

Financial Systems and Economic Growth: Evidence from Poland and Ukraine

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Abstract: We have produced simplified models of an integral indicator of the level of financial system development and economic growth. We used the models of an integral indicator to compare the level of the development of the financial system and economic growth in Poland and Ukraine. We used integral indicators to evaluate whether the financial system influences economic growth in Poland and Ukraine. We may state that the relationship between the development of a financial system and economic growth in Poland and Ukraine generally has the same character, despite some individual differences. In Ukraine the effects of the financial system development on economic growth is more significant than in Poland. In contrast to Poland, the development of the financial system in Ukraine is still far from that level, after which it becomes unfavourable for economic growth.

Keywords: financial system, economic growth, an integral indicator of economic growth, the integral indicator of the financial system of development

Introduction

In the last 10–15 years scholars have explored the link between financial development and economic growth. Some contributions investigated the finance-growth nexus which are more theoretically oriented and others have an empirical focus.

But since the 19th century researchers have considered the question of: what is the causal link between financial development and economic growth? The first statement of the effects of finance on economic growth was defined by Walter Bagehot in the 19th century. He stated that the quality of the British financial system resulted in economic success. 50 years later Joseph Schumpeter, an Austrian economist, came to a similar conclusion.

Later another scholar (Solow et al. 1956) developed a neoclassical theory of economic growth. This theory neglected finance in the sense of financial institutions and financial relationships as being relevant for growth.

Other economists have argued that financial development is a reflection of economic growth and not a reason of growth in the real sector of an economy (Stern 1989). Neglecting

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finance as a reason for economic growth ended in 1989 after issuing of a World Bank Report which argued persuasively that “finance matters”.

Going back to the first question of the finance-growth nexus it should be noticed that the first attempt to define the relationship between financial development and economic growth was made by Goldsmith in 1969. Using cross-country data Goldsmith found evidence of a positive trend in the ratio of financial institutions’ assets to GDP for 35 countries over 1860–1963 (Goldsmith 1969). Later many authors have extended this line of inquiry and have confirmed Goldsmith’s findings. They have provided additional information on the finance-growth nexus and have offered a much bolder assessment: firm-level, industry-level, and cross-country studies. The latter offers that the level of financial development exerts a positive effect on economic growth (Beck et al. 2000; Levine et al. 1998; Levine 2002; Rajan 2003).

The existing literature on the finance-growth nexus uses three approaches: cross sectional analysis, a time-series approach, panel data methods (a combination of both techniques). Each of these approaches has made useful contributions to the investigation of the relationship between finance and growth. However, how Schmidt emphasized in his work (Schmidt et al. 2006) that all approaches suffer from some important limitations which do not allow us to take all results at face value. The general problem of all empirical studies is that, to examine the relationship between financial development and growth, one has to define appropriate measures of financial development. Researchers come up with various definitions and measures. Some studies use the size of the banking sector typically measured by the deposit liabilities to GDP or bank claims on the private sector to GDP, others use the size of the stock markets, defined as market capitalization to GDP or total value of domestic equities traded on the stock exchanges to GDP. However, these measures have been criticized by others (Schmidt et al. 2006).

Empirical studies have provided the view that more developed financial sectors positively influence long-run economic growth. This contribution presented in the study of Levine et al. (2000, 2005). They concluded that the overall level of financial development is associated with higher growth rates. As well, the efficiency of the legal system in protecting outside investors’ rights significantly influences financial sector development and in this way indirectly causes economic growth. This result confirms the hypothesis provided by La Porta et al. (1998). Also they attempted to empirically assess which type of financial system is more favourable for economic growth. They did not find any evidence that the type of the system matters for economic growth.

It must be emphasized that one of main problems of the examination of the finance-growth nexus is the impossibility of a complete objective assessment of both of these phenomena. The financial system and economic growth are such complicated categories that any scholars’ attempts of simulation and evaluation could not provide absolute face value. Moreover, it is not possible to make adequacy assessments using neither a complicated model nor a simple one, because the objects of assessment are complicated and there is a lack of

generally accepted objective criteria of validity estimates for these objects. From the point of view of the last statement we assert the impossibility of creating a complicated model of finance-growth nexus estimation, which consists of a wide database and many indicators and require using complex mathematical methods. On the other hand, it is unacceptable to provide an over-simplification evaluation which leads to simple generalizations and subjective expert assessments of certain aspects of the finance-growth nexus and contradicts the principles of scientific knowledge.

