for almost all stocks from the three size groups, except for isolated cases. These findings are rather consistent with the literature because the existence of a bid/ask spread has several consequences in time series properties, and one of them is the bid/ask bounce, e.g. Roll (1984), Tsay (2010). According to definition (3), the realized spread is in fact a percentage logarithmic rate of return. As a price reversal component of a bid/ask spread, the realized spread is usually positive since an investor realizes earnings only if price reverses. A small positive realized spread value informs about higher liquidity, while a high positive realized spread value denotes lower liquidity. Furthermore, the evidence is that average daily estimations of price impact (%PI) are negative in most cases, which is a probable consequence of the fact that both the realized spread and price impact proxies are treated as the effective bid/ask spread components complementing each other, e.g. Glosten (1987), Huang and Stoll (1996, 1997).

Table 1 The average daily values of percentage effective spread %ES, percentage realized spread %RealS, and percentage price impact %PI

B	%ES				%RealS				%PI			
	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4
BHW	0.04	0.04	0.04	0.04	0.09	0.14	0.11	0.11	−0.06	−0.11	−0.07	−0.07
BPH	0.10	0.02	0.06	0.10	0.14	0.07	0.16	0.20	−0.07	−0.05	−0.11	−0.11
BNP	0.09	0.15	0.20	0.02	0.03	0.01	0.06	−0.001	−0.01	0.03	−0.02	0.001
BOS	0.11	0.12	0.08	0.13	0.04	0.01	0.007	0.06	−0.01	−0.001	−0.01	−0.03
BDX	0.07	0.10	0.07	0.06	0.11	0.03	0.15	0.10	−0.06	0.04	−0.09	−0.05
BZW	0.04	0.03	0.03	0.03	0.07	0.09	0.08	0.07	−0.04	−0.06	−0.05	−0.04
DBC	0.10	0.09	0.08	0.12	0.09	0.12	0.07	0.12	−0.04	−0.05	−0.03	−0.07
ECH	0.08	0.09	0.07	0.09	0.16	0.10	0.17	0.22	−0.10	−0.04	−0.10	−0.14
GTN	0.05	0.04	0.04	0.03	0.11	0.15	0.08	0.07	−0.06	−0.11	−0.04	−0.04
GTC	0.05	0.05	0.03	0.03	0.09	0.11	0.05	0.08	−0.05	−0.07	−0.02	−0.05
ING	0.06	0.06	0.09	0.05	0.10	0.13	0.09	0.09	−0.05	−0.08	−0.03	−0.04
KTY	0.07	0.04	0.06	0.08	0.13	0.22	0.13	0.09	−0.08	−0.18	−0.09	−0.04
KGH	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.000	0.000	−0.01	−0.007
LPP	0.08	0.09	0.10	0.09	0.09	0.05	0.19	0.12	−0.05	−0.01	−0.12	−0.08
MBK	0.03	0.04	0.03	0.04	0.07	0.13	0.06	0.08	−0.04	−0.10	−0.03	−0.04
MIL	0.05	0.07	0.04	0.05	0.11	0.15	0.13	0.10	−0.07	−0.09	−0.09	−0.05
MOL	0.07	0.07	0.07	0.09	0.07	0.17	0.14	0.04	−0.04	−0.11	−0.11	−0.02
NET	0.05	0.03	0.07	0.05	0.12	0.15	0.13	0.13	−0.08	−0.11	−0.07	−0.08
OPL	0.02	0.01	0.02	0.02	0.04	0.04	0.04	0.04	−0.02	−0.03	−0.02	−0.04
ORB	0.08	0.05	0.05	0.10	0.13	0.17	0.10	0.17	−0.08	−0.12	−0.07	−0.10
PEO	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	−0.008	−0.02	−0.02	−0.02
PKN	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.001	−0.004	−0.01	−0.004
PKO	0.02	0.01	0.02	0.02	0.03	0.04	0.03	0.03	−0.01	−0.03	−0.14	−0.08
STP	0.13	0.12	0.13	0.12	0.14	0.16	0.22	0.16	−0.07	−0.08	−0.10	−0.31
SNS	0.06	0.11	0.07	0.06	0.12	0.12	0.20	0.20	−0.07	−0.03	−0.13	−0.14

	%ES				%RealS				%PI			
	P1	P2	P3	P4	P1	P2	P3	P4	P1	P2	P3	P4
TVN	0.04	0.03	0.03	0.03	0.08	0.08	0.09	0.08	−0.05	−0.06	−0.06	−0.05
ZWC	0.13	0.12	0.22	0.16	0.03	0.03	0.03	0.04	−0.01	−0.01	0.003	0.001
Mean	**0.06**	**0.06**	**0.07**	**0.06**	**0.08**	**0.09**	**0.10**	**0.10**	**−0.05**	**−0.06**	**−0.06**	**−0.07**

	%ES				%RealS				%PI			
M	P1	P2	P3	P4	P1	P2	P3	P4	P1	P2	P3	P4
ALM	0.17	0.16	0.14	0.17	0.22	0.26	0.20	0.23	−0.13	−0.14	−0.12	−0.09
AMC	0.12	0.15	0.15	0.14	0.17	0.21	0.25	0.17	−0.08	−0.09	−0.14	−0.06
ATG	0.17	0.16	0.16	0.15	0.12	0.03	−0.003	0.04	−0.04	0.02	0.04	0.01
ATM	0.13	0.15	0.14	0.14	0.16	0.19	0.25	0.16	−0.10	−0.10	−0.16	−0.09
CNG	0.12	0.10	0.12	0.11	0.14	0.17	0.08	0.18	−0.08	−0.11	0.004	−0.11
COL	0.15	0.15	0.18	0.12	0.17	0.04	0.20	0.19	−0.07	0.02	−0.08	−0.08
IND	0.12	0.15	0.11	0.17	0.09	0.10	0.08	0.20	−0.05	−0.04	−0.06	−0.14
IPL	0.13	0.15	0.14	0.13	0.11	0.17	0.08	0.10	−0.04	−0.06	−0.02	−0.03
LTX	0.13	0.15	0.13	0.15	0.15	0.17	0.18	0.19	−0.06	−0.03	−0.06	−0.08
MCI	0.12	0.13	0.12	0.12	0.16	0.20	0.15	0.12	−0.05	−0.08	−0.03	−0.01
MNI	0.16	0.14	0.14	0.10	0.21	0.23	0.20	0.15	−0.09	−0.10	−0.09	−0.06
PEK	0.14	0.14	0.12	0.16	0.14	0.23	0.22	0.07	−0.08	−0.14	−0.16	−0.03
PUE	0.18	0.19	0.22	0.20	0.05	0.02	0.06	0.08	−0.01	0.02	−0.02	−0.03
SKA	0.11	0.14	0.10	0.10	0.02	0.04	0.08	−0.02	0.000	−0.01	−0.07	−0.04
STF	0.13	0.12	0.16	0.15	0.13	0.18	0.19	0.17	−0.06	−0.08	−0.07	−0.09
STX	0.12	0.11	0.12	0.07	0.19	0.17	0.15	0.18	−0.10	−0.06	−0.03	−0.11
TIM	0.16	0.14	0.14	0.15	0.11	0.20	0.15	0.06	−0.05	−0.10	−0.09	−0.01
VST	0.13	0.11	0.11	0.14	0.20	0.07	0.20	0.19	−0.09	−0.01	−0.12	−0.07
Mean	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	**0.15**	**0.16**	**0.14**	**−0.06**	**−0.06**	**−0.07**	**−0.06**

(continued)

Table 1 (continued)

S	%ES				%RealS				%PI			
	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4
APL	0.17	0.25	0.33	0.25	0.17	0.31	0.27	0.29	−0.07	−0.11	−0.10	−0.14
BDL	0.15	0.19	0.20	0.13	0.25	0.22	0.29	0.24	−0.15	−0.06	−0.12	−0.14
EFK	0.23	0.28	0.20	0.16	0.14	0.32	0.21	0.005	−0.07	−0.12	−0.13	0.02
ENP	0.24	0.29	0.30	0.24	0.24	0.46	0.28	0.29	−0.13	−0.23	−0.12	−0.17
KMP	0.20	0.32	0.23	0.24	0.26	0.38	0.33	0.40	−0.14	−0.13	−0.19	−0.25
MZA	0.19	0.28	0.24	0.17	0.20	0.41	0.27	0.11	−0.12	−0.21	−0.15	−0.05
PLA	0.20	0.19	0.24	0.21	0.15	0.26	0.20	0.24	−0.06	−0.11	−0.04	−0.14
SME	0.25	0.34	0.20	0.29	0.15	0.45	0.04	0.12	−0.06	−0.22	0.03	−0.06
Mean	**0.20**	**0.27**	**0.24**	**0.21**	**0.20**	**0.35**	**0.24**	**0.21**	**−0.10**	**−0.17**	**−0.09**	**−0.13**

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

B—BIG, M—MEDIUM, S—SMALL

Table 2 Summarized statistics of correlation coefficients for three size groups

		BIG (27 companies)				MEDIUM (18 companies)				SMALL (8 companies)			
		P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4
ES/RealS	Min	−0.03	−0.002	−0.05	−0.09	0.04	0.004	−0.03	−0.03	0.08	0.17	0.05	−0.05
	Max	0.32	0.48	0.48	0.39	0.33	0.37	0.50	0.37	0.27	0.40	0.17	0.20
	Median	0.15	0.13	0.14	0.16	0.14	0.19	0.14	0.14	0.13	0.32	0.09	0.10
	Mean	0.16	0.16	0.17	0.17	0.14	0.19	0.14	0.16	0.15	0.30	0.09	0.10
	St. Dev.	0.08	0.13	0.12	0.12	0.07	0.11	0.14	0.12	0.07	0.08	0.04	0.09
ES/PI	Min	−0.12	−0.25	−0.22	−0.17	−0.15	−0.15	−0.13	−0.08	−0.09	−0.16	−0.04	−0.05
	Max	0.11	0.15	0.14	0.24	0.09	0.22	0.09	0.27	0.05	0.06	0.13	0.15
	Median	0.01	0.01	0.002	0.03	−0.003	0.004	−0.001	0.04	−0.02	−0.07	−0.01	0.01
	Mean	0.01	0.00	−0.01	0.02	−0.004	0.000	−0.01	0.04	−0.02	−0.06	0.02	0.03
	St. Dev.	0.05	0.10	0.08	0.09	0.06	0.07	0.06	0.10	0.04	0.07	0.06	0.08
RealS/PI	Min	−0.99	−0.99	−0.99	−0.99	−0.99	−0.99	−0.99	−0.99	−0.98	−0.97	−0.99	−0.98
	Max	−0.94	−0.95	−0.93	−0.89	−0.94	−0.85	−0.93	−0.88	−0.96	−0.93	−0.96	−0.95
	Median	−0.98	−0.98	−0.98	−0.97	−0.97	−0.97	−0.98	−0.97	−0.96	−0.96	−0.97	−0.96
	Mean	−0.97	−0.98	−0.98	−0.97	−0.97	−0.96	−0.98	−0.96	−0.97	−0.95	−0.97	−0.96
	St. Dev.	0.01	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.01	0.01	0.02	0.01

The table is based on: (1) the whole sample period P_1, (2) the pre-crisis period P_2, (3) the Global Financial Crisis period P_3, and (4) the post-crisis period P_4. The ES/RealS and ES/PI correlations are the Fisher's z-transformed correlation coefficients while the RealS/PI values are the Pearson's correlation coefficients

Table 3 Percentage of statistically significant correlation coefficients

	ES/RealS				ES/PI				RealS/PI			
	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4
BIG	96.3%	62.9%	70.4%	74.1%	40.7%	29.6%	18.5%	33.3%	100%	100%	100%	100%
MEDIUM	94.4%	77.8%	61.1%	72.2%	38.9%	11.1%	11.1%	22.2%	100%	100%	100%	100%
SMALL	100%	100%	37.5%	50%	50%	25%	25%	25%	100%	100%	100%	100%

See Tables 1–2 for explanation

3.2   Basic Correlation Analyses between the Effective Spread and Its Components on the WSE

Table 2 reports basic statistics of correlations for three size groups in the whole sample period (P_1), the pre-crisis period (P_2), the Global Financial Crisis period (P_3), and the post-crisis period (P_4). The correlations (except the RealS/PI values) are the Fisher's (1921) z-transformation of sample correlation coefficients. Only the RealS/PI values are the Pearson's sample correlations because all of them are very strong and the Fisher's z-transformation is not appropriate in these cases.

As expected, we observe very strong negative relation among daily percentage realized spread (%RealS) and daily percentage price impact (%PI) values. The value of correlation coefficient varies between -0.99 (Min) and -0.85 (Max), and it does not depend on a firm size. This evidence confirms that these two components of the effective spread are complementing each other and they capture various sources of liquidity/illiquidity.

Table 3 reports the percentage of statistically significant correlation coefficients between daily percentage effective spread, daily percentage realized spread, and daily percentage price impact estimations for 53 WSE-traded companies in the whole sample, pre-crisis, crisis, and post-crisis periods. In the case of the whole sample period (P_1) the correlation critical value is equal to 0.038 at the 5% significance level (2626 daily observations) while for the other periods (P_2, P_3, P_4) the correlation critical value is equal to 0.094 at the 5% significance level (436 daily observations). The results reveal that the percentage of statistically significant ES/RealS and ES/PI correlations is quite high in many cases. However, it is important to note that various correlation analyses of liquidity measures might be biased by a non-trading problem on the WSE, e.g. Nowak and Olbryś (2016). Specifically, a consequence of non-trading might be extraordinarily many zeros appearing simultaneously in daily time series of liquidity proxies for some WSE-traded companies regardless of size group.

4   Conclusion

The aim of this paper was to investigate relations between percentage effective spread and its two components: (1) percentage realized spread and (2) percentage price impact. The estimated liquidity measures have been derived from high-frequency intraday data on the WSE. Daily proxies of percentage effective spread, percentage realized spread, and percentage price impact values have been analysed for 53 WSE-traded companies divided into three size groups. As information about trade side is essential for estimation of percentage realized spread and percentage price impact, the Lee and Ready (1991) algorithm was employed to infer trade sides and to distinguish between buyer- and seller-initiated trades. Moreover, the paper provided a robustness analysis of empirical findings with respect to the whole

sample and three adjacent sub-samples each of equal size: pre-crisis, crisis, and post-crisis periods. The results revealed that estimation values of all utilized measures rather did not depend on firm size and turned out to be robust to the choice of the period. Besides, the hypothesis concerning statistical significance of correlation coefficients between daily values of three indicators employed in the study was tested. The empirical results confirmed a strong negative relation between daily percentage realized spread and daily percentage price impact proxies.

Given the uncertainty surrounding liquidity/illiquidity estimation, a possible direction for further investigation could be to utilize the presented liquidity proxies in asset pricing models on the WSE (Olbryś 2014). Moreover, liquidity measures derived from intraday data would be employed in another research concerning commonality in liquidity on the WSE, as beginning with Chordia et al. (2000), the identification of commonality in liquidity emerged as a new and fast growing strand of the literature on liquidity.

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Fiscal Stability Protection in Poland in the Face of the Debt Crisis

Przemysław Panfil

1 Introduction

The outbreak of the global financial crisis led to a significant deterioration in the budgetary situation of most members of the European Union (hereafter: EU). This was visible, for example, in the number of countries subject to the excessive deficit procedure. In 2008–2016, it was conducted in relation to 25 of the 28 EU Member States. Significantly, 22 proceedings were initiated in 2008–2010 (Panfil 2017). At the same time, in some euro area countries, the financial crisis turned into a debt crisis becoming a serious challenge to the monetary integration process in Europe. These facts unambiguously demonstrated the failure of solutions intended to increase the budgetary discipline of EU members. The circumstances resulted in a large-scale legislative intervention. The actions of the EU legislator were twofold. On the one hand, the EU legislator sought to increase the effectiveness of the EU fiscal rules on guard of the fiscal stability of the Member States. On the other hand, the EU legislator sought institutional solutions to facilitate the process of restoring stability in countries in debt crisis.

The actions of the EU legislator and the experience of the debt crisis could have inspired the creation of legislative solutions for improved protection of fiscal sustainability in Poland. Unfortunately, many related issues have not been addressed by the Polish legislator. For example, the legislator did not decide to introduce the collective action clause into contracts forming the basis for domestic issues of treasury securities. Nor did the legislator attempt to regulate the quantitative easing of monetary policy by the National Bank of Poland. The subject of increased activity of the Polish legislature were mostly the legislative measures regulating the shape of fiscal policy.

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The aim of this article is to assess the actions that influenced the shape and functioning of the Polish fiscal policy rules undertaken by public authorities in the face of the debt crisis. The resulting conclusions will form the basis for formulating the *de lege ferenda* regarding solutions that may contribute to increasing the protection of fiscal sustainability in Poland. The basic research method used in the work is dogmatic analysis.

2 The Essence of Fiscal Stability

The creation of effective legislative solutions that would safeguard fiscal stability requires a prior definition of the essence and meaning of this concept. For many reasons this is a very difficult task. The issue of fiscal stability is the subject of research conducted by representatives of various disciplines. Moreover, the views on fiscal stability are subject to constant modifications. In the 2000s, fiscal stability was most often defined as the ability to continue the current fiscal policy without interfering with budgetary constraints (Mackiewicz 2010). This approach was in line with the concept of long-term debt stabilization. This may be understood as a situation in which fiscal authorities may continue to service debt without unrealistic adjustments to future budget balances (IMF 2002).

Due to the experience of the debt crisis in the euro area, the understanding of the nature of fiscal stability has been significantly modified. More emphasis is now placed on the dynamic approach to this concept. A good example here is the definition in which fiscal sustainability is understood as avoiding undue growth of government obligations for future generations, while at the same time providing the public with the necessary public services, including adequate security in difficult times, and the ability to change policies in response to new challenges (European Commission 2012). This approach poses a serious challenge for public authorities. It means the need to maintain fiscal indicators at levels much lower than those considered critical. This approach creates space to use fiscal policy instruments in response to new challenges. Fiscal stability is also to be assessed in the broader context of the economic stability of the state, as well as examined in terms of the relationships within the public sector and its link with the private sector (Panfil 2015b). Particularly important are the interactions between the state and the financial market. A public law institution may fail not only due to insolvency, but also as a result of increasing liquidity problems (Roubini 2001).

3 The Precautionary and Remedial Procedures

Discussions on the nature of fiscal sustainability and the experience of the euro area debt crisis have not had a major impact on the Polish legislator. This stability is invariably assessed in view of Article 216.5 of the Constitution of the Republic of

Poland of 2 April 1997 (Journal of Laws No. 78, item 483, as amended), according to which public debt may not exceed 60% of GDP. This provision is a form of adopting one of the budgetary convergence criteria laid down in the Treaty on the Functioning of the European Union (OJ C 326/47 of 26.10.2012, as amended) into the Polish legal system. The basis for the reference value adopted in the EU law is of political, not the economic nature (Issing 2014).

One of the most serious drawbacks to the constitutional debt limit is that it operates in a zero-one mode. As long as the public debt does not exceed the level of 60% of GDP, from the formal point of view of Article 216.5 of the Constitution it does not affect the conduct of the fiscal authorities. Only exceeding the reference value means breaching the constitutional norm, i.e. a condition that should be changed immediately. The necessity of a gradual reduction of this indicator is threatened by a decline in aggregate demand and, consequently, an economic crisis. Recognizing this problem, the Polish legislator created a package of quantitative and qualitative fiscal policy rules, included in the precautionary and remedial procedures. They are currently regulated by Article 86 of the Act of 27 August 2009 on Public Finance (Journal of Laws of 2016, item 1870, as amended, hereinafter referred to as: PFA). The aim of the precautionary and remedial procedures is to slow down the public debt growth rate at a time when it is dangerously approaching 60% of GDP. This goal is achieved by limiting the fiscal authorities' freedom to decide the state budget deficit and budgets of local government units. Once the public debt reaches or exceeds the reference value, these limits become increasingly burdensome. In its original form, the precautionary-remedial procedures provided for three reference values of 50, 55 and 60% of GDP.

The outbreak of the global financial crisis in 2008 rapidly began to affect the state of public finances in Poland. Significant deceleration of economic growth resulted in an increase in the State Treasury borrowing needs and rapid accumulation of debt. As early as 2009, public debt reached 49.2% of GDP, which was only marginally lower than the threshold for launching precautionary and remedial procedures. It became clear that the threshold would be broken the following year. The introduction of precautionary and remedial procedures would have meant limiting the fiscal policy freedom of the Council of Ministers. These circumstances were at the root of the increased activity of the Polish legislator who tried to minimize the importance of precautionary and remedial procedures in two different ways. The first was the amendment of these procedures. The suspension (2013) and subsequent abrogation (2014) of the precautionary procedure starting to limit fiscal policy freedom when public debt exceeded 50% of GDP proved to be the most effective solution. The second way to minimize the importance of the Polish fiscal policy rules was an attempt to circumvent the resulting restrictions, in particular by implementing solutions bearing features of creative accounting. In this regard, the Polish legislator succeeded in reducing the size of selected fiscal indicators by changing the methodology of their calculation or delaying the financial consequences of current fiscal policy. Real reforms were therefore replaced by apparent acts, creating a false image of the state of public finances and creating fiscal illusions. A good example of this type of activity is, for instance, the transfer of some State Treasury expenditures

related to road infrastructure to the National Road Fund in 2009 outside the public finance sector. This solution helped to reduce the state budget deficit and the public debt growth rate. However, this situation did not improve the financial situation of the State Treasury, who covered all the liabilities of the National Road Fund. Thus, the nominal debt was replaced by a potential debt not included in the official statistics.

4   The Temporary and Stabilizing Spending Rules

An analysis of the actions undertaken by the Polish legislator in times of financial and debt crises reveals a far-reaching lack of consistency. On the one hand, it minimized the importance of precautionary-remedial procedures, and on the other hand, introduced two fiscal rules aimed at limiting the dynamics of the growth of selected categories of public expenditure. The first of these rules, of a temporary character, became effective on 1 January 2011. On this day, the Act of 16 December 2010 on the amendment of the Public Finance Act and some other acts (Journal of Laws of 2010, No. 257, item 1726, as amended) came into force. Under its authority the content PFA was supplemented, among other things, by Article 112a–d, which regulated both the temporary expenditure rule and the exit clauses. The main reason for introducing these solutions may be found in the decision of the Council of the European Union of 6 July 2009 on the existence of an excessive deficit in Poland (Council of the European Union 2009). According to the recommendations made in this decision, Poland was to make an appropriate adjustment of the balance until 2012. The temporary expenditure rule was intended to be one of the instruments used to achieve this objective. It is perfectly accentuated by the content of Article 112b PFA. Under that provision, the new fiscal policy rule was only applicable until the EU Council decided to abrogate the excessive deficit procedure against Poland. This provision also conditioned the temporary nature of the rule in question.

The temporary expenditure rule assumed a moderate real increase in state budget expenditures. Their maximum level for subsequent years was determined according to the principle that expenditures planned for the previous year increased by the inflation rate and by one percentage point (Article 112a.1 PFA). An important disadvantage of the temporary expenditure rule was its narrow scope, which included primarily discretionary spending. However, a number of rigid and, therefore, legally determined expenditures were excluded from the restrictions resulting from this rule. For example, debt servicing costs, EU own resources, and social security contributions for people on parental and maternity leave, and for the persons with disabilities (Article 112a.2 PFA).

The temporary expenditure rule was in effect for 2 years. It was included in planning budget expenditures for 2012 and 2013. Unfortunately, in this period Poland experienced a significant slowdown in economic growth, which amounted to 1.9% and 1.3% respectively. Under these circumstances, the provisional expenditure rule turned out to be of a pro-cyclical nature, preventing wider use of

fiscal policy to stimulate aggregate demand. This became particularly apparent in mid-2013, when the Polish government faced the need to draft an act amending the current budget law. At the same time, the EU Council issued new recommendations on excessive deficit in Poland, extending the time to correct the balance until 2014 (Council of the European Union 2013). In view of the above circumstances, the Polish legislature adopted the Act of 26 July 2013 on amending the Public Finance Act (Journal of Laws, item 938). The Act suspended the application in 2013 of Article 112a and 112b PFA. This allowed the adoption of the Act of 27 September 2013 on amending the Budget Act for 2013 (Journal of Laws, No. 1212), with the exclusion of the limitations imposed by the existing fiscal policy rules.

The temporary expenditure rule was in force until the end of 2013. As of 1 January 2014, the Act of 8 November 2013 on the amendment of the Public Finance Act and certain other acts came into force (Journal of Laws of 2013, item 1646). On the one hand, it repealed Article 112a–c PFA, on the other hand, supplemented the content of the Act with Article 112aa. New regulations structured the stabilizing spending rule. Introducing a new fiscal policy rule into the Polish legal system was a form of fulfilling the obligation imposed on EU members by Council Directive 2011/85/EU of 8 November 2011 on requirements for the budgetary frameworks of the Member States (OJ L306, 23.11.2011, p. 41). This directive is part of a set of six legislative acts (the six-pack) adopted in 2011, aimed at increasing the protection of the fiscal stability of the EU members.

As intended by the legislator, the fiscal rule of Article 112aa PFA was to be a mechanism leading to a reduction of the deficit in the general government sector and, in the long term, enabling Poland to achieve the medium-term budgetary objective of -1% of GDP (Panfil 2014). In general, this rule limited the growth of expenditure of selected institutions and bodies. They could grow at a rate that was influenced by the medium-term dynamics of GDP, the annual inflation rate (measured on the basis of consumer price indexes) and the value of discretionary measures. At the same time, a correction mechanism was introduced in the structure of the new fiscal policy rule, which automatically adjusts the spending limit depending on the economic situation in Poland.

The stabilizing spending rule in its original form was in force for less than 2 years. It was subsequently modified by the Act of 10 December 2015 on amending the Public Finance Act (Journal of Laws of 2015, item 2150). New solutions were used to set the limit of state budget expenditure for 2016. The main change in the expenditure structure of the fiscal rule was the replacement of the annual inflation rate by the inflation target of the National Bank of Poland. This target is determined by the Monetary Policy Council in the monetary policy assumptions for a given financial year and since the beginning of 2004 it is at 2.5%. The modification of the stabilization fiscal rule in the described scope was justified by the excessive volatility of inflation which introduced a significant factor of uncertainty in the budgetary process (Sejm Print No. 72). While evaluating this change, it is worth to note the circumstances in which it occurred. According to the original version of the stabilizing spending rule, the government, drafting the budget law for 2016, had to include the actual or projected level of the commodity and service price index for

2014–2016. Due to the persisting product gap in this period, Poland was subject to deflationary processes. While the price index of consumer goods and services was 0% in 2014, in the following years it stood at −0.9 and −0.6%. In the first draft of the budget law for 2016 (presented by the PO-PSL government), the forecasts concerning the development of this indicator in 2015–2016 were significantly overestimated. They were −0.2% and 1.7% respectively (Sejm Print No. 3988). As a result, the state budget spending limit was set at PLN 351.5 billion. The modified stabilizing spending rule was implemented in the second draft of the budget act for 2016 (presented by the PiS government). As a result, the spending limit increased to PLN 368.5 billion, creating a space for the implementation of new social programs.

One more problem related to the Polish fiscal policy rules may be noted. Both the precautionary and remedial procedures, as well as the stabilizing spending rule, limit the value of the fiscal indicators that the Council of Ministers may include in the draft budget law. They are based on the real and predicted data on such macroeconomic indicators as GDP and inflation. This situation poses the risk of manipulating these forecasts in order to reduce the constraints imposed by the existing fiscal rules.

5 Polish Fiscal Policy Rules and Fiscal Stability

The analysis of changes in Polish legislative solutions influencing the provisions or functioning of fiscal policy rules leads to several important conclusions. The key element of fiscal sustainability in Poland is the constitutional debt limit and related precautionary and remedial procedures. These solutions significantly reduce the risk of uncontrolled public debt growth. This statement is true despite the numerous actions of the Polish legislator, which contributed to easing the rigors resulting from the precautionary-remedial procedures. The legal, economic and image-related consequences of breaking the constitutional debt limit are, however, serious enough to represent a significant deterrent to excessive government fiscal easing.

