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THE STRUCTURE – CONDUCT – PERFORMANCE PARADIGM IN THE EUROPEAN UNION BANKING

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ABSTRACT. In this study we investigate the structure and performance at the European Union (EU) banking market as a whole between 2008 and 2015. The structure of this banking market was measured by two main concentration indices: the Herfindahl-Hirschman Index (HHI) and the Concentration Ratio for 5 largest banks (CR5). The results show a stable development in concentration until 2012, and a significant decrease in 2012. Since 2013, the level of concentration increased, reaching its historical maximum at the end of 2014, when the increase in market concentration was reflecting primarily the decline in the number of credit institutions. The performance was measured by means of profitability indicators: the Return on Assets (ROA) and the Return on Equity (ROE). Since 2008, the development of the market in question was affected by the financial crisis, which resulted in low profitability till the end of 2013. In more recent years the profitability in European banking market slightly increased. The purpose of this paper was to examine the relations between structure and performance. We tried to test the presence of structure-conduct-performance (SCP) paradigm in the EU conditions. The presence of this paradigm was verified using the Granger causality test for panel data. The results of our analysis show that under the studied conditions only the one-way relationship running from banking sector performance to banking market concentration was approved. The findings do not confirm the presence of the SCP paradigm, but are in line with the quiet life hypothesis, thus indicating there is a negative relationship between concentration and performance at European banking market.

JEL Classification: G21, C12, D40

Keywords: performance, concentration, structure-conduct-performance paradigm, European Union banking market, Granger causality test

Introduction

In the economic theory and in the works of many authors (e.g. Majková *et al*., 2014) can be seen that the basic condition for effective and functional economic system is well

functioning financial system. The functioning of the financial systems in recent years was affected by significant changes in deregulation, market globalisation and innovation (Becerra Alonso *et al*., 2016; Grčić Fabić *et al.*, 2016; Piotrowska *et al*., 2017; Jantoń-Drozdowska, Mikołajewicz-Woźniak, 2017). The structure, stability and performance of the financial system were affected especially by the process of globalisation. As we know that the banking system is very important part especially in the condition of European Union banking, we can say that it is very important to focus on the examination of the banking systems performance (Galloppo *et al.*, 2015; Rajnoha *et al.*, 2016). The performance must be examined also in the context of market structure, as the number of banks and the strength of their market position, can affect the performance of whole banking system (Belás, Polach, 2011; Kubiszewska, 2017). As well as the level of the performance in banking system can affect the concentration in the banking market. Therefore, the aim of this paper is to examine the relations between the concentration and banking sector performance. The presence of structure-conduct-performance paradigm was verified using the data on the European Union banking market within the period from 2008 to 2015.

This paper is a contribution to the empirical analysis of the relationship between banking market performance and concentration in the European Union countries. As the main contribution of the paper can be considered the application of the panel Granger causality approach, which fills the gap in the existing literature. The aim is to examine the relative complexity in the relationship between structure and performance and also to prove that the causation is running not only from performance to concentration but also in the opposite direction – from concentration to performance. In the previous studies, the authors tried to analyse this relationship using the regression or correlation analysis. In our paper, we try to analyse this relationship in term of causation. When we talk about the correlation, we are talking about the relationship between the two variables. This relationship can be positive (when performance goes up and the concentration also goes up), or negative (when performance goes up while concentration goes down). It means that correlation is when these two variables tend to occur at about the same time and might be associated with each other, but are not necessarily connected by a cause relationship. On the other hand, causation is found when changes in one variable directly cause changes in the other variable. Such a causality could run one-way or two-way. To fulfil the aims mentioned above, the paper is divided into two main parts. In the first part, the relationship between market structure and banking sector performance is defined (from the theoretical point of view). In the second part, we evaluate the performance and concentration at the European Union banking market and try to verify the structure-conduct-performance paradigm between the selected variables. To measure the performance we have used the ratio method along with the indicators like Return on Assets (ROA) and Return on Equity (ROE). The concentration is measured by using the traditional indicator Concentration Ratio for 5 largest banks (CR5) along with the Herfindahl-Hirschman Index according to the value of total assets.

1. Literature review

The market structure (e.g. in form of concentration) is widely discussed primarily because of the close relation of competition and business performance in the condition of market economies (Belás *et al.*, 2015a; Cipovová, Belás, 2012). The basic principle of business activities assumes that conducting of enterprises depends on the market structure and market structure, in turn, will affect their conduction (Belás *et al*., 2015b). Concentration in the banking market is an important factor affecting the performances of provided services, quality of products and degree of innovation in the banking sector (Belás *et al.*, 2015c; Minh, Huu, 2016;