In our opinion, the best option in solving the methodological problems of the evaluation of the finance-growth nexus is compliance with the concept of a “moderate middle way”, which provides:

- using publicly available statistical data – quantitative objective indicators calculated using generally accepted methods and openly published on the Internet,
- maximum avoidance of subjective assessments and indicators that are characterized by uncertainty regarding the methods of collection or calculation,
- using mathematical approaches of the average level of complexity and using average dimension data sets. However, data sets must be sufficient to identify the main statistical regularities on the basis of a regression analysis,
- Visualization of assessment results.

In this paper we have built simplified models of integral indicators of the level of financial system development and economic growth using the principles of the concept of the “moderate middle way”, which are mentioned above. We use the simplified models of an integral indicator to compare the level of financial system development and economic growth and to explore the trend of financial development and growth in Poland and Ukraine. We use the coefficient of variation to assess the stability of financial system and economic growth in Poland and Ukraine. Lastly we used integral indicators and econometric methodologies to assess the relationship between financial development and economic growth in the countries referred to.

1. Methodology and Data

We suggest using the principles of the concept of the “moderate middle way”, which is mentioned above, to build a simplified model of an integral indicator of the level of development, which is associated with the generalization of three types of indicators: 1) scale (extensity development); 2) resources; 3) efficiency. The composition of these indicators are illustrated in Table 1.

Table 1

Indicators of the simplified model of an integral indicator

Indicator	Financial system		Economic growth
	banking sector	financial markets	
Scale (extensity development)	Commercial bank branches (per 100,000 adults).	Listed domestic companies (per 1,000,000 adults).	Employment to population ratio, 15+, total (%) (modelled ILO estimate).
The resources	Deposit liabilities (% of GDP).	Market capitalization of listed companies (% of GDP).	Gross capital formation (% of GDP).
The efficiency	Domestic credit to private sector by banks (% of GDP).	Stocks traded, total value (% of GDP).	GDP per capita (current US\$).

Source: own development based on data of from the World Bank (2015a, 2015b).

We divided the financial system into two components – banking sector and financial markets. We propose to call the model of an integral indicator of the relative level of the financial system development as “3 + 3”¹.

We offer to consider the significance of each indicator as being equal. It let us to avoid the result distortion which is associated with subjective judgments regards to the ranking of each indicator.

The integral indicator of level development is calculated as an area of the geometric figure (triangle is for economic growth, hexagon – for financial system), with the tops in a coordinate system of 3 or 6 axes. Each axis corresponds to one of the indicators listed in table 1. On each of the three or six axes we plotted the relative values which are defined as a share of the maximum (or reference) value of the indicator.

The integral indicator of the economic growth level as an area of the triangle can be calculated by the formula:

$$I_{EG} = \frac{1}{2} \times [(I_1 \times I_2) + (I_2 \times I_3) + (I_3 \times I_1)] \times \sin 120^\circ \quad (1)$$

where:

I_{EG} – the integral indicator of the economic growth level,

I_1, I_2, I_3 – relative values of indicators of scale, resources and efficiency.

The integral indicator of the financial system development level as an area of the hexagon can be calculated by the formula:

$$I_{FS} = \frac{1}{2} \times [(I_1 \times I_2) + (I_2 \times I_3) + \dots + (I_6 \times I_1)] \times \sin 60^\circ \quad (2)$$

¹ Amore detail explanation of the model “3+3” is Oliynyk at el (2015).

where:

II_{FS} – the integral indicator of the financial system development level,

I_1, I_2, \dots, I_6 – relative values of indicators used in the model “3 + 3” (6 indicators):

I_1, I_2, I_3 – relative values of banking sector indicators, I_4, I_5, I_6 – relative values of the financial market indicators (see Table 1).

