
THE IMPACT OF COMMERCIAL BANKS ON CONVERGENCE IN THE EUROPEAN UNION

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Abstract: The paper traces the impact of the international, systematically important banks on the state and phenomena observed in the European Union. It comes to the conclusion that international commercial banks further strengthen the convergence in the banking systems of the member states. In the process of disclosure of these relationships, the macroeconomic factors in the European Union have also been analyzed affecting the returns from the main activity of banking institutions aggregated across member states. By sequential use of the regression model and optimization, values representing the local specificities of the individual member-state towards the Union have been reached. Links have been found that suggest a time lag in the effects observed since the crisis in 2008. Both the international banks and the stock market status in the individual member states indicate that international systematically important banks function as a conductor of extreme cross-border phenomena.

Key words: international commercial banks, convergence, European Union

JEL: G21, C31, C39.

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Introduction

International commercial banks are the biggest players in the interbank market in Europe. As institutions operating in multiple markets, this type of companies have the opportunity to help unify the European banking market and the banking system. The analysis of their situation and the effect on the member states of the European Union is an important part of maintaining a stable interbank market and banking system for the whole community. Such increased attention to international organizations can also be found in the regulatory framework presented by the International Settlement Bank in Basel-Basel III. International systematically important banks also have an impact on border-crossing of market changes, strengthening the domino effect in the banking system. Particular importance is attached to this after the crisis of 2008, which denied the doctrine that a bank, while "too big, could go bankrupt". Thus it is increasingly seen growing of local phenomena into global ones. This helps to highlight international banking institutions as a multidimensional link between member states' banking systems and contributes to the characterization of a European banking system.

The object of this paper is the European banking system and the interbank market in Europe, and the subject is their influence on the interconnection of the local banking systems in the individual member states that make up the general banking market and the capital movement.

The study defends the thesis that international banking institutions are an important driving force in the convergence of the banking system in Europe and have a decisive influence on its development. By adopting the effects of the convergence, the results obtained get progressively closer to the normal for the zone. Relationships between the different markets caused by internationally important institutions are fully expected, but the direction of change may be variable or inverse.

The opposite view of divergence caused by banking institutions of international importance can be justified on the concepts and distribution laws between groups. This is in reference to Zipf's law and the Pareto principle, as well as so-called "80/20 rule" (or Power Law)², able to describe the same element, namely distribution of wealth in society. Based on this, it can be expected that approximately 20% of the banking system would contain 80%

² For more information on this topic, you can review Newman's developments (Newman, 2006), the concepts of the above-mentioned concepts not being limited to one direction of science but common in both sociological and natural sciences. Zipf's law is empirical in nature, that is, based on observations in many areas, including economics and linguistics.

of the capital and the remaining 80% - only 20% of the capital leading to the creation of breaks in the overall European banking system and hence significant differences between the results obtained.

Hypothesis 1: There is a significant correlation between a specific part of the level of convergence and the market share taken by international banks in the local banking system as a result of the shrinking of the specifics of the individual system and the approximation to the average for the whole European Union.

Hypothesis 2: Global institutions are one of the main carriers of market phenomena across borders. The phenomena observed in them are ahead of those observed in other institutions, that is, causal links between international commercial banks and the extreme situations observed locally can be found.

1) Theoretical foundations

The simplest way to define a bank institution and its functions in economic life is to present it as a deposit-taking and lending organization³. Functionally, a banking institution is a place where free capital is put to use where it is needed. The banking system is often presented as the backbone of the economy or a "blood system" that supports the entire economic system. By accepting such a view, we must also assume the threat of the transformation of local negative phenomena into massive ones. This is the basis for drawing up a number of regulatory frameworks aimed at creating security and trying to prevent breaches in the functioning of the banking system. Besides the normal regulations for each banking system provided by the central bank, it is appropriate to mention the so-called Basel III, which is a global player. Basel III pays special attention to banking institutions of international significance or systemic importance for a particular country, requiring additional capital in the form of specialized buffers (For more information, see: Basel III: A global regulatory framework for more resilient banks and banking systems). Links between activities in banking institutions have many aspects, as well as policies for managing the various elements.