The constitutional debt ceiling and precautionary-remedial procedures correspond to the concept of long-term debt stabilization and are part of a traditional approach to the issue of fiscal stability. Unfortunately, these solutions provide insufficient incentives for the reform of public finances during prosperity. Public authorities may pursue expansive fiscal policies until the level of indebtedness exceeds the reference value, which is most likely to occur during a downturn. Thus, the constitutional debt limit and the precautionary-remedial procedures are pro-cyclical. Exceeding the reference values means in fact losing the fiscal stability of the state in the new, dynamic definition of this concept. In this case, the state loses part of its capacity to provide the public with adequate security in times of crisis and the ability to properly respond to emerging challenges. It is therefore necessary to bring public debt to a level that would enable active use of fiscal policy instruments in the downturn without fear of exceeding the reference values set by the precautionary-remedial procedures.

The measure leading to the reduction of public debt could be the stabilizing expenditure rule that appeared in the Polish legal system on 1 January 2014. Originally, it was intended to enable Poland to achieve medium-term budgetary target of −1% of GDP. This situation, combined with a several percent growth of the Polish economy, would result in it "growing out" of debt. Unfortunately, the change in the stabilizing spending rule, which took place in December 2015, significantly reduced its efficiency. The NBP's inflation targeting limit allowed the government to pursue much more expansive fiscal policy. However, this situation is transitory. With the acceleration of inflationary processes, the importance of the stabilizing spending rule will increase. Paradoxically, if the consumer price index exceeds the inflation target of the NBP, the current solutions will be more stringent.

One of the *sine qua non* conditions for the effectiveness of fiscal policy rules is the need to respect them by the legislator and the addressees of the resulting restrictions. In the case of Poland this issue leaves much to be desired. As the experience of recent years shows, the provisions of Polish fiscal policy rules are adjusted in each case to the needs of current fiscal policy. Alternatively, the legislator implements solutions that allow for the "circumvention" of the restrictions resulting from these rules. Similar steps were taken by the Polish government to overestimate the value of selected macroeconomic indicators at the stage of drafting the budget act. In this way, additional space is created to pursue expansive fiscal policy, while remaining—formally—in accordance with the fiscal rules in force. The cost of this type of activity is an increase in the risk of Poland losing fiscal stability, declining transparency of public finances, as well as creating a misconception about the state of the finances in the society.

The above circumstances lead to the conclusion that the Polish fiscal policy rules should be strengthened by appropriately designed institutional environment. It seems important to ensure the transparency of public finances. It may be increased in two different ways, although it seems optimal to use both. The first is to improve the quality of the Polish budget statistics. To that end, it would be appropriate to implement for internal purposes the solutions contained in Regulation (EC) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union (Official Journal of the European Union L 174 26.06.2013, as amended). This would include, inter alia, the need to switch to an accrual method of recording budget transactions. In this way, the data presented to the Polish public would be identical to the data reported to the European Commission and subject to scrutiny by that authority. This would significantly reduce the possibility of using creative accounting to improve fiscal indicators by the Polish public authorities. The second way to strengthen the fiscal rules in force in Poland would be to establish a fiscal institution (Panfil 2015a). This entity would be independent of the government and would be of expert nature. The purpose of the fiscal institution would be to evaluate the way fiscal policy is conducted. In this regard, it could, inter alia, assess: the macroeconomic assumptions underlying the draft budget law, the degree of compliance with fiscal policy rules, and the costs, consequences and transparency of newly implemented legislative measures (Calmfors and Wren-Lewis 2011). In this way, the public would be

provided with objective information about the government policies. It is worth stressing that this solution is successfully used in countries such as the Netherlands, Japan, Denmark, Germany and the USA.

6   Summary

The shape of the Polish fiscal policy rules, based on the constitutional debt limit and the precautionary and remedial procedures, refers to the concept of long-term debt stabilization. Despite serious structural defects, which have been deepened in recent years by the Polish legislator, these rules have proven to be quite effective instruments for the protection of fiscal sustainability in its traditional approach. They limited the possibility of easing fiscal policy by the Council of Ministers, who were aware of the scale of the negative consequences of possible breach of the constitutional debt limit. The proposed solutions do not fit in with the new concept of fiscal stability. Protecting the debt reference values reduces the ability of fiscal policy to respond actively to the challenges of the downturn. In extreme cases this situation may be treated as a form of loss of fiscal stability by the state. From this point of view, the existing system of fiscal policy rules should be complemented by solutions that would affect the behavior of public authorities in times of prosperity. The aim should be to create a space between the current value of the public debt and the reference values set out in the precautionary-remedial procedures. Potentially, such a role could be fulfilled by the stabilizing fiscal policy introduced in the Polish legal system in 2014. Unfortunately, the modification it was subjected to a year later significantly reduced its effectiveness. Taking into account the scale of the amendment of the existing fiscal policy rules and the attempts to circumvent the resulting restrictions, it is also appropriate to reinforce the institutional environment in which these rules operate. It could consist in introducing in Poland the accounting standards resulting from the ESA2010 and establishing an independent fiscal institution that would evaluate the way fiscal policy is being implemented.

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The Particular Aspects of Procurement Contracts of Trading in Securities in the Conditions of the Slovak Republic

Tomáš Peráček, Alexandra Mittelman, and Boris Mucha

1 Introduction

The securities trade is a system of economic relationships and institutions facilitating collection, allocating and redistributing free financial resources by means of securities on the basis of offer and demand. Households, public sector represented by the government and by local authorities, companies, bank sector and other institutions act as subjects of securities trade. As the professional literature states, securities trade is divided by economic theory into primary and secondary. On the primary trade, securities are issued and the task of secondary trade is the realization of the securities trade itself. The purpose of contracts of acquisition of securities trade is to provide purchase or sale of securities to the client for remuneration. Commission contract, mandate contract and intermediary contract belong into this category and it is inseparable part of securities trade (Milošovičová et al. 2017). The research of the issue of procurement contracts about securities has been neglected for a long time by theoreticians from the field of securities law as for example Ľ. Strážovská, J. Dědič, J. Pauly. The effort of the authors of this paper was to fill this gap and to process the examined issue with the usage of the available professional literature and legal regulations. We would like to confirm or deny by means of analysis, description, deduction and comparison two hypotheses; 1. Legal regulation of procurement contracts about securities is adequate, 2. It is not necessary another fulfillment of legal regulation.

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2 Commission Contract of Acquisition of Purchase or Sale of Securities

The Commission contract of acquisition of purchase or sale of securities is adjusted in § 31 to § 35 of Act on securities. This type of contract is managed by the provisions of § 577 to § 590 of Commercial Code about commission contracts except of cases that object Act on securities. Commission contract of acquisition of purchase or sale of securities as the specific subtype of commission contract with the provision of § 263 (6) (c) of Commercial Code taken into account. However, it is included in the category of absolute commercial commitment relationships, what means that the rights and obligations of contract parties are directed exclusively by the provisions of Commercial Code. Act on securities includes also a statutory definition, according to which by commission contract of acquisition of purchase or sale of securities, a commission agent undertakes that he manages in his own name purchase or sale of securities for a principal on his behalf or he will perform an act for reaching this result and principal undertakes to pay him remuneration. Obligatory terms of contract are then the determination of:

1. contract parties, i.e. to determinate who is a commission agent and who is a principal
2. an obligation of a commission agent to manage in his own name purchase or sale of securities for principal on his behalf or to perform an act to reach this result,
3. an obligation of a principal to pay to a commission agent remuneration.

It is possible to make conclusion from the legal definition that this contract can be concluded as the contract about the result, i.e. as an obligation of commission agent to manage in his own name purchase or sale of securities for a principal on his behalf or as a contract to carry out only the performance for reaching this result. It follows from the above that the goal of a contract will be fulfilled if a principal is able to purchase or sell securities. The second possibility, i.e. when the obligation from contract terminates by its fulfillment is the situation when there was not any purchase or sale of security but a principal performed contract performance with the professional care (Juríčková et al. 2006).

The complying the written form of contract is a formal condition of its effectiveness. The Act nonmandatorily determines the written form of the instruction of a principal, according to who, commission agent has to manage the purchase or sale of securities. This requirement is possible to adjust with the variation on the basis of contract, but only with the instruction of principal was not in a written form. The Act imposes to commission agent the obligation to issue principal at his request the confirmation about the instruction imposed. If according to provision of § 32 (1) of Act on securities a principal imposes to a commission agent the instruction to manage purchase of security, the commission agent can require advance payment. In this case, we talk about the variation adjustment of § 571 (2) of second sentence of Commercial Code that recognizes the possibility to require advance payment but

only in the case if a commission agent has the considerable costs with arranging requirement.

If the subject of a contract is an obligation of commission agent to arrange the purchase of securities, he has a right to request a principal to pass him a paper security or if it is a book entry security, it has to register the suspension of a right to use this security in Central Securities Depository or in other separate record. During this period, principal is not authorized to use security. Commission agent can fulfill his commitment also by selling a principal securities from his own assets or by purchasing it from him but only providing that commission contract of acquisition of purchase or sale of securities enables it (Kajanová and Olvecká 2016).

It is supposed that purchase price or sale price of security is determined by the agreement of both parties in contract or order. However, if something else results from commission contract of acquisition of purchase or sale of securities and a commission agent is able to sell securities for the higher price than agreed, he is obliged to do so also without the approval of principal. The same situation is in the case of purchase of securities for the lower price than agreed, in the opposite case, commission agent will be responsible for the damaged caused to principal. However, it is not obligatory to state in contract purchase or sale the price. This defect is solved by the act with the obligation of commission agent to purchase or sell securities for the best price to principal, that was able to get in requested professional care.

The provisions of § 34 and § 35 of Act on securities solve the question of the transfer of ownership of securities. In the term of these provisions, securities are entrusted to commission agent for sale till the time if a third person does not acquire it. Paper securities, that are acquired for principal by a commission agent on the basis of contract are transfered to his assets by the day of carrying out endorsement and if it is required, following its passing to commission agent or writing it down to the account of the owner or to the holder account of a commission agent in the case of book entry securities. It follows from the above that the obligation of a commission agent is to execute endorsement on securities without the delay and to pass it to a principal. In case of book entry securities, commission agent will arrange its transfer to the account of the owner (principal) without delay, after obligations of principal have been fulfilled, that is payment of purchase price and remuneration to commission agent (Mucha et al. 2016).

It is necessary to distinguish the separate contract that a commission agent concludes for the purpose of fulfilling their obligation from commission contract of acquisition of purchase or sale of securities. In this case a commission agent acts on the side of a buyer or seller whereby this contract is independent from commission contract. The obligation of commission agent is to synchronize the content of both contracts with the aim to fulfill all obligations that will arise not only against his own client- principal but also against counterparty that he concludes the contract with. As it follows from the content of commission contract of acquisition of purchase or sale of securities, it is the type of contract consisting of more partial obligations, fulfillment of which is the condition of the success of contract. It is generally valid that commission agent is obliged to act with professional care in executing their performances and to follow instructions of client that are in

accordance with provision § 34 of Civil Code. It means practically that instruction of principal determines type of security which will be dealt with, timeframe of the validity of instruction etc.

Other obligation of commission agent is mainly to act with the necessary professional care and according to the instructions of principal, to protect the interests known for them connected to the arranging of the matter and to announce them all circumstances that can have influence on the change of their instructions, to arrange insurance only if contract determines so or when he got the instruction for it from a principal, to give to a principal notices about arranging the matter by the way determined in contract or on their call.

From the performance of commission agent himself, any rights or obligations do not arise to principal in relation to third persons because as it follows from the basic provision of commission contract "commission agent acts on the behalf of his own". However, the act enables to a principal to request directly from the third person to release the matter or to fulfill the obligation, that a commission agent arranged for them under the condition that a commission agent is not able to do it because of circumstances that relates to themselves (Pilková et al. 2015).

Act on securities particularly does not solve the question of remuneration to a commission agent. The obligatory requirement of commission contract of acquisition of purchase or sale of securities is only a determination of obligation of principal to pay to a commission agent remuneration. The determination of its amount, maturity and other conditions is up to the agreement of contract parties what belongs into the usual parts of contracts. It is valid as in other contract types (purchase contract, works contract, mandate contract) that if the amount of remuneration that was not agreed, remuneration belongs to a commission agent that is adequate to the performance executed and to the reached result with the respect to the remuneration usually provided for the similar performance in the time of the conclusion of contract. The expression usual remuneration is therefore necessary to explain with the respect to the stable practice, that was developed from the certain field and it is respected.

The payment of remuneration itself, resp. the right for its payment belongs to commission agent after fulfilling their obligations included in the provisions of § 584 to § 586 of Commercial Code, where processing and submission of the report about the result of performance, execution and submission of accounting, recovery of fulfillment of liability in favour of principal or transfer of a debt in favour of him belongs. The act particularly solves the question of substitution of costs, that are the part of costs for a commission agent and it is paid together with remuneration. It is costs that a commission agent necessarily and responsibly made in executing agreed performances as for example travelling costs, telephone etc. Remuneration then includes two components that consist of remuneration and a substitution of commission agent costs.

As far as the discharge of obligation from commission contract of acquisition of purchase or sale of securities is concerned, it is valid that the most common case is fulfillment of obligation. Between other ways of discharge of obligation following from contract of purchase or sale of security, there is an agreement of contract parties

about the discharge of contract, that does not need to have written form in comparison with general commission contract. The particular way of contract discharge is already mentioned so—called self-entry of a commission agent. The provisions of § 574 and § 575 of Commercial Code are similarly valid for commission contract of acquisition of purchase or sale of securities. Similarly as a principal in case of mandate contract, a commission agent can also partly or in whole terminate the contract in any way and if termination does not determine later efficiency which becomes effective when a commission agent learnt it or could have learnt it (Stoličná and Kočišová 2017).

Commercial Code does not enable to a commission agent whenever terminate the contract unilaterally. It acknowledges the possibility of a commission agent to terminate it, but at the earliest till the end of the calendar year following after the month that when the termination was delivered to principal. Their obligation to execute performance that they were commited to terminates also on that day. If by interruption of this performance the damage would be made to a principal, they are obliged to warn him what measures it is necessary to make for its diversion. If a principal is not able to do it nor with the help of other people and asks for its performance a commission agent, he is obliged to execute it under the threat of potential responsibility for damages.

The obligation of a commission agent terminates also on the basis of legal action as the death is, if it is a natural person or by its termination, if it is a legal entity. Regarding this, it is necessary to point out on the claim of a commission agent related to the performance executed from the day of termination notice till its efficiency and executed according to law, because also in this case he keeps the claim for payment of costs spent rationally and necessarily and for the part of remuneration adequate to the result reached in arranging the matter.

3 Mandate Contract of Acquisition of Purchase or Sale of Securities

Mandate contract as the common contract type has its roots in ancient Roman Empire. Its name itself is derived from roman words "manu data" (offered hand) i. e. from the gesture that has been used for ages for confirmation of agreement conclusion.

Mandate contract of acquisition of purchase and sale of securities as the specific type of mandate contract is contained in provision § 36 (1) and (2) of Act on securities. As the specific subtype of mandate contract and with the respect to the provision of § 263 (6) (c) of Commercial Code it is classified into the category of the absolute commercial- contractual relationships. An agent commits by mandate contract of acquisition of purchase and sale of securities to purchase or sell security on the behalf of principal and on their account according to the instructions of a principal or he will execute the performance for reaching this result and principal

commits to pay remuneration to an agent (Strážovská et al. 2008). The provisions of § 33 of Act on securities and on obligations and rights of a commission agent relate to the rights and obligations of agent, this means that it's a contract type that is almost identical with Commission contract of acquisition of purchase or sale of securities. Mandate contract of acquisition of purchase and sale of securities is managed by the provisions of § 566 to § 576 of Commercial Code about mandatory contract, has to have written form except of the provisions contrary to Act on securities. The obligatory requirement of the contract is then the determination of:

1. contract parties, i.e. who is a principal and who is and gent,
2. commitment of an agent that he will purchase or sell security on the behalf of a principal, or his account and according to the instructions of a principal, or he will execute the performance for reaching this result,
3. commitment of a principal to pay remuneration to an agent

Similarly, as commission contract of acquisition of purchase and sale of securities also this contract can be concluded as the contract about the result, i.e. as the commitment of an agent that he will arrange the purchase or sale of security on his account or as a contract for carrying out performance for reaching that result. It applies then that the aim of the contract will be fulfilled if an agent is successful in purchasing or selling security. The second possibility when the termination of contract by fulfillment is valid is the situation when the purchase or sale of security did not happen but agent executed contractual performance with the professional care.

Subject-matter of this contract is the commitment of an agent to arrange for a principal on his account the acquisition of purchase or sale of securities or only to execute that performance for some remuneration while he is obliged to proceed with the professional care. As a rule, it is the main part of his business performance and because of this reason, high professionality and expertise is assumed. Keeping the instruction of a principal and performance in accordance with his interests, that an agent has to be aware of and the notification of all information found out in connection with the acquisition of purchase and sale of securities having at least the potential influence on the change of instructions of a principal belongs into other obligations of an agent. A vote of confidence in professionality of an agent stems from his possibility to divert from the instructions of a principal if it is necessary mainly in the case when an agent is not able to get his approval in time (Rentková and Janac 2016). However, not even in this special case, an agent must not divert from his instructions if it stems from the contract concluded or from the instructions of principal himself. Particularly, it is necessary to apply analogically the provision of § 33 (2) and (3) of Act on securities, according to which if there is not anything that stems from mandate contract of acquisition of purchase and sale of securities and if an agent has the possibility and he is obliged also without the approval of a principal to sell security for higher price or purchase security for lower price than it was stated in the instruction. On the other hand, he is responsible for the damage he would cause to principal by this if the purchase or sale price was not stated in the instruction of a principal, the act imposes to an agent to purchase or sell securities for

a principal for the best price, which it would be able to reach when making efforts in the professional care.

One of the obligation of a principal that stems from Commercial Code and Act on securities is to hand over all necessary things and information in time to an agent for realizing the subject-matter of a contract except of those that a principal has to arrange. Executing certain legal transactions cannot be done without the power of attorney that a principal is obliged to issue in written form to an agent immediately (Kočišová 2016).

Agent's responsibility for the damages is expressed in the provision of § 570 of Commercial Code in a way that an agent is responsible for damages on the things taken from a principal for the arrangement of the content of contract and on the things taken in its arrangement from the third person except of the situation if he was not able to avert the damage not even in using his own professional care. Other legal requirements of the contract as for example the amount of remuneration for the agent, payment of costs connected to the realization of contract or termination of contract is identical with the former contract type.

4 Contract of Intermediation of Purchase or Sale of Securities

Contract of intermediation of purchase or sale of securities is the third and the last from the examined contract types. It is primarily adjusted in the provision of § 37 (1) and (2) of Act on securities and represents the contract by which intermediary commits to execute the performance leading to the situation when the candidate would have the opportunity to sell or purchase securities and he commits to pay him remuneration. The obligatory requirement of the contract is then the determination of:

1. contract parties, i.e. who is an intermediary and who is a candidate,
2. the commitment of an intermediary that he will execute the performance leading to the opportunity for the intermediary to sell or purchase of securities,
3. the commitment of an candidate to pay the remuneration to an intermediary.

Despite the fact that Commercial Code specifically regulates contract of intermediation, the provision of § 37 (2) first sentence of Act on securities determines, that contract of intermediation of purchase or sale of securities is regulated by the provisions of Commercial Code about securities determines that contract of intermediation of purchase or sale of securities is regulated by provisions of Commercial Code about mandate contract if this act does not determine differently that can not only generate but also generates confusion in practice. This concern is supported also by explanatory memorandum to § 37 (1) and (2) of Act on securities, that mentions subsidiary (supportive) scope of commercial amendment to the contract of intermediation as follows: "contract of intermediation is regulated also by Commercial

Code. It applies here that this legal regime refers to the contract of intermediation regardless of the legal status of contract parties if the act does not determine something else. In the contract of intermediation, an intermediator does not act neither on the behalf of nor on the account of client, he just develops the performance leading to the fact that the client would have the opportunity to purchase or sell securities." It is possible to state the basic obligations of an intermediator with the use of the provision of § 567 of Commercial Code that is mainly:

– to use the professional care in arranging the matter,
– to execute the performance that he commited to according to the instruction of the person concerned in accordance with their interests that an intermediator knows or has to know,
– to announce to the person concerned all circumstances that he found out in arranging the matter and can have the influence on the change of his instructions, while it applies that he can divert from them only if it is necessary on the behalf of him and he is not able to get his agreement in time,
– to pass the matters that he took over instead of them in arranging the matter to the person concerned without unreasonable delay.

In connection with the fulfilling the instructions of the person concerned it applies that if an intermediator (resp. other authorized representative) commits in arranging the matter other similar illegal action that fulfills all the criteria of the facts of the crime, eventually offence or administrative tort, he is responsible for such an act regardless of the fact if he bears responsibility only towards a principal (person concerned). Moreover, an intermediator is obliged to proceed in arranging the matters with the professional care according to the instructions from the person concerned and in accordance with their interests (Milošovičová and Nováčková 2014). His performance executed in contrary to the client's interests has a consequence the responsibility for the damage that would be arise by this to the person concerned.

Contract of intermediation determines also the obligations of the person concerned that is to pass things and information which are necessary for arranging the matter to an intermediator in time if it is does not result from their character that the person concerned should arrange it (for example the proof of the purchase of security), or to issue in the written form the necessary power of attorney to the intermediator if the arrangement of the matter requires executing legal actions on the behalf of the person concerned, e.g. to request the statement from the Central Securities Depository of the Slovak Republic or from the securities broker.

The question of remuneration payment resp. to determine its amount can be solved by two ways. On one hand the contract parties have the possibility to determine its amount and maturity or other conditions by the agreement. If the amount of remuneration is not determined in the contract then the legal wording applies according to which the person concerned is obliged to pay the remuneration to an intermediator that is regular in the time of the conclusion of the contract for the performance similar to the performance that the intermediator executed in arranging the matter (Nováčková et al. 2016). The maturity of remuneration is determined by

the law for the time when the performance properly executed that an intermediator was obliged to execute regardless of the fact if it brought expected result or not. Maybe the only positive side of this unusual supportive application of other contract type is only the demand of an intermediator on the commission for the performance properly executed regardless of the fact if the result came, because the contract of intermediation in § 647 (1) of Commercial Code determines the demand on the commission after the result was reached, i.e. conclusion of particular contract of purchase or sale of securities.

In the case if it is possible to expect that in connection with the intermediation of purchase or sale of securities, the considerable costs arise to an intermediator (e.g. travelling costs, the necessity to pay different fees etc.) then he has the right to request the appropriate advance payment from the person concerned after the conclusion of the contract (Piškanin et al. 2006). Except of the possibility to provide the advance payment we can consider the payment of necessary or rationally used costs to an intermediator in fulfilling his commitment stemming from the contract in the way that person concerned is obliged to pay it to him except of the case when their inclusion in the remuneration stems from its character.

Act on securities does not particularly dedicate to the question of contract of intermediation of purchase or sale of securities termination and therefore it is necessary to search for the answer for this question in the general legal enactments of the private law that are Civil Code and Commercial Code. It stems from its content that contract of intermediation of purchase or sale of securities can terminate by different ways, but the most often on the basis of the legal act which is the fulfillment of the content of the contract, time expiration that the contract was concluded for, the agreement of the parties about its termination or notice of person concerned or an intermediator (Roštárová and Janac 2016).

One of the most important right of the person concerned is the possibility to terminate the contract whenever wholly or partly. In this case also applies that the notice as the one-side legal act if it does not have later effectiveness, enters into force on the day when an intermediator learnt or could learn about it. Legislator does not dictates the for of notice nor the way of delivery, however, also in this case because of the reason of legal certainty of parties it is convenient to comply with the proven way of delivery. After the delivery of notice, intermediator must not continue in the performance which the notice applies to, however, he is obliged to draw the person concerned attention to the measurements necessary for the prevention of damage that directly threatens the person concerned by not finishing the performance connected to the intermediation of purchase or sale of securities. It is necessary to draw attention also to the demand of an intermediator on the payment of necessary and efficiently incurred expenses included the adequate part of remuneration for the performance executed properly till the force of the notice.

The provision of § 575 (1) of Commercial Code does not allow in this case to intermediator whenever unilaterally terminate contract of intermediation of purchase or sale of securities. It states that he can terminate with the effect till the end of the calendar month followed after the month in which the notice was delivered to the person concerned (Saxunová et al. 2017). Also the commitment to execute the

performance that he commited to terminate to this day. The commitment of an intermediator terminates also on the basis of the legal act as death, if he is a natural person or its termination if he is a legal entity and as he is commited only to the person of intermediator it does not transfer to the legal representative.

5   Conclusion

We deny both hypotheses on the basis of the reached results of the research. We can conclude from the result of the research that the legal enactment of the contracts on securities is still insufficient despite the ambition of legislators and does not respect fully the general trends of the development of European law. The incomplete legal enactment of the particular contract types is considered as the biggest imperfection. Ministry of Finance of the Slovak Republic as the submitter of the government bill on securities and investment services was in many cases satisfied with only the indication of the enactment of the particular contract types as for example contract on donation of securities where there is only one paragraph with the subsequent message to subsidiary enactments of § 488 to § 587 of Civil Code, that regulate obligations and provisions § 628 to § 630 of Civil Code about deed of gift. According to the opinions of authors, the legal enactment of procuring contracts of securities is extremely chaotic, blind and literally "diffused" in many legal enactments. It stems from the practice that this diffusion causes many obscurities whose resolution is often on the shoulders of courts with more than doubtful result.

Within the scope of the critical view on the legal enactment of the Slovak Republic, professional literature almost always refers to more elaborated and more convenient diction of the czech legal enactment which is right now czech Civil Code. It is a codex of private law in the position "lex generalis" effective from 2014, which tries in its more than 3000 paragraphs to unite all field of the czech private law including also the field of the law of securities. After more years of its effectivity, czech theoreticians from the field of private law, as well as the professionals from the practice stated that the way that the czech legislator has chosen is not right at all. The ambition to include the issue of securities that belongs mainly to the field of public law into the private law has the consequence of opacity and chaos of this legal segment. From the point of view of the slovak national legal enactment and within the framework of the proposals "de lege ferenda", it would be convenient to amend the second part of Act on securities and investment services by the way that the legal enactment would be amended mainly with the legal definitions of all contract types and at the same time the general enactments about the particular contract types would expand in the appropriate way so the complex legal enactment would arise that would respect the needs of capital market. This requirement is legitimate by the fact that several financial institutions (banks) appeal also as the brokers with securities, do not dedicate enough attention to the amendment of the contracts on securities and they are often satisfied with only a very superficial and general form

contract in the volume of one page, whose first sentence expresses the manifestation of the will of seller and it is adopted from the testament.

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The Position and Importance of Stock Exchange Market and Central Securities Depository as the Inseparable Part of the Capital Market of the Slovak Republic

Tomáš Peráček, Lucia Kočišová, and Boris Mucha

1 Introduction

The capital market of the Slovak Republic has long been showing signs of stagnation and failure of its core functions. The fundamental problem is that the domestic capital market virtually fails to provide effective redistribution of free financial resources, which makes legitimate questions about its meaningfulness (Loischová 2016). The need for an urgent remedy for this undesirable state is not self-serving, as delaying the current problems of the Slovak capital market could endanger the long-term stability of the financial sector. This scenario is also being avoided by the European Commission, which opened a debate on the barriers to free movement of capital in February 2015. According to us, this step provided some room for discussion to address the question of whether a capital market is needed in each country and, if so, whether there is a potential for its recovery (Európska komisia 2015). However, there are also older theoreticians such as J. E. Stiglitz (1989) or C. Mayer (1989), who argue that the existence of the capital market is not relevant to the economic growth of the country. However, according to the authors, it is necessary to resolve this issue and increase the efficiency of our capital market functioning, which can be an added value for the Slovak economy.

The Slovak theorists in the field of financial law and economics, R. Beňa, D. Nováčková or A. Loischová, are somehow avoiding the problems of legal regulation of the status of the Stock Exchange and the Central Securities Depository. A similar situation is in the Czech Republic. We believe that it is necessary, through this contribution, to "fill the hole" of information. The aim of the research is to answer hypotheses:

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1. The legal regulation of the status of the stock exchange and the CSD is sufficient.
2. The capital market in Slovakia is properly performing its economic function.

We intend to achieve this objective by examining the legal framework for financial market instruments, in particular by means of professional literature and legislation, as well as establishing their merits by comparing the results of their activities in the past years and proposing solutions.