Belás, 2013). Claessens and Leaven (2004) reported that the level of concentration also affected the access of businesses and households to financial products and services, what affects overall economic growth. The relatively high concentration of assets in the hands of a small number of banks in most countries, set up the question of whether the banking market is powerful, and whether its performance does not just result in revenues achieved due to monopoly prices. Due to a high concentration in the banking market, banks have undoubtedly favourable conditions, which give them the opportunity to establish and maintain a higher interest margin; there can be occurred the allocation of credit as banks have a strong negotiating position. The higher concentration gives an additional incentive for the banks to act in a concerted fashion which can lead to higher margins and higher profits. The importance of measuring concentration and performance in the banking area are separately discussed in works of many authors (Svitálková, 2014; Skvarciany, Iljins, 2015; Paulík *et al*., 2015). Individual authors in their papers used to measure the performance by traditional methods or modern methods based on the use of mathematical models, or based on the use of information technologies, or by the Balanced Scorecard method (Gavurová, 2012; Lesáková, Dubcová, 2016). On the other hand, market concentration is evaluated mainly by the Concentration ratio or Herfindahl-Hirschman index. Nowadays, the researchers started to study the relationship between these two variables. Investigation of the relationship between concentration and performance in the banking market is driven by the aim to create an efficient banking market, which minimises the probability of bankruptcy. In the existing literature, there are two main theoretical approaches that describe the relationship between market structure and performance in the banking area. One is the quiet life hypothesis (presented by Hicks, 1935) and the second one is the structural approach (presented by Mason, 1939 and Demsetz, 1973). According to quiet life hypothesis, a higher level of market concentration reduces the bank's efforts to improve their performance. This quiet life leads to decreasing motivation of managers to focus on the effective functioning of banks, which in turn leads to a decrease in their performance. On the other hand, a stronger competitive environment prevents managers to "live quietly", forcing them to constantly look for opportunities to strengthen its position in the market, which will be reflected in the growth of their performance. Under the structural approach there are used two basic paradigms to define this relationship: Structure-Conduct-Performance (SCP) and Efficient structure (ES) paradigm. To test the presence of SCP paradigm the concentration is measured by indicators of absolute concentration (e.g. Concentration Ratio, Herfindahl-Hirschman index, etc.). The SCP paradigm was firstly presented in the work of Mason (1939) and now forms one of the basic approaches to test the competing hypotheses. This paradigm is based on the idea that the performance depends on the conduct of the enterprises and buyers, while the conduct of the enterprises and buyers depends on the market structure. Market structure and conduct of the enterprises and buyers are influenced by the basic conditions (e.g. economic environment) within they operate. Mason (1939), in his study, identified not only flows from the basic conditions to the structure, conduct and performance but also analysed feedbacks between the parts of the model. Bain (1959), brought a new perspective on the test of SCP paradigm through regression analysis. In his study, he focused directly on the relationship between performance and structure. Bain (1959) concluded that fewer enterprises in the market led to less competitive behaviour and less competitive outcome. Second, efficient structure (ES) paradigm argues that performance of enterprise grows with its size. In other words, a growth of market share leads to the growth of ability to achieve higher profits. As can be seen in the case of ES paradigm the concentration is measured by indicators of relative concentration (e.g. market share of individual enterprises). Both competing paradigms explain the positive relationship between performance and concentration. According to Rumler and Waschiczek (2012), based on the SCP paradigm higher concentration reduces competition by fostering collusive behaviour

among firms and whether higher concentred market improves market performance as a whole. In a high concentrated market, enterprises have higher market power which allows them to set prices above marginal costs and achieve higher profitability. The ES paradigm also assumes the existence of a positive relationship between concentration and profitability. This is a result of the fact that more profitable firms achieve higher market shares, which brings the growth of profitability with increasing concentration. Several authors suggested that the relationship between concentration and performance may be modified by specific conditions. Therefore, when testing competition hypothesis through the regression models, the other variables are added (e.g. characteristics of the banking sector and macroeconomic variables). One of the first papers which studied this relationship using regression analysis was prepared by Smirlock (1985). The author argues that there was no causal relationship between concentration and performance. Using data from 2700 unit state banks operating in a particular region over the period 1973-1978, he found that once market share was controlled for, concentration didn't contribute to explaining bank profit rates. This way in his work the ES paradigm was confirmed. The ES paradigm was also confirmed in works of Goldberg and Rai (1996), and Grigorian and Manole (2006).

Aleknavičienė and Tvaronavičienė (2006) deals with changes in Lithuanian banking sector, which analysed during the years 1996-2005 and try to verify the presence of structure-conduct-performance paradigm. They discussed the efficiency of foreign banks in less developed countries and try to identify the impact of foreign direct investment on banks´ efficiency. Based on the results of their analysis the SCP paradigm was confirmed. The presence of SCP paradigm was also confirmed in the papers prepared by Tregenna (2009), Rumler and Waschiczek (2012). However, few authors have used Granger causality test to estimate and investigate empirical relationship between bank performance and market competition. Pruteanu-Podpiera *et al.* (2008), examined the Czech banking market between 1994 and 2005 and tried to estimate the effects of banking competition to efficiency. The results of their analysis rejected the quiet life hypothesis and indicated a negative relationship between competition and efficiency in banking. Casu and Girardone (2006) applied Granger causality test to estimate the relationships between competition and efficiency, using bank-level balanced data for the commercial banks from five European Union countries (France, Germany, Italy, Spain, and the United Kingdom), between 2000 and 2005. Their finding also didn't support the quiet life hypothesis, since the Granger causality running from market power to efficiency was positive. On the other hand, there was no clear evidence that an increase in efficiency will precede any increase in a bank´s market consolidation.