Policy and strategy management are important for the functioning and performance of a credit institution. These include the establishment of limits, forms of profit management, maintenance of liquidity reserves, management of assets and liabilities, etc. Following the introduction of the last Basel-Basel III iteration, the regulatory burden greatly limits the possibility to risk freely

³ We assume the concept of the "spherical cow" presented in the collection of the American Astronomical Association, known by saying, "Let's think about a cow as a sphere."

and the ability to internally regulate positions in the banking institution. Such a system is expected to lower the risk in the core activity of banking institutions by requiring the maintenance of sufficient capital buffers (capital adequacy) to cover losses in unforeseen and unpredictable situations while ensuring liquidity and solvency in credit institutions through specialized indicators – LCR (Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools)) and NSFR (Basel III: the net stable funding ratio)). The regulatory framework provides for the creation of higher stability in banking institutions using internal risk measures based on balance sheet items after a certain weighing. The effectiveness of such regulation is not the subject of this paper but, but rather an increase in the stability of institutions is expected. It can be argued that the limitations in the positions of banking institutions strengthen the impact of the macroeconomic situation and environment on banking institutions by limiting possible reactions by the bank.

By considering banking systems in a highly correlated market such as the European banking system, an assumption is created of unity in power and direction of influencing general factors for the community. This is an assumption on which the development of a model is based that includes both common factors for the EU, and specific factors for the country. In the development of a similar function expressing the relation between determinants and dependent variables, the question remains, what exactly represents the constant (coefficient alpha, intersection). Two approaches to interpretation are possible. The first follows the classical statistical principle and assumes that alpha represents a constant additive anomaly in the linear linkage, but if we look at things from an alternative - investment perspective, alpha can be accepted as a constant additional value added by the specificity of individual business. This interpretation allows the creation of a specific constant for the individual banking system. The model can be output by converting a regression model into a panel one and supported by the expectation of incomplete unification of the local systems. Consequently, a constant, specific for a member state, can be used as a measure of local specificity beyond the classical factors used to express the specificity or divergence of banking systems in individual member states. For such a type of measure it can be expected to approach the average for Europe - while the market share of international credit institutions in the particular market increases.

In a development such as this one, it is appropriate to look at the basic concepts and parameters on which the developed models are based for analysis and assessment of the assumptions, claims and links sought. The following features of the **core banking activity** can be deduced in the form of crediting and deposit, while working on the variables used to partially assimilate elements of complementary activities. Accordingly, the elements

representing the main activity of a banking institution are the credit portfolio and the aggregate of called up capital, mainly in the form of deposits. The magnitude that characterizes their effectiveness is the interest rate and its derivatives. Interest rates can be classified by a number of different characteristics - the duration of the asset or liability they represent, the method of formation, the specific asset or liability to which they belong but without taking into account that the interest rate is the price paid for the specific capital, whether it is paid or accepted for consumption. It should be noted that the banking institution is a passive party about its core activity. This means that the credit institution only indirectly influences its lending activity and deposit, through the product's specificity, the interest payments linked to it, and some alternative methods⁴ that are outside the scope of the present study. Interest payments are the main interest and, in particular, interest rate formation, with the basic method comprising two basic elements - the base interest rate and the allowance (for more information see Bozhinov, B. et al., 2003) or (Dimitrova, 2015)) In most cases, the base interest rate is determined by the specifics of the particular banking institution and includes an expression of a reference interest rate, and the allowance is calculated on the basis of the specificity of the particular credit or deposit.

Interest rate spread is another magnitude, expressing the interest rate characteristics of the loan portfolio in relation to the deposit. Vatev and colleague (Vatev & Georgiev, 2004) present the interest rate spread as the difference between the interest income weighted on the base of interest-bearing assets and the interest costs weighted by the interest-bearing liability. Such a value represents the average yield per unit of interest-bearing liability transformed into an interest-bearing asset. The value obtained, although close to the baseline of calculation to that of the ROA (return on assets), has a logic with significant differences. First, non-interest-earning revenues and expenses are excluded, which eliminates all income from fees, commissions, and most of the costs of a nature other than that of the core activity. These are maintenance costs for buildings, equipment or staff costs, but revenue and costs are retained, which can be considered as an alternative to lending and deposit. They represent investments in debt securities that have interest rate yield characteristics, and external borrowing costs. They provide an opportunity for active bank deposit-taking (positive in value, allowing for

⁴ It refers to the different marketing techniques that can be used in banking institutions, but their scope and specifics are not directly related to the present study. At the same time, their universality and a high degree of local specialization make them difficult to apply in international developments, although part of the effect of such approaches to participate in the resulting outputs.

deviations due to anomalies or liquidity management errors). Secondly, the value weighing this yield are interest-bearing assets, which converts the value into a weighted average interest rate on the asset and the liability respectively. Such a principle rejects the impact of non-operating assets, does not highlight costs (future earnings), related to maintaining liquidity and the amount of equity. The marked differences and the reported weaknesses allow us to some extent assess the completeness of the current survey indicator, where the interest rate spread can be used as an ancillary variable or completely offset by the net interest margin.