The integral indicator describes the relative development level and it cannot be calculated only for one country for one year without comparison with another country or establishing reference values or time-series data. There are two types of integral indicator of development level:

- sectional indicator is calculated for a certain period (year) and for group of countries. The relative value of each indicator presented in formula 1 and 2 is defined as a share of the maximum value of the indicator for the group of countries. In other words, we normalized the largest value among the group of countries (or value of reference country or reference value) to one for each indicator,
- individual indicator is calculated for a certain country and for several years. The relative value of each indicator presented in formula 1 and 2 is defined as a share of the maximum value of the indicator for the time period. In other words, we normalized the largest value for the time period to one for each indicator.

We could use the sectional integral indicators for a comparison of the level development of the financial system and economic growth of different countries between each other or with a certain reference value. But we could not use the sectional integral indicators for the time series analysis. Thereby, we used them as additional indicators to explore the relationship between financial development and economic growth.

The individual integral indicators used to explore the trend of the level development of the financial system and economic growth. The time series of the individual integral indicators of certain countries are comparable to each other to examine the nexus between the financial development and economic growth.

2. Results

We used the sectional integral indicator of the financial system development level to examine the development trend of the financial system in Poland and Ukraine (see Figures 1 and 2).

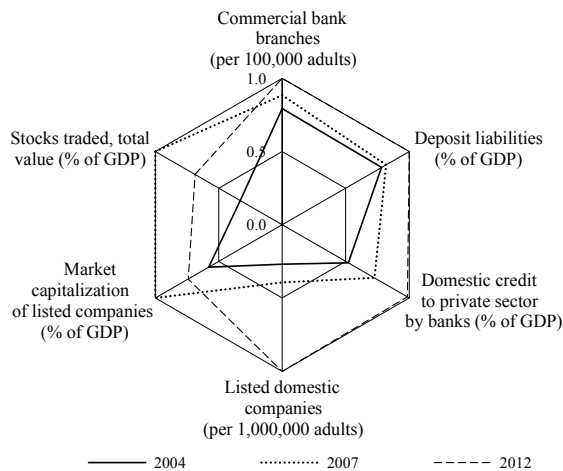


Figure 1. The financial system development of Poland, according to the model “3 + 3”, 2004–2012

Source: authors’ calculations based on data from the World Bank (2015b), ECB (2015).

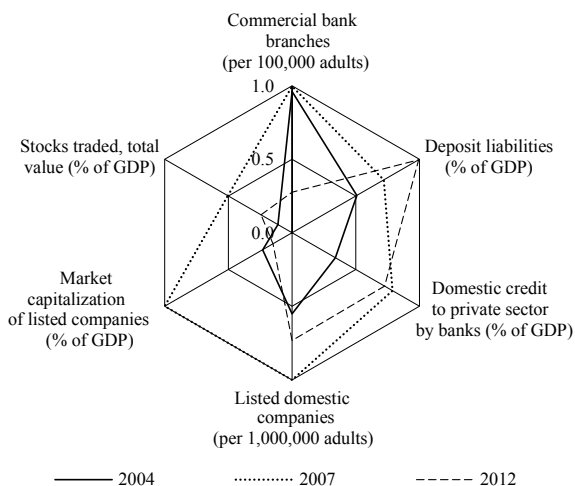


Figure 2. The financial system development of Ukraine, according to the model “3 + 3”, 2004–2012

Source: authors’ calculations based on data from the World Bank (2015b), NBU (2015).

Looking at the recent evolution of the financial system of both countries, Figures 1 and 2, the most striking point is the significant changes. The common tendency for both countries is a strict increasing of the financial system level especially the market component

until the financial crisis in 2007. Since the onset of the financial crisis the bank component started to grow.

The Polish financial system successfully overcame the crisis recession of 2008 and fully compensated the reduction of negative development in 2010. However, the economic growth has not been so successful since the post-crisis period (see Figure 3). This is in stark contrast with the situation in Ukraine, where the level of financial system development has decreased rapidly since the onset of the financial crisis and after a slight stabilization in 2010 it has been declining. However, economic growth in Ukraine has been more prominent than in Poland for the period 2010–2012. This was caused by the effective performance of agriculture. Figure 4 shows the trend of financial development and economic growth in Ukraine.