Ferreira (2014) contributed to the literature with the test of the panel Granger causality relationship running not only from bank efficiency to bank market concentration but also the reverse causality from concentration to efficiency. For the measure of bank efficiency, he adopted Data Envelopment Analysis and for the bank marked concentration he used the Herfindahl-Hirschman Index. The findings confirmed the complexity of the relationship between concentration and performance. The results were generally in line with the structure-conduct-performance paradigm. He applied a panel of 27 European Union countries over a relatively long period, from 1996 to 2008, and found out that the most cost-efficient commercial banks and saving banks operated in less concentrated markets.

2. Methodology and data description

As it was mentioned, the performance will be measured by the classical ratios like ROA and ROE, which are widely discussed in the literature, therefore will be not detail described in this paper. Therefore in this methodological part of our paper, we focus on the description of

methods used for concentration measurement. The concentration can be measured by concentration indices (CI), which could be expressed as follow:

$$CI = \sum_{i=1}^{n} r_i \cdot w_i \quad (1)$$

Where r_i is the market share of bank i, w_i is weight attached to the market share according to weighted scheme and n is the number of banks in the relevant market. The value of attached weight (w_i) can be different according to the applicable weighted scheme. Marfels (1971) examined the weighting structure of various concentration indices. Based on his analysis the concentration indices could be classified into four basic groups:

- Weights of units are attached to the shares of an arbitrarily determined number of banks ranked in descending order ($w_i = 1; \forall\ i \leq m$); and zero weights are attached to the remaining banks on the market ($w_i = 0; \forall\ i > m$). An example of this weighted scheme is the concentration ratio. Concentration ratio (CR_m) can be calculated as the sum of the market shares (r_i) of the m largest banks ($m \epsilon <1;n>$), which are arranged from highest to lowest value of market share ($r_1 \geq r_2 \geq .. \geq r_m \geq .. \geq r_n$). The calculation of the Concentration ratio of the m strongest banks on the market can be calculated as follows:

$$CR_m = \sum_{i=1}^{m} r_i \quad (2)$$

This indicator can takes values $0 \leq CR_m \leq 1$. A number of subjects included in the calculation of CR_m is free, but in the banking sector, the CR_m is most frequently quantified for three, respectively five largest banks on the market.

- Banks´ market shares are used as their own weights ($w_i = r_i; \forall\ i$). The greater weights are linked to larger banks. The advantage is that all banks on the market are taken into account. An example of this weighted scheme is the Herfindahl-Hirschman index (HHI) in the following form:

$$HHI = \sum_{i=1}^{n} (r_i)^2 \quad (3)$$

The value of HHI below 0.1 shows a very low concentration, in the range from 0.1 to 0.18 shows a moderate concentration, value of HHI above 0.18 shows a very high concentration of the banking system, whereas the index value equal to 1 shows a full concentration.

- The rankings of the individual banks are used as weights ($w_i = i; \forall\ i$), where banks can be ranked in increasing or decreasing order. In this weighted scheme also all banks are included in computing index. Examples are the Hall-Tideman index (HTI) and Rosenbluth index (RI). The difference between HTI and RI is in the arrangement of banks in ranking in accordance with market share and in the allocation of weights where HTI assigns greatest weight to the smallest banks and RI assigned the maximum weight of the largest banks.
- Each market share is weighted by the negative of its logarithm ($w_i = -log(ri); \forall\ i$). An example of this type of index is the Entropy index (EM), which develops inversely with the level of concentration. The EM decline indicates an increasing level of concentration while growing EM indicates decreasing concentration level.

In order to test the Granger causality relationship between banking sector performance and bank market concentration, we will follow the concept of Granger causality developed by Granger (1981). Since the panel Granger causality model is computed by running bivariate regressions, there can take the following form:

$$y_{i,t} = \alpha + \sum_{k=1}^{K} \gamma_i^{(k)} \cdot y_{i,t-k} + \sum_{k=1}^{K} \beta_i^{(k)} \cdot x_{i,t-k} + \varepsilon_{i,t}$$
$$x_{i,t} = \alpha + \sum_{k=1}^{K} \gamma_i^{(k)} \cdot x_{i,t-k} + \sum_{k=1}^{K} \beta_i^{(k)} \cdot y_{i,t-k} + \varepsilon_{i,t} \quad (4)$$

Where $i = 1,2,...,N$ denotes the cross-sectional dimension; $t = 1,2,...,T$ denotes the time period dimension of the panel; α is intercept; $k = 1,2,...,K$ are lags; ε is error term.

To test the Granger non-causality from x to y, the null hypothesis is:

$$H_0: \beta_i = 0, \forall i = 1, 2, \dots N \quad (5)$$

The alternative hypothesis states that there is a causality relationship from x to y for at least one cross-unit of the panel:

$$H_1: \quad \beta_i = 0, \forall i = 1, 2, \dots N$$
$$\beta_i \neq 0, \forall i = N_1 + 1, N_1 + 2, \dots, N; (0 \leq \frac{N_1}{N} \leq 1) \quad (6)$$

Before proceeding with the panel Granger causality estimations, we test the stationarity of the series, using panel unit root tests: Levin, Lin and Chu test and ADF test for panel data. The optimal number of lags is estimated using Schwarz information criterion.