The net interest margin⁵ (NIM) has one radical difference to the interest rate spread (IS), which, although the many similarities, changes the logic of the coefficient, namely the weighing value. When calculating the net interest margin, the full amount of the asset (or the balance sheet total) is used. This allows for a fuller examination of the core activity of credit institutions by avoiding some of the shortcomings of interest rate spread and, at the same time, presenting to some extent the overall performance of the banking institution with the relationship of the core activity to supplementary activities. For the purpose of development, it is sensible to highlight the macroeconomic factors that affect the net interest margin by dividing the value in two elements - the variance dictated by the macro-specifics, and the variance specific to the individual unit observed. By basing the study on this value, we can reflect the difference in the core activity of banking institutions, including purely empirical results from the additional activities carried out by the surveyed banking systems

The convergence of the member states of the European Union can conceptually be seen as a balancing of the economic environment. This creates comparable conditions for the functioning of economic operators, accompanied by the free movement of resources in any form within the Union. The reasons for the creation of such an environment are numerous, but the author believes it is important to emphasize the security of the volume and the stability provided by the binding of the member states, referring to the history of Europe. On the other hand, the measurable effect of convergence are the results obtained. Considering the principles laid down in the legal organization and economic system⁶, it is to be expected that the resultant parameters in the different sectors will be commensurate, secondly - under the

⁵ Also known as a net interest margin; for more information, see the developments of Vatev and Georgiev (Vatev & Georgiev, 2004).

⁶ In the form of institutions and systems organized to control, regulate and stimulate all economic organizations and industries or specific ones.

influence of similar factors and thirdly, they will have rising similar values⁷. Additionally, it may be expected that the estimated values in the different Member States would have a significant correlation to factors aggregated across the European Union.

2) Methodology and selection of measures

The model on which empirical connectivity testing is based, is constructed from top to bottom, starting with the fundamentally sought-after magnitude. The goal we seek to achieve is first of all to detect and sensibly assess the relationship between international banking institutions and the convergence of banking systems. The quantitative measurement of an institution foreign to a market is a convenient variable that will serve as a factor for market unification. The desired dependent variable, for building the core function of the model, should represent the specific deviation of the particular member state towards the state of the whole Union. For this purpose we will use the previously mentioned local constant, based on a common model. The correlation strength between the size of the market share of international banking institutions and the degree of convergence is calculated on the basis of a regression model, assuming a linear relationship between the variables. The function has the following form:

$$d|\alpha_i| = IBS_i \times \beta + \varepsilon_i,$$

where:

α_i – alpha ratio), determined on the basis of a cross - panel model, serving as a measure of the divergence between the banking systems of the individual member state ($I = 1, 2, 3 \dots i$). The value used is the difference from the average country case in absolute value;

IBS_i – the amount of foreign for the i -th member state presence in the banking system (the market share of international and foreign banking institutions);

β – regression coefficient beta;

ε_i – accidental deviation.

⁷ Of course, such expectation is not absolute, the values are expected to have deviations from the average for the Union, but the distribution is heavily elongated around the center.

There are a number of developments in the literature that seek to describe the determinants that affect the yield and interest rate of credit institutions. One of the most common approaches to determine and characterize the factors and relationships is based on the net interest margin (NIM); the alternative dependent variables are the interest rate spread (IS) and the interest rates on different loan portfolio breakdowns. The study of NIM as a dependent variable has been done by Gelos (Gelos, 2006), Claeys and Vennet (Clays & Vennet, 2004), Gul and colleagues (Gul, Irshad, & Zaman, 2011), and others, whereas the IS has been studied by Brock and Suarez (Brock & Suarez, 2000), Mihailov (Mihailov, 2005), (Mihailov, 2014) and others. Mihailov's survey (Mihailov, 2014) uses modeling of interest rates under different loan portfolio breakdowns. For the purpose of the current study, the activity of banking institutions is modeled on the basis of the net interest margin, under the assumption that the indicator accurately reflects the main activity performed by them. This allows the use of NIM as a measure of the local performance of the banking system in the EU.