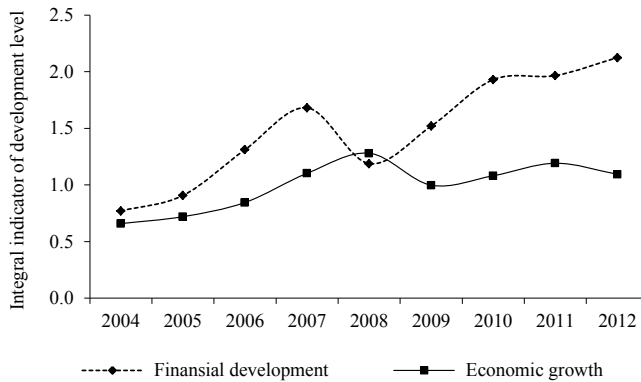


Figure 3. The trend of financial development and economic growth in Poland

Source: authors’ calculations based on data from the World Bank (2015b), ECB (2015).

We see a large divergence among Poland and Ukraine regards to the rate of growth of integral indicators of financial and economic development, see Table 2. In Poland the average annual growth rate of the integral indicator of financial development was significantly ahead of the same indicator of economic development. In Ukraine vice versa – the growth rate of the integral indicator of economic growth showed a slight improvement.

There is no reason to assert that the average annual rates of growth of integral indicators of financial and economic development were anomalous. Similar values were observed in other countries of the world; particularly the Russian Federation has 1.012, the USA – 0.992, Germany – 0.955. It should be noticed that in 2008 Poland and Ukraine had the same rates of growth of integral indicators – respectively 0.609 and 0.634. It confirms a similar reaction of the economies of these countries in the world financial crisis. We can also see such a tendency in the Russian Federation and Germany – respectively 0.522 and 0.731.

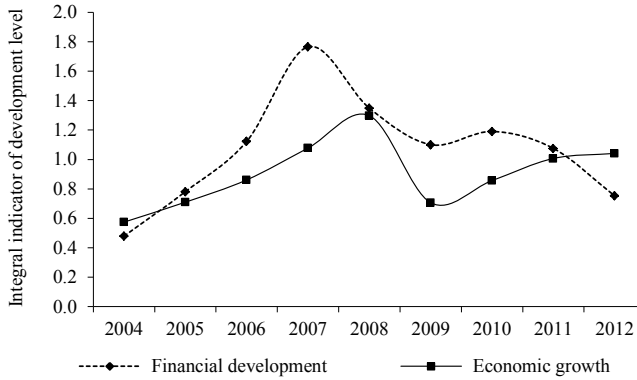


Figure 4. The trend of financial development and economic growth in Ukraine

Source: authors’ calculations based on data from the World Bank (2015b), NBU (2015).

Table 2

The rate of growth of integral indicators of financial and economic development in Poland and Ukraine, 2004–2012

Year	Poland			Ukraine		
	Financial development (FD)	Economic growth (EG)	FD/EG	Financial development (FD)	Economic growth (EG)	FD/EG
2005	1.178	1.093	1.077	1.630	1.235	1.320
2006	1.445	1.174	1.231	1.437	1.213	1.184
2007	1.282	1.305	0.982	1.572	1.251	1.257
2008	0.707	1.161	0.609	0.764	1.204	0.634
2009	1.278	0.780	1.640	0.816	0.545	1.498
2010	1.270	1.084	1.172	1.082	1.212	0.892
2011	1.019	1.102	0.924	0.903	1.175	0.769
2012	1.081	0.918	1.177	0.700	1.034	0.677
Average	1.135	1.065	1.065	1.058	1.077	0.982

Source: authors’ calculations based on data from the World Bank (2015b), ECB (2015), NBU (2015).

We can observe that in Poland and Ukraine the coefficient of variation of the financial integral indicator is more volatility than the economic integral indicator (see Figure 5). We also see a similar tendency in such countries as the Russian Federation, the USA and Poland. However, the values of the coefficient of variation in Poland, Ukraine and the Russian Federation are significantly higher compared to the USA and Germany.