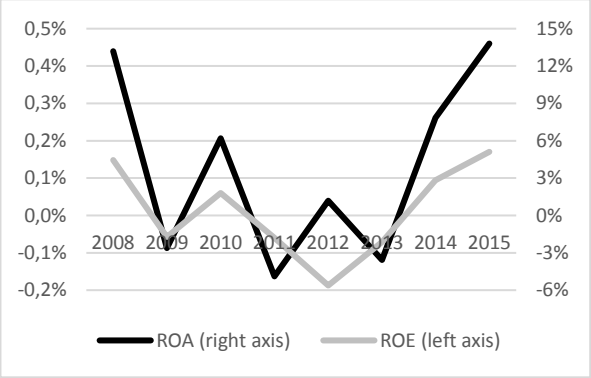
In this paper, we try to test the relationship between banking market performance and bank market concentration in the European Union countries using a panel Granger causality approach. The aim is to verify the presence of structure-conduct-performance paradigm, and confirm that causation running not only from performance to concentration but also from concentration to performance. To fulfil the objectives the contribution in the first part we analyse the performance and market structure of the European Union banking sector. To analyse the performance there are used two main financial ratios, Return on Assets (ROA) and Return on Equity (ROE). The market structure is analysed by the level of concentration on the market, using traditional indicators, Concentration Ratio for 5 largest banks (CR5) and Herfindahl-Hirschman Index according to the value of total assets. As the main data source will be used database published on the web page of European Central bank. The annual data on the country level (27 EU banking sectors) will be used during the period from 2008 to 2015.

3. Empirical analysis and results

The performance and concentration in the European Union banking sector within the period 2008-2015 is estimated in based on the methodology presented in the previous section. Further, the relationship between concentration and performance is determined, using Granger causality test.

The performance of banking sector can be measured by different methods. In our paper, we decided to measure the performance by the classical ratios, profitability indicators (ROA and ROE). The graphic development (*Figure 1*) shows that trends of both indicators are the same, but a higher degree of variability shows return on equity. The performance of the European Union banking market in average was positive and reached one of the highest values

in the first year (2008). During the next year, the average return on assets (-0.09%) and equity (-1.72%) were negative. As we know achieving losses in the EU banking market in 2009 was a consequence of the crisis, which gradually began to affect world banking market since 2004. The profitability in the following years was challenged by the on-going deterioration in asset quality, with ensuring increases in impairment changes and provision. Most of the impairment charges were attributable to losses on loans and receivables. During the last two years (2014 and 2015) the positive development in the area of performance could be seen.



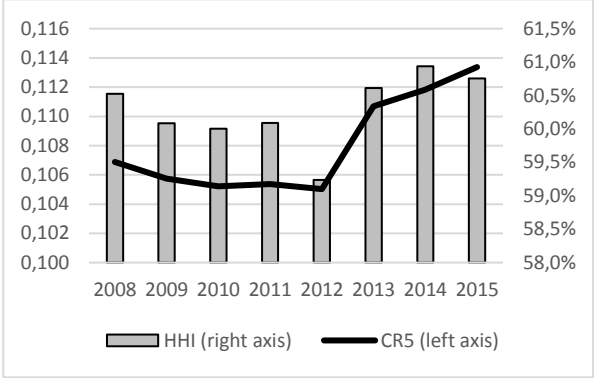


Figure 1. Performance and concentration in the European Union banking sector, 2008-2015
Source: prepared by authors.

As the aim of the paper is to estimate the relationship between concentration and performance in the European Union banking industry, the other analysed variables were indicators of absolute concentration. To analyse the concentration two most commonly used methods (Concentration ratio for five largest banks in the market (CR5) and Herfindahl-Hirschman index (HHI)), on the market of total assets, were chosen. The development of these indicators can be seen in *Figure 1*. The value of CR5 index demonstrates that through the whole analysed period the top five banks owned an absolute majority of the assets of the European banking market. At the beginning of analysed period, the development can be regarded as relatively stable until 2012, since this year there was a significant growth of values. CR5 reached its minimum values in 2012 when the first five banks in EU average owned 59.10% of total assets. CR5 reached the maximum values at the end of the analysed period, what indicates a decline in quality of the competitive environment. On the basis of *Figure 1*, we can see that HHI showed the same tendency of development as the CR5 index. Both indicators fell in 2012 and remain well above the pre-crisis levels. According to ECB (2013) the dip in 2012 was mostly driven by large banks´ moves – especially in Germany, France, Belgium and Netherlands – to reduce assets to comply with forthcoming regulations. With regard to individual countries, concentration indices reflected a number of structural factors. Banking systems in larger countries, such as a Germany, France and Italy, were more fragmented, and included strong savings and cooperative banking sectors. Banking systems in smaller countries tend to be more concentrated, with the notable exception of Austria and Luxembourg. In the case of Austria, this was on account of a banking sector structure similar to the one characterising the larger countries, and in the case of Luxembourg it was due to the presence of a large number of foreign credit institutions. Since 2013 there can be seen an increased, remaining at the pre-crisis levels. This increase was mostly driven by moves in the crisis countries where larger banks acted as consolidators in resolutions of non-viable entities – especially in Cyprus, Greece and Spain. Market concentration continued to increase, reaching

a historical maximum at the end of 2014. The increase in market concentration reflected primarily the decline in the number of credit institutions.