The coefficient α_i used in the above formula is determined by means of a panel simple optimization model aimed at minimizing the average error by using the empirically determined significant beta ratios and rebalancing the local intersections for each member state. An advantage of this approach is the ability to determine local blocks with a dynamic temporal character. With such a variable alpha in the time horizon, the dependence between the market share of the international banking institutions and the local variable can be determined more precisely and significantly.

The Ho and Saunders interest rate spread model (Thomas, Ho, & Saunders, 1981) operates under the assumption that macroeconomic factors are well expressed in intra-banking indicators. They base their independent variables on microeconomic information for surveyed credit institutions. Using a regression model based on cross-section data for individual US banks, the authors note that the alpha ratio and net non-interest costs, in relation to the total asset, have a strong descriptive capability and a positive relationship with NIM. The deduction supports the use of factors that are local to the banking institution concerned, as it can be assumed that they express the effects of banking management. Determining the influencing variables is intended to achieve a high degree of variance, and local ones are an expression of the management of the individual credit institution or banking system. They inevitably reflect the environment, but they are also a product of the bank's history and the bank management's decisions over time. Considering the scope of the survey, this type of data would take in much of the variance in the survey variable, with links to a value determined on the basis of this type of variables being guaranteed - as the net interest margin is

calculated on the basis of fundamental information used in the Ho and Saunders model. This is the reason why the variables internal for the banking system are outside the scope of the survey model, further avoiding taking over part of the local specificity that the study seeks to encompass. For the present study, it is appropriate to use macroeconomic indicators specific to the local state of a specific element in the Union (a member state). Such an approach can further be defended by the fact that the model is being developed for complete banking systems rather than for individual ones.

In the research of Gelos (2006), Mihailov (Mihaylov, 2014), Peshev (2015) and a number of others, macroeconomic indicators are considered to be attractive determinants of the studied variables, whether they are NIM, IS or interest rates. Among the independent variables used are GDP, inflation, reference interest rates such as EURIBOR and others. In some of the above-mentioned developments, the relationship between economic activity is in a negative relation to the net interest margin, interpreted as stimulating the lending at lower interest rates, but Mihailov (Mihailov, 2014) establishes inverse relationship which is expected to be caused by an increase of the cost of capital. Studies on the impact of inflation on interest rates show a positive relationship to interest rates but a reverse relationship to net interest margin and interest spread. Brock and Suarez developments (Brock & Suarez, 2000) support the negative relationships between the net interest margin and inflation. According to Peshev (2015), the rise in the price levels leads to an increase in the interest rate, but the change in interest rates on loans has a higher growth rate than the deposit-taking, and at deflationary levels, the fall in interest rates on deposits has a faster pace.

Most developments applying a similar type of interest rate modeling or credit institutions' functioning use both macroeconomic and microeconomic factors in determining relationships. According to Peshev (2015), it can be assumed that such a combination of factors can best represent the variance in the studied dependent variables. To build a model outlining the divergence of individual member states, a combination of factors is used, but it is appropriate to make the grouping of the factors based on their scope - global factors affecting the whole EU and local factors specific to the individual member state.

The selected factors for the regression analysis of the dependent variable (net interest margin - NIM) are:

- 1) Gross domestic product for the whole EU (abbreviated GDP)

Total GDP for the EU is seen as an indicator of economic performance and activity across the community, where in case of growth, a positive impact is expected on the net interest margin driven by an increase in capital demand. At the same time, GDP or an alternative form of change in economic activity

are commonly used to construct models describing the characteristics of interest (interest rate, spread or margin) contributing to the need to use such a factor. Although the overall EU GDP is a common measure for each of the member states, it is expected that the indicator will absorb much of the variance in the dependent variable which would in principle be of a random nature, by identifying the relationship between credit institutions and markets.

2) The reference interest rates Euribor and Libor (on a 12-month basis in euro)

By default, these are elements involved in the building of interest rates. Some degree of proportionality can be expected in their changes toward NIM, and they may have a high degree of correlation with inflation rates.

3) Inflation rates (abbreviated inf)

Based on Peshev's observations (2015), expectations for inflation rates as a measure of price increase, are to show a positive correlation with the net interest margin based on a faster increase in the interest rates on the loan than that of deposit-taking.

4) The local GDP for a member state (abbreviated GDP loc)

Similarly to the overall EU GDP, the function of the local GDP is to express the impact of economic activity on the interest margin, the direction of impact being the same, ie. positive. In this case, GDP expresses the local specifics of the particular market segment in the EU.