2   Stock Exchange

The law allows to organize trading of securities in other public markets than exchanges (as well as closing those trades outside the public markets). Of these public markets, the stock exchange has a special position because it acts as an organized securities market. It works as an independent institution separated from the state. Although it is subject to state supervision, it is governed by its own self-government. Its importance and function on the capital market are given by focusing on an important part of the supply and demand of individual types of securities, most often in shares and bonds. There is an effective movement of capital on the stock market based on supply and demand and therefore the order of business is subject to a relatively strict and thorough control mechanism, which is also important from the point of view of the legitimacy of closed transactions. The functionality of an exchange as an organized market is ensured by various partial system systems that, in their entirety, cover all stock market activities as a market (Beneš and Musílek 1991).

The stock exchange as a financial market instrument can be defined differently from the perspective of economic theorists. According to B. Chovancová, the stock exchange is an institution through which public trading of securities and other investment instruments, operating based on specific laws, is organized and is organized on a membership principle with a specific structure of organs (Chovancová 2006). O. Rejnuš defines it as a relatively separate economic, organizational and technical system operating on the capital market, which is a highly organized secondary market trading with previously issued publicly traded securities (Reinuš 2008). Finally, B. Hrvoľová talks about stock exchanges as the top capital market institutions facing an aggregate offer with the demand for securities of the largest and richest companies. An objective price is created to ensure the liquidity of the securities (Hrvoľová 2001).

The legislation of the Slovak Stock Exchange, as well as the Czech legislation, allows the establishment of a larger number of stock exchanges. The fact that in the conditions of the Slovak Republic has not yet been created corresponds to the general tendencies of the European development and to the pragmatic point that the international position of the Exchange is that stronger like larger volume of transactions performed on it; at the same time, the level of exchange rates at that exchange is objectified.

The legal status of the Stock Exchange, its creation, activity and termination, trading with financial instruments on the regulated market of the Exchange and the multilateral trading system and supervision of the Exchange's activities and the organization of the multilateral trading system are currently regulated by Act No. 429/2002 Coll. about the Stock Exchange as amended, which only after 2 years replaced effective law No. 330/2000 Coll. about the stock exchange.

The legal form of the stock exchange as a legal person was determined by law as a joint stock company based in Bratislava with a paid-up share capital of 11,404,928 euros which organizes a regulated market, including pre-issue trading and secures related activities, for the exercise of this activity, an authorization for the establishment and operation of the Exchange granted by law. The Exchange may also engage in other activities such as organizing a multilateral trading facility or organizing a primary market at a designated place and at a specified time, provided that the issuer, simultaneously with the issuance of securities or other financial instruments, requests their admission to the stock market and provides other necessary activities. The Exchange may also perform other activities than those mentioned above if it is related to its purpose, it does not jeopardize the performance of these activities and the National Bank of Slovakia has given its approval for their implementation. Such activities are not recorded in the business register. At the same time, the law prohibits the Exchange to trade securities and perform other than the aforementioned activities (Dědič 1992).

The trading name of the stock exchange must be labelled "Stock Exchange". Other legal entities that have not been established under the Stock Exchange Act or physical persons may not use this trade mark or other interchangeable sign in Slovak or foreign languages in their own name. The stock exchange may be set up by at least ten founders, which may be only a securities dealer, a management company, an insurance company, a bank or other stock exchange, and a legal entity with a foreign-based corporate body with the same subject of business. The law allows the stock exchange as a joint stock company to issue shares only as registered securities in the name. It is strictly forbidden to change the form and form of shares of the Exchange, the issue of priority shares by the Exchange, the change of the legal form of the Exchange, the sale of the stock exchange company or its part. As of 9 April 2009, Stock Exchange issued 11,385 ordinary book-entry registered shares in nominal value of 331.94 euros and 229,734 ordinary dematerialized registered shares in the nominal value of 33,194 euros whose transferability is limited in accordance with the provisions of §156 section 9 of the Commercial Code and in the scope of the statutes in force.

The option to buy Stock Exchange shares is unavailable to a normal citizen because its shareholder may be only a legal person who may be the founder of the Exchange, the National Property Fund of the Slovak Republic and the Central Securities Depository. The minimum share capital of the Exchange is 3 million euros, subject to the provisions of the Commercial Code.

The capital market in Slovakia was created as a by-product of coupon privatization rather than the need for investors and issuers, as is common in other market economies. This is to a certain extent also the character of its operation. The stock

market in Slovakia does not exist at present. This claim is based on trading results
on the stock exchange. For example, in 2016 from the total volume of trades in
the amount of 7,193,162,036 euros to the Bratislava Stock Exchange, up to
7,182,064,771 euros (99.85%) trading in bonds. These results cannot even be
compared with countries with countries such as the United States or the United
Kingdom with developed equity financing. Most of the transactions were realized on
the Bratislava Stock Exchange in 2006. It was a total volume of 26,832,376,281
euros of which 26,762,165,271 euros (99.74%) was trading with government bonds
(Burza cenných papierov v Bratislave 2016). If we compare the results from 2006
(in the pre-crisis) and 2016 figures, this trend is unambiguous. Despite the specificity
of our capital market, which has always been dominated by bond trading, it is
undeniable that global stock trading is on the decline. We also see the same results
in the Czech Republic (Beňa 2012).

When looking for a solution, it is also necessary to consider several capital market
parameters. This is mainly the type of capital (pensions and insurance), assets in
the administration and others. In 2015, the "New Financial Study (2015)" was
published, which states that the Slovak capital market is one of the least functional
and ranks us on 29th place from 31 countries in Europe (Writh and Bax 2015). How
can this regretful state be explained? We can also find reasons in not allowing
potential issuers to issue their own securities. Financial stability of the country,
healthy banks and low interest rates make it easier for entrepreneurs in Slovakia to
obtain capital in the form of a loan and the need to emit their own shares or bonds is
not possible. Furthermore, they do not have to be exposed to the risk of not placing
the issue of their own securities on the market. Since the liquidity of the Slovak stock
market is minimal and the barriers for entry are relatively high, investors do not
consider the Slovak stock market as an investment opportunity and do not pay
attention to it.

Investors consider the lack of high-quality domestic stocks as the biggest barrier,
and therefore prefer foreign markets that offer higher liquidity, lower fees and a more
diversified market (e.g., offer of financial derivatives). High costs and administration
are rightly considered to be the main causes of the current dysfunction of the capital
market in Slovakia, so any orientation to foreign markets may reduce some of these
costs. However, as can be observed by the 2014 Slovak Ecopoint Survey, foreign
stock exchanges are not always focused on issuers of securities from other than local
markets, which forces them to incur considerable costs for their promotion in the
given area (KPMG 2014).

3   Central Depository of Securities

The registry of securities in the Slovak Republic is managed by the Central Secu-
rities Depository of the Slovak Republic, which is a joint stock company established
in the Slovak Republic and registered in the Commercial Register maintained by the
Bratislava I District Court with a minimum statutory capital of 8,298,480 euros.

Its business name must bear the designation "Central Depository of Securities". Such a designation or translation shall not be used by any other physical person or legal entity in a commercial name.

The Central Depository of Securities must be legally the legal form of a joint stock company only, the founder of which may be the Ministry of Finance of the Slovak Republic, the National Property Fund of the Slovak Republic, the National Bank of Slovakia, the bank, the securities broker, the insurance company, the management company, or a stock exchange and a legal person established abroad with a similar object of activity. The mandatory provisions of the Securities Act require the Central Depositary to issue only dematerialized registered shares, which are currently 316 in nominal value each, at 33,194 euros. At the same time, it is forbidden to change their form and form. In addition, it may not issue priority or employee shares. Its shareholder may be only a legal person who may be the founder of the central depository.

In its activities it follows the main frameworks of the previous Securities Centre of the Slovak Republic, and it is operating under the Securities and Investment Services Act since 19 March 2004. With effect from 16 March 2006, it became its 100% shareholder the Stock Exchange in Bratislava because of the contribution of the state's ownership interest in the Central Depository's business to the capital stock of the Stock Exchange.

Its activity is carried out mainly based on the Commercial Code and the Securities Act. Its core activities/duties include:

1. registration of book-entry securities and immobilized securities in the registers of issuers,
2. registration of owners of book-entry securities on the accounts of holders and securities data on members' client accounts to the extent stipulated by the Securities Act,
3. allocation, modification and interruption of ISIN,
4. provision of services to members of the central depository, securities issuer, stock exchange, foreign stock exchange,
5. keeping the list of shareholders in the name of the registered shares,
6. establishment and maintenance of account holders, including changes to these accounts and other statutory or permitted activities.

Among its other duties, the legislator also has a role in every deal over 15,000 euros to identify the ownership of funds used by clients to execute the transaction, unless the order for the registration of the transfer of the book-entry securities is issued by the securities broker.

Not every individual or legal person can freely trade on the stock exchange. Even the central depository works on a membership principle and its members may be only securities dealers who have obtained prior approval from the Financial Market Authority for the performance of the member's activity and have fulfilled the conditions for granting membership under the Central Depository's Operating Rules, papers, the National Bank of Slovakia and another central depository, whether domestic or foreign.

For the opening of the holder's account, the registration of the transfer of the book-entry securities, clearing and settlement of transactions or other services related to the change of the holder of the book-entry security, physical persons and legal entities may request a member of the Central Depository and from 1 January 2007 also a central depository (excluding clearance and settlement of trades).

3.1 Two-Tier Bookkeeping of Book-Entry Securities

Under the Securities and Investment Services Act, the Central Depository can open three types of accounts:

1. The account of the owner who can open in the Central Depository its members, the state bodies acting on behalf of the SR, the National Property Fund of the Slovak Republic and other physical persons and legal entities. The account of the owner can also be opened by a physical person and legal entity with one of the members of the central depository. In the holder's account, the central depository or member of the central depository records the type and number of securities of the account holder.
2. Client account of a member who shall establish a central depository only to its member holding central data on the type and number of securities registered by the CSD member on the securities holders' accounts. However, the central depository will not be aware of the ultimate owners of the securities registered in the client accounts.
3. Holding account which may establish a central depository only for a central depository, a foreign legal person with a similar subject of business, a securities trader, a foreign securities dealer, a bank or a foreign bank with an authorization to perform the secondary service. In the holder's account, the Central Depository records data on securities the owners of which are registered by the person for whom the holding account has been established.

3.2 Clearing and Settlement System for Investment Instrument Trading

The Central Depository arranges clearing and settlement of stock exchange transactions with investment instruments and clearing and settlement of investment instrument transactions at client's request. Settlement in CSD terms means the calculation of the mutual obligations and receivables of participants in the clearing and settlement system resulting from closed transactions for settling transactions in investment instruments.

Participants in the clearing and settlement system are the Central Depository, the members, the Stock Exchange, the National Property Fund of the SR and the state body, acting on behalf of the SR, which have the account of the owner set up by the Central Depository.

3.3 Types of Clearing

In the calculation of liabilities and receivables arising from transactions in investment instruments, the central depository uses two methods:

1. netting—represents the netting of liabilities and receivables of participants in the clearing and settlement system of equities settled in the clearing and settlement system,
2. gross—the amount of the commitment or receivable of the participant in the clearing and settlement system is determined separately for each transaction.

The basic clearing method used by the central depository to clear out stock exchange transactions is netting. Investments on client orders are settled by the central depository generally by the gross method. Because of the current list of participants in the clearing and settlement system, they are only a total of 17. The Central Depository is an associated system for the TARGET2-SK payment system operated by the National Bank of Slovakia as of 1 January 2009. The transfer of securities is executed based on an irrevocable order registration of the transfer, which means that from the time of receipt of the transfer registration order neither the participant in the settlement system nor any third party can validly revoke or cancel the transfer registration order received by the settlement system or otherwise make it impossible to execute such an order.

The Central Depository is entitled to remuneration for the activities it performs unless the Securities Act provides otherwise. Furthermore, he has the right to provide all the documents necessary for the performance of his activity; otherwise it may refuse to provide the service. Failure to provide required documents, their delayed or incomplete provision, or provision in a form other than that required is always at the expense of who is required to provide them.

In March 2006, the became the 100% shareholder of CSD because of the contribution of property ownership of CDS to the registered capital of Stock Exchange in Bratislava. The development of activities and services is evidenced by the fact that by 2012, the depository allowed to acquire and subsequently to trade in securities traded on the market in the Czech Republic and on the market in the Slovak Republic. From the point of view of the depositary, 2017 was extremely successful for two reasons. Firstly, because the depositary has successfully passed the European platform of TARGET2-Securities (T2S), which consummated several years of efforts of CSD and its participants to harmonize services, securities settlements with European depositors and full integration into the single EU capital markets along with participants in the capital market in Slovakia. The second reason is continuing consolidation of our market position and the positive trend of recent years. While in 2015, the total volume of trades amounted to 34.78 billion euros, with an average daily volume of 135.87 million euros, in the year 2016 the total volume was 46.62 billion euros and a daily volume of EUR 182.1 million euros. The year-on-year increase of 34% is very considerable in Slovakia (Centrálny depozitár cenných papierov v Bratislave 2016).

3.4 Central Securities Depository Bodies of the Slovak Republic

The law does not contain specific regulation of central depository authorities. According to the Commercial Code, as a lex generalis of commercial law, the statutory body of the joint stock company and therefore the central depository is the governing body which operates its business and acts on its behalf. It further decides on all matters of the company unless they are subject to the General Assembly or the Supervisory Board by law or by the Articles of Association. Currently it has three members. In all matters binding the company, all members of the board of directors are entitled to act on behalf of two members of the board of directors, one of whom must be the chairman or vice-chairman of the company's board of directors. Signing for a company is made by affixing its signature to the printed or written business currency of the company, names and functions of the signing board (Strážovská 2016).

The supervisory body of the central depository is a minimum three-member supervisory board, whose task is to oversee the exercise of the powers of the Board of Directors and supervise the business of the central depository. Its members are authorized to inspect all documents and records concerning the activities of the depositary, to check the proper keeping of the accounting records, as well as to supervise the observance of the General Assembly's instructions to the Board of Directors and, finally, compliance with the legislation. In addition, the law entrusts it with reviewing the accounts, proposing to distribute profits, or reimbursing the loss and submitting its statements to the General Assembly (Saxunová et al. 2017).

The central body of the central depository is the General Assembly of Shareholders, which according to the law must be held once a year within the term specified by the statutes, based on the Board of Directors' convocation. The General Assembly is also responsible for the election and dismissal of members of the Board of Directors and members of the Supervisory Board.

4 Options for Reviving Trading on the Stock Exchange

The Government of the Slovak Republic has already responded to the decline of trading on the Stock Exchange when approving the Capital Market Development Concept. This is a set of state support measures aimed at simplifying the administrative processes of issuance of new issues of securities, reducing the tax and levy burden on trade and modernizing the capital market infrastructure. They were expected to reduce emission costs and speed up the service process, along with anticipations that after its entry into force they would have the potential to revive the Slovak capital market. Further efforts were made by the state in the concept of startup support and the development of the Startup Ecosystem, which resulted in the supplementing the Commercial Code for the third type of capital company under the

title "Easy Company for Shares" with effect from 1 January 2017. The result of this concept was the exemption of a simple company shares from the obligation to pay a tax license, as well as other incentives (Roštárová and Janač 2016).

The creation of a capital union also appears to be a solution to our problem. It could create a more efficient capital market, improve access to finance for businesses, expand and diversify sources of funding, and possibly improve risk sharing and increase the stability of the financial system. The entry of a strategic investor into the Stock Exchange would also be one of the possible theoretical solutions to the current situation. Also, the question of the termination of the Stock Exchange in Bratislava should be considered.

5 Conclusion

From the results of the research we can state that the legal regulation of the position of the Stock Exchange in Bratislava and the Central Securities Depository confirmed the hypothesis no. 1 on their adequate legal regulation and we consider it to be standard. This was probably the reason why the legislation of these two institutes was not included in the concept of capital market development in Slovakia. Hypothesis no. 2 was rejected because the capital market in Slovakia is not performing at all. In our opinion, its development and even the stock market itself will not help the government-promoted startup concept. We found from the Commercial Register data that in the year of effectiveness of the aforementioned amendment to the Commercial Code, only 61 simple companies were established in Slovakia. Due to the effort and financial resources involved, the project was unsuccessful. We do not really see the solution in the creation of a single European capital market, especially because of the supposed opposition of several countries that would have to leave control of its functioning to the central bodies of the European Union. The possibility of cancelling the Stock Exchange is also not on the agenda of the day. Even though we have noticed the long-term development of the Slovak economy without a functioning capital market, we are convinced that its abolition is not permissible from a political point of view. This step would question the overall functionality of our economy in relation to foreign investors. The capital market is likely to continue to "live" its own life. The development of the Prague Stock Exchange and investments in its market would not, in our opinion, help the accessibility of English translations of key laws such as the Securities Act, the Commercial Code, the Civil Code or the Stock Exchange Act. Generally binding legislation is available only in the Slovak language and in electronic form on the website administered by the Ministry of Justice of the SR www.slov-lex.sk.

Within the critical point of view of the authors, it can be stated that these important economic and legal categories of the market, despite the efforts of the responsible ones, did not penetrate the wider public awareness of the public. This fact results in a low turnaround compared to the exchanges of the Visegrad quadrilateral, which has a direct impact on the economic development of the Slovak

Republic. Reasons are many. The main problem, however, is the Slovaks' conservatism in the matter of investing in securities, while the abolition of this handicap was not helped by an extraordinarily mediated pension reform. On the contrary, the first pensions paid out of the income of the pension fund management companies' investments on the capital market have further strengthened the Slovaks in their negative, reserved attitude to investing in the capital market.

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The Sustainable Development and the Issue of Subsidies in the Light of the Law of the World Trade Organization

Anna Reiwer-Kaliszewska

1 Introduction

The sustainable development is one of the most important challenges of the modern world and constitutes the foundation of the functioning of many economies, including the European Union economy.[1]

The most transparent definition of sustainable development was formulated in the report of the World Commission on the Environment and Development (the so-called Bruntland Commission) that was titled "Our Common Future" in 1987.[2] It was then recognized that the sustainable development is a process that aims to meet the development aspirations of the present generation in a way that enables the same aspirations to succeed generations.

The Sustainable Development Strategy was endorsed by the Council of the European Union in 2001 and adopted in June 2006 as the Renewed Sustainable Development Strategy of the European Union. The basic objectives of the European Union's Sustainable Development Strategy included environmental protection, justice and social cohesion, economic well-being and the fulfillment of EU commitments on an international scale. The key challenges that have been adopted in the strategy were: climate change and clean energy, sustainable transport, sustainable consumption and production, the protection and management of natural resources, public health, social inclusion, demography and migration, as well as the challenges of global poverty and sustainable development.

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[1]According to the Treaty on the Functioning of the European Union, sustainable development is one of the objectives of the European Union, OJ 2012 C 326.

[2]World Commission on Environment and Development (1987), Our Common Future. Oxford, Oxford University Press, p. 27.

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In September 2015, at the United Nations Headquarters in New York, during the Summit of the 2030 Sustainable Development an Agenda „Transforming our world: the 2030 Agenda for Sustainable Development"[3] was erected. This Agenda contains 17 sustainable development goals, including: ending poverty in all its forms everywhere, ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture, ensuring availability and sustainable management of water and sanitation for all, reducing inequality within and among countries, taking urgent action to combat climate change and its impacts, conserving and sustainably using the oceans, seas and marine resources for sustainable development, protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably managing forests and combating desertification. Each goal has specific targets which should be achieved till 2030.

2 Subsidies as Part of the Sustainable Development

The instruments for the implementation of the sustainable development policy include, inter alia, subsidies, in particular supporting the investment activities (Kożuch 2009). Due to P. Jeżowski the most important economic instruments in sustainable development are ecological fees, subsidies, environmental taxes, depository and reimbursement schemes and transferable rights (Jeżowski 2007). Subsidies constitute financial support for the entrepreneur by the authorities of his country. Subsidies can be subdivided into direct subsidies where the cash flow is directly from the state budget or public financial institutions to the beneficiary and indirect, occurring when the state or another public institution resigns from demanding the benefit back from the beneficiaries of such aid. This results in a decrease in budgetary resources (Woźniak 2003). Direct subsidies occur more frequently and take the form of subsidies and preferential loans or credits (Kożuch 2009).

The aid granted in the form of subsidies should be used to finance environmental projects aimed at reducing pollutant emissions and increasing the efficiency of the use of natural resources (Jeżowski 2007). The 2010 Organisation for Economic Co-operation and Development (OECD) report Trade and Economic Effects of Responses to the Economic Crisis found that countries around the world have targeted through the end of January 2009 nearly USD 2800 billion on tax cuts, credits and extra spending. More than USD 430 billion was spent at increasing the supply of low-carbon power, improving energy efficiency or upgrading water or wastewater infrastructure, which means that the average share of the "green" subsidies was around 16%. The world's leader in green spending is China (OECD Trade and Economic Effects of Responses to the Economic Crisis 2010).

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[3]United Nations A/RES/70/1 Resolution adopted by the General Assembly on 25 September 2015 A/70/L.1.

Although the subsidies are a part of the sustainable development policy, there is no lack of views in the literature on their often negative impact on the economy and the environment.[4] Due to Kiyo Abasaka subsidies often lead to economic, environmental or social distortions. Not only are they expensive for governments but also induce harmful environmental and social outcomes without achieving their objectives. That is why reforming environmentally harmful subsidies has been a focus of the OECD Horizontal Programme on Sustainable Development. Hence, it is important that State aid in the form of subsidies should be addressed with caution, with due respect for the law and in a rational manner (Abasaka 2007). Incorrectly applied public aid may violate competition rules, so a number of public aid rules have been introduced in the European Union. The most important rules are: providing public assistance in a transparent manner, facilitating its oversight, complementing the nature of public funds involved, supporting projects to the requisite but sufficient level to achieve the purpose of granting aid. It is also extremely important that the involvement of public funds has greater social benefits than it would be achievable without obtaining such funding (Woźniak 2003).

Some subsidies may be subject to countervailing measures. The WTO SCM Agreement does not ban all subsidies outright, however it constitutes a compromise and discourages only the most distortive government subsidies. It is therefore important to indicate which subsidies are reprehensible and subject to countervailing measures and whether the subsidies within the sustainable development policy can be subject to countervailing measures.

3 WTO Rules on Subsidies

The issues concerning subsidies and anti-subsidy proceedings have been regulated in the Agreement on Subsidies and Countervailing Measures (SCM Agreement).[5] This document is an Annex to the 1986–1994 Uruguay Round GATT Agreement establishing the World Trade Organization. All WTO members' regulations concerning subsidies and anti-subsidy proceedings are based on the SCM Agreement (Reiwer-Kaliszewska 2017a, b).

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[4]J.J. Heymans, S. Mackinson, U.R. Sumaila, A. Dyck, A. Little, The Impact of Subsidies on the Ecological Sustainability and Future Profits from the North Sea Fisheries, https://doi.org/10.1371/journal.pone.0020239. There have also been an interesting series of articles criticizing the subsidies in The Guardian e.g. Are agricultural subsidies causing more harm than good? by J. Clay or Perverse government subsidies impede sustainable business, by R. Cowe, www.theguardian.com access on 30.04.2017.

[5]The SCM Agreement is an annex to the Agreement Establishing the World Trade Organization. Dz. Ust. 1995, Nr 98, poz. 483. Certain issues concerning agricultural subsidies are contained in the Agreement on Agriculture (AoA Agreement), which is also an annex to the Agreement Establishing the World Trade Organization. This article is limited to discussing the provisions contained in the SCM Agreement.

According to art. 1 of the Agreement on Subsidies and Countervailing Measures a subsidy includes two alternative elements: a financial contribution by a government or any public body within the territory of a Member, as a result of which a benefit is conferred. The term "public body" has been defined by the WTO Appellate Body as "an entity that possesses, exercises or is vested with governmental authority".[6] A financial contribution takes place where: (i) a government practice involves a direct transfer of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees); (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits); (iii) a government provides goods or services other than general infrastructure, or purchases goods; (iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments. The first three are direct support to domestic entrepreneurs, while the latter is an example of indirect support.

The second criterion for the recognition of a measure as a subsidy is the allocation of benefits to the recipient. It is essential to note, that the determination of whether the benefit exists should be based on the effect on the recipient. It is not therefore based on the cost to the government. The calculation of the benefit depends on the type of a subsidy and in the case of grants or tax exemptions the benefit is the amount of grant or the amount of tax that would have been paid in the absence of the exemption. The SCM Agreement also provides guidelines to determine the existence of the benefit in more complex cases.

Only specific subsidies can be subject to countervailable measures. The principles to apply in order to determine whether a subsidy is specific to an enterprise or industry or group of enterprises or industries have been placed in art. 2 of the SCM Agreement. Due to the first principle, where the granting authority, or the legislation pursuant to which the granting authority operates, explicitly limits access to a subsidy to certain enterprises, such subsidy shall be specific. The second principle states that specificity shall not exist, where the granting authority or the legislation pursuant to which the granting authority operates, establishes objective criteria or conditions governing the eligibility for and the amount of a subsidy, provided that the eligibility is automatic and that such criteria and conditions are strictly adhered to. Objective criteria or conditions mean criteria or conditions which are neutral, which do not favour certain enterprises over others, and which are economic in nature and horizontal in application, such as number of employees or size of enterprise. The criteria or conditions must be clearly spelled out in law, regulation or other official document, so as to be capable of verification.

However if, notwithstanding any appearance of non-specificity resulting from the application of the first and second principles, there are reasons to believe that the

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[6]Korea-Measures Affecting Trade in Commercial Vessels, 2.03.2005, WT/DS273/R, par.7.50.

subsidy may in fact be specific, other factors may be considered. Those factors are: use of a subsidy programme by a limited number of certain enterprises, predominant use by certain enterprises, the granting of disproportionately large amounts of subsidy to certain enterprises and the manner in which discretion has been exercised by the granting authority in the decision to grant a subsidy. Special account shall be taken of the extent of diversification of economic activities within the jurisdiction of the granting authority, as well as of the length of time during which the subsidy programme has been in operation.

Subsidies, which are limited to certain enterprises located within a designated geographical region, export subsidies and domestic content subsidies are always treated as specific.

4 Types of Subsidies According to the WTO Law

The SCM Agreement indentifies three types of subsidies based on the criterion of alleged harm: prohibited—3 SCM, actionable—art. 5 SCM and non-actionable—art. 8 SCM. Street light colors are also used to determine the type of subsidies (Fig. 1).

Red (prohibited) subsidies include export subsidies and subsidies dependent on local content subsidies. Export subsidies are considered to be dependent on export performance. The SCM Agreement does not contain a definition of the normative concept of export subsidies and only Annex I to the SCM Agreement contains an exemplary list of 12 prohibited export subsidies. This list includes, for example: the provision by governments of direct subsidies to a firm or an industry contingent upon export performance, currency retention schemes or any similar practices which involve a bonus on exports, internal transport and freight charges on export shipments, provided or mandated by governments, on terms more favourable than for domestic shipments, exemptions and preferential export credits. Prohibited subsidies are also subsidies that are legally or actually dependent on export activity. The SCM Agreement does not require proof of injury in regard to prohibited subsidies.

Actionable subsidies (yellow) are not directly defined in the SCM Agreement. However, they are considered to be such subsidies that do not meet the conditions for counting them for prohibited or non-actionable subsidies. Actionable subsidies are normally permitted unless they cause adverse effects. They are controlled for compliance with WTO law. The parameters to be considered when establishing

Fig. 1 Traffic light markings for three types of subsidies. Source: Own resource

Prohibited subsidies (red)

Actionable subsidies (yellow)

Non-actionable subsidies (green)

whether the subsidies have caused adverse effects have been provided in art. 5 of SCM Agreement. Due to it a subsidy causes adverse effects to the interests of other Members in the following situations: causation of injury to the domestic industry of another WTO Member, causation of a nullification or impairment of GATT 1994 benefits or causation of serious prejudice to the interests of another Member.

The category of actionable subsidies can be divided into two sub-categories: "dark amber" subsidies and "light amber subsidies" (Adamantopoulos and Pereyra-Friedrichsen 2001). The first sub-category includes the subsidies which exceed 5% the total ad valorem, subsidies that are intended to cover operating losses sustained by an industry or enterprise (other than one-time measures which are non-recurrent and cannot be repeated for that enterprise and which are given merely to provide time for development of long-term solution and to avoid acute social problems) and direct forgiveness of debt. The SCM Agreement establishes a rebuttable presumption of serious prejudice for the dark amber subsidies and a complainant WTO Member only needs to establish that the dark amber subsidy exists. However, serious prejudice shall not be found if the subsidizing Member rebuts this presumption by demonstrating that the subsidy in question has not caused any of the following four effects enumerated in SCM Agreement. Those effects are:

(a) displacement or impediment of imports of a like product of another WTO Member into its market;
(b) displacement or impediment of imports of a like product of another WTO Member from a third country market;
(c) significant price undercutting by the subsidized product as compared with the price of a like product of another Member in the same market or significant price suppression, price depression or lost sales in the same market;
(d) increase in the world market share of the subsidizing WTO Member in a particular subsidized primary product or commodity[7] as compared to the average share it had during the previous period of 3 years and this increase follows a consistent trend over a period when subsidies have been granted.