Based on the classification of HHI can be a market of assets during the analysed period as a moderate concentrated market. Increasing values of HHI at the end of analysed period indicates a decline in the quality of the competitive environment which is in line with the development of CR5. Focusing on the link between banking market structure (concentration) and performance, the theoretical and empirical literature doesn't provide a clear-cut conclusion about a direct relationship between concentration and performance. As can be seen in the literature review there exist many paradigms about this relationship. While the structure-conduct-performance paradigm and efficiency structure paradigm suggest a positive relationship between concentration and performance, the quiet life paradigm favour a negative relationship between these two variables.

We analyse the relationship between concentration and performance in the European Union banking market in a panel Granger causality framework. As we believe that it takes time for the effect of concentration on performance and vice versa to become apparent, we adopt yearly lags. The optimal number of lags is estimated using Schwarz information criterion (SC). As the optimal number of lags were appointed two-year lags (see *Table 1*).

Table 1 Lag order selection criteria

Lag	0	1	2	3	4	5
SC	13.87640	7.513207	6.736563**	6.904087	7.344092	7.910481

** significant at 5% level

Source: prepared by authors.

Before proceeding with the panel Granger causality test, we test the stationarity of the series, using panel unit root tests: Levin, Lin and Chu test and ADF test for panel data. The first condition is, that the variables must be non-stationary at the level (there is unit root), but when we count into first differences they become stationary (there is no unit root). The null hypothesis in both tests assumes that all series are non-stationary. The results of stationarity analysis display in next table (*Table 2*) allows us to reject the null hypothesis at the 1st differences.

Table 2. Panel unit root tests

Variable	Test	Levels		1st differences	
		Statistics	Probability	Statistics	Probability
HHI	Levin, Lin and Chu test	-0.36702	0.3568	-15.2871	0.0000
	ADF test for panel data	53.0651	0.5104	224.965	0.0000
CR5	Levin, Lin and Chu test	-0.77584	0.2189	-13.2133	0.0000
	ADF test for panel data	44.8756	0.8073	204.679	0.0000
ROA	Levin, Lin and Chu test	0.83433	0.7980	-17.1636	0.0000
	ADF test for panel data	101.802	0.0001	269.790	0.0000
ROE	Levin, Lin and Chu test	-3.72816	0.0001	-22.1785	0.0000
	ADF test for panel data	123.031	0.0000	304.020	0.0000

Source: prepared by authors.

In our panel Granger causality test, we used panel ordinary least squares (OLS) estimations. The results are displayed in *Table 3*, both for the causality running from bank

market concentration to banking sector performance and for causality running from performance to concentration. We test the null hypothesis that there is not Granger causality running between variables. In order to test the null hypothesis, F statistics is appointed.

According to the results in the table, we cannot reject the null hypothesis if the probability is higher than 0.05 and rather we accept the null hypothesis. Therefore we can say that there is no Granger causality running from HHI to ROA, HHI to ROE, CR5 to ROA and CR5 to ROE. On the other hand, if the probability is lower than 0.05 we can reject the null hypothesis and we can accept the alternative hypothesis. Based on the results then we can say, that there exist Granger causality running from ROA to HHI, ROE to HHI, ROA to CR5 and ROE to CR5. So we can say, that ROA causes HHI, ROE causes HHI, ROA causes CR5 and ROE causes CR5.

Table 3. Granger causality test – F statistics

Null hypothesis	F statistics	Probability	Result
HHI does not Granger Cause ROA	0.71935	0.4887	Accept H0
ROA does not Granger Cause HHI	5.81711	0.0037	Reject H0
HHI does not Granger Cause ROE	0.45364	0.6361	Accept H0
ROE does not Granger Cause HHI	4.51770	0.0124	Reject H0
CR5 does not Granger Cause ROA	0.64768	0.5247	Accept H0
ROA does not Granger Cause CR5	8.74762	0.0003	Reject H0
CR5 does not Granger Cause ROE	0.22040	0.8024	Accept H0
ROE does not Granger Cause CR5	3.04585	0.0500	Reject H0

Source: prepared by authors.

In our research, we apply the Granger causality in VAR model and we use two-year lags. We try to test the null hypothesis if e.g. ROA lag 1 and ROA lag 2 jointly cannot cause HHI. To test this null hypothesis we use Walt statistics. The results of the test between variables which was marked as relevant in *Table 3* are presented in *Table 4*. According to them we can reject the null hypothesis, and rather accept alternative hypothesis, that e.g. ROA lag 1 and ROA lag 2 jointly can cause HHI. So we can say that these lags can be used to predict depended concentration variable.

Table 4. Granger causality test – Walt statistics

Null hypothesis	Chi square	Probability	Result
ROA lag 1 and ROA lag 2 jointly cannot cause HHI	11.63422	0.0030	Reject H0
ROE lag 1 and ROE lag 2 jointly cannot cause HHI	9.035409	0.0109	Reject H0
ROA lag 1 and ROA lag 2 jointly cannot cause CR5	17.49524	0.0002	Reject H0
ROE lag 1 and ROE lag 2 jointly cannot cause CR5	6.091700	0.0476	Reject H0

Source: prepared by authors.