5) The stock exchange index of the particular member state (abbreviation - Index)

The function of the stock exchange index is to serve as a measure of alternative financing and investment opportunities. The expectation for it is to show a negative relationship toward the dependent variable. Even though the stock exchange index is an imperfect measure for such alternatives, it is assumed that the increase in its value may lead to activation of stock exchange trading (attractive return), and its decline - to a contraction of the alternative yield and the possibility of capital expansion (financing). An alternative to the factor may be the traded volumes or stock exchange turnover but it is significantly more difficult to obtain such information in a reliable amount, with a high probability of correlation between the two values.

In order to limit the fictitious increase in descriptiveness in the final model, the presence of multicollinearity or the avoidance of strong correlations between the factors used should be limited. For this purpose, a PCI analysis can be used or the relationship between the individual factors can be assessed, with the lower determinant coefficient (R^2) being removed in the presence of high binding. The second approach offers additional convenience, presenting a real direction of proportionality between a dependent variable and an independent one. Thus, in addition to the standard statistical measures

for the quality and security of variables, it may be logical to protect the quality of the results obtained on the basis of the above expectations for their relationships.

Table 1 presents the correlation between the proposed factors. The reported data shows a very strong correlation between the proposed reference interest rates, with Libor also exhibiting a stronger negative correlation with the member states' stock exchange indices. This is the reason why this factor is rejected by the overall model. Thus, the total number of factors falls to 5, namely EU GDP, member state GDP, the member state stock exchange index, inflation in Europe and the Euribor reference interest rate. The stock exchange index exhibits a relatively weak correlation with the studied dependent variable and a high probability for fortuity of the initially determined beta coefficient. The factor will be applied due to observance of expectation about the direction of the relationship. Additionally, although its direct correlation toward the dependent variable is weak, the factor may prove to be significant after taking up part of the variance caused by the other factors in the generalized model.

Table 1

Correlation matrix of the factors used

Correlation Matrix	GDP	Euribor	Libor	inf	GDP loc	Index
GDP	1,0	-0.2273	-0.22992	0.143058	0.466171	-0.05692
Euribor	-0.2273	1,0	0.99987	0.493791	0.062527	-0.50761
Libor	-0.22992	0.99987	1,0	0.490427	0.061428	-0.50779
inf	0.143058	0.493791	0.490427	1,0	0.188656	-0.36215
GDP loc	0.466171	0.062527	0.061428	0.188656	1,0	-0.10578
Index	-0.05692	-0.50761	-0.50779	-0.36215	-0.10578	1,0

Empirical results

The data aggregation used is applied to two major sample aggregates, international banks, the sample being based on the size of the assets, including – HSBC Holdings, BNP Paribas, Deutsche Bank, Credit Agricole Group, Barclays PLC, Societe Generale, Banco Santander, Group BPCE, Royal Bank of Scotland, Lloyds Banking Group, UBS AG, UniCredit S.p.A, ING Group, Credit Suisse Group и BBVA. The sample is almost identical to that used by Schoenmaker (Schoenmaker, 2017), where it examines the possibility of dealing with the collapse effects of an international banking institution and these

credit institutions have been identified as significant for the euro area, the United Kingdom and Switzerland. The sample of EU member states is limited in a number of cases to: Austria, Belgium, Cyprus, Germany, Estonia, Spain, Finland, France, Greece, Ireland, Italy, Lithuania, Luxembourg, Slovenia, Slovakia and Bulgaria. This is due to the limitations in the access to public information of part of the variables used, where the entire population of member states is used and, if necessary, the area under consideration is limited.

Table 2
Results of the generalized regression model

	Index	GDP loc	inf	Euribor	GDP
Beta	0.006072099	-0.00542	0.537383	0.274646	0.094035
t-stat	0.002901086	0.019148	0.093204	0.082749	0.035297
R ²	0.603352404				
df	53.23953637				
f	2.161 x 10 ⁻³³				
P-value	0.037787202	0.777276	3.6 x 10 ⁻⁸	0.001099	0.008441