A WTO Member, who is successful in determining that the subsidy concerned has not caused adverse effects may continue granting the subsidy. Otherwise the subsidy will have to be withdrawn or its adverse effects removed (Adamantopoulos and Pereyra-Friedrichsen 2001).

Actionable subsidies which do not fall into dark amber sub-category are light amber subsidies. In case of those subsidies no presumption of adverse affects is provided. The burden of proof to demonstrate that such effects exist is therefore on the complaining country (Adamantopoulos and Pereyra-Friedrichsen 2001).

The green subsidies are presumed not to distort the trade and at the first years of the SCM Agreement were not actionable. However, it should be noted that the provision of art. 8 was controversial, applied for 5 years and was assumed to be

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[7]Unless other multilaterally agreed specific rules apply to the trade in the product or commodity in question.

temporary. WTO Members have not agreed on an extension of this deadline and therefore, pursuant to Art. 31 of the SCM Agreement the protection period for this type of subsidies has already expired. Hence, since 1st January 2000, non-actionable subsidies have also been considered as actionable. It is useful to review briefly about the matter of green subsidies, as that issue seems still not settled enough under the WTO law.

Non-actionable (green) subsidies were not subject to sanctions. Non-actionable subsidies were those that were not specific, that means those subsidies, which were not contingent upon exportation and not limited to certain enterprises or sectors. The category of green subsidies also covered subsidies, which were specific, however they were of particular value or had a negligible impact on trade. This category was provided to subject to very strict conditions and included three groups. The first group was assistance for research activities conducted by firms or by higher education or research establishments on contract basis with companies if that assistance covered not more than 75% of the costs of industrial research or 50% of the costs of pre-competitive development activity.[8] Those costs could only be used for certain expenditure e.g. costs of personnel, costs of instruments, equipment, land and building used exclusively and permanently for the research activity, costs of consultancy and equivalent services used exclusively for research activity, additional overhead costs and other running costs incurred directly as a result of the research activity.

The second group of subsidies considered to be green subsidies were subsidies concerned with assistance to disadvantaged regions within a general framework of regional development. To qualify to be green subsidies three conditions had to be fulfilled. First, each disadvantaged region had to be a clearly designated contiguous geographical area with a definable economic and administrative identity. Second, the region had to be considered as disadvantaged on the basis of neutral and objective criteria, indicating that the region's difficulties arise out of more than temporary circumstances. Third, those criteria should include a measurement of economic development which should be based on at least two factors such as GDP per capita and unemployment.

The third group of subsidies were subsidies concerned with assistance to promote adaptation of existing facilities to new environmental requirements imposed by law or regulations which result in greater constraints and financial burden on companies. However those subsidies were subject to some conditions e. g. they had to be one-time non recurring measures, limited to 20% of the costs of adaption and available to all companies which could adopt the new equipment and production processes.

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[8]Subsidies within civil aircraft sector are excluded from the provisions of art. 8 SCM Agreement and therefore are not within green subsidies category.

5 Controversies Around the Subsidies Within the Sustainable Development

The green-light category of subsidies has been allowed to lapse in 2000 and this means that also the subsidies within the meaning of sustainable development are now treated as potentially actionable and the existing rules about the amber subsidies apply also to them. In case the subsidy comes directly from public resources, confers a benefit, is paid to near-market ready projects and is conditioned on growing exports than it could be challenged under SCM Agreement.

Although the research and development subsidies have rarely been challenged under WTO rules (Maskus 2015), there have been a number of challenged environmental subsidies especially concerning China's solar and wind sectors. Between 2010 and August 2013 there have been six anti-subsidy complaints filed by European Union and USA at the WTO involving climate-related incentives (biodiesel, solar cells, wing-power equipment and renewable energy). China has responded with its own trade defense measures and in return alleged violations in both European Union and United States markets (Dove 2014).

Without doubt there are subsidies that could arise controversy about their consistency with WTO rules. K. Maskus gives some examples of such subsidies: a green subsidy to adopt new technology in an exportable corporation or an international grant to international company to establish a research and development facility in a particular town in order to improve the quality of inputs that are offered within the production networks (Maskus 2015). Should such subsides be prohibited? K. Maskus states that in such cases it is essential to assess the primary intention of the subsidization program. If the main intention of the support is the directive expansion of exports or replacement of import it should with sure remain unavailable. However, if the subsidy aims at solving a recognized environmental problem or link companies and research organizations with international networks, than such subsidies should escape WTO scrutiny, even if they additionally indirectly expand export capacity (Maskus 2015).

It is crucial to emphasize that the subsidies should be available for all firms. A fact that a subsidy is limited only to some enterprises or industry or group of enterprises or industries may indicate that it is specific.

As it was underlined before, despite the fact, that the green-light category of subsidies has been allowed to lapse the research and development subsidies, in opposition to environment subsidies, have in practice rarely been challenged.[9] However, this does not change the fact, that subsidies arise a controversy and should be subject to ex-ante and ex-post procedures to assess whether or not they have effects on international competition. This is essential to escape from the negative consequences of considering the subsidy as countervailable and consequently of the imposition of countervailing measures. Each WTO Member whose industry has

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[9]About those few examples, see: G.E. Luengo Hernandez de Madrid, *Regulation of Subsidies and State Aids in WTO and EC Law*, Kluwer Law International, 2007 and the literature given thereof.

suffered damage as a result of the subsidy has the right to question a subsidy under a multilateral system or has the right to unilaterally impose countervailing measures on subsidized imports. Countervailing measures (provisional countervailling duties, undertakings, countervailling duties) may be imposed on any subsidy that is considered to be illegal under WTO law. These will therefore be all prohibited subsidies and those actionable subsidies that have been declared incompatible with SCM (Lasiński-Sulecki 2009).

6 Final Remarks

Subsidies within the framework of a sustainable development policy aim at economic support for entrepreneurs and the development of selected areas of the economy. According to the 2010 Organisation for Economic Co-operation and Development (OECD) report Trade and Economic Effects of Responses to the Economic Crisis the average share of the "green" subsidies in the total number of tax cuts, credits and extra spending has been around 16% around the world. However subsidies that distort international competition are unacceptable and may be subject to countervailing measures.

It should also be borne in mind that the Art. 8 SCM, which unequivocally recognized environmental and development subsidies as non-actionable, was allowed to lapse in 2000. This means that also the subsidies within the meaning of sustainable development are now treated as potentially actionable and the existing rules about the amber subsidies apply also to them.

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Bid Premiums on the Warsaw Stock Exchange in the Period 2000–2015

Andrzej Rutkowski

1 Introduction

When making the decision to take over a company, acquiring significant or partial control of the company, people are inclined to pay a share price that will ensure the acquiring company and its shareholders an increase in value. They treat their decision like a complex investment that will bring them benefits in the future, which are often unobtainable for the current owners.

In certain situations, the owners of the acquiring company gain control of the target company and thus have an influence over the operational, investment and financial decisions that may generate benefits for the controlling shareholder and at the same time be unreachable for other (minority) shareholders. Under these conditions, the acquirer is inclined to pay a higher price, increased by the size of the control premium. The size of premium paid (Pr_t) is determined by the formula:

$$Pr\_t = \frac{P_{to} - P_{A,t}}{P_{A,t}}$$

P_{to}—Price per share in tender offer
$P_{A,t}$—Price per share t days prior to the date of the announcement.

The decision to buy additional shares to ensure the acquirer can exercise control, achieve proportional synergy benefits and access the extra benefits of additional transfers can be treated as an investment decision.

Bruner (2004) identifies control as the right to determine a company's strategy, to drive its day-to-day operations in the allocation of company resources, and to redistribute goodwill. He treats the possession of control as an option right. The value of the

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option right changes in line with changes in the financial situation of the company. According to valuation rules, its value increases with increasing volatility.

Control means direct management, including selection of the board, determination of strategic policy, influence over decisions on the company's important trade contracts, shaping investment policy, and the option to sell assets that are redundant in the assessment of the new strategic owner. This relates to the possibility of obtaining benefits not available to minority shareholders.

The payment of control premiums has formed the subject of many empirical analyses. These studies analyse the relationship between the size of the acquisition premium and a range of phenomena, such as:

1. the economic situation at the time of the takeover (Ruback and Jensen 1983; Jarrell and Poulsen 1989),
2. expectations for the future economic situation (Chatterjee et al. 2012; Kouwenberg and Salomons 2005),
3. the nature of the takeover—friendly or hostile (Betton et al. 2009; Chen and Cornu 2002),
4. the number of entities participating in the tender offer (Betton et al. 2009),
5. the sectoral diversification of the merged entities (Healy et al. 1997; Roach 1998),
6. the size relationships of the merged companies (Varaiya 1987),
7. the quality of corporate governance in the acquired and acquiring companies (Cotter et al. 1997; Moeller 2005; Dyck and Zingales 2004b),
8. the nature of the capital market on which the takeover is taking place—developed or undeveloped market (Kouwenberg and Salomons 2005; Chari et al. 2010; Nenova 2003),
9. the level of competition in the product market of the acquired company (Dyck and Zingales 2004a),
10. the nature of the acquirer—public or private company (Bargeron et al. 2008; Betton et al. 2009),
11. the method of payment for the acquired unit (Betton et al. 2009),
12. the nature of the acquisition—foreign or domestic (Chari et al. 2010; Dyck and Zingales 2004a; Nenova 2003),
13. the complexity of interests of the management of the acquired company (Wulf 2004; Hartzell et al. 2004),
14. the length of capital commitment in the acquired company (Gaspar et al. 2005).

2   The Rationale for Premium Size: An Overview of Selected Empirical Research Results

Many empirical studies have attempted to explain the reasons behind the size of premiums. The following table summarizes the results of studies conducted in developed markets, which have been analysed in the author's own research. It includes issues such as:

- The economic situation,
- The nature of the relationship between the buyer and the acquired company: domestic and foreign,
- Intra-sectoral and intersectoral connections,
- Public and private buyers,
- Operating and financial targets.

Merger and acquisition processes are carried out under so-called merger waves. As many studies indicate, the *state of the economy* at the time of acquisition has a significant impact on the size of the premium. Jarrell and Poulsen (1989) analysed 663 successful takeover attempts carried out between 1962 and 1985. According to their estimates, the average premium was 19% in the 1960s, 35% in the 1970s, and 30% in the first half of the 1980s. Ruback and Jensen (1983) achieved similar results. According to their analysis, premiums for the period prior to the 1980s ranged from 16% to 30%.

Betton et al. (2009) conducted extensive research into the size of premiums paid for the acquisition of companies on the US public equity market between 1990 and 2002. The research sample comprised 10,806 companies. According to their research, between 1980 and 1989, the average premium was 48.1%, while in the period 1990–2002, the average premium dropped to 45.0%. These three studies clearly show that, in successive periods characterized by different economic conditions and differing interest in takeovers, the premium sizes reached different levels.

Market participants' views on future economic conditions also influence the size of negotiated control premiums. Chatterjee et al. (2012) highlight the impact of differences in the assessment of financial forecasts on the size of premiums. The greater the variability in analysts' evaluations of the future financial position of the acquired entity, the lower the premium.

The *time horizon* of assessing the effectiveness of a takeover can also affect the size of premiums achieved. Long-term investors are more interested in monitoring the situation in the company. Gaspar et al. (2005) indicate that long-term investors pay a 3% higher acquisition premium compared to short-term investors. Kouwenberg and Salomons (2005) showed that premium size is largely dictated (40%) by the development prospects of the market.

Analysing data on premiums in particular transnational *regional markets* indicates a significant variation in the size of premiums. Later studies by Nenova (2003) and Dyck and Zingales (2004b) show that foreign buyers pay particularly high control premiums in countries with poor legal protection. In their view, these circumstances make it easier to transfer benefits to strategic shareholders.

Many empirical studies reveal significant differences in the size of premiums in *particular countries*. Zingales (1995) conducted a study of control premiums for companies listed on various capital markets, based on data for the period 1985–1990. He observed a very large difference between premiums paid in different countries. For example, in the analysed period, premiums amounted to 6.5% in the United States and Sweden, 45.5% in Israel, and as much as 81.5% in Italy. These figures also apply to block trades.

In the analysis of data on premiums with a focus on *sector specificity*, a significant variation in premium size can be noted. It can be assumed that the size of the premium depends on the development prospects of particular sectors, the potential for subsequent cost reductions and the implementation of restructuring processes (Hammermesh and Wachter 2007).

In global capital markets, *foreign acquisitions* are becoming increasingly important. Many of the empirical studies are devoted to the comparative analysis of international transactions and ventures restricted to domestic (local) markets. The research of Dyck and Zingales (2004a, b) shows that foreign investors are inclined to pay higher premiums when they acquire companies in countries where the legal system is more allowing of tax-free financial transfers. The results of the comparative studies presented in the published research raise doubts, due (among other things) to the fact that groups of companies of very different sizes are studied in different countries. Under these conditions, it is difficult to formulate unambiguous conclusions about the differences in the realisation of acquisitions.

Premium size is influenced by the *stage of development of the capital market* (developed market, emerging market). The value of control premiums on markets in developing countries in the period 1986–2006 was the subject of extensive research by Chari et al. (2010). Their analysis shows that most of the value creation benefits resulting from acquisitions are achieved by acquirers from developed countries. The larger the intangible assets and the "weaker the contracting environment" in the developing country, the greater the benefits to the acquirer. This may explain in part the possibility for foreign buyers to pay higher acquisition premiums. Similar conclusions were reached by Kouwenberg and Salomons (2005) in their research conducted between 1991 and 2002.

Investors making acquisitions can be divided into two groups: *industry* (strategic) and *financial*. The premiums paid by these two groups of investors constitute the subject of research conducted by Roach (1998). In his view, there is no significant relationship between the fact of belonging to the same sector and the size of the premium paid. Earlier research conducted by Healy et al. (1997) arrived at a different conclusion. Their results show that industry investors pay lower acquisition premiums compared to financial investors. They emphasize the fact that industry investors pay less, while achieving higher synergistic effects following the merger.

The research of Betton et al. (2009) shows that the premiums paid by *public company acquirers* (47.5%) are higher than those paid by private companies (42.6%). It should be added that the success of a takeover involving the actual acquisition of control over a company is more often achieved by public buyers than buyers outside the capital market. These findings point to the greater experience of larger public companies in the realisation of acquisitions.

The size of the acquisition premium has also been the subject of analysis on the Polish public capital market (Perepeczo 2009; Zarzecki and Byrka-Kita 2012; Byrka-Kita 2013). However, their analysis focused primarily on assessing the response of the capital market to public announcements of a tender offers.

3 Own Study of Acquisition Premiums on the Warsaw Stock Exchange

Under the conditions of the Polish public capital market, in order to transcend the limits of equity interest, it is necessary to publicly announce the tender offer and to offer potential sellers the right price for their shares. In the analysed period, the requirements for the limit values of thresholds in equity interest, and the determination of the limit values of the price in the tender offers, changed over time.

Fig. 1 illustrates the size of acquisitions premiums paid on the developed capital markets and on Polish capital market in the recent period (2000–2015). Vertical axis presents the medians of premiums paid in subsequent years. These deals premiums were calculated in relation to the price of shares 5 days prior to the date of the announcement of the tender offer. Bid premiums for the Polish public capital market were calculated using the data included in the sample of tender offers described in the further part of the study.

Premium paid on developed capital market are significantly higher than premiums paid on the Polish capital market (WSE). A large variation can be observed in the control premiums paid on the Polish public capital market.

Therefore, the question arises as to what caused the variation in the size of these premiums and whether any regularities exist in this issue. The objective of this study was to identify differences in the size of premiums paid by different groups of buyers planning to take over control of a company.

In accordance with the assumptions, the study aimed to answer the following questions:
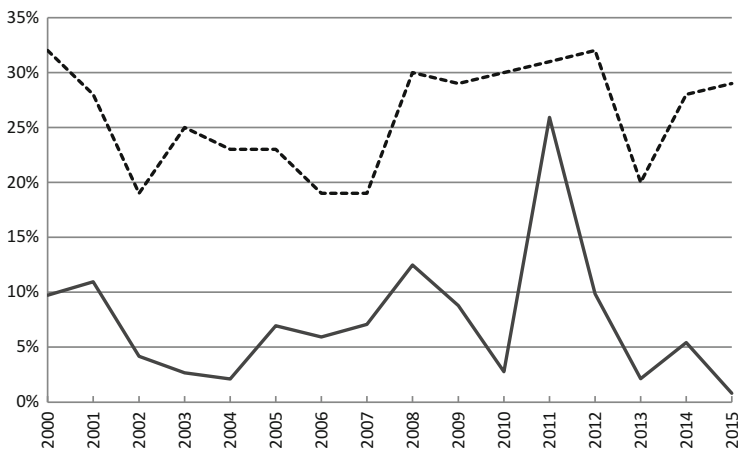

Fig. 1 Medians of 5 days acquisition premiums paid on Polish public capital market (authors own estimations, *solid line*) and premiums paid on developed capital markets (according to the McKinsey researches: Cogman 2014, Agraval et al. 2017, *dotted line*)

- Do domestic buyers pay higher control premiums than foreign buyers?
- Do buyers from the same sector (as the acquired company) pay higher control premiums than buyers from different sectors?
- Do buyers which are public companies pay higher control premiums than buyers which are private companies?
- Are control premiums for financial companies (e.g. banks, insurance companies, investment funds) higher than control premiums for operating companies (others than financial companies)?
- Are control premiums offered under conditions of growth in the capital market higher than those offered under conditions of capital market downturn? (Periods of growth of stock market general index (WIG—Warsaw Stock Exchange Index) calculated separately for subsequent years indicate periods of growth of the capital market. Periods of decline of WIG Index indicate periods of downturn on the capital market.)

The study was conducted on a sample of calls on shares of companies listed on the Warsaw Stock Exchange (WSE), announced in the period 2000–2015. The source of information was the data available on the InfoStrefa website (share price quotes), as well as the WSE Annual Reports.

Initially, the analysed group consisted of all 466 transactions of public tender offers announced on the WSE. In the next step, buyback transactions were eliminated from the sample. Tender offers for National Investment Funds (NIF) shares were also eliminated. This was mainly due to a subjective assessment of the non-transparency of the capital ties between buyers and sellers of NIF shares. The sample was thus reduced to 367 transactions. In the preliminary analysis, some of the premium sizes were identified as outliers. The range of variability was restricted for the study. Premium transactions below -10% and above 120% were eliminated. (Similar restrictions have also been introduced by other researchers analysing control premiums). In the end, the study covered 296 transactions.

The following groups of transactions were distinguished for the purposes of analysis (Table 1):

1. Transactions conducted by domestic and foreign buyers
2. Transactions conducted by buyers from the same sector and different sectors
3. Transactions conducted by buyers which are public companies (listed on the WSE) and those which are private units
4. Transactions for the purchase of operating companies and financial companies

Table 1 Tender offer transactions

Research	Transaction characteristics	Group_1	Group_2
1	Bidders	Domestic	Foreign
2	Bidders and targets	From the same sector	From different sectors
3	Bidders	Public	Private
4	Target company	Operating	Financial
5	State of capital market	Growth	Downturn

5. Transactions made under conditions of growth in the capital market and those conducted under conditions of downturn.

In order to ensure the comparability of the results with the research of other authors, in each study, premium size was analysed relative to the price of shares from a specified number of days (trading days) earlier:

- 1 day (Pr_1)
- 5 days (Pr_5)
- 10 days (Pr_10)
- 20 days (Pr_20)
- 60 days (Pr_60)

The study set 5 baseline null hypotheses relating to the differentiation in size of the offered control premiums. Each of these hypotheses was analysed in five variants for the different number of days before the date of the call (1 day, 5 days, 10 days, 20 days and 60 days prior to the date of the announcement):

Hypothesis 1:
Acquisition premiums offered by domestic buyers (Group 1) are equal to premiums offered by foreign buyers (Group 2).

Hypothesis 2:
Acquisition premiums offered by buyers from the same sector (Group 1) are equal to premiums offered by buyers from a different sector (Group 2).

Hypothesis 3:
Acquisition premiums offered by buyers which are public companies (Group 1) are equal to premiums offered by buyers which are private companies (Group 2).

Hypothesis 4:
Acquisition premiums offered for operating company shares (Group 1) are equal to premiums offered in calls for financial company shares (Group 2).

Hypothesis 5:
Acquisition premiums offered under conditions of growth in the capital market (Group 1) are equal to those offered under conditions of capital market downturn (Group 2).

The hypotheses were tested using a two-sample t-test with unequal variances. Surveyed samples were sufficiently large (significantly greater then 30, Weinberg and Abramowitz 2016). Each null hypothesis was considered in the context of 3 alternative hypotheses (Hamilton 2013, Kanji 2001; Stata 15 software was used to test the hypotheses):

H_{a1}: Premiums paid by bidders from Group 1 are different from premiums paid by bidders from Group 2.
H_{a2}: Premiums paid by bidders from Group 1 are higher than premiums paid by bidders from Group 2.

H$_{a3}$: Premiums paid by bidders from Group 1 are lower than premiums paid by bidders from Group 2.

The test results are presented in the subsequent Tables 2, 3, 4, 5 and 6.

Based on the test results, the following conclusions can be drawn in relation to the Polish capital market:

- Premiums paid by foreign investors are statistically significantly higher than those paid by domestic buyers (Pr_1, Pr_5, Pr_10). These results are consistent with the results of the research conducted by Dyck and Zingales (2004b). Under the conditions in Poland, it seems that these buyers expect higher synergies of a

Table 2 Mean premiums paid by Domestic (Group_1) and Foreign (Group_2) bidders (Hypothesis 1)

Bidders	Pr_1	Pr_5	Pr_10	Pr_20	Pr_60
Domestic (Group_1)	8.1%	9.9%	10.6%	13.0%	17.1%
Foreign (Group_2)	13.6%	15.1%	15.9%	15.7%	17.8%
p-value	0.0029***	0.0046***	0.0044***	0.1132	0.3948

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

Table 3 Mean premiums paid by bidders from the Same sector (Group_1) and from Different sectors (Group_2) as target (Hypothesis 2)

Bidders and Targets	Pr_1	Pr_5	Pr_10	Pr_20	Pr_60
From the same sector (Group_1)	11.0%	12.7%	13.3%	14.4%	17.6%
From different sectors (Group_2)	7.6%	6.6%	7.4%	10.4%	13.1%
p-value	0.1038	0.0169**	0.0213**	0.0966*	0.2106

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

Table 4 Mean premiums paid by Public (Group_1) and Private (Group_2) bidders (Hypothesis 3)

Bidders	Pr_1	Pr_5	Pr_10	Pr_20	Pr_60
Public (Group_1)	9.7%	10.3%	17.3%	23.8%	89.9%
Private (Group_2)	13.2%	32.1%	20.3%	37.0%	42.7%
p-value	0.3624	0.1279	0.3992	0.2224	0.0886*

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

Table 5 Mean premiums paid for Operating (Group_1) and Financial targets (Group_2) (Hypothesis 4)

Targets	Pr_1	Pr_5	Pr_10	Pr_20	Pr_60
Operating (Group_1)	12.9%	29.5%	21.0%	37.1%	55.9%
Financial (Group_2)	9.2%	9.9%	6.8%	6.9%	10.7%
p-value	0.2605	0.1025	0.0287**	0.013**	0.0011***

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

Table 6 Mean premiums paid in the period of Growth of capital market (Group_1) and Downturn on capital market (Group_2) (Hypothesis 5)

Periods	Pr_1	Pr_5	Pr_10	Pr_20	Pr_60
Growth of capital market (Group_1)	8.4%	9.6%	10.8%	11.6%	16.6%
Downturn on capital market (Group_2)	16.4%	19.1%	18.7%	21.0%	19.6%
p-value	0.0003***	0.0001***	0.0006***	0.0007***	0.1335

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

financial, operational and market nature. Entering a new geographic area allows these benefits to be expected.

- Premiums paid by buyers from the same sector are statistically significantly higher than those paid by buyers from other sectors (Pr_1, Pr_5, Pr_10, Pr_20). In other words, diversification activities are accompanied by lower premiums than activities centring on existing activities. It appears that a focused strategy makes it easier to achieve the synergy effect. These results are inconsistent with the findings of Roach's (1998) and Healy et al. (1997) researches.
- The average "long term" premiums (Pr_60) paid by public companies are higher than those paid by private companies. These results are consistent with the results of Betton et al. (2009) researches.
- Under conditions of economic growth, the premiums paid are statistically significantly lower than those paid under conditions of decline (Pr_1, Pr_5, Pr_10, Pr_20). Investors expect growth in subsequent periods. These results are consistent with the results of the research conducted by Ruback and Jensen (1983) and Jarrell and Poulsen (1989).
- The average premiums paid for operating companies are higher than those paid for financial companies (Pr_10, Pr_20, Pr_60). It should be emphasized that this relationship is not statistically significant. In this case, the higher premiums may result from the greater possibilities of obtaining the synergy effect with operating companies.

4 Conclusions

The sizes of acquisition premiums on the Polish public capital market are significantly differentiated depending on the nature of the buyer (domestic vs. foreign), the nature of the acquired company's business, and the state of the market. The limited sample size made it difficult to conduct a more in-depth analysis.

This study requires further examination in terms of identification of the various factors that influenced the premiums, especially the fundamental reasons for the premium levels (financial and operating results). Furthermore, it is necessary to explain the relationship between premium value and the value creation process following a merger in the whole holding company.

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Sustainable Finance: Paradigm Shift

Bożena Ryszawska

1 Introduction

Finance are adopting themselves to the new trend of greening economy. Transition to green economy means conversion (evolution) from the existing model of economy towards one based on increased social and environmental responsibility. The new model emphasised such elements as: circular economy, low emission, resource efficiency, clean technologies, responsible consumption, social justice and equality (both inter- and intra-generational).

According to above transition new concepts of finance have emerged in public debate such as: green finance, sustainable finance, climate finance, carbon finance. New approach of finance is purpose oriented, mission oriented, and value oriented which is opposite to traditional role of finance. Finance were always an instrument of economic decisions. The aim of finance in the neoclassic market economy was to maximize profits and shareholders value. Financial sector become huge in recent decades and completely decouple from real economy. What is interesting in current transformation in finance? The role of finance is changing from the dominant view rooted in neoclassical economic theory (to maximize profits, and shareholder wealth) towards one supporting sustainable development, green economy, low carbon economy also adaptation and mitigation of climate change. The process is powerful, fast and multilevel.

The paper presents a paradigm shift in economy which changes the role of finance (financial agents and markets) from dominant view of finance, focusing only on profits and shareholder value to alternative to the current regime. The goal is to identify a new direction for finance which is already emerging in Europe and confirm it by many initiative undertaken on the international arena.

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2   Methods and Procedures

The article is based on transitions research approach. It adopts a broader perspective than other approaches to sustainable development, emphasizing wide-scale system transformation. Transition research develops co-evolutionary approaches that high-light multi-dimensional interactions between industry, technology, markets, policy, culture and civil society (STRN 2010). This framework has guided work within the Sustainability Transitions Research Network. Particularly the multilevel perspective created by Geels is effective in the analysis of the sustainability transition and presents a "socio-technical" framework for understanding and managing transitions in finance.

The above approach is based on the assumption that the transformation is not a linear process but a joint effect of occurrences observed on three distinct levels:

- in the external economic, social and technological environment (demographic trends, political ideologies, financial crises, social values, and macroeconomic principles—the *socio-technical landscape*).
- in the dominant economic, technological and social system (the existing patterns of production, consumption, management, and legislation—the *socio-technical regime*);
- in *niches*—as areas associated with radical innovations;

The multi-level perspective offers a "big-picture" analytical framework that accommodates these broader processes and helps explain both stability and change. The *sustainability transition* is an end result of all interactions that occur between processes on each of the above levels. In this view, niches are the environment involved in the initiation of changes with potential to accelerate changes in the dominant system, while processes observed in the external surrounding exert pressure upon the system. Destabilisation of the dominant system, in turn, forms windows of opportunity for further innovations generated at niche level (Geels 2018). Landscape developments comprise both slow changing trends (e.g. demographics, ideology, spatial structures, geopolitics) and exogenous shocks (e.g. wars, economic crises, major accidents, political upheavals. Conceptually, this means that we should analyze socio-technical transitions as multi-dimensional struggles between niche-innovations and existing regimes. These struggles include: economic competition between old and new technologies; business struggles between new entrants and incumbents; political struggles over adjustments in regulations, standards, subsidies and taxes; discursive struggles over problem framings and social acceptance; and struggles between new user practices and mainstream ones (Geels et al. 2017). The first section of this paper presents the characteristic of landscape and external economic, social and technological environment and challenges to the sustainability transition of finance at hand, as reported in professional literature. Section 2 presents characteristics of the dominant economic and financial system, we call it dominant regime. The third section discusses the emerging financial initiatives supporting sustainability transition (niches) and author's view on sustainable financial system.