The result of Granger test and the coefficient of variables can be seen in *Table 5*. The results showed that the performance (measured by ROA and also by ROE) negatively caused the concentration (measured by HHI and also by CR5). It should indicate that the most performed banking systems were those that were obligated to compete in less concentrated markets.

Table 5. Granger causality test – Coefficients

	Depended variable HHI		Depended variable HHI	
	Coefficient	Standard error	Coefficient	Standard error
Intercept	0.004166**	0.00184	0.003922**	0.00185
HHI(-1)	0.958430***	0.08000	0.941222***	0.08167
HHI(-2)	0.009412	0.07942	0.026221	0.08101
ROA(-1)	0.000134	0.00071		
ROA(-2)	-0.002317***	0.00071		
ROE(-1)			-0.000108**	0.00000
ROE(-2)			-6.43e-05	0.00000
R-squared	0.967878		0.967375	
Adjusted R-squared	0.967059		0.966544	
No. of observations	162		162	
	Depended variable CR5		Depended variable CR5	
	Coefficient	Standard error	Coefficient	Standard error
Intercept	1.073022	0.70682	1.092745	0.73138
CR5(-1)	1.180852***	0.07550	1.187073***	0.07838
CR5(-2)	-0.194306***	0.07484	-0.201780***	0.07767
ROA(-1)	0.056155	0.13726		
ROA(-2)	-0.553900***	0.13718		
ROE(-1)			-0.009698	0.01074
ROE(-2)			-0.017708*	0.0157
R-squared	0.979487		0.978053	
Adjusted R-squared	0.978964		0.977491	
No. of observations	162		162	

* significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Source: prepared by authors.

Based on the results mention above we can see that there existed only one-way causality running from performance to concentration. The opposite way was not found, so the concentration could not cause the performance. Based on the R-squared and Adjusted R-squared values we can conclude that the results are statistically significant.

These results are in line with quiet life hypothesis that indicates a negative relationship between concentration and performance in the banking. According to this hypothesis, a higher level of market concentration reduces the bank's efforts to improve their performance. This quiet life leads to decreasing motivation of managers to focus on the effective functioning of banks, which in turn leads to a decrease in their performance. On the other hand, a stronger competitive environment prevents managers to "live quietly", forcing them to constantly look for opportunities to strengthen its position in the market, which will be reflected in the growth of their performance.

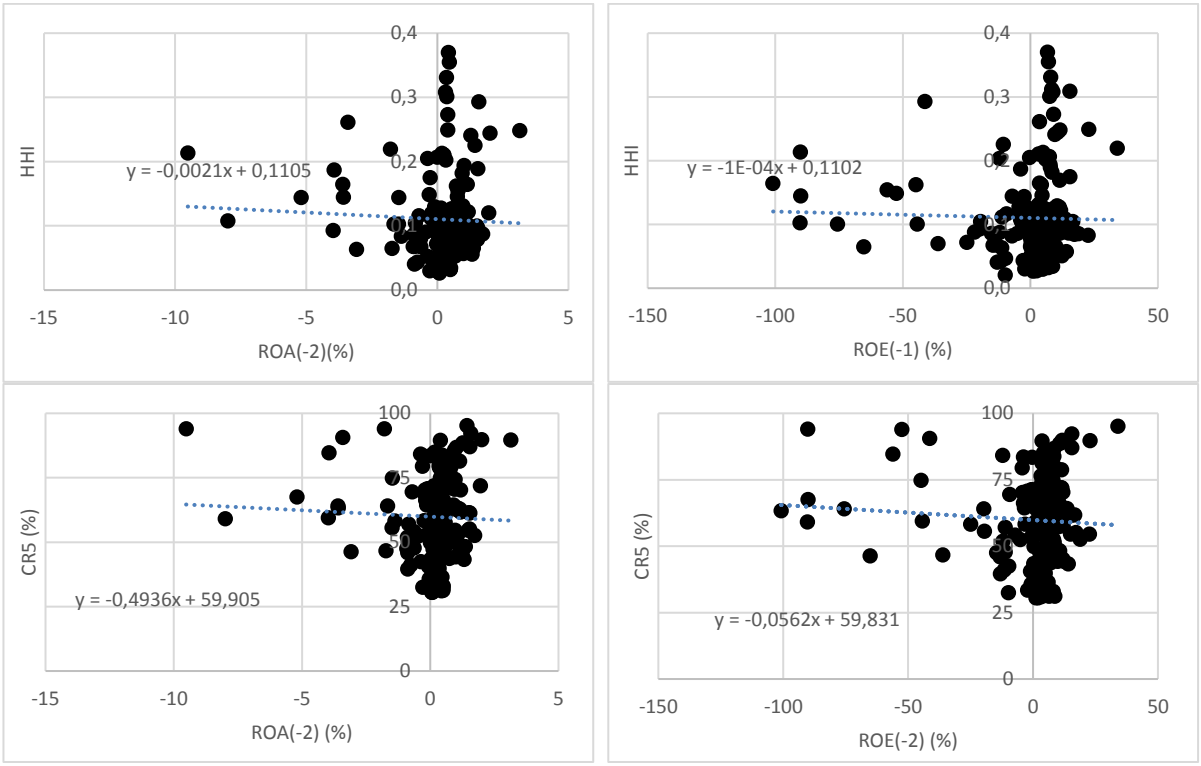


Figure 2. Relationship between performance and concentration in the European Union banking sector, 2008-2015
Source: prepared by authors.