The descriptiveness reached by the model is moderate, tilting to strong, explaining over 60% of the variance in the studied dependent variable. The F-criterion points to a very low probability of random open dependence on the regression model, with its value tending to 0. The most significant factors in the model are GDP for the whole EU, inflation and the reference interest rate, having very low p-values, which indicates a lack of probability of error. Of interest is the GDP of the individual member state because its characteristics, referring to the direction of dependence (beta factor is a negative value) and p-value, indicate a high probability of error. This means that the factor cannot be used in a subsequent form of the model. Additionally observed stock exchange index results (Index) indicate a positive relationship between a particular stock exchange index and the net interest margin. While the factor's expectation that the value of the beta factor is negative, its value may be positive, as the stock index is not a direct measure of stock exchange activity and access to capital. It may be that the index serves as an additional measure of the rise in economic activity, which, although disproportionate to the GDP of the member state, can explain the bad characteristics of local GDP (GDP loc). This is because the stock index, combined with GDP for the whole European Union, gives a fuller and more secure description of the studied variance in the dependent variable.

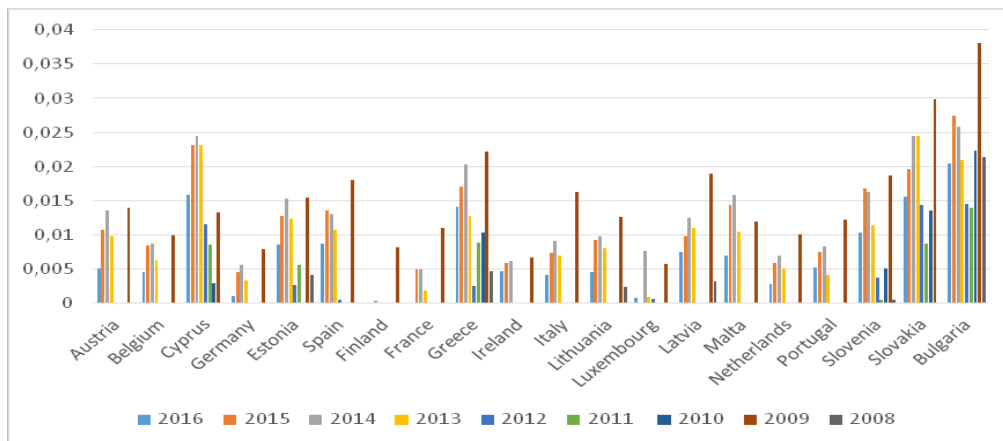


Figure 1. *Deviations based on the common model*

Figure 1 illustrates graphically the deviations from the average in the European Union determined by an optimization model. The figure shows an increase in deviations in 2011 and 2012, which can be explained by the financial crisis in 2008. As there are extremely negative development trends in most segments of the market during very negative events, this creates conditions for realizing a fictitious correlation for a certain period. Such a trend can be observed in 2010, and subsequently, the different rates of recovery from the negative effects of the crisis create additional effect of increasing deviations. This partially blur the relationship between the size of the market share and the deviations during the different periods.

Table 3

Results obtained for the regression dependence between deviations and market share of local credit institutions

Crossed $dALFA_x DOM_y$		Residual plot
Beta	-0.878	
t-stat	0.04	
R ²	0.751	
df	536	
f	4.44×10^{-76}	
P-value	0%	

Table 3 shows the final results representing the relationship between the market share of international banking institutions and the optimizationally defined deviations among the different member states. As a consequence of the previously mentioned reasons, it is expected that the relationship has some

deviations from reality due to the anomalies linked to the crisis of 2008. The results obtained by the regression analysis indicate that the detected relationship is significant and the values obtained are not accidental. At the same time, the value obtained for the beta coefficient has the expected direction, which empirically proves the correlation between the values considered. The coefficient of determination (R^2) shows that the correlation is strong, but it is possible that some of it is caused by dependencies generated around the crisis that bind the recovery process with the market presence of international banking institutions within the local market. The graph added in Table 3 presents the distribution of the deviations (ϵ), where it can be noticed that the values are not entirely random and there is a pronounced trend nuance. This can be explained, in part, by the negative effects during the crisis and the deviations generated by them. As previously indicated, the methods for avoiding such effects would also have negative impact on the open beta, which, in practical terms, means that the obtained coefficient of determination is unrealistic and its value is significantly below the empirically determined.

Additionally mentioned autocorrelation indicates that it is possible to use the values considered for the further purposes of the current study. The observations above point to the adoption of the first hypothesis, namely the existence of a significant relationship between international banking institutions and the convergence of banking systems in the EU.