Finally, the paper closes with a discussion about possible scenario. The research was conducted using a variety of sources, such as scientific articles and reports of green finance experts group.

3 Landscape: Literature Review

The present problems are systemic, complex and multilevel. They also involve many actors (government, business, consumers, academia). Main of them: Unlimited growth of production and consumption, devastation of ecosystems, climate change, social inequalities (both in national and global perspective); macroeconomic instabilities and imbalances; depletion of natural resources, and degradation of the natural environment (Røpke 2013). Dominant economic model is not able to deal with them (Jackson 2009). The growing trend can also be found with respect to general awareness of the fact that some of the recent changes observed throughout world should be perceived as systemic risks or hazards, i.e. factors that are no longer contained within the narrow framework of individual problems, but pose a serious threat to the operation or the very existence of the entire system (Dietz and O'Neill 2013). Systemic risks may be triggered by certain events or evolve over time, and their effects are typically grave, with potential to reach catastrophic dimensions. Some of the most pronounced risks are produced as consequence of protracted, long-drawn processes and only come into light when certain threshold values are breached. Consequently, it may take decades before the full extent of their damage can be recognised or anticipated. Until then, their potential impact upon the economy and the society tends to be downplayed or underestimated. Following are some of the examples of the present systemic risks: (1) climate change and the loss of biodiversity—these are interconnected, complex and typically of global scale; (2) imbalanced and unsustainable use of resources across various economic and social strata—these have the effect of limiting the ecosystem's ability to provide its services (such as waste absorption or the supply of production resources, water, breathable air, etc.); (3) environmental challenges—of more complex character, strongly correlated to other social problems, and resulting in an influx of uncertainty and risk. As aptly observed by M. McIntosh, we are witness to several concurrent transformation processes at present: from high-emission to low-emission economy; from deep imbalance in income distribution to egalitarianism; from glaring practice of neglect for basic human rights towards communities formed on the sound fundaments of social justice (M. McIntosh 2013).

Main areas of current situation (Table 1) and necessary transition are:

- Economic transition—from dominant neoclassic model of economy to alternative one
- Environmental transition—mitigation and adaptation to climate change, protection of ecosystems and biodiversity
- Social transition—reducing poverty and inequalities
- Digital transition—new technologies, artificial intelligence, Internet of things

Table 1 Transitions from dominant model to alternative one

Dominant model of economy (brown, high carbon, unsustainable economy)	Alternative model of economy (green, low carbon, sustainable, circular economy)
Economic transition	
Unlimited growth Unregulated markets Business as usual Short term decision Private profits and socialized cost of actions Negative externalities are not internalized in prices Profit and shareholder value	Decoupling economic growth from natural resources consumption Socially responsible firms and investors Long term perspective (investment in infrastructure, long life education, demographic problems, environmental issues) Mission oriented Sharing economy, co-consumption
Environmental transition	
Fossil fuels—main energy source High consumption of natural resources CO2 emission Reduction of biodiversity	Renewable energy Energy and resource efficiency Clean production Biodiversity
Social transition	
Global social inequalities Over consumption Lack of responsibility Lack of social trust	Decent life Sustainable consumption Intergenerational and interregional justice Social trust, partnership, transparency
Digital transition	
Computer's support for business Technologies for effectiveness Innovations of products and services	Innovation drives success, New customers—generations Y and Z Personalization of products Democratization Decentralization of services Access 24/7 New services Clean technologies

Source: Authors own elaboration

Above transitions are leading issues in public debate specially in Europe. International institutions initiatives direct action to deal with problems:

- Strategy Europe 2020 focused on low carbon, resource efficient economy also smart and inclusive and financial framework to support transition
- International climate agreement in Paris in 2015, to combat climate change and unleash actions and investment towards a low carbon, resilient and sustainable future is confirming importance of transition.
- The Sustainable Development Goals (SDGs), known as the Global Goals— universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These 17 Goals include areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities.

International organisations and individual countries have undertaken activities in response to global crisis, as part of much broader strategies of development and new policies, strongly rooted in the concepts of sustainable growth, green economy and clean production as the most effective remedies with potential to revitalise and sanitise the economy. Business entities gradually depart from the business as usual model of operation, looking for new business models which Sustainability and Responsibility. The process of transformation that can be witnessed at present is—in its essence—a manifestation of structural changes. Research results and statistical data confirm the growing impact of green economy upon the GDP and employment rates, thus elevating its significance as a source of competitive advantage, a mark of sectoral development and a potent attractor for public and private investors (Ryszawska 2013). This is a new and very distinct trend. Observation and interpretation of structural changes associated with such concepts as green economy, green growth, green entrepreneurship and green employment are an important and current topic for in-depth studies.

It may be observed that some of the processes which, up till recently, were only registered at the niche segments and peripheral areas of the economy, are gradually seeping to the mainstream, turning the brown economy of overabundance into a green economy of moderation and restraint. Some of the manifestations of this process include such phenomena as: the growing share of energy from renewable sources in total energy production, waste recycling, reduced greenhouse gas emission, of modern products and technologies with improved energy efficiency, sustainable transportation, sustainable supply chains, sustainable consumption, collaborative consumption, corporate social and environmental responsibility, corporate sustainability.

Changes of this scale can only be effected through concerted effort of various source of finance; international, national, public, corporate, households.

4 Critique of Dominant Regime of Finance

Discussion about real economy transition (production, consumption) made us aware about a scale of financial sector. The financial sector represents over €100 trillion of assets, or more than six times the EU's annual GDP. Unbalance on this market strongly influence real economy as we experience during financial crisis. Many experts and researchers express a growing discontent in society regarding the functioning of financial agents and markets. Sandberg (2015) also general discontent with the dominant view of finance (e.g. Krugman 2013; Dziawgo 2014; Stiglitz 2010). The role of finance can no longer be defined solely in terms of profits and economic efficiency, then how should it be defined? (Sandberg 2015).

Financial markets don't address the more pressing sustainability challenges of our time, such as global poverty and the threat of climate change. The theory of finance needs to incorporate the socio-ecologically embedded nature of finance (Fullwiler 2015) and to align financial systems with the financing needs of an inclusive,

sustainable economy this is complementary to real economy actions such as environmental regulations, reform of perverse subsidies and changes to resource pricing (Castilla-Rubio et al. 2016).

How looks dominant model of finance? It is playing primarily intermediate role between those that provide funds and those that need funds, and typically involves transforming and managing risk (Castilla-Rubio et al. 2016). Finance in neoliberal economy are concentrated on maximizing profits and shareholder value (profit oriented). Short term perspective in investment and return rate is another feature of modern finance. The time horizon in finance is typically much shorter than the time horizon needed to address society's pressing challenges; and the conception of risk in finance is typically much narrower than one that effectively captures economic, social and environmental sustainability (Eichler et al. 2017). Privatization of profits and socialization of cost and negative externalities is a common practice in neoliberal economy. Wallerstein calls it a dark secret of capitalism (Wallerstein 2004). Market prices don't internalize real social cost of products or services. Sandberg writes: that something is wrong when profits are made in a way that imposes such great costs or risks on others (Sandberg 2015). Neoliberal economy is not contributing in using public infrastructure, investing in long life education, solving demographic problems is not investing sufficiently in R&D. Financial sector is not evaluating a full risk of investment (environmental, climate, social), even is very well equipped to do it. Current financial system is not align with new trends in economy and are not contributing to the transition towards to a low-carbon and climate-resilient economy (Eichler et al. 2017). Dominant model of finance is adapted to support mainstreaming economy. It means to freeze existing regime and work against sustainable trends (Fig. 1).

Existing regime is focused on finansialisation. It means the financial sector mainly lending to itself rather than to the real (production) economy, with the risk being far higher but severely underpriced. The second factor is the corporate sector's concentration on short term boost to profitability (trough merges and acquisitions) activity and divesture from long run areas like R&D and boosting stock prices and

Fig. 1 Dominant regime of finance (Source: Author's own elaboration)
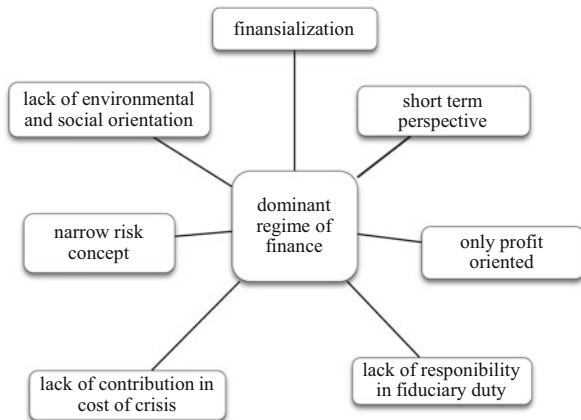
stock options (hence executive pay) through the increased trend of share buybacks (Mazzucato and Perez 2004).

Next issue and week point is fiduciary duty of financial institutions with a lack of responsibility to their beneficiaries and clients, they not consider the broad range of long-term interests. It is leading to extra risk and seems be unethical.

Pressure made by external trends and challenges is leading to an emerging consensus that the financial system is in need of reform.

Summing up dominant regime of finance is not aligned with main social, economic and environmental challenges. So is not serving society to deal with problems. He is more and more separated from society.

5 New Action and Innovation Created in Niches: Main Results

New concept of finance emerged: sustainable finance, green finance, climate finance, carbon finance. Financial system is already in transition driven by economic and finance strategy oriented towards long-term sustainable and climate-resilient development and also by digital revolution. There are few groups of experts working of the issue of sustainable finance: High—Level Expert group on Sustainable Finance, The Green Finance Initiative (GFI), Green Finance Study Group G20, Green Finance The International Finance Corporation, OECD Centre for Green Finance and Investments. Sustainability is the model for Europe's future development—and finance is an essential lever for achieving ambitious goals for economic prosperity, social inclusion and environmental regeneration (Financing a Sustainable European Economy 2017).

Sustainable finance are defined as finance supporting sustainable development in three combined dimensions: economic, environmental and social (Ryszawska 2016). The fundamental purpose of a sustainable financial system is to serve the economy and wider society. Society and economy expect that finance align themselves sustainability transition, social transition and digital transition. Environmental transition needs money for mitigation and adaptation to climate change, protection of ecosystems and biodiversity. Redistribution of financial resources is necessary for social transition—reducing poverty and inequalities. Strongly influencing financial sector is digital transition—new technologies, artificial intelligence, Internet of things.

Expectation of green, low carbon economy is to change role of finance. New aim of sustainable finance is to improve the social, economic and environmental performance of the financial system. For the financial system, sustainability has a dual imperative (Financing a Sustainable European Economy 2017):

- The first is to ensure that environmental, social and governance (ESG) factors are at the heart of financial decision-making.
- The second is to mobilize capital to help solve society's key challenges that require long-term finance: creating jobs, especially for young people, improving

education and retirement finance, tackling inequality, and accelerating the shift to a decarbonized and resource-efficient economy.

Authors of Financing a Sustainable European Economy say: This is key to delivering *better finance*—finance that is more long-term, more attuned to emerging risks and more efficient at delivering returns for the economy and wider society. The second, complementary imperative is for finance to contribute to *better development*—thus supporting the creation of good quality jobs, tackling inequality, delivering inclusive growth and accelerating the shift to a decarbonized and resource-efficient economy The financial system has become more stable, but is not fully connected with a real economy in transition (Financing a Sustainable European Economy 2017).

A financial system that serves the sustainable development is one that:

1. Considers the full value of financial assets, incorporating sustainability factors into valuation and product design.
2. Is productive, serving its users in their projects and needs, notably households, firms and governments.
3. Is resilient, withstanding and recovering from a wide range of both external and internally generated shocks.
4. Demonstrates alignment between the sustainability preferences of its users and the outcomes of the decision-making process, ensuring accountability and transparency.
5. Takes a long-term perspective and overcomes the 'tragedy of the horizon' (Financing a Sustainable European Economy 2017).

Sustainable finance were defined after the first Earth Summit in Rio in 1992 by United Nation Environmental Program. Contemporary we can defined them also as the provision of financial capital and risk management products and services in ways that promote or do not harm economic prosperity, the ecology and community well-being (Strandberg 2005).

Some of the processes which, up till recently, were only registered at the niche segments and peripheral areas of the economy, are gradually seeping to the main-stream, turning the brown economy of overabundance into a green economy of moderation and restraint (Fig. 2).

Sustainability transition in finance is seen as the result of existing regimes which open up as a consequence of external shocks (climate change, energy transition, low carbon economy) and simultaneously bottom up innovations and new financial initiatives like climate finance, green finance, carbon finance. It is a structural change in financial system on many levels: international, public, corporate and household finance.

The significant element of transformation of finance is digitalisation and digital transformation. Technological innovations are important driver of changes in societies, in production, consumptions and communications between people. Digitalization change business model also in financial system specially in banking sector. Digitalisation is described as a "global megatrend that is fundamentally changing
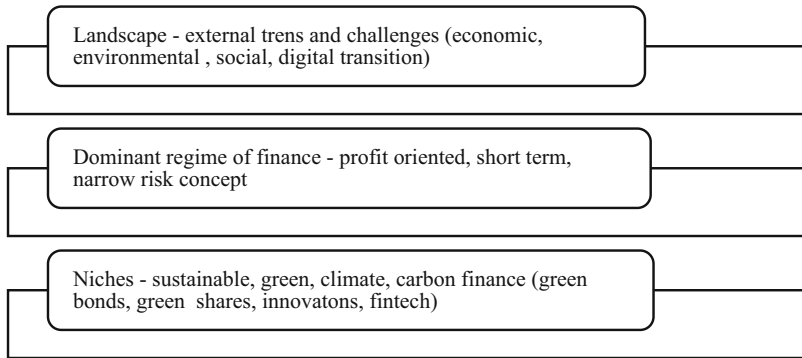
Fig. 2 Transition in finance—multilevel perspective. Source: Authors own elaboration

existing value chains across industries and public sectors" (Khan 2016). Examples of digital transformation can be seen in the media, banking, telecom and insurance industries as pioneering sectors that are in the middle of large-scale digital transformation. Today digitalization works as the catalyst, enabler and engine of societal development. Transformation of financial system requires to think big and shaping and creating new markets, better distribution of risks and rewards that emerge from this kind of collective effort towards smart innovation-led growth (Mazzucato and Penna 2015). 2017 is the year where green digital finance can come of age. Group of 20 is taking on themes of "digital" and "resilience," and is considering fintech as part of its focus on green finance (Zadek 2018).

To sum up new concepts of finance emerged (Table 2) as an answer for external pressure (landscape) and bottom up innovations (niches).

Green finance supports green growth and transition to green economy and reduces negative environmental outcomes. Green finance means investment in renewable energy, reduction of emission in industry, sustainable transport, recycling, organic agriculture, waste management, water management, eco-innovation, clean technology by public and private actors. Climate finance is a new issue in an international debate. The aim of climate finance is to support adaptation to climate change and mitigation of climate change. It mean also financing a shift towards low emission and climate-resilient development. Climate finance is a critical element of global climate policy. Effective mitigation of climate change will depend on a complex mix of public funds, private investment through carbon markets, and sophisticated national and global regulation, forest and energy policy, international development funding, international trade law, and coordinated tax policy (Stewart et al. 2009).

A number of green markets have emerged as a result of increased public and private investments. Also examples of green markets and financial instruments emerged in the past decade. They include: carbon finance, green stimulus funds, microfinance, green bonds, international and national climate funds, green infrastructure, real estate funds, socially responsible equity funds.

To sum up all presented kinds of finance facilitate sustainability transition and create a sustainable financial system, which creates, values, and transacts financial

Table 2 New concepts of finance

Authors	Concept	
	Sustainable finance	Finance supporting sustainable development in three combined dimensions: economic, environmental and social
G20 Green Finance Synthesis Report (2016) Green Finance A Bottom-up Approach to Track Existing Flows (2017)	Green finance	Green finance means investment in renewable energy, reduction of emission in industry, sustainable transport, recycling, organic agriculture, waste management, water management, eco-innovation, clean technology by public and private actors Green finance can be defined as financing of investments that deliver environmental benefits in the broader context of environmentally sustainable development. These environmental benefits include, for example, reductions in air, water and land pollution, reductions in greenhouse gas emissions, improved energy efficiency while utilizing natural resources, as well as mitigation of and adaption to climate change and their co-benefits. Such a definition is directionally clear whilst allowing for different technical interpretations by countries and markets
Green Climate Fund (2015) Stewart et al. (2009)	Climate finance	The aim of climate finance is to support adaptation to climate change and mitigation of climate change. It mean also financing a shift towards low emission and climate-resilient development
Labatt and White (2007)	Carbon finance	Carbon finance marked solution to climate change (kind of environmental finance)
Mazzucato et al. (2015)	Mission oriented finance	Finance oriented to support economic, social and digital challenges, guided by public policies
Guez i Zaouati (2015)	Positive finance	Re-envision the allocation of capital in order to support social and technological innovations, to design and build sustainable infrastructure, and to finance the energy transition

Source: Authors own elaboration

assets, in ways that shape real wealth to serve the long-term needs of an inclusive, environmentally sustainable economy (Financial System We Need 2015). A sustainable financial system plays three key roles to enable this transition a low-carbon, climate resilient economy (Aligning the financial system 2015) first, it effectively recognizes the costs and risks of high-carbon and resource intensive assets; second, it allocates sufficient attractively priced capital to low-carbon, resource efficient assets; third, it ensures that financial institutions and consumers are resilient to climate shocks, including natural disasters.

Fig. 3 Green finance align with sustainable and digital transition. Source: Authors own elaboration

Fig. 3 Green finance align with sustainable and digital transition. Source: Authors own elaboration
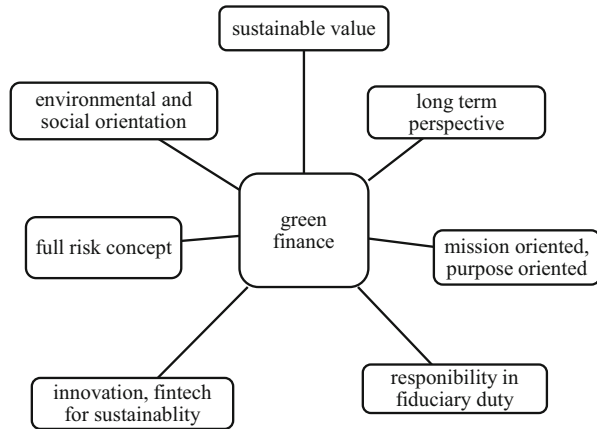
6   Conclusion

Sustainability transition is a multilevel process which means reaching goals of sustainable development, transforming economy towards green, low carbon, resource efficient and to combat climate change. This process is supported by sustainable finance, green finance and climate finance. Finance are slowly adapting to ongoing transition. It is called quiet revolution in finance because is still emerging on peripheries of mainstream economy. General trend in economy is oriented to decentralization of energy production which means decentralisation and democratisation of economic activities. Also urban and local development is playing bigger role in decentralization process. Transformation empowered by digital revolution is strengthening trends towards personally adjusted goods and services, democratic access to information, sharing economy. Technology revolution has enabled a new global techno-economic paradigm. All this factors will shape financial system in close future (Fig. 3). Gradually dominant regime of finance will erode and the engines of growth will be replace by new regime and new drivers. New paradigm in economy and finance will be in power.

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Analysis of Short-Term Changes in Health Spending in CEE Countries: Creeping Trend Estimation

Rafał Siedlecki, Agnieszka Bem, Paweł Prędkiewicz, and Paulina Ucieklak-Jeż

1 Introduction

Most developing countries struggle with the problem of high healthcare spending (Hady and Leśniowska 2011). Many experts and policymakers expect the rapid growth of healthcare expenditures (HCE) due to various factors, such as technological progress in medicine, growing expectations or adverse demographic changes, which can cause not only the increase of demand for health services for the elderly, but also reduce the potential for economic development by reducing a number of people in a productive age. The problem of forecasting of HCE growth, especially in a long term, is a relatively frequent subject of scientific research, however, from the point of view of a current performance of healthcare system, it is also important to predict changes in a shorter horizon, especially when a significant part of the expenditure is financed from public sources.

Presented research is part of a larger study on the analysis of the financial health of hospitals. The level of expenditure on health has a particular impact on the financial situation of the hospitals, because of the provision of stationary care, in analysed countries, are practically funded only from private sources. Available financial

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resources are therefore the primary factor affecting profitability of hospitals, both public and private.

The aims of the study are: (1) the analysis of short-term changes in the level of HCE in selected CEE countries; (2) short-term HCE forecasting using the creeping trend method.

This study is the continuation of previous research, which show the existence of development trends in current healthcare expenditures (CHCE), in relation to GDP, in the Czech Republic, Poland and Slovakia.[1] Initial results suggest the possibility of the existence of non-linear trendline, what is typical for economic phenomena (Hellwig 1967; Doran 1999).

At the design stage of the study the following research hypothesis is formulated: *(H1)* in a short period HCE are characterized by variable dynamics. This means, that one cannot expressly claim, that HCE grows all incessantly—there are changes which involve not only the pace but also the direction of this tendency.

The research sample includes the following CEE countries: Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovak Republic. Data, obtained from OECD Health Data Database, cover the years 1995–2014. We use the creeping trend method with constant segment 4.

2 Literature Review

According to Getzen (2010), forecasting of future HCE is one the most important tasks of fiscal policy analysis. It can be generally concluded, that healthcare services follow the Wagner law, and along with the socio-economic development, especially an increase in wealth, there is a pressure to increase a level of HCE, especially from public sources (Bordignon and Turati 2009; Angulo et al. 2011), Dobrovič and Timková (2017), Tkacova et al. (2017), Ključnikov and Popesko (2017), Kozubíková et al. (2017), Simionescu et al. (2017), Blendinger and Michalski (2018) and Michalski (2016a). As a result, HCE grows, not only in absolute terms, but also in relation to GDP (Bordignon and Turati 2009).

The literature review indicates a few root causes of the HCE growth, both of demographic and non-demographic character. Regardless of the source of financing, the level of expenditure is subject of the market laws (supply and demand) and other factors, such as economic growth, which is a primary factor of a non-demograhic character (Häkkinen et al. 2008). When it comes to the demographic processes, the most important factor concerns the increased ratio of older people in a population, according to the fact, that the level of HCE is a function of a population's size and its composition in the sex-age dimension (Häkkinen et al. 2008). Some research

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[1]The paper entitiled "GDP growth versus health care spending – is there any tendency?" presented during 20th International Scientific Conference "Enterprise and Competitive Environment", March 9–10, 2017, Brno, Czech Republic

confirm a significant impact of demographic processes on the increase in spending on healthcare services (Nozaki et al. 2017), however, some works suggest, that economic growth could even reverse this adverse impact, or at least reduce its impact (Wolf and Amirkhanyan 2010; Friedland 2005; Michalski 2016b, c; Merickova et al. 2017; Gavurova et al. 2017; Belas et al. 2017; Simo et al. 2016; Soltes et al. 2017; Benda-Prokeinova et al. 2017).

The adoption of the assumption, that GDP is the most important predictor of the level of expenditure on health (Getzen 2010; Getzen 2011 2014; Mladenović et al. 2016; Freeland and Schendler 1981; Dormont and Huber 2006; Murthy and Okunade 2016; Dalal 2017; Huarng and Yu 2015; Smith et al. 2009; Maksimović et al. 2017; Borger et al. 2008), suggest, that a level of spending on healthcare should be correlated, significantly, with a pace of economic growth. Because, despite periods of recession, we can observe, constant, though at different rates, GDP growth, we should expect the constant growth in HCE. Almost all long-term forecasts confirm this thesis, however, it does not automatically mean, that in a short and medium run, we should expect a constant upward trend—and from the point of view of fiscal planning, a possibility of forecasting in a shorter period is crucial. In this study we show, that HCE is characterised by very high dynamics. We also propose the creeping trend as a prognostic tool in the short time analysis.

3 Data and Methodology

Getzen (2000) emphasizes, that, although in a long term, a share of spending on health, in relation to GDP, is the best predictor of the level of spending, in the short term the CHCE, expressed in monetary units, is the best unit. Based on this finding, we analyse the current expenditure on healthcare (CHCE), per capita, expressed in euro, using purchasing power parity. CHCE include final consumption of health care goods, both private and public, without capital investment in health care infrastructure. According to Getzen (2000) a prediction model based exclusively on data relating to expenditure (univariate trend model) usually explains more than 80% of the growth in national health expenditures over time.

The research sample covers six CEE countries: Bulgaria, The Czech Republic, Hungary, Poland, Romania, Slovak Republic. Sample size is limited due to the unavailability of data. Analysed countries are characterized by similar features— have undergone, during the 1990s, the economic transformation, finance health benefits based on Bismarck model, with a high proportion of public funds. Data is obtained from OECD Health Data Database and covers the period 1995–2014.

Apart from the statistical analysis, we employ a creeping trend method with constant segment 4. Creeping trend is characterised by several advantages comparing to other short-term forecasting methods. It is one of adaptive methods—due to high flexibility, it is characterised by an ability to delineate irregular changes in time-series. In other words, the algorithm "learns" the curve's shape and, as a result, can extrapolate into k- periods. That's make it a useful tool for construction forecasts in a

short term (Hellwig 1967; Siedlecka 1996). The creeping trend method smooth's a tendency using a first degree polynomial. Because polynomials of higher degree give a better fit, creeping trend method is better than models based on the averages. In this model, the parameters of the linear trend function are estimated on the basis of the subsequent statistical series. Obtained sequence is treated as a time series proxy (segmental proxy).

In this model, for time series y1, y2, ..., yn and fixed smoothing constant $k < n$, we estimate the parameters of the linear trend function based on consecutive sections (Siedlecka 1996; Hellwig 1967):

$$
\begin{aligned}
&y1, \ y2, \quad \ldots \ , \ yk \\
&y2, \quad y3, \quad \ \ldots \ , \quad yk + 1 \\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\
&yn - k + 1, yn - k + 2, \ \ldots \ , yn
\end{aligned}
\tag{1}
$$

These functions are:

$$
\begin{aligned}
&f_1(t) = a_1 t + b_1 & 1 \leq t \leq k \\
&f_2(t) = a_2 t + b_2 & 2 \leq t \leq k + 1 \\
&\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \ldots\ldots\ldots\ldots\ldots \\
&f_{n-k+1}(t) = a_{n-k+1} t + b_{n-k+1} & \text{n-k} + 1 \leq t \leq n.
\end{aligned}
\tag{2}
$$

For any t ($1 <= t <= n$) values yt correspond to the smoothed values obtained by using some of the above functions:

$$
fi(t) = ai \ t + bi
\tag{3}
$$

such, for which:

$$
d(t) <= i <= g(t)
\tag{4}
$$

where:

$$
d(t) = \begin{cases} 1 & dla \ t = 1, 2, \ldots, k \\ t - k + 1 & dla \ t = k + 1, \ldots, n; \end{cases}
\tag{5}
$$

$$
g(t) = \begin{cases} t & dla \ t = 1, 2, \ldots, n - k + 1 \\ t - k + 1 & dla \ t = n - k + 2, \ldots, n. \end{cases}
\tag{6}
$$

Interpretation of values d (t) and g (t) is as follows:

d(t)—determine, for the specified t, a first segment number used to calculate a trend at the time t,

g(t)—determine, for the specified t, a number of the last segment used to calculate a trend at the time t.

The final smoothed time series is a series of mean values. The sequence (1,), (2,), ..., (n,), obtained in this way, we treat as the proxy time series, and due to the nature of it is called also the segmented proxy.