We can explain the highest value of the coefficient of the variation of the financial integral indication in comparison to the economic integral indication by the impact of the global financial crisis which has hit the financial sector more.

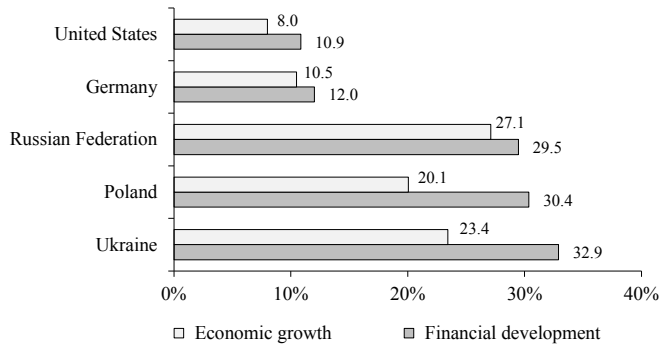


Figure 5. The coefficient of the variation of financial and economic integral indicators in Poland, Ukraine, the Russian Federation, Germany, and the USA, 2004–2012

Source: authors' calculations based on data from the World Bank (2015b), ECB (2015), NBU (2015), FRS (2015), CBRF (2015).

We used the integral indicators and a regression analysis to assess the relationship between the financial system and economic growth in Poland and Ukraine. For the regression analysis the dependent variable is the integral indicator of economic growth and independent variable is the integral indicator of financial development. The polynomial regression of the second order is the best way to describe the interdependence between economic growth and financial development in Poland (see Figure 6). Both regression coefficients are statistically significant (p-values for these ratios do not exceed a critical threshold). The regression analysis of the time series of financial and economic integral indicators revealed the existence of a strong (almost functional) relationship between them in the case of deleting the anomalous values of 2008.

In Ukraine the relationship between financial development and economic growth is not as sharp as in Poland, in particular the value of the coefficient of determination is 0.449 (see Figure 6).

We can observe for both countries that the elasticity between the integral indicator of economic growth and the integral indicator of financial development gradually decreases.

Although getting statistical consequences are important (especially for Poland), they are not sufficient to confirm the hypothesis that financial development impacts on economic growth. A strong argument in favour of this hypothesis is the existence of a strong statistical relationship between the time series of the financial integral indicator with a delay of 1 year, and the time series of the economic integral indicator without displacement. We defined the strong statistical dependence (including in the time series of the economic integral indicator the value for 2013) in Poland (see Figure 7).

In spite of the relatively small number of data, the regression model, which is shown in Figure 7, is statistically adequate, and the two regression coefficients are significant (p-value does not exceed the limit). The model confirms that the level of the financial system

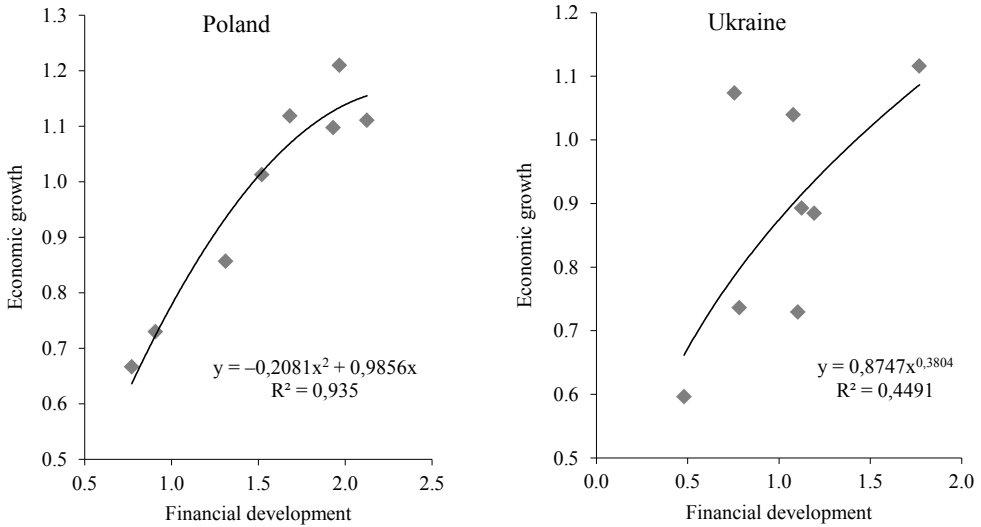


Figure 6. The regression model describing the interdependence between financial and economic integral indicators in Poland and Ukraine, 2004–2012 (data of 2008 is excluded)

Source: authors’ calculations based on data from the World Bank (2015b), ECB (2015), NBU (2015).