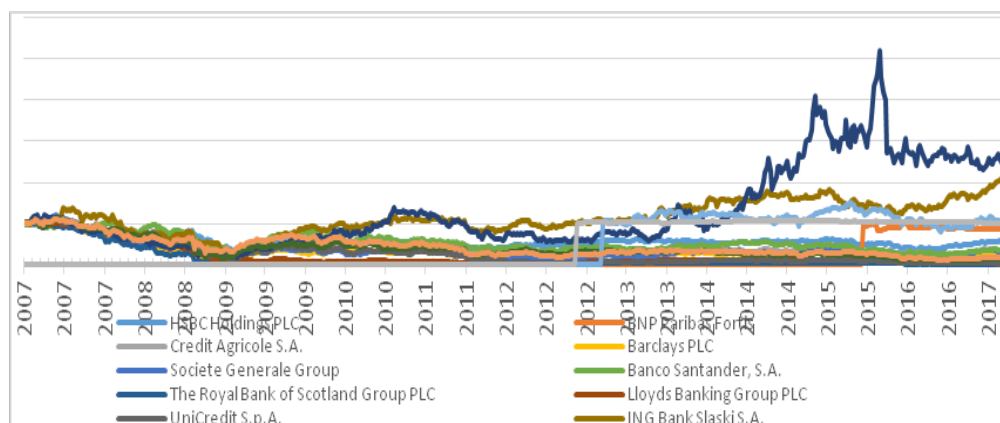


Chart 1a. Changes in capital price in the selected group of international banks

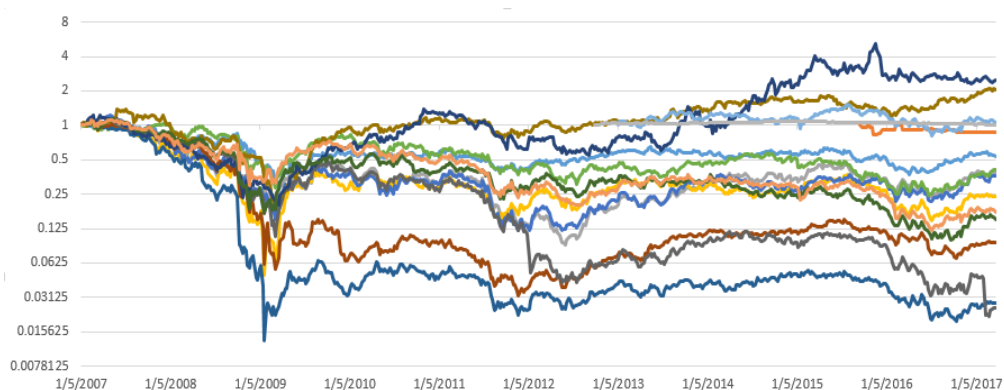


Chart 1b. Changes in capital price on a logarithmic scale

Graph 1a presents the changes in the prices of the surveyed aggregate of international banks in the period 2007-2017. On the graph there is a relatively stable and proportional movement in the negative direction from 2007 to 2008, where the negative values were nearing its bottom. After this period, there was a relatively sharp decline, followed by a change in the direction of movement in a positive one. Logically, this phenomenon is dictated by the financial crisis in 2008. What we can see is that the drop in values began at the outset of phenomena, accompanied by a gradual acceleration of the negative trend. At the same time, much of the surveyed institutions fail to recover values similar to those preceding the crisis, although it is possible that there is no direct relation to the capacity and extent of recovery, as this is the period of gradual introduction of the so called Basel III. The following graph (Chart 1b) shows the same statistics, but with a logarithmic scale (2), on which the above-mentioned phenomena are much more pronounced. A similar representation of the data for the period, through a proportional geometric progression of the scale for capital price changes, gives a very good idea of the negative processes and greatly facilitates the discovery of the moment when the negative events of the crisis are in their peak. On the graph, it is easy to pinpoint the moment when the values reach a minimum value, namely the period December 2008 - February 2009. For the purpose of measuring a lag in the values of local to international measures, it is reasonable to use a relatively accurate time point to serve as the starting point for testing possible temporal lags. The aforementioned peak will fulfill that goal.