4 Results and Discussion

First, we analyse the stationarity of time series for CHCE p.c., using the KPSS test. According to KPSS test's construction, we are forced to reject the null hypothesis, and adopt the alternative hypothesis, which assumes non-stationarity. That suggests, that CHCE p.c. time series are non-stationary in all analysed countries, as well as in EU as a whole. This also suggests an existence of trend or random walk around a mean (Table 1). Then, we test the stationarity of residuals—based on KPSS test, and we are entitled to adopt the stationarity hypothesis. That suggest, that there is some trend (linear or non-linear) which characterize CHCE p.c. time-series (Table 1).

To conclude, the analysis of the stationarity of residuals for time-series and the estimated trend shows, that CHCE p.c. values oscillate around the trend line, and it is possible to determine an upward or downward tendency in a short term. *According to that we estimate the creeping trendlines for all analysed countries, obtaining fitting measures higher than 0.987 (Table 1).*

We can observe, that the growth rate of CHCE p.c. (based on historical data), in the period 1995–2007, in all analysed countries is definitely higher than the average growth rate for EU. In the period 2008–2014 some slowdown is observed—both in CEE countries and the whole EU, but the growth rate in CEE countries is still higher than in EU, except of Hungary which notes an important decline (Table 2). The

Table 1 Results of KPSS test and fitting measures

Crawling trend	Bulgaria	Czech Rep.	Hungary	Poland	Romania	Slovak Rep.	EU
KPSS test for data (test statistic/p-value)							
	0.7489	0.699	0.683	0.7175	0.7176	0.6913	0.7062
	(p < 0.01)	(p < 0.01)	(p = 0.012)	(p < 0.01)	(p < 0.01)	(p = 0.011)	(p < 0.01)
KPSS test for residuals—creeping trend (test statistic/p-value)							
	0.2518	0.0679	0.1439	0.1547	0.2163	0.05600	0.1349
p > 0.1 for all countries							
RMSE	11.44	34.26	31.05	31.11	17.47	25.87	59.45
R^2	**0.997**	**0.994**	**0.990**	**0.987**	**0.992**	**0.998**	**0.99**

Source: own study

Table 2 Average growth rate of CHCE

Crawling trend	Bulgaria	Czech Rep.	Hungary	Poland	Romania	Slovak Rep.	EU
Average growth rate (based on trend, geometric) (in%)							
1995–2007	15.41	10.02	10.42	11.26	19.26	13.75	5.54
2008–2014	7.73	1.85	−0.35	2.83	3.81	4.03	1.61
1995–2014	12.52	6.94	6.33	8.08	13.32	10.07	4.08
Average growth rate (based on historical data, geometric) (in %)							
1995–2007	13.69	9.79	10.21	11.21	18.86	14.12	5.64
2008–2014	8.27	2.65	−0.01	3.69	3.97	4.32	1.8
1995–2014	11.66	7.1	6.33	8.38	13.15	10.41	4.21

Source: own study

Table 3 CHCE in selected CEE countries comparing to the EU average

	1995	2014	1995	2014
	CHCE [EUR PPP]		CHCE as % of EU average	
Bulgaria	81.38	661.85	4.9	18.3
Czech Republic	374.35	1378.52	22.7	38.2
Hungary	323.01	1036.62	19.6	28.7
Poland	197.38	910.28	12.0	25.2
Romania	53.29	556.81	3.2	15.4
Slovak Republic	221.76	1454.81	13.4	40.3
European Union	1650.73	3612.94	100.0	100.0

Source: own study

correspondence between the average growth rate based on trend with the average growth rate based on historical data shows also the high fitting of estimated trendlines (Table 2).

The analysis confirms the existence of the positive relationship between the level of CHCE and the pace of economic development expressed by GDP. CEE countries, after a period of economic transition (since 1995) have experienced the rapid GDP growth, what is reflected in the rapid growth of CHCE. The economic slowdown, that hit Europe after 2008, impacts negatively CHCE growth. Despite this rapid growth, particularly before 2008, CEE countries cannot reach, however, the level of CHCE that can be considered as comparable to the average for the EU (Table 3).

In the next stage, we analyse the direction of changes in the estimated trendlines, based on the value of the I differences (Table 4). In most countries, we identify a number of points of transition, or for the growth phase, or for the downtrend phase, however it is difficult to define clearly any common scheme. In all countries, we can isolate a period of steady growth of CHCE p.c. covering the years 2001–2008. In the earlier period (1995–2000) CHCE p.c. shows a downward trend in the Czech Republic, Slovakia and the EU as a whole. In the case of other countries (Bulgaria, Hungary, Poland and Romania), it is the period of continuously rising CHCE p.c. In the period after 2008, in most countries (except of Bulgaria) we can specify the periods of CHCE p.c. decline, especially in Hungary and the Czech Republic (Table 4).

On this background Bulgaria stands out, where, throughout the analysis period, CHCE p.c. grows continually, as well as Romania, where we identify only one period of decline in CHCE p.c. (Table 4). It might be important, from the point of view of results' interpretation, that those two countries are characterised by the smallest level of CHCE p.c. in comparison to EU average—in 2014 Bulgarian CHCE p.c. is equal to only 18% of the EU average, while in the case of Romania it is only 15% (comp. Table 3).

The analysis of II differences suggest, that all countries face alternating periods of deceleration or acceleration of CHCE p.c. growth, or the periods deceleration or acceleration of CHCE p.c. decrease. Particularly in the period 2008–2010, we can observe an important deceleration of CHCE growth rates (Table 5).

Table 4 The analysis of I differences—trend's direction: growth (+) or decline (−)

	Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovakia	UE
1997	+	−	+	+	+	−	−
1998	+	−	+	+	+	−	−
1999	+	−	+	−	+	−	−
2000	+	−	+	+	+	−	−
2001	+	+	+	+	+	+	+
2002	+	+	+	+	+	+	+
2003	+	+	+	+	+	+	+
2004	+	+	+	+	+	+	+
2005	+	+	+	+	+	+	+
2006	+	+	+	+	+	+	+
2007	+	+	+	+	+	+	+
2008	+	+	+	+	+	+	+
2009	+	+	−	+	+	+	+
2010	+	−	−	+	−	−	−
2011	+	+	+	+	+	−	+
2012	+	−	−	+	+	−	−
2013	+	−	−	−	+	+	+
2014	+	−	−	+	+	+	+

Source: own study

Table 5 The analysis of II differences—periods of acceleration (+) and periods of slowdown (−)

	Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovakia	UE
1997	+	−	+	−	+	−	−
1998	+	+	+	−	−	−	−
1999	+	−	−	−	−	−	−
2000	−	+	−	+	+	+	−
2001	+	+	+	+	+	+	+
2002	+	+	+	+	+	+	+
2003	+	+	+	+	+	+	+
2004	−	−	−	+	+	+	+
2005	−	−	−	+	+	−	+
2006	+	+	−	+	+	+	+
2007	+	+	+	+	+	+	+
2008	−	+	−	−	−	−	+
2009	−	−	−	−	−	−	+
2010	−	−	+	−	−	−	−
2011	+	+	+	+	+	−	+
2012	−	−	−	+	+	+	−
2013	+	+	−	−	+	+	+
2014	+	−	+	+	+	−	+

Source: own study

Presented results allow us to adopt the research hypothesis (H1) concerning the variable dynamics of CHCE p.c. We prove, that despite the fact, that in the long term a constant increase in CHCE is expected, in the short term, CHCE is subjected to significant fluctuations, responding to changes in the pace of economic development.

5   Conclusions

The literature review suggests, that HCE, in a long term, are characterised by a constant upward trend, both in absolute values and in relation to GDP. In a short period we can, however, observe the considerable variation, not only in the pace of change, but also in its direction (increase/decrease), as well as (though not confirmed by statistical analysis in this study) the relationship between the direction and pace of CHCE growth and the pace of economic development, expressed by GDP.

The analysis prove, that the development's trend in Poland show important resemblance to this observed in the Czech Republic and Slovakia (Soltes and Gavurova 2014; Stefko et al. 2016)—in the period prior to 2008 the growth rate in those countries is about 10% per year. In the period 2007–2014 some slowing down can be observed, with the growth rate about 3% per year. However, due to the fact, that Poland, in the early years after transition, starts from a very low level of expenditure, this gap is still visible in 2014.

We also show, that the creeping trend allows forecasting of changes in development tendencies in a short period. This is of particular importance for financial forecasting, particularly in countries, where health services are largely financed from public sources.

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The Hidden Factors of Public Administration in Poland

Bożena Skotnicka–Zasadzień, Radosław Wolniak, and Michał Zasadzień

1 Introduction

Public sector has a great importance for the contemporary society. It is the quality of provided services that is becoming more and more significant in its functioning (Hammond 2009; Sánchez–Hernández et al. 2009). The issue of quality did not use to be of any importance in the traditional public management but yet, the development of concepts, such as a public management or new public services have changed the attitude to this issue (Lee and Wilhelm 2010; Margo et al. 2015). In these new attitudes, the local government is said to provide services to citizens and assist them and therefore, these provided services should be marked with an appropriate level of quality.

The main aim of public institutions is to serve the local society and provide services at the highest level (Tarí 2008). Meeting clients' needs and fulfilling their requirements is in this case very difficult because petitioners, who come to the public services, constitute a very complex group and thus, they may have different expectations and each of them assess the level of provided services differently (Hochman 2005).

The aims of the conducted investigations include:

- identification of factors of public administration services quality perceived by the customer,
- examination of relations between Servqual dimensions and hidden factors of services quality.

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- In order to achieve the goals defined in the introduction, the following research hypotheses have been formulated:
- H1—The division of the examined variables into hidden factors does not coincide with the division applied in the classical Servqual method.

2 Quality Management in Public Services

According to the definition abiding in the EU (Art. 6 Act 1, VI Directive), providing services means each and every transaction which does not constitute selling the goods. In literature, the concept of service is understood mostly as an expression of a man's economic activity which is characterized as not material but it is an interaction between a service provider and a client.

Simply, service quality is nothing more than meeting a client's demand by entities running a service activity (Tsekouras et al. 2010). Precisely, the services can be defined as a level in which all inherent properties (Dowty and Wallace 2010) of a service fulfil a client's demand (Dagger and Sweeney 2006; Yip et al. 2011; Janke 2013; Hysa and Grabowska 2014; Awan and Mahmood 2013).

According to the definition, it is the client who can decide whether and to what extent, the service fulfils his expectations and meets his needs. Therefore, he is 'a judge' in the assessment of service quality but not only in the moment of purchase but also during its usage. In other words, the assessment done by a client is the final measurement of service quality. Obviously, it does not mean that the procedures of service quality assessment are excluded (Egan 2010; Martínez García and Martínez Caro 2010; Michna et al. 2015; Aurel and Bucur 2016). In fact, the active quality management in a service providing organization assumes a current monitoring of provided services by means of:

- Measuring and checking the most important actions of a service providing process done in order to eliminate and avoid undesirable tendencies and client's dissatisfaction,
- Self–control of staff providing the services,
- Final assessment of service provided which is conducted by a service provider in a client's presence.

Consequently, the rise of quality level should be defined not only by a client's satisfaction but also by efficiency improvement and cost reduction in an organization providing services (Tan and Rae 2010; Crostack et al. 2011; Ferrari et al. 2010; Łuczak and Wolniak 2013; Samkar and Alpu 2013; Wolniak and Skotnicka–Zasadzień 2017).

In scientific literature, there is a set of consumer's criteria of service quality assessment which is constituted by a conglomerate of characteristics, so called—hard which can be touched or seen and very subjective whose effects of use are strictly depended on individual impression, experience, moods, emotions and education of each client (Al–Ibrahim 2014; Wolniak et al. 2016).

The size of a gap between the expected service and perceived service defines a service quality, satisfaction or its lack. The above presented basic characteristics of a service quality can't be defined as universal because there is a wide range of offered services along with a high growth of new services which in turn, can change or widen this set. What's more, this set should be completed with separate characteristics, which are distinctive for separate kinds of services.

The above mentioned reservations are important because quality is not a static concept—it is 'a mobile target'. The change of social and economic conditions as well as increasing clients' expectations results in the need to improve criteria, tools and methods of quality assessment.

Quality without a client does not make any sense. Yet, it is a degree of fulfilling his expectations and these in turn, are subjective categories, a value judgment which is directly or indirectly expressed by each and every client.

This opinion closely corresponds with a definition provided by a research team Valerie A. Zeithaml, A. Parasuramana and Leonarda L. Berry, for whom the service quality is shaped by a divergence between expectations and client's perception of service (Wolniak and Skotnicka–Zasadzień 2009a, b; Wolniak and Skotnicka–Zasadzień 2012).

International Organization for Standardization, in standards ISO 9000, has included a definition of quality of an object which also refers to services. According to this definition, a service quality is the whole characteristics of service connected with its ability to fulfil defined and expected clients' needs.

According to this definition, it is a client who decides if and to what extent the service suits his expectations and meets his needs. Therefore, not only is he 'a judge' of a service quality in a moment of making decisions about using the service but also during the process of service providing. Naturally, it does not mean that a service provider is excluded from the process of service quality assessment (Scutariu and Bilouseac 2016).

The former satisfaction is connected with a client's satisfaction or dissatisfaction experienced during the contact with a service provider, e.g. during a dentist's appointment or a conversation with a person repairing equipment in our house. The latter satisfaction stands for either a client's satisfaction or dissatisfaction with services provided by a given organization but they are a total sum of impressions which come with all contacts and experience. Each of these two assessments can influence a service quality which is defined by the above mentioned authors as a general client's impression being a result of a comparison of positive and negative feelings connected with service providing organizations and services provided by them.

Van Ossel draws attention to the need of a clear separation of a client's satisfaction and a service quality. He thinks that a level of client's satisfaction is a result of a client's comparison of expected service quality with a service quality. A client will be satisfied fully when a perceived service quality will be compatible with expected one. It is pointed out that a client's perceived quality can be different from quality of performed service being a result of a comparison of performance with earlier established expectations. Yet, a client's satisfaction is a subjective concept not

only because it goes through 'a perception filter' but because clients' expectations are extremely differentiate and its shape is influenced by many different factors. On one hand, a client's contact with a service provider is a result of a will to meet needs. On the other hand—it is a result of a current activity of a service provider. But yet, the motive to contact with a particular service provider can be an outcome of client's needs, his financial abilities and flexibility of service offer provided by an organization (Ziemna et al. 2014).

3 Description of a Surveyed Object

The authors of this article have surveyed the quality level of service provided by the Municipal Councils in Silesian voivodeship. It is quite obvious that it is the communication that is one of the biggest challenges in agglomeration of this type. Silesia has a privileged position in terms of transport infrastructure, not only due to a well–developed transport system which covers 20% of shares of all domestic railways. Silesia is situated on the intersection of two communication routes (corridor III: Berlin—Wroclaw—Katowice—Krakow—Lwow and corridor IV: Gdansk—Katowice—Zylina). The research was conducted in 19 random Silesian cities: Bielsko–Biała, Chorzow Cieszyn, Czerwionka–Leszczyny, Dąbrowa Górnicza, Gliwice, Katowice, Knurów, Mikołów, Mysłowice, Olkusz, Oświęcim, Pszczyna, Ruda Śląska, Sosnowiec, Tychy, Wojkowice, Zawiercie, Zory.

4 Methodology of Research

The following analysis was conducted on the basis of research done by means of questionnaire based on the Servqual methodology. The following, 28 variables were included within the scope of the research:

- Z1—Municipal Council should have modern equipment (computer, office equipment),
- Z2—Municipal Council should be placed conveniently (easy access),
- Z3—Municipal Council should have a big parking area,
- Z4—Municipal Council should have facilities for the handicapped,
- Z5—the officials should be neat and trim,
- Z6—Municipal Council should have attention drawing brochures,
- Z7—Municipal Council should have a good website,
- Z8—Municipal Council should be renovated,
- Z9—the officials provide services in strictly defined time periods,
- Z10—Municipal Council should be open in the afternoon and at the weekends,
- Z11—Municipal Council settles matters in an appropriate way at first time,

- Z12—Municipal Council tries to settle clients' matters in an appropriate manner and relatively fast,
- Z13—in Municipal Council, all measures are taken to resolve the matter,
- Z14—Municipal Council's employees serve the clients urgently and are willing to provide them all the necessary information,
- Z15—Municipal Council employees are always willing to help clients,
- Z16—Municipal Council employees should quickly respond to e–mails,
- Z17—Municipal Council keep clients informed about realization of his matter,
- Z18—Municipal Council's websites should be updated systematically,
- Z19—Municipal Council employees should be qualified,
- Z20—Municipal Council employees should be trustworthy,
- Z21—Municipal Council should look after security of clients' personal details,
- Z22—Municipal Council should be always polite and kindly turn to clients,
- Z23—Officials should help the clients if he does not know which Department he should go to,
- Z24—Municipal Council should treat each and every client individually,
- Z25—Officials should serve to the last client even if the Council work time is about to finish,
- Z26—Council should put a client's interest first,
- Z27—Officials should understand specific needs of its clients,
- Z28—Officials should be always understanding and patient for clients.

The literature quotes different Servqual scales, which have been described in the previous chapter. The list of 28 variables prepared for the needs of this research has been based on the previously discussed classical Servqual method—adequate questions have been assigned to each area. The questions have been prepared on the basis of the Delphi Panel participated by a group of experts. It included employees of public administration institutions in Poland, customers using the services provided by these institutions as well as persons from university circles dealing with the Servqual method. In the process of brainstorming, the experts developed a list of several questions which were next narrowed (on the basis of the Delphi technique results) to the list of 28 variables included in the investigations.

Within the scope of this research, these variables were divided into five basic dimensions used in the Servqual's methodology:

- W1—tangibles—variables Z1–Z8,
- W2—reliability—variables Z9–Z13,
- W3—responsiveness—variables Z14–Z17,
- W4—assurance—variables Z18–Z21,
- W5—empathy—variables Z22–Z28.

The research is said to check to what extent the division of variables into five dimensions used in the Servqual method suits to the analysis of the issue of quality service in public administration. It is important to take into account that Servqual method was at the beginning used to analyse the quality in financial services. Then, it was utilized into other branches (which have been described in the earlier part of the publication) without changing already used areas in financial services.

In order to divide variables of service quality assessment into dimensions, the extrapolation analysis of factors was used for the differences between a client's perceived quality and expected quality. The classical method of factor analysis of principal components was used. In this case, factor analysis was used to define the structure of data set and to point out the minimal number of dimensions by means of which a considerable part of variations of variables (Gantar and Walesiak 2004). Factors, which are being looked for, are hidden factors but they have importance in an analytical description of a problem. These factors represent the biggest subset of original variables (Aczel 2000). To define a number of factors, Kaiser's criterion was used which recommends to leave these factors in analysis whose values are bigger than 1.

In order to gain a simple structure of matrix of factors of loadings which presents correlations between variables and isolated principal components, they were subjected to an orthogonal rotation by means of varimax methods. Varimax rotation is especially useful when looking for factors with the highest loadings because it attributes each factor to a couple of variables with the highest loadings and the rest variables with low loadings. As a result, factors with variables with the highest values of loadings are marked (Aczel 2000).

5 Factor Analysis of Hidden Loadings of Customer Service Quality

As it was mentioned earlier, the research was conducted in 2016 with 1250 people using Municipal Council services in Silesian voivodeship. Factor analysis may be applied in two ways: as a confirmative factor analysis—applied in the event when we assume the existence of a certain set of factors and want to confirm our suppositions by means of factor analysis, and extrapolation factor analysis by means of which we want to distinguish the initially unknown factors. In these investigations it has been assumed that factors in the case of municipal offices differ in comparison with the classical version of the Servqual method. For this reason it was decided to apply extrapolation factor analysis for the identification of these unknown factors.

As a consequence of having used the extrapolation analysis of factors of 28 attributes of service quality in public administration, they can be divided into five factors (Table 1). All together, these factors explain 58% of variability.

As a consequence of the research the following factors were identified:

- Factor 1—**attitude to client** (20% of explained variability)
- Factor 2—**reaction** (17% of explained variability)
- Factor 3—**physical appearance** (9% of explained variability)
- Factor 4—**accessibility** (6% of explained variability)
- Factor 5—**material aspect** (6% of explained variability).

Table 1 Font sizes of headings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Z1	0.165	0.166	0.192	0.082	**0.654**
Z2	0.064	0.023	0.054	0.062	**0.669**
Z3	0.081	0.148	0.052	**0.745**	0.183
Z4	0.122	0.032	0.278	**0.601**	0.235
Z5	0.247	0.208	**0.462**	0.146	0.421
Z6	0.109	0.210	**0.557**	0.233	0.204
Z7	0.137	0.120	**0.718**	0.158	0.057
Z8	0.147	0.159	**0.593**	0.109	0.397
Z9	0.244	**0.479**	0.133	0.172	0.195
Z10	0.226	0.280	0.152	**0.614**	−0.186
Z11	0.198	**0.749**	0.128	0.197	0.017
Z12	0.253	**0.749**	0.213	0.096	−0.008
Z13	0.231	**0.782**	0.143	0.039	0.082
Z14	0.239	**0.790**	0.107	0.065	0.134
Z15	0.307	**0.725**	0.102	0.050	0.183
Z16	**0.396**	0.327	0.348	0.260	−0.151
Z17	0.276	**0.660**	0.218	0.117	−0.012
Z18	0.441	0.237	**0.533**	−0.034	−0.072
Z19	**0.662**	0.222	0.357	0.011	−0.007
Z20	**0.667**	0.221	0.313	−0.039	0.022
Z21	**0.578**	0.190	0.355	−0.006	0.135
Z22	**0.722**	0.237	0.157	0.119	0.131
Z23	**0.655**	0.182	0.195	0.010	0.178
Z24	**0.736**	0.206	0.110	0.150	0.109
Z25	**0.493**	0.360	−0.064	0.105	0.221
Z26	**0.752**	0.227	0.042	0.190	0.062
Z27	**0.767**	0.233	0.079	0.152	0.071
Z28	**0.762**	0.237	0.013	0.193	0.060

Bold values represent when variable is a part of particular factor

The relations between Servqual dimensions and hidden factors found in the result of conducted research are presented in (Fig. 1). It results, on the basis of analysed data, that defined hidden factors differ in comparison with Servqual dimensions. Therefore, the investigation results confirm the formulated hypothesis H1. They indicate that public services are characterized by a specific division into factors, which is different from other types of services.

On the basis of the study, it results that three hidden factors correspond to Servqual's dimension—tangibility (along with some variables from other dimensions). This dimension seems to be excessively aggregated in case of classic Servqual method yet, it turns out that it covers different problems in an essential way. The above mentioned dimension can be divided into three independent factors: physical appearance, accessibility and material conditions. All variables together comprising the above mentioned factors covers all variables within the scope of tangibility (and two other variables of other dimension—website's image and
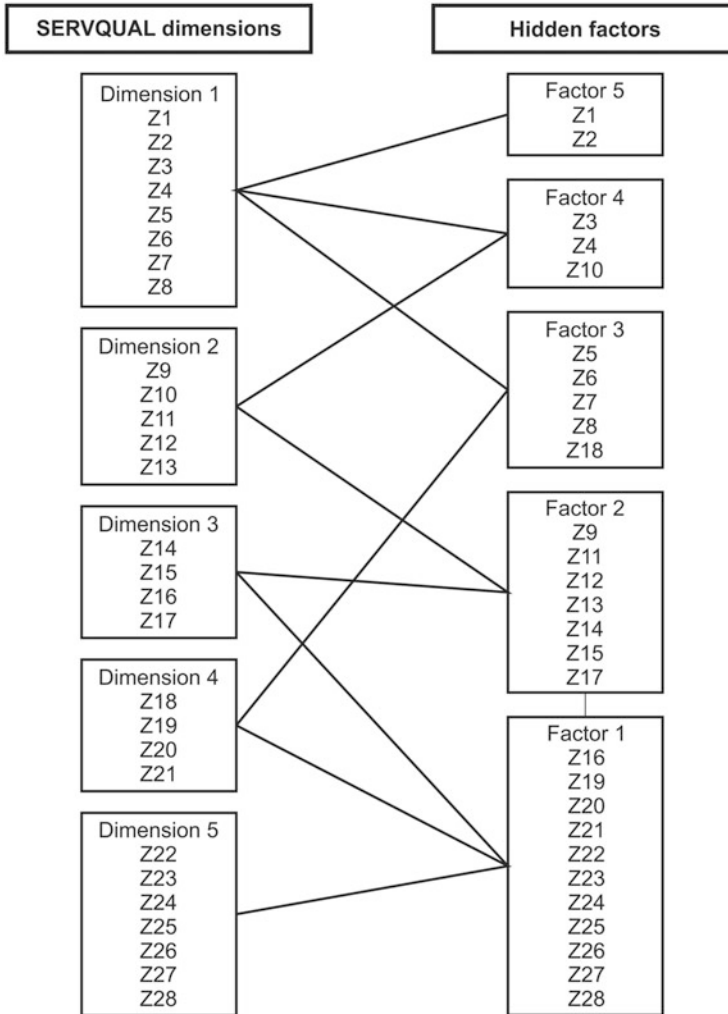
Fig. 1 Connection between Servqual dimensions and hidden factors

opening hours). Whereas, there is a completely different situation in case of other Servqual dimensions. In this case, the level of aggregation is too low. In classic Servqual, assurance and empathy dimensions are separately distinguished while after having conducted the research in Municipal Council, it seems that these dimensions should be joined in one dimension—the attitude to a client. This dimension covers all problems included in responsiveness and empathy without a variable Z18—website image, which as it has been already mentioned, should be included in a factor—physical appearance.

A very similar situation appears in case of reliability and responsiveness. A client, in fact, perceives it as one factor—responsiveness, which means that an official's reaction should not only occur but it should be conducted at the appropriate level, in other words, it should be realisable. The reaction factor covers all variables included unreliability and responsiveness dimension in a classical Servqual analysis, apart from two variables Z10—openings hours which should be included into an area of accessibility and Z16—replying to e–mails which was included into area of an attitude to client.

In order to use the prepared model of factors to measure service quality in the studied councils, it should be checked if a reliable definition of dimensions and assigning variables was done in case of each found factor. It can be done by means of alfa–Cronbach's coefficients which are the minimum limit of reliability estimator scale for single dimensions scales. This factor can take on values form 0 to 1, yet its value is recommended to be bigger than 0.7 (Rószkiewicz 2002). In case of factors of alfa–Cronbach's coefficients values being described in the research, they fall within the range 0.7–1 and thus, they can be perceived as reliable.

6 Summary

On the basis of the research, it appears that within the scope of differences perceived quality and expected quality, twenty eight studied variables grouped firstly into five dimensions according to Servqual method can be divided into five factors explaining all together 57% of variability.

Although the number of hidden factors found by means of extrapolation analysis of factors is the same as Servqual dimensions, they do not coincide with the division of variables into five dimensions, which confirms hypothesis H1.

To take everything into account, it can be claimed that in case of public administration, there are the following differences (along with reservation mentioned in the text) between the classical Servqual model and the division into factors conducted by means of extrapolation analysis of factors:

- Three factors correspond to tangibles dimension—physical appearance, accessibility and material aspects,
- Reliability and reaction dimension corresponds to one factor—reaction,
- Assurance and empathy dimensions correspond to one factor—attitude to a client.

On the basis of the research, it can be observed that when studying service quality by means of Servqual method, a classical division of variables in Servqual method into five areas can be unquestioningly followed. It should be remembered that this division was created for financial services and it does not have to be right for other service sectors. When conducting a study of clients' satisfaction for example in public sectors, firstly, it should be started from analysing a high number of population of clients and using factor analysis for gathering date in order to define the way a division of variables should be done.

Such a division will be better adjusted to a specificity of public administration than a classical division. A similar procedure should be followed when we want to study other services. Every time, Servqual analysis should be preceded with a definition of dimension characteristic for a given service.

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Impact of EBITDA Variability on Empirical Safety Thresholds of Indebtedness and Liquidity Ratios: The Case of Poland

Jacek Welc

1 Introduction

Analysis of corporate credit risk (including evaluation of likelihood of company's bankruptcy) typically involves a set of simple accounting metrics, such as liquidity, indebtedness and debt-coverage ratios. Basically, there are three approaches applied for interpretation of the calculated ratios: (1) time-series analysis (where trend of a given ratio of a given company is evaluated), (2) cross-sectional analysis (where ratios of a given company are compared to some industry-wide averages), (3) comparing ratios of a given company to some pre-assumed safety thresholds. The third of this approaches calls for assumptions about the safety thresholds (upper or lower, depending on the nature of a given ratio) for individual credit risk metrics.