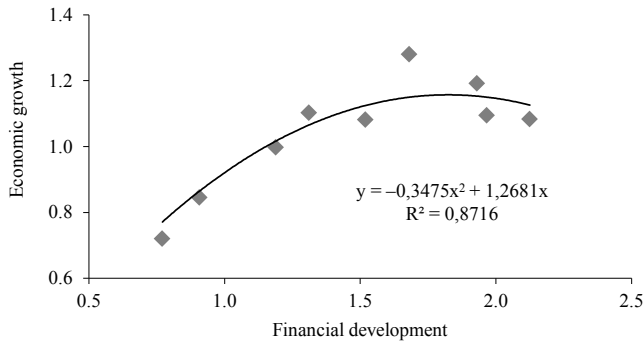


Figure 7. Regression model depending on the economic integral indicator on the values of the financial integral indicator for the previous year in Poland (the values of the financial integral indicator are with a delay of one year)

Source: authors’ calculations based on data from the World Bank (2015b), ECB (2015).

development of Poland had a significant statistical impact on economic growth in the next year. It is possible to argue that this statistical effect is not random and it is related to the existence of the essential causal relationships between the financial development and economic growth. It is important that the extreme-maximum of regression function is at the

point $x = 1.8247$, where its derivative ($y' = 1.2681 - 0.6949x$) is zero. This implies that the excessive increasing of the financial system is not useful for the economic growth of Poland. More additional research needs to be undertaken to determine the cause of the regularity. However, we could assume that the excessive development of the financial system in Poland is associated with the movement of capital from the real sector to the financial sector. So, this is the reason why economic growth has declined.

We can prove that our regression model is significant and it confirms the hypothesis of the existence of the direct effects of finance on economic development because similar inverse statistical dependence (statistical relationship between the time series of the economic integral indicator with a delay of 1 year, and the time series of the financial integral indicator without displacement) has detected a significantly weaker relationship (the coefficient of determination is 0.746), even in the case of deleting the anomalous values of 2008 (see Figure 8).

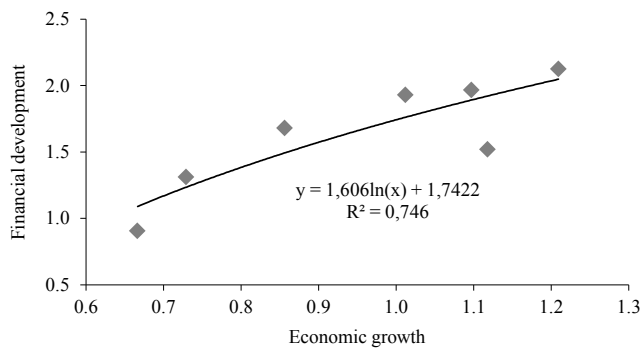


Figure 8. Regression model depending on the financial integral indicator on the values of the economic integral indicator for the previous year in Poland (the values of the economic integral indicator is with a delay of one year, data of 2008 is excluded)

Source: authors' calculations based on data from the World Bank (2015b), ECB (2015).

We can see that our models confirm the existence of the effects of financial development on economic growth and vice versa (see Figures 7 and 8). However, the influence of finance on economic development is more powerful. The situation in Ukraine is quite different from the one observed in Poland:

- First, a regression model of the relationship between the time series of the financial integral indicator with a delay of 1 year and the time series of the economic integral indicator without displacement is linear in the case of deleting the anomalous values of 2008 (see Figure 9);
- Second, we could not determine the relationship between the financial integral indicator and the economic integral indicator with a delay of 1 year (see Figure 10).