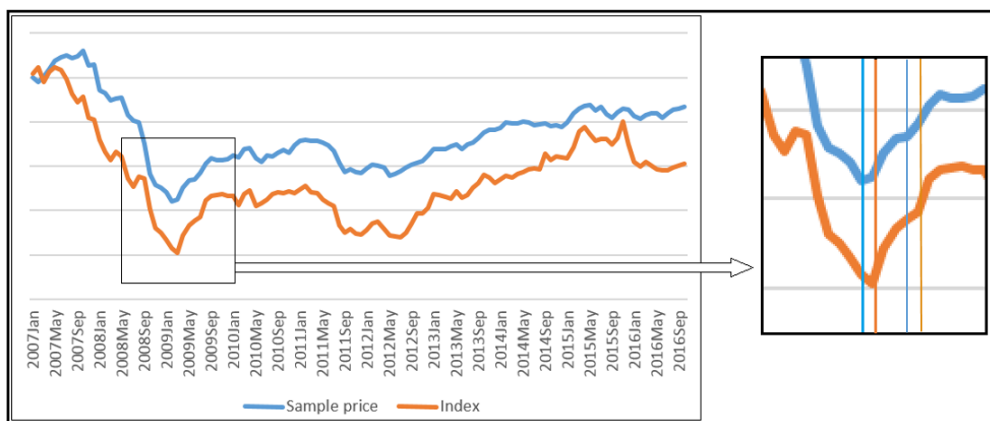


Chart 2. Index of changes in sample prices by international banking Institutions

Chart 2 presents in parallel the changes in the member states' stock indices and the sample price changes in the international banks. During the period, it is easy to trace a parallel movement of values with slight deviations at certain times, which can be attributed to random variance and factors with a specific impact on banking systems (as the indices include capital from all branches of the economy). With regard to the expectation of a lag in the values of the supplement to the chart, there was a postponement in the changes, with the bottom in the index values observed in March 2009, and the bottom in the price changes of the international banks - in February. This observation leads to the belief that global banking institutions have the effect of a conductor for external market events. Such phenomena can also be noticed in previous as well as subsequent moments in the presented graph. At the same time, it can be argued that it is normal for such institutions to have a prominent change to stock indices, under the assumption that banking institutions are more sensitive to macroeconomic processes and market phenomena. Based on this and the previous findings and observations, it can be stated that there is evidence in favour of the second hypothesis, but we should also note the possibility of an alternative interpretation of Chart 2 as well as the difficulties of presenting evidence based on balance sheet positions. There are strong indications of the impact of international banking institutions as a conductor in the border-crossing of market phenomena, but the hypothesis cannot be definitively confirmed.

Conclusion

On the basis of the empirical tests made on the factors having an impact on the selected indicator, namely the net interest margin, it can be argued that the international banking institutions influence the convergence of the banking systems in the European Union, which proves the hypothesis first. The observed relationship (based on the beta coefficient) has a positive character, which points to the acceptance of the thesis defended in the study, as true and to rejection of inverse dependence. On the basis of the model it can be assumed that the magnitude of this effect is moderate to strong. However, it can be argued by a macroeconomic cleanup model of the net interest margin that the significant factors determining the change are the European Union gross domestic product, inflation, the reference interest rate and the stock exchange index of the particular member state. What makes an impression is that these factors mainly have a macro effect on the whole European Union, further reinforcing the focus on the relationship between member states.

Based on the results of the regression model applied to describe the variance in the net interest margin, it can be stated that the independent variables used to a large extent follow the directional and strength expectations. This adds additional security to the results obtained. The only indicator pointing to a relationship different from the expected is the stock exchange index, as the direction of the relationship is positive or, with the stock exchange index increasing, a parallel increase in the net interest margin is observed. The interpretations of this observation can be varied and provide prospects for further research in the field. Possible reasons for this may be the ability of the index to describe economic activity in parallel to GDP at global level, an error in the outcome of parallel movements in crisis periods, or the adaptation of the banking sector to increased stock exchange profitability. At the same time, of interest is the relation of the stock exchange index to the interest rates, as it is possible in this case the direction to be the opposite.

By analyzing the changes in the selected sample of international banking institutions, it can be argued that they are one of the drivers of external phenomena on the local segments of the European market. This is achieved by finding a time lag in the changes in the stock exchange indices of the member states and the changes in the capital prices for the international banking institutions in the sample. In some of the observations an alternative interpre-

tation of the observed effects is possible, namely the possibility that the banking institutions' high sensitivity to market phenomena can lead to an accelerated course of the negative consequences of extreme and crisis situations. In examining the fundamental positions of banking institutions it is difficult to impossible to establish definitively the presence of time deviations due to the large distance in time (quarter). The presence of these deficiencies, together with the positive observations made, show that there is a very high probability of cross-border transfer of negative phenomena, but on the basis of the research it is not possible to reliably defend the security of the second hypothesis.

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