Among the most commonly applied indicators of corporate credit risk are current liquidity ratio (aimed at quantifying the company's short-term financial liquidity) and total indebtedness ratio (intended to measure the firm's long-term solvency). Both metrics are often compared to some pre-determined general safety thresholds. Such an approach entails a risk of analytical errors due to over-simplification. This is because typically similar generalized benchmarks are assumed for businesses exposed to varying operating risks, while in reality some of them may afford more indebtedness and lower current liquidity (due to their relatively stable operating profits and cash flows), while others should follow more conservative financial strategies to stay solvent. Also, such general safety thresholds for individual ratios are usually assumed as "rules of thumb", without confirming them by any up-to-date empirical research, based on real-life data of enterprises differing in terms of exposures to various business risks.

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One of the major corporate business risks is variability of financial results. It seems logical that firms with relatively volatile operating cash flows should keep below-average indebtedness and relatively high liquidity (to compensate for their moody operating results), while businesses with smoother income patterns (which translate into more predictable financial results) may afford more operating leverage and lower liquidity (because they can count on relatively reliable operating cash flows as a source of debt repayments). However, whether such common-sense principles are followed in a real-life business practice is an empirical issue.

This research attempts to empirically examine an extent to which volatility of corporate profits affects recommendable safety thresholds for indebtedness and current liquidity ratios. To this end, the EBITDA (sum of operating profit and depreciation and amortization) has been used as a proxy for corporate annual income. This metric is often treated as a simplified surrogate of operating cash flows, because it adjusts the operating profit for expenses of a non-cash nature, that is depreciation and amortization (Mulford and Comiskey 2002). The justification for choosing EBITDA (from among other measures of profit or cash flows) is its prevalence as a performance metric in corporate debt covenants (Li 2016; Demiroglu and James 2010).

The remainder of the paper is organized as follows. In the next section the relevant literature is discussed. Next the data and methodology used in the study are described. Then the section that presents the empirical findings follows. The paper closes with concluding comments.

2 Literature Review

2.1 Nature and Relevance of Indebtedness and Liquidity Ratios

According to White et al. (2003), liquidity analysis measures the adequacy of a firm's cash resources to meet its near-term cash obligations, while solvency (indebtedness) analysis examines the firm's capital structure, including the mix of its financing sources and the ability of the firm to satisfy its longer-term debt and investment obligations. Accordingly, liquidity and indebtedness focus on different aspects of corporate financial risk and due to this they are complementary to each other.

The most commonly applied metric of short-term liquidity is a current ratio, computed as a quotient of company's current assets to its current liabilities (Pratt and Niculita 2008). With such measurement, illiquidity may be defined as an excess of current cash payments due over cash currently available, and the current ratio gauges the risk of this occurring by comparing the claims against the company that will become payable during the current operating cycle with the assets that are already in

the form of cash or that will be converted to cash during the current operating cycle (Fridson and Alvarez 2002; Verninmen et al. 2005).

Indebtedness, also labeled as financial leverage, is usually measured as a quotient of company's total liabilities to its total assets and is interpreted as a measure of the debt to be repaid relative to the total assets of the firm available as a source for repaying the debt (Beaver et al. 2005).

Various suggested safety thresholds (or critical values) for liquidity and indebtedness ratios may be found in a literature on financial statement analysis. In a legendary textbook of Graham and Dodd (1934), a minimum ratio of quick assets to current liabilities, equaling two, is mentioned as a standard for industrial companies. Similar ratio (of about two) is often assumed in forming stock investment strategies based on fundamental analysis (Montier 2009). In contrast, many financial institutions assume a current ratio in excess of unity as a "rule of thumb" for their lending decisions (Stickney et al. 2004). However, it is important to bear in mind that a company may face liquidity problems even with its current ratio exceeding one by sizeable margin, when some of its current assets are not easy to liquidate (Palepu et al. 2004). This means that the more easily current assets are convertible into cash, the less need be the proportion of current assets to current liabilities (Saliers 1924; Atrill 2000). Accordingly, a current ratio of 1.5 may be assumed as a safety threshold for industrial firms, while public utilities may probably function with considerably lower ratios, because their accounts receivable turn over on a monthly basis, that is much faster than in the typical industrial firm (Moyer et al. 1995). However, not only differences in business profiles of individual firms drive the differences in their recommendable safety thresholds for current ratio. Also other risk factors, such as company size or predictability of operating cash flows, are relevant here.

In contrast to liquidity, the literature is more silent on safety thresholds for indebtedness ratios. However, the logic of corporate risk management suggests that relatively high financial leverage may be affordable in the case of companies with relatively low operating risks (e.g. low demand cyclicality), while firms with more erratic and unpredictable financial results should follow more conservative capital structures (with relatively low share of liabilities in financing assets).

Despite over-simplicity and lack of universally accepted generalized safety thresholds of liquidity and indebtedness ratios, they appear statistically significant in most statistical models for bankruptcy prediction (Charalambous et al. 2000; Caouette et al. 2008). Particularly, total indebtedness ratio often turns out to be the most statistically significant of all accounting ratios tested (Ohlson 1980; Zmijewski 1984; Shumway 2001; Chava and Jarrow 2004).

2.2 Impact of Earnings Variability on Corporate Credit Risk

On capital markets relatively smooth/volatile corporate earnings are assumed to be associated with relatively low/high business risk (other things being equal), including relatively low/high risk of financial failure (Badrinath et al. 1989; Previts et al.

1994; Wang and Williams 1994; Carlson and Bathala 1997). It is argued that smooth earnings may reflect relatively low information uncertainty about the company's future economic results (Jiang et al. 2005).

Positive relationship between earnings volatility and perceived investment risk means that firms with relatively stable profits enjoy relatively low cost of capital (Beaver et al. 1970; Rosenberg and McKibben 1973; Lev and Kunitsky 1974; Bowman 1979; Trueman and Titman 1988; Easley and O'Hara 2004). One of the reasons is that smoother income reduces the probability of breaking debt covenants (Beattie et al. 1994) which in turn reduces observed cost of debt (Li and Richie 2009). Others found that increased earnings smoothness reduces the likelihood of a downgrade of corporate debt ratings (Jung et al. 2013).

Positive relationship between earnings volatility and cost of capital is justified on the ground that earnings volatility relates negatively to earnings persistence (Dichev and Tang 2009; Takasu and Nakano 2012). Therefore, the more stable/erratic are corporate profits, the stronger/weaker is their "inertia" (and the more/less useful are historical financial results in predicting company's future performance). Indeed, researchers found that earnings smoothness is associated with a higher accuracy of analysts' earnings forecasts (He et al. 2010). From the bankruptcy risk perspective it means that businesses with relatively volatile earnings, which imply relatively low predictability of future financial results, should compensate this increased business risk by keeping relatively low indebtedness and relatively high liquidity (as a buffer of liquidity for poor times which are relatively difficult to foresee in advance). In contrast, companies which enjoy more "inertia" in their positive profits may afford more financial leverage and lower values of liquidity ratios, because their operating profits are more reliable as a source of funds for future debt repayments.

3 Data and Methodology

This research attempts to empirically examine an extent to which volatility of corporate profits affects recommendable safety thresholds for indebtedness and current liquidity ratios. To this end, the empirical safety thresholds for both metrics are estimated (with the use of univariate logit models) within a sample of real-life data from the Polish capital market. The safety thresholds are meant here as values of ratios at which the probability of bankruptcy exceeds 50%.

The study covered public firms whose stocks or corporate bonds were listed on the Warsaw Stock Exchange (on the regulated market as well as on NewConnect and Catalyst) in the period between the beginning of 2009 and the end of 2016. However, any financial institutions (including banks, insurers and investment funds) have been omitted in the analysis, due to their different financial reporting principles which would distort the comparability of financial results within a sample. Within this timeframe, as many as 98 non-financial public firms faced at least one bankruptcy filing. The companies included in that sample, labelled further as "bankrupt firms", formed the primary sub-sample. However, this sample of failed businesses had to be

reduced due to unavailability of financial results of some firms for the whole 5-year period preceding the bankruptcy filing. As a result, the final sample of "bankrupt firms" included 64 observations. To enable a statistical analysis, this sample has been extended by adding 64 randomly selected public firms, in which case no any bankruptcy filing was announced in the same period (this sub-sample is further denoted as "healthy firms" or "non-bankrupt firms").

In this research a one-period-ahead bankruptcy prediction horizon has been investigated. However, to make sure that only data which were publicly available on the bankruptcy filing date are taken into account, the following rules for data collection have been followed:

- For bankruptcy filings announced between the beginning of April and the end of December of *t*-th year (i.e. when annual financial statements for the preceding year have already been published), data from annual reports for *t-1* period have been used,
- For bankruptcy filings announced between the beginning of January and the end of March of *t*-th year, data from annual reports for *t-2* period have been used.

The investigated sample of 64 bankrupt firms is featured by the following industrial breakdown:

- Construction & Engineering: 12 firms,
- IT technologies: 7 firms,
- Distribution of foodstuffs: 6 firms
- Real-estate investments: 5 firms,
- Energy: 4 firms,
- Financial services and consulting: 4 firms,
- Manufacture of industrial goods: 4 firms,
- Restaurants: 4 firms,
- Distribution of software and hardware: 3 firms,
- Distribution of vehicles and car parts: 3 firms,
- Apparel stores: 2 firms,
- Distribution of heavy industrial goods: 2 firms,
- Distribution of other consumer goods: 2 firms,
- Food production: 2 firms,
- Others: 4 firms.

Accordingly, it seems legitimate to conclude that no any particular industry clearly dominates the collected sample of bankrupt firms, although two leading businesses (construction and IT technologies) make up about 30% of investigated bankruptcy filings. However, a time-series breakdown (not presented here) shows that 2 years of economic slowdown (2012–2013) seem to be over-represented, while some other periods seem to be under-represented. However, it is legitimate because bankruptcy rates tend to rise/fall in tune with a deterioration/improvement of general macroeconomic conditions.

In order to estimate the empirical thresholds for both investigated accounting ratios, the following five-step analytical procedure has been applied:

- First, for each "bankrupt firm" a coefficient of variation of annual EBITDA (in a 5-year period preceding a bankruptcy filing) has been computed. Then the same statistic has been computed for each "healthy firm" included in the sample.
- All firms in the whole sample have been sorted in order of decreasing variability of annual EBITDA and divided into two equally-sized sub-samples (i.e. 50% firms with above-average and 50% firms with below-average EBITDA variability).
- In the third step medians of indebtedness and liquidity ratios within both sub-samples have been compared.
- Then, four univariate logit models for bankruptcy prediction have been estimated, for both ratios and for both sub-samples.
- Finally, on the ground of the estimated logit models the safety thresholds for indebtedness and liquidity ratios have been simulated.

To avoid possible distortions brought about by negative and non-interpretable coefficients of variation (which may appear in case of companies with negative average 5-year earnings), the presence of any such negative values has been checked for. However, no any such observations have been identified. Accordingly, there was no need for reducing the sample size by eliminating the observations with negative coefficients of variation.

In this research the following formulas have been applied in computation of both analyzed accounting ratios:

- Indebtedness ratio = total liabilities and provisions/ total assets,
- Current liquidity ratio = total current assets/total current liabilities.

The primary statistical tool applied in this research was the simple (univariate) logit regression, in which the resulting predicted value of the dependent variable is the probability of the event (corporate bankruptcy in this case), bounded in a range between 0% and 100%. The advantage of the logit model lies in the understandable and clear suggestions about the classification of a given object. For example, if the estimated probability of a corporate bankruptcy is 70%, it may be immediately concluded that the bankruptcy is more likely than not.

4 Empirical Results

Table 1 presents several statistics computed for firms which form both sub-samples. As might be seen, the median coefficient of variation of annual EBITDA among most volatile firms is about three times as high as in the case of firms with the smoothest income patterns. This noisiness of EBITDA is one of the causes of much higher bankruptcy rate (64.1% of observations) among firms with most moody EBITDA, as compared to more stable businesses (where bankruptcy rate within the investigated sub-sample is 35.9%). Consequently, it seems advisable for such volatile businesses to offset their above-average operating risks (as proxied by

Table 1 Medians of indebtedness and liquidity ratios within sub-samples of firms with above-average and below-average EBITDA variability

	Indebtedness ratio		Current liquidity ratio	
	50% firms with most variable annual EBITDA	50% firms with least variable annual EBITDA	50% firms with most variable annual EBITDA	50% firms with least variable annual EBITDA
Coefficient of variation of annual EBITDA	139.4%	34.6%	139.4%	34.6%
Share of bankrupt firms in a sub-sample	64.1%	35.9%	64.1%	35.9%
Median value of ratio	66.2%	54.4%	1.24	1.31

Table 2 Obtained parameters of logit models estimated for the indebtedness ratio

	50% firms with most variable annual EBITDA		50% firms with least variable annual EBITDA	
	Coefficient	t-Statistic	Coefficient	t-Statistic
Intercept	−0.71	−1.08	−4.54	−7.03
Slope	2.16	2.77	6.46	6.37
F statistic	7.67		40.60	
Number of observations	64 (41 bankrupt and 23 non-bankrupt)		64 (23 bankrupt and 41 non-bankrupt)	
Simulated value of ratio, at which probability of bankruptcy (1-year ahead) exceeds 50%	32.9%		70.3%	

EBITDA variability) by keeping relatively low exposure to financial risks, as measured by indebtedness and liquidity ratios. In other words, to compensate for their noisy operating results, these firms should keep relatively low indebtedness and relatively high liquidity (as cushions for depressed operating cash flows in poor economic times). However, as might be seen in the last row of Table 1, the reality is just the opposite: companies with above-average EBITDA variability (where bankruptcy rates tend to be relatively high) are featured by relatively high indebtedness and below-average current liquidity.

Table 2 presents the univariate logit models obtained for the indebtedness ratio. As expected, slope parameters of both regressions have positive and statistically significant values, reflecting the observed positive relationship between corporate indebtedness and probability of bankruptcy. However, t-Statistic (as well as F statistic) is several times higher in the case of sub-sample of firms with relatively stable income streams. This seems to confirm that past accounting information tends to be more useful (in predicting future) in those businesses whose financial performance tends to show significant time-series inertia, as compared to firms with more

Table 3 Obtained parameters of logit models estimated for the current liquidity ratio

	50% firms with most variable annual EBITDA		50% firms with least variable annual EBITDA	
	Coefficient	t-Statistic	Coefficient	t-Statistic
Intercept	1.53	3.60	0.64	1.16
Slope	−0.35	−2.77	−0.94	−3.38
F statistic	7.66		11.40	
Number of observations	64 (41 bankrupt and 23 non-bankrupt)		64 (23 bankrupt and 41 non-bankrupt)	
Simulated value of ratio, at which probability of bankruptcy (1-year ahead) exceeds 50%	4.38		0.68	

noisy results. Finally, consistent with expectations, the simulated upper safety threshold for indebtedness ratio (meant as the value of ratio at which the logit-derived probability of bankruptcy starts exceeding 50%) lies much higher (at about 70%) in the case of relatively stable firms, while being much lower (only about 33%) for firms with more volatile profits. In other words, companies with relatively stable / noisy operating profits may afford relatively more/less debt in their capital structures.

Table 3 presents the univariate logit models obtained for the current ratio. Consistent with expectations, slope parameters of both regressions have negative and statistically significant values, reflecting the observed negative relationship between corporate liquidity and probability of bankruptcy. Similarly as for indebtedness, t-Statistic (as well as F statistic) is higher in the case of sub-sample of firms with relatively stable income streams (but the difference between two sub-samples is narrower than in the case of indebtedness ratio). As expected, the simulated lower safety threshold for current ratio lies much higher (above 4.00) in the case of firms with noisy earnings, while businesses with more stable profits may keep it at lower levels (even below unity, according to the obtained estimates).

When interpreting the obtained empirical results of this study, one must be aware of its relevant limitations. First of all, the period covered by the research is pretty short and embraces only few incomplete business cycles. During the years under investigation Polish economy did not experience any single year of recession. This means that the results can be somewhat biased. In particular, it is likely that the obtained estimates may understate the safety thresholds of current ratio and overstate the thresholds of indebtedness. Another limitation of the study stems from the fact that the investigated ratios have been computed on the ground of annual reports only, instead of the most recent publicly available information published in quarterly reports.

5 Conclusions

In this paper the impact of variability of annual EBITDA on the empirical safety thresholds of indebtedness and current liquidity ratios has been investigated. The study has been based on real-life data of Polish public companies, in which case at least one bankruptcy filing was announced in the period between the beginning of 2009 and the end of 2016. This sample of corporate failures has been examined on the background of the counter-sample of randomly selected non-bankrupt firms.

Main findings of this study may be summarized as follows:

- consistent with expectations, businesses with relatively smooth income trends may afford much more debt than firms with above-average earnings variability,
- likewise, the empirical safety threshold of current liquidity ratio lies much higher for firms with relatively erratic earnings (as compared to those with more stable profit streams).
- however, contrary to these findings, companies with relatively volatile EBITDA tend to have above-average indebtedness and below-average liquidity ratios.

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Modelling Quantile Premium for Dependent LOBs in Property/Casualty Insurance

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1 Introduction

An essential element of an insurance company's activity is the calculation of what is referred to as the pure premium for a single risk. In the case of a line of business (e.g. automobile coverage) for which the company observes a mass portfolio of risks, the pure premium for individual risk is calculated using statistical models. Because in practice the portfolios are usually heterogeneous in terms of the loss burden, ratemaking, i.e. a classification of the portfolio into homogenous groups of risks, is carried out. This is done using regression models, usually generalized linear models (GLMs), in which the expected total claim amount for a single risk is estimated (cf. Antonio and Valdez 2012; Dimakos and Di Rattalma 2002; Wolny-Dominiak 2014). The pure premium is determined as the expected value of the random variable representing total claim amount of single risk. Nowadays the typical situation is to cover several LOBs in one risk, as e.g. automobile risk can be split into TPL (third party liability), MOD (motor own damage), fire, theft and so on. Then the total pure premium is simply a sum of partial pure premiums regardless of the dependency structure among all LOBs.

The additional information is to look for the VaR risk measure or quantile premium (cf. Pérignon and Smith 2010). This measure allows us to set a premium at such a level, that the probability of loss does not exceed a predetermined value α.

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It is an easy task in case of only one LOB covered by the premium. On the other hand, in the case of several LOBs, as opposed to pure premiums, the determination of the appropriate level of the quantile premium depends on the correct estimation of the LOBs' dependency structure.

The purpose of this article is to present the possibility of using a copula in estimating a quantile premium for a risk generating losses in several LOBs. We propose copula-based model for LOBs, in which the MC (Monte Carlo) estimators of the premium for single risk are used. The model investigates the sum of dependent random variables representing the total claim amount of single risk insured in several related LOBs and we propose the simulation procedure to calculate total quantile premiums for a single risk. Since the straightforward calculations are complex we propose the simulation procedure based on the multidimensional empirical distribution. For this model theoretical background and real data examples are given.

2   Basics of Pure Premium in Property/Casualty Insurance

Consider the portfolio of n risks, in which every risk is insured among LOBs. A single ith risk is understood here as the random variable representing the total claim amount

$$S_i = S_{i1} + \ldots + S_{im}, \quad i = 1, \ldots, n, \tag{1}$$

where S_{ij} denotes the claim in jth LOB, $j = 1, \ldots, m$. Classically, in case of one LOB only (say 1—th LOB, therefore $S_i = S_{i1}$), the *pure premium* is defined (cf. Bühlmann and Gisler 2005; Shi et al. 2015) as the expected value of the random variable

$$\pi_i = E[S_i] \tag{2}$$

In this approach only the point estimation of the expected value is applied. Additional information is given by the entire distribution of the variable and the possibility to figure out so-called the *quantile premium* expressed by the formula

$$Q_{S_i}(\varepsilon) = F_{S_i}^{-1}(1 - \varepsilon), \tag{3}$$

where $\varepsilon \in [0, 1]$ means that the quantile premium covers $(1 - \varepsilon)100\%$ of the possible claims and $F_{S_{ij}}$ denotes the cumulative distribution function of the claim of ith risk in jth LOB.

The quantile premium has many possible uses. Majority of its applications are in the field of risk management. It can be used to determine internal capital allocation, as it tells us also the maximum amount we are likely to lose. High level managers can take advantage of it to set their overall risk target or analyse the impact of different scenarios (e.g. by changing parameter ε) on the expected financial results of the portfolio. They can also apply this measure to remunerate managers, agents, and other employees with reference to the risk they take in order to discourage

high-premium, but excessive risk-taking. Some insurance companies might find it useful for reporting and disclosing purposes, and reveal it in annual reports for investors. Another advantage of aggregate loss distribution is better understanding of insurer's need for reinsurance coverage and its pricing.

As mentioned above, the tendency in insurance business is to design the policy covering losses occurring in several LOBs. On the polish market the best example of such a practice is so-called automobile package insurance, containing TPL, MOD and assistance cover. The other example is travel insurance covering usually the cost of treatments, transport of the patient to the country, accidental loss, damage or theft of luggage and other personal possessions. In case of several LOBs the problem is how to obtain the quantile premium of the random variable S_i. One way is to sum up partial quantile premiums for every LOB and follow the formula

$$Q_{S_i}^c(\varepsilon) = Q_{S_{i1}}(\varepsilon) + \ldots + Q_{S_{im}}(\varepsilon) = F_{S_{i1}}^{-1}(1-\varepsilon) + \ldots + F_{S_{im}}^{-1}(1-\varepsilon) \qquad (4)$$

In this approach, the hidden assumption is that the vector $(S_{i1}, \ldots, S_{im})'$ has a comonotonic dependency structure, see Dhaene et al. (2002a, b), Denuit et al. (2006), and Wanat (2012) for details. This assumption is quite realistic, since claims $S_{i1}, \ldots, S_{im}$ in single LOBs are generated by the same ith risk, but the better way is to capture real dependency structure using a copula. In this case, quantile premium, which captures the dependency among LOBs, can improve in practice the determination of risk-based capital requirements for P&C insurers, setting overall risk target by senior management, pricing of excess-of-loss reinsurance treaties or designing scenario analyses, to name a couple of applications. Therefore we propose the model with the copula and Monte Carlo simulation to estimate the quantile premium.

3   Copula-Based Quantile Premium

In the model, the variable of interest is total claim for single risk in all LOBs. We search the distribution of the sum (1) and calculate total quantile premium as the following quantile

$$Q_{S_i}^{sim}(\varepsilon) = F_{S_i}^{-1}(1-\varepsilon), \qquad (5)$$

where F_{S_i} denotes the cumulative distribution function of the total claim for i—step inference for margins (IFM) method (Joe and Xu 1996), (Sklar 1959). In the first step, the method fits parameters $\mathbf{v}_{ij}$ of marginal distributions $f_{ij}(s_{ij}, \mathbf{v}_{ij})$ by maximum likelihood (ML), and then a pseudo sample is defined as:

$$\hat{\mathbf{u}}_i = (\hat{u}_{i1}, \ldots, \hat{u}_{im})' = (F_{i1}(s_{i1}; \hat{\mathbf{v}}_{i1}), \ldots, F_{i1}(s_{im}; \hat{\mathbf{v}}_{im})). \qquad (6)$$

In the second step, the copula parameter matrix Σ is fitted on the ground of estimated ith risk.

In order to accommodate the dependency between LOBs $S_{i1}, \ldots, S_{im}$ we use the m-dimensional copula and obtain the quantile premium on the base of the joint distribution of the vector of variables $(S_{i1}, \ldots, S_{im})'$.

The main challenge in the model is to fit the copula capturing the dependency between LOBs. Let's denote $C(\cdot; \Sigma)$ the assumed copula (e.g. Gaussian, Student). In order to estimate the parameter matrix of the copula we take advantage of two values $\hat{\mathbf{u}}_1, \ldots, \hat{\mathbf{u}}_n$ by maximizing the log-likelihood:

$$l(\Sigma; \hat{\mathbf{u}}_1, \ldots, \hat{\mathbf{u}}_n) = \sum_{i=1}^{n} \log c(\hat{u}_{i1}, \ldots, \hat{u}_{im}; \Sigma). \tag{7}$$

In practice there is no closed-form solution of the optimization. Therefore in this paper we use the numerical BFGS algorithm implemented in R package (see the R code).

Thanks to the IFM method the result comprises both the parameters of marginal distribution as well as the parameters of the copula.

We use this parameters to create the m-dimensional distribution of the vector $(S_{i1}, \ldots, S_{im})'$ from the copula $C(F_{i1}(s_{i1}; \hat{\mu}_{i1}, \hat{\phi}_1, \hat{p}_1), \ldots, F_{im}(s_{im}; \hat{\mu}_{im}, \hat{\phi}_m, \hat{p}_m); \hat{\Sigma})$. It gives us the possibility to simulate the empirical distribution of the random variable S_i and obtain the MC estimator of quantile premium denoted as $\hat{Q}_{S_i}^{sim}(\varepsilon)$. We propose simulation:

1. simulate vectors of probabilities $\mathbf{u}_i^s = (u_{i1}^s, \ldots u_{im}^s)'$ for ith risk, $s = 1, \ldots, 5000$ from the fitted copula,

2. calculate values of claims for ith risk in jth LOB $s_{ij}^s, j = 1, \ldots, m$ as $s_{ij}^s = F_{S_{ij}}^{-1}(u_{ij}^s)$.

3. Then we receive the empirical distributions of claims in each LOB for every single risk in the portfolio. Using this distributions we obtain the distributions of sum $s_i^s = s_{i1}^s + \ldots + s_{im}^s$. The estimated quantile premium $\hat{Q}_{S_i}^{sim}(\varepsilon)$ with the copula is then the empirical quantile of order $(1 - \varepsilon)$ from the sample $s_i^1, \ldots, s_i^{5000}, i = 1, \ldots, n$.

4   Example: Brasilian Data

In order to illustrate the above-stated model we analyze vehicle insurance risks taken from *brvehins1* database in the R package *CASdatasets*. Dataset includes information about claim amount in four LOBs: S_{i1}—theft, S_{i2}—partial collision, S_{i3}—total collision, S_{i4}—fire and other guarantees for each risk. Apart from that three factors are provided: X_{i1}—the gender (F, M), X_{i2}—the driver age group (18–25; 26–35; 36–45; 46–55; >55) and X_{i3}—the vehicle year (2009–2011). For all combinations of factors (30 cases) we calculate three premiums: pure premium, quantile premium

with comonotonicity and quantile premium with Gaussian copula. Matrix in formula (8) shows the correlations between LOBs and proofs the existence of some dependency.

$$
\begin{bmatrix}
1 & & & \\
0.36 & 1 & & \\
0.12 & 0.24 & 1 & \\
0.32 & 0.4 & 0.21 & 1
\end{bmatrix}
\tag{8}
$$

We assume following model:

1. The marginal cumulative distribution $F_{S_{ij}}(\cdot)$ of claim for single risk in jth LOB comes from Tweedie distribution with a mean μ_{ij}, the dispersion parameter ϕ_j and the power p_j, $S_{ij} \sim T(\mu_{ij}, \phi_j, p_j)$ (cf. Jørgensen and de Suoza 1994)
2. Dependency is accommodated by the m-dimensional Gaussian copula $C(\cdot)$ with correlation matrix Σ (cf. Nelsen 1999) following the form

$$
\Sigma = \begin{bmatrix}
1 & \rho_{12} & \cdots & \rho_{1m} \\
\rho_{21} & 1 & \cdots & \rho_{2m} \\
\vdots & \vdots & \cdots & \vdots \\
\rho_{m1} & \rho_{m2} & \cdots & 1
\end{bmatrix}
\tag{9}
$$

There are no obstacles to fit the other type of the copula as well as the other parameter matrix. After the use the estimation procedure described in Sect. 3 we receive the distribution of random variables S_i (the copula does not change). Assuming the order of quantile we calculate different quantile premiums. Figures 1, 2 and 3 shows the results.
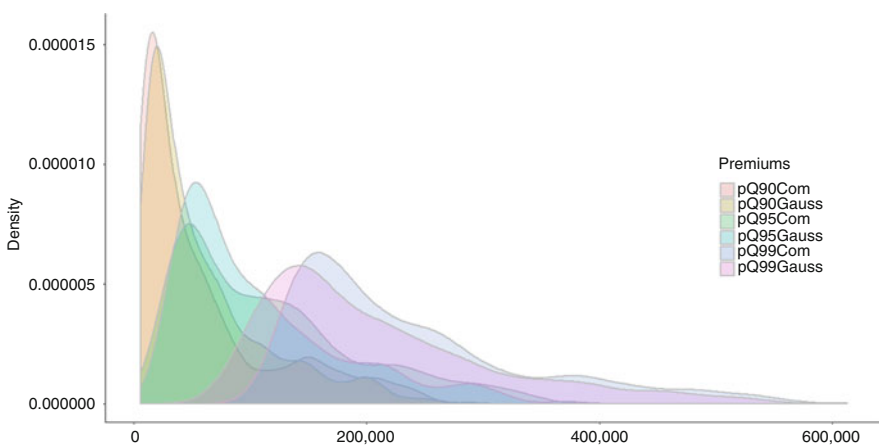

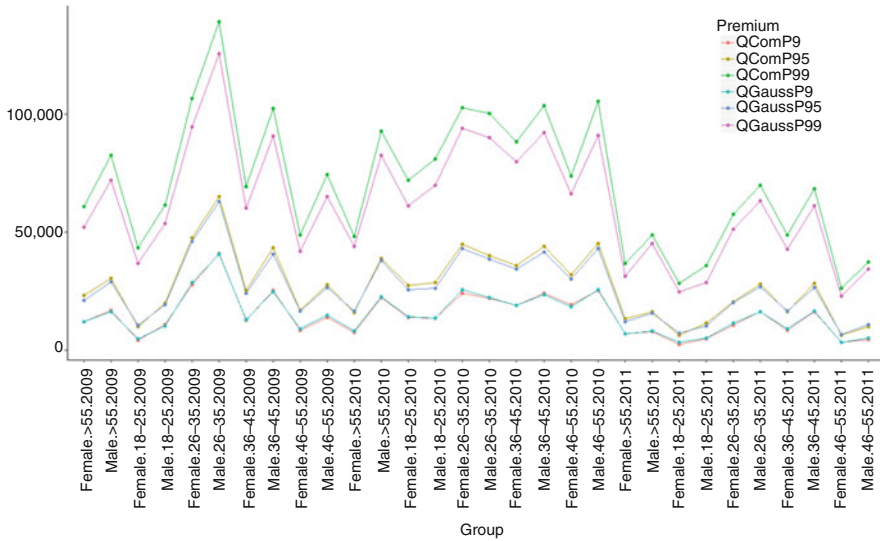**Fig. 1** The comparison of densities of quantile premiums

Fig. 2 The comparison of means of quantile premiums in groups

The results in the example show that this approach of the premium calculation gives much more conservative outcomes in modeling. It means that the copula-based quantile premium can be in most cases higher than the premium determined without taking into account the dependency, that is with hidden assumption about the comonotonicity structure, which poses highly important conclusion for risk management purposes. The comonotonicity assumption is generally considered as the safe value, which actually may lead to underestimation of the premium. This is due to the fact that the quantile premium is not the coherent risk measure. Thus, the use of this premium must ensure the correct identification of the dependency structure, because the comonotonicity assumption does not guarantee a safe value of premium.