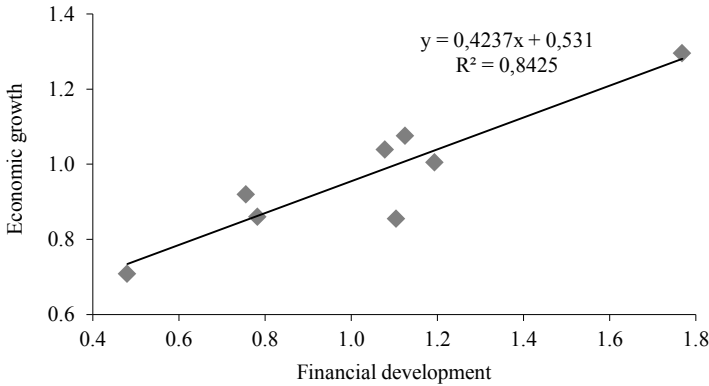


Figure 9. Regression model depending on the economic integral indicator on the values of the financial integral indicator for the previous year in Ukraine (the values of the financial integral indicator is with a delay of one year, data of 2008 is excluded)

Source: authors' calculations based on data from the World Bank (2015b), NBU (2015).

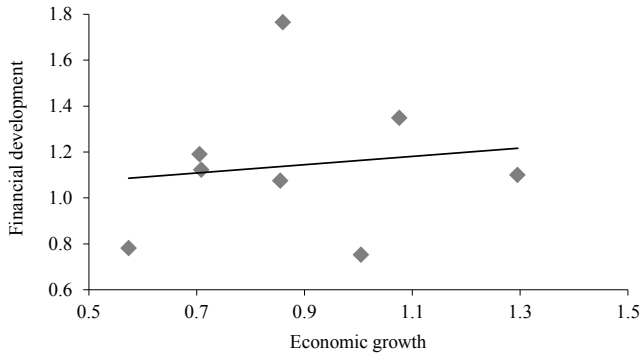


Figure 10. Regression model depending on the financial integral indicator on the values of the economic integral indicator for the previous year in Ukraine (the values of the economic integral indicator is with a delay of one year, data of 2008 is excluded)

Source: authors' calculations based on data from the World Bank (2015b), NBU (2015).

We could explain the differences mentioned above that the financial system is more decisive for economic growth in Ukraine than in Poland because the economic entities have significant limited access to finance in Ukraine. The development of Ukraine's financial system is still very far from the level where it becomes excessive and burdensome for economic growth. Also it should be noted that the existence of common problems of the economic system in Ukraine blocked the mechanisms of economic influence on financial development in contrast to Poland – compare Figure 10 with Figure 8. The main reason was

the inability of Ukraine’s enterprises of the real sector of the economy and households to generate free cash flow to the extent that it would be sufficient to make a significant financial investment through the institutions of the financial system.

The strong statistical relationship between the integral indicators of the financial system and economic growth, which were identified in Poland and Ukraine, are not universal. They illustrate the specific patterns and the factors which are peculiar to these countries. We may observe a very different nature of the relationship between financial development and economic growth in other countries. For example, we defined a correlation between the financial development and economic growth in Germany, which is inverse to that observed in Poland (see Figure 11).

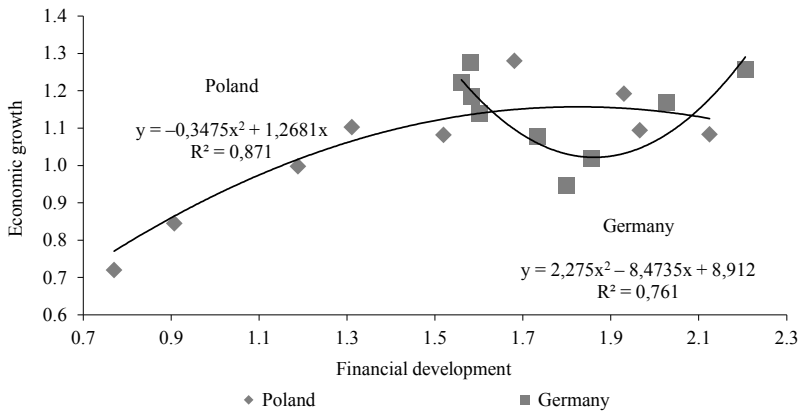


Figure 11. Regression model depending on the economic integral indicator on the values of the financial integral indicator for the previous year for Poland and Germany

Source: authors’ calculations based on data from the World Bank (2015b), ECB (2015).