Figure 2 is assistant in evaluating the concordance between performance and concentration in the banking market. As can be seen, all variables were negatively correlated and the tightest relationship was ascertained between performance measured by ROE with two-year lags and concentration measured by CR5. Another strong relationship was found between performance measured by ROA with two-year lags and concentration measured by HHI. In the graphs displaying the relationship between performance and concentration measured by HHI is more evident mentioned the fact, that during the analysed period the most performed banking systems were those that were obligated to compete in less concentrated markets.

Conclusion

The financial crisis which hit the banking sectors in European Union countries affected the number of banks operated in individual countries. With the increasing requirement from the regulators pointing to recovery of the banking sectors the number of banks decreased. As the consequence of this decrease, the concentration in the European Union banking market increased, which can be seen by the higher values of concentration indexes, Herfindahl-Hirschman index (HHI) and Concentration Ratio (CR5).

The impact of the crisis can be also seen in the area of banking sector performance. As was mentioned, during the analysed period low profitability was challenged by the on-going deterioration in asset quality, with ensuring increases in impairment changes and provision. Most of the impairment charges were attributable to losses on loans and receivables. But during the last two years (2014 and 2015) the positive development in the area of performance could be seen. To investigate the relationship between concentration and performance in EU banking

sector the panel Granger causality method was used. We consider a model with two lags. As the benefit of this paper can be considered the application of panel Granger causality approach, using annual comparable data at the country level of the 27 European Union countries collected from the database of European Central Bank for the period 2008-2015. The results obtained with this technique confirm the complexity of the relationships between bank market concentration and banking sector performance in the panel of EU countries. Similar to Granger causality results obtained by, for example, Casu and Grigorian (2006) or Ferreira (2014), there are not only clear oscillations in the influence of the first and second lags of variables but specifically for the causality running from bank performance to market concentration, there are also some contradictions in the results obtained with different estimation techniques.

However, the comparison of results provided by F statistics and Wald statistics allows us to conclude that the causality running from performance to concentration was clearly negative. Our findings didn't confirm the presence of structure-conduct-performance paradigm in European Union banking. On the other hand, the quiet life hypothesis was confirmed. A higher level of performance in the banking market was associated with higher level of concentration. So we can say, that the most performed banking systems were those that were obligated to compete in less concentrated markets.

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References

Aleknavičiene, A., Tvaronavičiene, M. (2006). Some aspects of the Lithuanian banking sector transformation. *Journal of Business Economics and Management*, *7*(4), 235-241.

Bain, J. S. (1959). *Industrial Organization*. Wiley.

Becerra Alonso, D., Androniceanu, A., Georgescu, I. (2016). Sensitivity and Vulnerability of European Countries in Time of Crisis Based on a New Approach to Data Clustering and Curvilinear Analysis. *Administration and Public Management*, *27*, 46-62.

Belás, J., Polach, J. (2011, April). Economic Imbalance and Regulatory Traps in Banking Sector. In: *Proceedings of the 5th International Scientific Conference Finance and the performance of firms in science, education and practice*. April 28, 2011, Zlín, Czech Republic, 28-36.

Belás, J. (2013). The Leadership Style and the Productiveness of Employees in the Banking Sector in Slovakia. *Journal of Competitiveness*, *5*(1), 39-52. doi: 10.7441/joc.2013.01.03

Belás, J., Sipko, J., Bilan, Y. (2015a). Regional Aspects of Business Environment Creation in the SME Segment in Slovakia. *Mediterranean Journal of Social Sciences*, *6*(3), 637-645. doi:10.5901/mjss.2015.v6n3p637.

Belás, J., Demjan, V., Habánik, J., Hudáková, M., Sipko, J. (2015b). The business environment of small and medium-sized enterprises in selected regions of the Czech Republic and Slovakia. *E&M Economics and Management*, *18*(1), 95-110. doi:10.15240/tul/001/2015-1-008.

Belás, J., Chochoľáková, A., Gabčová, L., Sipko, J. (2015c). Bank Customers´ Satisfaction, Customers´s Loyalty and Additional Purchases of Banking Products and Services. A Case Study from the Czech Republic. *Economics and Sociology*, *8*(3), 82-94.

Casu, B., Girardone, C. (2006). Bank competition, concentration and efficiency in the single European market. *The Manchester School, 74*(4), 441-468.

Cipovová, E., Belás, J. (2012). Assessment of Credit Risk Approaches in Relation with Competitiveness Increase of the Banking Sector. *Journal of Competitiveness, 4*(2), 69-84. doi:10.7441/joc.2012.02.05.

Claessens, S., Laeven, L. (2004). What Drives Bank Competition? Some International Evidence. *Journal of Money, Credit and Banking*, *3*, 563-583. doi:10.1353/mcb.2004.0044.

Demsetz, H. (1973). Industry structure, market rivalry, and public policy. *Journal of Law and Economics*, *16*(1), 1-9.

European Central Bank (2013). *Banking structures report*. Frankfurt am Main. Germany.