5   Conclusions

The copula-based model seems to be of the special interest as nowadays the "multi-LOBs" insurance have become very popular and more and more insurance companies promote cross- and up-selling strategies. The problem remains the way of premium calculation in such insurance models. The quantile premium we propose is not the ultimate solution to this problem. However, it can be seen as useful information about the assessment of coverage of future liabilities in a given insurance group.
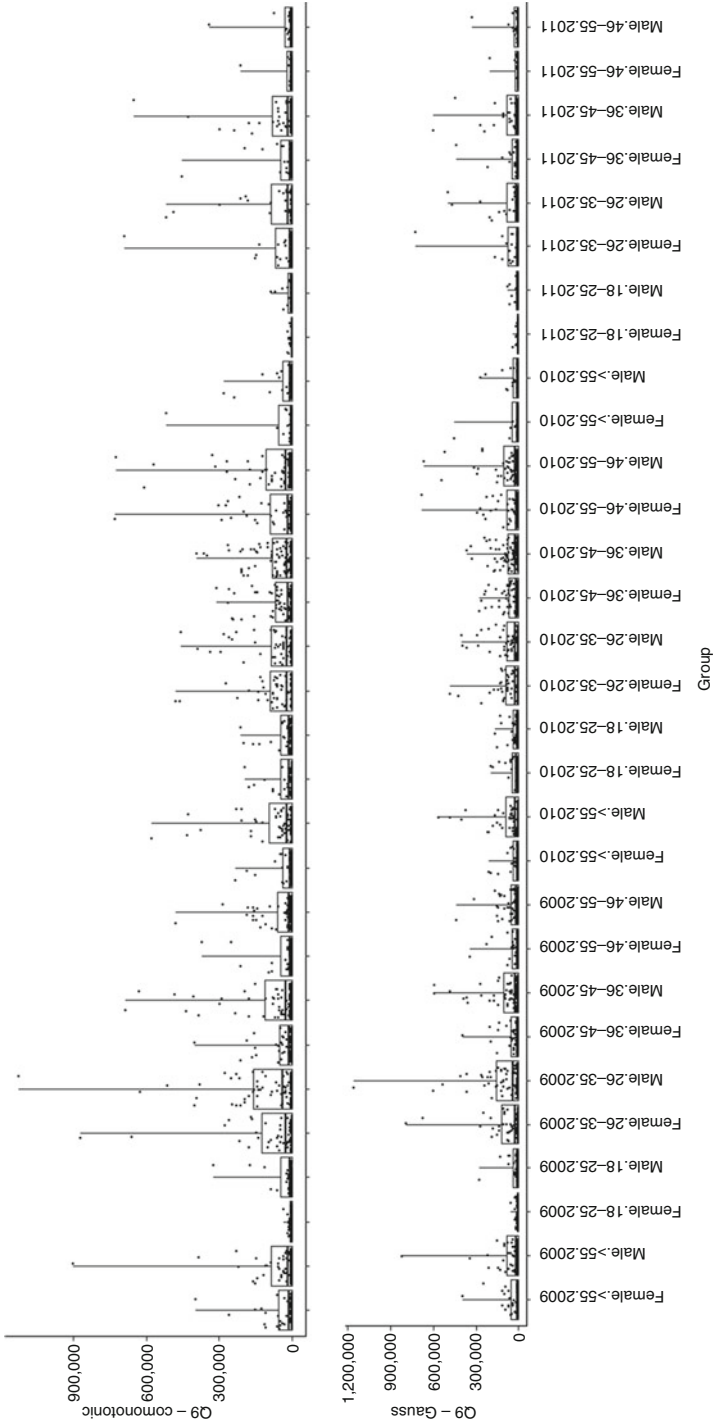
Fig. 3 Boxplots of quantile premium in groups

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Design of Innovative Research Procedure Concerning Environmental Responsibility of Banks and Their Financial Effectiveness in the Context of Implementation of the Directive 2014/95/EU

Justyna Zabawa

1 Introduction

Actions that aim to protect the natural resources of the environment are a practical implementation of the ideas of Socially Responsible Business on the part of modern organizations, including banks or insurance companies. The European Union has issued, in 2010, its strategic plan called Europe 2020: A European Strategy for Smart, Sustainable, and Inclusive Growth, which voices specific requirements for the environmental awareness of modern credit institutions in the future. The name itself suggests that environment-related legislation will be the priority, banking law included.

The development of research fields related to sustainable development and Corporate Social Responsibility (CSR) is also the effect of current EU law. The 2014/95/EU Directive concerns sharing non-financial information and information on diversity by some large entities and groups (directive 2014/95/EU—disclosure of non-financial and diversity information), and requires that the public interest entities, including banks, disclose information on, among other matters, their involvement in environment protection.

In addition, Polish National Accounting Standard No. 9 ("Activity Reports", Statement No. 4 of the Minister of Finance) contains formal regulations regarding disclosure of non-financial information, including reports of those activities which are directly related to protection of natural environment.

In line with the above legislative determinants, the central objective of this paper is to present a new conceptual approach to research and evaluation of corporate ecologic responsibility of banks in relation to their financial effect, in the form of an

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innovative procedure that can be employed for the evaluation of banking insti-
tutions' involvement in activities designed to protect natural environment and its
resources.

2 Justification of Research

The matters of Corporate Social Responsibility increase in importance, both for
manufacturing and service enterprises, including financial services. This trend can be
observed in both Polish and foreign literature on the subject. Due to the rapid
development of the field, an array of new terms emerged, such as Sustainable
Development, Sustainable Economy, Socially Responsible Investing (SRI), Green
Finance, Climate Finance, Green Banking, Sustainable Banking, Climate Banking.
These terms may seem to mean the same thing, but a more detailed analysis shows
otherwise. What's more, each of these terms can refer to a different scale of socially
responsible actions. Figure 1 shows these terms divided into three levels.

The lowest level is a base for the higher two, a condition for their existence and
meaning. The questions of green banking are the third, narrowest semantic field, and
the reason for its functioning, as well as its meaning, is created by the other two,

Fig. 1 Terminology

III
Green Banking, Ecobanking
Climate Banking, Sustainable Banking

II
Corporate Social Responsibility (CSR),
Environmental, Social, Governance (ESG),
Socially Responsible Investing (SRI)
Green Finance, Climate Finance

I
Sustainable Development
Sustainable Economy
Sustainable Growth
Climate Economy
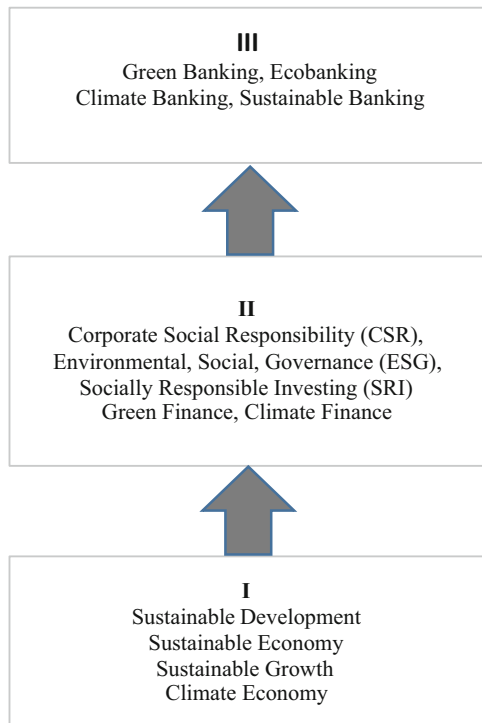
especially level II. The literature on the subject—both Polish and foreign—produced a whole array of terms to describe corporate social responsibility. The definition that best reflects the core of CSR is the one proposed by professor Dziawgo: "undertaking a commercial business activity which voluntarily included ethical, social and environmentalist aspects in contact with enterprise stakeholders: clients, workers, contractors, investors" (Dziawgo 2010).

Analyses of professional publications in long-term perspective suggest that the term 'ecology' has evolved over the years (Zabawa 2015). The online edition of the Great Dictionary of the Polish Language[1] defines ecology as "a branch of biology involved in the examination of relations and interactions of human beings, animals and plants with their environments" or, alternatively, as "activities designed to propagate protection of natural environment and nature-centred lifestyles". Interestingly enough, another formal source—the Dictionary of the Polish Language— restricts the use of the term ecology, defining it as "a branch of biology involved in the study of correlations between organisms and their environment" (Szymczak 1992). In line with the above publication's terminology, the study of problems involved in protection of natural environment and its resources is the realm of another branch of science—sozology. Professional publications on natural environment protection in the area of finance (and other areas) employ the term 'ecology' as corresponding to activities designed to protect and defend natural resources. Consequently, the latter understanding of the term will also be employed for the purpose of this study.

Environmental responsibility, therefore, is a special type of ethical responsibilities, which includes economic, legal, strategic and organisational aspects of respect for the natural environment. Green banking, by extension, strives to ensure a lasting improvement of the quality of life of current and future generation by keeping the proper proportion between the three types of capital: economic, human and natural.

Questions arise as to how can we measure the extent to which a bank is involved in implementing the corporate social responsibility ideas, with special focus placed on respecting the environment, on all three levels: public relations, internal eco-management and financing green investments. And are environmentally responsible banks still financially effective? How do they fare, economically, when compared to other banks—listed banks, and the entire banking sector?

An analysis of the subject literature shows that very few works take up the subject of measuring the ecologisation of modern banks, and of the economic effectiveness of environmentally responsible financial institutions. Professional literature provides little evaluation of those aspects of research that address correlations between financial effectiveness and corporate involvement in the realisation of the CSR idea in the banking sector and environmental protection in this segment of economy is examined individually by only few authors (Paulík et al. 2015; Soana 2011; Zabawa 2013, 2014).

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[1]Based on www.wsjp.pl (1.03.2015), Institute of the Polish Language at the Polish Academy of Science, a publication financed by the Minister of Science and Higher Education under the framework of the National Program for the Development of Humanities in the years 2013–2018.

Works were dedicated first of all to one of these subjects, namely the actions that modern banks take to protect natural resources (Dziawgo 2010; Marcinkowska 2013; Borys 2000; Burianová and Paulík 2014; Ganzo 2014; Lewicka 2013; Miśkiewicz 2017; Wiegler 2008; Dumitraşcu et al. 2014). Further works were dedicated to the economic effectiveness of Polish and foreign credit institutions. Some works take up the subject of economic effectiveness of financial institutions, with special attention paid to the crisis phase, but they do not scrutinise environmental responsibility (Marcinkowska 2007; Capiga 2011; Iwanicz-Drozdowska 2012; Stefański 2010; Moradi-Motlagh and Babacan 2015; Choudhry and Jayasekera 2014; Parinduri and Riyanto 2014; Matousek et al. 2015).

There are a lot of indexes available for measuring CSR involvement, including environmental aspects, of a given entity. The first such indexes appeared in the USA (Wacławik 2017). The most famous are the Dow Jones Sustainability Index (DJSI), implemented in the late 1990s by Dow Jones, STOXX Limited and SAM group—Sustainable Asset Management. Other such indexes are Calvert Social Index (CSI), FTSE4GOOD, FTSE Johannesburg Stock Exchange Socially Responsible Index (JSE SRI), Sao Paolo Stock Exchange Corporate Sustainability Index (ISE), MSCI KLD 400 Social Index or Ethibel Sustainability Index (ESI). Apart from Corporate Social Responsibility indexes, which usually include some environmentalist aspects, there are also specialised indexes concerned with environmentalism only, active on the modern capital market. One such index is the UmweltBank—AktienIndex (UBAI).

The Warsaw Stock Exchange has an index of socially responsible companies as well, called Respect Index, where environmentalist aspects are one of the set of criteria used.[2] The latest, tenth edition of the Respect Index listed a record number of 25 companies, including 5 banks.

There is, then, a marked absence of a synthesised indicator that would only measure environmental aspects while taking into account the characteristics of the banking sector, in the financial market—both Polish and foreign.

The problems of environmental responsibility of business institutions, including banks, become especially important in the light of the EU strategy already mentioned, and the 2014/95/EU Directive on disclosure of non-financial information, including environmentalist actions. These laws come into force for Polish institutions on the 1st of January 2017 and include public interest institutions, commercial banks among them.

According to the Directive text, the public interest institutions must disclose, in their reports or separate documents, important information concerning:

1. Environmental matters.
2. Social and HR matters.
3. Respecting human rights.
4. Counteracting corruption and bribery.

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[2]More on responsibility at www.odpowiedzialni.gpw.pl (accessed on 28.12.2016).

Transposition of the regulations contained in the above Directive to the Polish legal system took the form of an amendment to the text of the Accounting Act. According to art. 49 of the Accounting Act, disclosure of non-financial information applies as obligatory to those entities that satisfy the following requirements: employ over 500 employees on average over 1 year period, the sum of their assets is over 85 million PLN or the sum of their income from selling goods and products exceeds 170 million PLN.

This information should be supplemented by a short description of the institution's business model, its policy for the given period, its results and risks, as well as its ways of managing risks in non-financial matters, and key indicators of results related to given activity.[3] Plenty corporations are involved in CSR activities, and as a result are providing more social and environmental information to the public (Tilt 2016). Companies are free to choose means of reporting that suit them and their standards. The most popular guideline standards for social reporting were established by the Global Reporting Initiative, with their newest standard being GRI Standards. GRI guidelines contain general rules of communicating the influence of business activities, and detailed indicators related to specific parts of reports. All member countries have until the 6th of December 2016 to implement the directive, hence the importance of the subject matter of our research.

Some aspects associated with protection of natural environment in the context of economic operation are also addressed in the regulations contained in the National Accounting Standard No. 9 ("Activity Reports", Statement No. 4 of the Minister of Finance). The above standard applies both to the impact exerted by economic entities (banks included) upon natural environment, and to the impact of environmental forces upon organisations and their conditions of operation.

The fact that a number of foundations and associations, both Polish and international, are active in the field of the environmental responsibility of financial institutions—such as Sustainable Finance and Accounting Association, Foundation of Environmental and Resource Economists, Centrum Doskonałości na Rzecz Zrównoważonego Rozwoju of the Wrocław University of Economics, The International Society for Ecological Economists (ISEE), or The European Society for Ecological Economists (ESEE)—underlines the importance of our research as well.

3   Research Goals

As we have shown in the previous chapter, an analysis of the subject literature shows a distinct lack of works on and research into the matter of environmental responsibility of banks in the light of their financial effectiveness. There is also a lack of works on the extent (measuring) of banks' involvement in ecologisation. Our goal is,

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[3]https://bip.kprm.gov.pl/kpr/wykaz/r2117,Projekt-ustawy-o-zmianie-ustawy-o-rachunkowosci. html (accessed on 28.12.2016).

therefore, to measure the extent of banks' involvement in ecologisation, and to examine the relationship between their ecological responsibility and their financial results. We plan to examine all commercial and corporate banks of the Polish sector. According to the National Polish Bank data from 2015, this means 38 institutions: 36 commercial banks and 2 corporate banks (Raport NBP 2015). This fact is due to the specific nature of its business (including legal conditions) and market share of types of banks (share in the assets of the banking sector: commercial and associating banks 93.2%, (NBP 2015). This research seems very important in the light of the aforementioned 2014/95/EU Directive coming into force in Polish law.

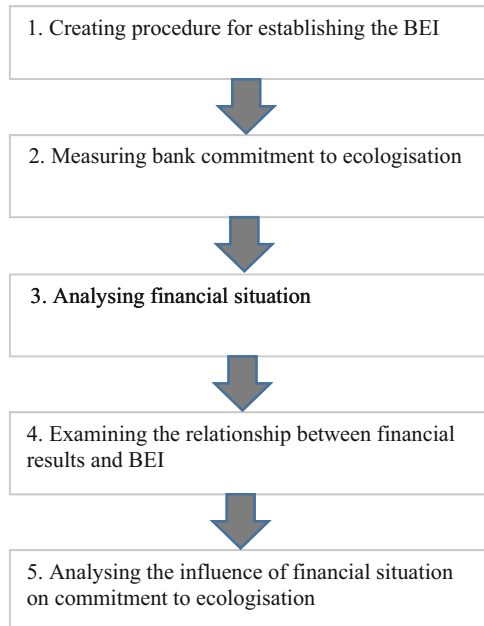We can thus state two main goals of our research:

1. Measuring the extent to which Polish commercial banks are involved in ecologisation based on pre-established procedure, this being one of the indicators of commitment to the ideas of Corporate Social Responsibility.
2. Examining the relationship between the environmental responsibility of Polish banks and their financial effectiveness. For each of the phases of environmental maturity of a bank, this relationship will be examined using chosen statistic tools. This will also be an attempt to answer the question whether environmentally responsible banks are economically effective.

Fulfilling these main goals will also entail fulfilling certain specific goals:

1. Establishing a procedure for creating a synthesized indicator of a bank's involvement in ecologisation.
2. Measuring the extent to which Polish banks are committed to meeting the goals of the modern, environment-oriented credit institutions.
3. Analysing the economic effectiveness of environmentally responsible banks.
4. Examining the relationship between the depth of involvement of a bank in its ecologisation, and its financial results.
5. Analysing the influence of a bank's financial situation on its environmental involvement.
6. Ordering the terminology of the field.

The above objectives correspond with the following research hypotheses, to be validated or rejected in the course of this study:

1. For banks listed on the Warsaw Stock Exchange, the Bank Ecologisation Index (BEI) will be higher compared to other banks across the same time perspective.
2. Banks involved in natural environment protection on a larger scale retain their economic effectiveness status.
3. There is a linear correlation between the Bank Ecologisation Index and the bank's financial result in each of the five stages of the 'banking ecologic maturity' model.
4. There is a threshold to the value of the aggregated index that describes the bank's financial standing that marks a point of significant increases in the value of the BEI index.

Fig. 2 Plan of research

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┌─────────────────────────────────────────────┐
│ 1. Creating procedure for establishing the BEI │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│ 2. Measuring bank commitment to ecologisation  │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│ 3. Analysing financial situation              │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│ 4. Examining the relationship between financial │
│ results and BEI                               │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│ 5. Analysing the influence of financial situation │
│ on commitment to ecologisation                │
└─────────────────────────────────────────────┘
```

4 Plan of Research

Meeting our research goals, stated above, requires specific actions. These actions form the research plan, the five phases of which are shown in Fig. 2.

Tasks allotted to each phase:

Phase 1 Creating a procedure for establishing a synthesised indicator of the extent to which banks are involved in ecologisation—BEI, Bank Ecologisation Indicator to create this procedure, we will use the Analytic Hierarchy Process (Saaty method), the Mystery Client and, and the linear ordering method (multidimensional comparative analysis). In the last phase of procedure creation, five stages of bank ecologisation will be established. The procedure itself will entail five stages:

1. Creating a profile of an environmentally responsible bank. Due to the specificity of banking organisations, a number of criteria were developed to better characterise the corporate ecologic responsibility of banks at three levels (Dziawgo 2010; Dziawgo L and Dziawgo D 2016). Following is the list of criteria adopted in the profile, with level II mapped in accordance with the GRI G4 standard.

Level I—Supporting activities:

– Expenses associated with promotion of pro-environmental activities

Level II—Internal management:

- CO2 emission (G4 EN 15).
- Paper conservation (G4 EN 1).
- Electric energy consumption (G4 EN 3).
- Business travels (G4 EN 30).

Level III—Products addressing ecological risk and those designed to protect natural environment:

- Number of loans granted on investments directly related to environment protection.
- Number of pro-ecologic products in the bank's offer of products.
- Relation: value of proceeds from commissions and interests on pro-ecologic products/total proceeds from commissions and interests.
- Relation: percentage of outstanding or overdue loans for pro-ecologic investments/percentage of total outstanding or overdue loans.

2. Choosing importance for previously stated criteria according to the AHP method. AHP method—hierarchic analysis—will be used to establish the importance of chosen criteria. The choice of weights in accordance with the AHP method for the criteria determined in advance. To determine the importance of particular criteria, the AHP method, which means, the analytic hierarchy process, will be used. This method makes it possible to solve a task consisting in taking multi-criteria decisions if an issue consists, among others, in choosing between various variants of decisions, or determining the influence of particular criteria upon the result, which can be constituted by, for instance, a synthetic index. The use of the AHP method in the procedure of the measurement of the degree of the involvement of a bank in the process of ecologization will make it possible to determine the weights of the criteria determined in advance. This phase, in turn, will entail six steps (Bryndza 2005):

- Developing questionnaires serving to compare criteria determined in advance with the use of marking in Table 1.
- Expert evaluation of chosen criteria and ordering them in appropriate tables.
- Making the assessments of particular criteria by experts, and then placing their elements in appropriate tables. Choosing importance for the chosen criteria by calculating the arithmetic median of the rows in each table containing normalised grades given by all the experts.
- Creating tables with the importance grades of all criteria graded by the experts.
- Verification of the credibility of experts, and also determining the weights for particular experts. The credibility of assessments obtained from particular experts will be estimated in accordance with Saaty's proposition and with the use of incoherence index. This index will be calculated in accordance with the use of the-following formula (1):

$$ICI = (\lambda\text{max} - n)/(n - 1) \tag{1}$$

Table 1 Markings used in the AHP method

Degree of importance	Marking	Explanation
9	Dominating significance	Evidence proving the dominating significance of an action in proportion to the others
7	Very important or imposing significance	Action is strongly superior to the remaining ones, and its domination is confirmed by practice
5	Essential or important significance	Experience and assessments indicate a majors significance of one action in proportion to the others
3	Small significance of one action in comparison with others	Experience and assessments indicate a small significance of one action in proportion to the others
1	Equally important	Two actions exert the same influence upon the objective
2,4,6,8	Values intermediary between adjacent points on the scale	Used if a compromise is needed

Source: Developed on the basis of: Dahlgaard J J, Kristensen K, Kanji G K (2004), Podstawy zarządzania jakością, Wydawnictwo Naukowe PWN, Warsaw, p. 143

where:
λmax—the greatest own value of the matrix of priorities,
n—number of characteristics.
It is assumed that the credibility will be checked for every of the experts.

– Establishing the synthesised weight of the criteria. It is planned that the following formula will be used (2):

$$wi = wi1 * we1 + wi2 * we2 + \ldots + wij * wej \ldots + win * wen \qquad (2)$$

where:
wi—the total weight of criterion i;
wij—the weight of criterion i assigned by the j^{th} expert;
wej—the weight of j^{th} expert.

3. Evaluating specific criteria chosen for each of the banks participating in research. The procedure entails questionnaire research.
4. Establishing a bank's BEI (Bank Ecologisation Indicator), using the development pattern method for linear ordering and multidimensional comparative analysis.
5. Formulating the five classes of a bank's environmental maturity model. At the last stage of developing the procedure, in accordance with the procedure assumptions, the following five classes of the ecologization of banks will be determined:

– first class—this class includes banks having the highest values of BEI: (4/5* (BEImax-1); BEImax];
– fifth class—this class includes banks having the lowest values of BEI, for which the value of the researched index is in the range: [1; 1/5*(BEImax-1)]. The width of every of these three classes is the same, and amounts to 20%.

Phase 2 Measuring the extent to which Polish banks are involved in performing tasks resulting from the environment-friendly orientation of modern financial institutions. The research will be conducted following the procedure outlined before in all active Polish banks (NBP 2015): 2 associating banks and also 36 commercial banks conducting operational activity. Assigning the banks into the five classes of bank ecologisation. The survey will be conducted after the first quarter 2018, after the preparation and publication of non-financial reports for 2017.

Phase 3 Conducting the economic analysis of the efficiency of ecologically-responsible banks with the use of indexes within the scope of financial analysis used for the assessment of the activity of contemporary credit institutions. Among the analysed variables, it is planned that attention will be paid both to indexes the values of which are expressed in %, and, as well in absolute values. Among the former ones, it is possible to indicate, among others, ROA, ROE, solvency margin and net interest margin, whereas among those expressed in absolute values: balance sum, net and gross profit. The analysis will be carried out in sector commercial banking, for each of the five previously designated classes of greening banks. In each of the classes will be conducted analysis of financial variables using the following parameters: measurement location, the arithmetic mean, modal, quantile; measure of variability: variance, standard deviation, average deviation, coefficient of variation, the range, quartile deviation and coefficient of variation (Ostasiewicz et al. 1998).

Phase 4 Examining the relationship between a bank's commitment to ecologisation, and its financial results. This relationship will be measured by chosen statistic tools such as (a) Pearson's correlation coefficient, coefficient of determination—for examining the relation between a bank's BEI and the financial variables of the Polish banking sector; (b) estimated parameters of the linear regression function, where financial indicators used for financial analysis are the explanatory variables, and the BEI is the dependent variable.

Phase 5 Analysing the influence of a bank's financial situation on its environmentalist commitment. Finding an aggregated indicator of a bank's financial situation (linear ordering method). Estimating the threshold value of that indicator, over which BEI grows significantly.

5 Conclusion

Taking into account the special conditions of the banking sector, and the lack of research into the extent of banks' commitment to ecologisation, we conclude that research proposed here would certainly fill the gaps in the literature on the subject, present both in the Polish and international market.

Research conducted as described above will answer the question whether banks that are involved in environment protection can at the same time be financially effective. An analysis of literature shows a lack of research on this subject. The

problem of Corporate Social Responsibility, especially environmental responsibility, is increasingly important in modern financial institutions, as testified by our literature research and by media coverage. Current legislation is important in this matter as well. To achieve lasting, long-term competitive advantage, financial institutions, including banks, cannot limit themselves to seeing profit as their main goal. Clients of banks, aware of their responsibilities, will take the CSR matters—especially those related to such crucial aspects of modern economies as environment protection—into account when choosing a financial institution. The research will be conducted after the first quarter 2018, after the preparation and publication of non-financial reports for 2017 according to the Directive 2014/95/EU.

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