In some countries such as the USA, we observed a strong statistical dependence of the financial integral indicator on values of the economic integral indicator with a one-year lag. However, we could not determine the statistical dependence of the economic integral indicator on values of the financial integral indicator with a one-year lag. The situation in the USA is the opposite to Ukraine.

The examples of Germany and the USA give reason to admit the same type nature of the relationship between financial development and economic growth in Poland and Ukraine, despite the existence of individual differences, as outlined above.

Conclusions

We built simplified models of the integral indicator of the level of financial system development and economic growth. We used the models of the integral indicator to compare

the level of financial system development and economic growth in Poland and Ukraine. We used the integral indicators to evaluate whether a financial system influences economic growth.

The financial systems of Poland and Ukraine were developing rapidly in the pre-crisis period (2004–2007). Specifically, in comparison to the bank component, the market component of financial systems showed much stronger growth in these years. The integral indicators of financial development of both countries reacted to the onset of the financial crisis in roughly the same way. However, in the aftermath of the crisis, the development of financial systems in these countries has been significantly different. The financial system in Poland has returned to the pre-crisis growth trend, but Ukraine's has failed to do so.

Despite the quite different trend of the financial and economic development in Poland and Ukraine in 2009–2012 we can see a similarity in the nature of the relationship between the financial and economic development in these countries. The regression analysis of the integral indicators of financial system development and economic growth showed a strong statistical relationship between the two countries. Increase in the level of financial development in a specific year caused the increase in the level of economic growth in the following year. However, in Poland this pattern was observed only to a certain extent, after which further financial system development was accompanied by decline in economic growth.

In the case of Ukraine, we could not build a regression model that would significantly and adequately describe the impact of economic growth on financial development. Also, we could not set a limit after which further financial system development is accompanied by a decrease in economic growth as it was observed in Poland. It suggests that the level of financial system development is a more important factor for economic growth in Ukraine than in Poland, and, consequently, the higher importance in the research of financial development processes in Ukraine.

During our research we observed various patterns and relationships between the financial development and economic growth in different countries. The similar nature of these patterns in the case of Poland and Ukraine may be the basis for the implementation of the best practices of financial system development in Poland and Ukraine.

Acknowledgements

The paper was prepared as part of the post-doc research program funded by the Erasmus Mundus Action II Alrakis II Project Number 2012–2733.

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SYSTEMY FINANSOWE I WZROST GOSPODARCZY: DOWODY Z POLSKI I UKRAINY

Streszczenie: W artykule przedstawiono zbudowane uproszczone modele integralnego wskaźnika poziomu rozwoju systemu finansowego i wzrostu gospodarczego. Wskazano użycie modeli wskaźnika integralnego, który pozwala porównać poziom rozwoju systemu finansowego i wzrostu gospodarczego w Polsce i na Ukrainie. Przy użyciu integralnych wskaźników oceniono czy system finansowy wpływa na wzrost gospodarczy w Polsce i na Ukrainie. Na ich podstawie można stwierdzić, że związek między rozwojem systemu finansowego i wzrostu gospodarczego w Polsce i na Ukrainie na ogół ma taki sam charakter. Mimo pewnych różnic indywidualnych na Ukrainie skutki rozwoju systemu finansowego na wzrost gospodarczy mają bardziej znaczący wpływ niż w Polsce.

Słowa kluczowe: system finansowy, wzrost gospodarczy, zintegrowany wskaźnik wzrostu gospodarczego

Citation

Wasilewski M., Oliynyk O., Adamenko V. (2015), *Financial Systems and Economic Growth: Evidence from Poland and Ukraine*, Zeszyty Naukowe Uniwersytetu Szczecińskiego nr 855, „Finanse, Rynki Finansowe, Ubezpieczenia” nr 74, t. 2, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Szczecin, s. 559–573; www.wneiz.pl/frfu.