Ferreira, C. (2014). Panel Granger causality between bank efficiency and market concentration in the European Union. *Research in Applied Economics*, *6*(1), 107-127. doi:10.5296/rae.v6i1.4589.

Galloppo, G., Paimanova, V., Aliano, M. (2015). Volatility and Liquidity in Eastern Europe Financial Markets under Efficiency and Transparency Conditions. *Economics and Sociology*, *8*(2), 70-92. doi: 10.14254/2071-789X.2015/8-2/6.

Gavurová, B. (2012). Source identification of potential malfunction of balanced scorecard system and its influence on system function. *E+M: Ekonomie a Management*, *15*(3), 76-90.

Grčić Fabić, M., Zekić, Z., Samaržija, L. (2016). Implementation of Management Innovation – a Precondition for the Development of Local Government Effectiveness: Evidence from Croatia. *Administration and Public Management*, *27*, 7-29.

Goldberg, L., Rai, A. (1996). The Structure-Performance Relationship in European Banking. *Journal of Banking and Finance*, *4*, 745-771.

Granger, C. W. J. (1981). Investigating Causal Relations by Econometric. *Rational Expectations and Econometric Practice, 1*, 371.

Grigorian, D. A., Manole, V. (2006). Determinants of Commercial Bank Performance in Transition: An Application of Data Envelopment Analysis. *Comparative Economic Studies*, *3*, 497-522. doi: 10.1057/palgrave.ces.8100129.

Hicks, J. (1935). The Theory of Monopoly. *Econometrica*, *3*, 1-20.

Jantoń-Drozdowska, E., Mikołajewicz-Woźniak, A. (2017). The impact of the distributed ledger technology on the Single Euro Payments Area development. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *12*(3), 519-535. doi: 10.24136/eq.v12i3.28.

Kubiszewska, K. (2017). Banking concentration in the Baltic and Western Balkan states – selected issues. *Oeconomia Copernicana, 8*(1), 65-82. doi: 10.24136/oc.v8i1.5.

Lesáková, Ľ., Dubcová, K. (2016, May). Knowledge and Use of the Balanced Scorecard Method in the Businesses in the Slovak Republic. In: *3rd International Conference on New Challenges in Management and Organization: Organization and Leadership*, 2 May 2016, Dubai, UAE. Procedia – Social and Behavioral Sciences, 230, 39-48. doi: 10.1016/j.sbspro.2016.09.006.

Majková, M. S., Solík, J., Sipko, J. (2014). The Analysis of Chosen Business Obstacles and Problems with the Financing of Young Entrepreneurs in Slovakia. *Economics and Sociology*, *7*(3), 90-103. doi:10.14254/2071-789x.2014/7-3/7.

Marfels, C. (1971). Absolute and Relative Measures of Concentration Reconsidered. *Kyklos, 4*, 753-766.

Mason, E. S. (1939). Price and Production Policies of Large-Scale Enterprise. *The American Economic Review, 1*, 61-74.

Minh, N. V., Huu, N. H. (2016). The Relationship between Service Quality, Customer Satisfaction and Customer Loyalty: An Investigation in Vietnamese Retail Banking Sector. *Journal of Competitiveness, 8*(2), 103-116. doi: 10.7441/joc.2016.02.08.

Paulík, J., Kombo, F., Ključnikov, A. (2015). CSR as a driver of satisfaction and loyalty in commercial banks in the Czech Republic. *Journal of International Studies, 8*(3), 112-127.

Piotrowska, A., Polasik, M., Piotrowski, D. (2017). Prospects for the application of biometrics in the Polish banking sector. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 12*(3), 501-518. doi: 10.24136/eq.v12i3.27.

Pruteanu-Podpiera, A., Weill, L., Schobert, F. (2008). Banking competition and efficiency: A micro-data analysis on the Czech banking industry. *Comparative Economic Studies, 50*(2), 253-273. doi:10.1057/palgrave.ces.8100248.

Rajnoha, R., Novák, P., Merková, M. (2016). Relationships Between Investment Effectiveness Controlling and Business Performance. *Montenegrin Journal of Economics, 12*(2), 29-44. doi:10.14254/1800-5845.2016/12-1/1.

Rumler, F., Waschiczek, W. (2012). Have Changes in the Financial Structure Affected Bank Profitability? Evidence for Austria. *Oesterreichische Nationalbank*. doi:10.1080/1351847X.2014.984815.

Smirlock, M. (1985). Evidence on the (Non) Relationship between Concentration and Profitability in Banking. *Journal of Money, Credit and Banking, 1*, 69-83. doi:10.2307/1992507.

Skvarciany, V., Iljins, J. (2015). The role of change management in trust formation in commercial banks. *Business: Theory and Practice, 16*(4), 373-378. doi:10.3846/btp.2015.557.

Svitálková, Z. (2014). Comparison and Evaluation of Bank Efficiency in Austria and the Czech Republic. *Journal of Competitiveness, 6*(2), 15-29. doi: 10.7441/joc.2014.02.02.

Tregenna, F. (2009). The Fat Years: The Structure and Profitability of the US Banking Sector in the Pre-crisis Period. *Cambridge Journal of Economics, 4*, 609-632. doi:10.1093/cje/bep025.