THE COMPARATIVE ANALYSIS OF FINANCIAL SYSTEM OF CZECH REPUBLIC, POLAND AND UKRAINE

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Abstract

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We create the simplified model of integral indicator – the model "3 + 3", which allows simplicity and affordability, but quite adequate, provide a comparative analysis of financial systems of individual countries and identify their type (bank-based or market-based). The results of comparative analysis demonstrate that the financial system of Ukraine in comparison with two leading members of the CEE countries – the Czech Republic and Poland – showed its viability as an independent integrated system and the possibility to develop in the terms of normal political situation.

Keywords: financial systems, bank-based system, market-based system, model "3 + 3", the integral indicator of the relative level of the financial system development

INTRODUCTION

The literature and global practice classify financial systems of countries as more bank-based or more market-based (Hartmann, 2003; OECD, 2000). In a bank-based system, banks play a key role in the channeling funds from capital providers to non-financial corporations. In the bank-based system, network of banks pools dispersed savings and plays an important role as delegated monitors of the enterprises they lend to, on behalf of deposit holders (Boot and Thakor, 2008). In the market-based system relationship between the savers and enterprises is carried out mainly through the financial market, where enterprises can more quickly obtain sufficient funding by participating in markets for tradable securities.

There are many scientific works, which provide the comparative analysis of two types of financial systems. In particular, the deep analysis from theoretical point of view according to advantages and disadvantages of different types of financial system at various functions was conducted by Allen, D. Gale (Allen, 2001). As well, a lot of empirical research has been made to answer the question which type of financial system has better impact on economic growth. In the book "Financial Structure and Economic Development: Firm, Industry and Country Evidence" Beck *et al.* (2000) attempted to evaluate the impact of financial structure on economic growth. They used firm level analyses of 33 countries, industry-level studies of 34 countries, and country level investigations of 48 countries. In their opinion that financial structure does not help in understanding economic growth, industrial performance, or firm expansion; and the results are inconsistent with both the market-based and bank-based views. They conclude that the overall level of financial development and the legal environment in which financial intermediaries and markets function critically influence economic development.

Later Levine (2002) conducted a study to evaluate the effects of two types of financial system on the growth rate of GDP, which showed absence of

the link between the type of financial system and economic growth.

There is a view that the dichotomy of bank-based and market-based financial system has lost its relevance. Proponents of this view consider the benefits of bank-based and market-based financial system only historically, indicating the inability to combine the advantages of two systems. They argue that the combination of the advantages of two systems is achieved through the financial innovations. One example of such innovation is the securitization (Franke, 2005). The above indicates ability to create so-called "hybrid" financial system. However, the presence of such innovative tools as securitization, still does not give grounds to assert complete creation of a "hybrid" financial system. The work of Boot and Thakor shows the impossibility of creation a full "hybrid" financial system (Boot, 2000).

Some of papers argue that the differences between financial systems around the world are more often a question of degree (Allen *et al.*, 2004). Distinction of financial systems on bank-based and market-based is rather nominal. For example, in the United States (US), which belongs to the type of market-based financial system, the financial system is characterized by high importance role of banks in financing smaller businesses. The same time, in traditionally bank-based system in Germany, the market for corporate bonds has grown significantly over the past decade (Bijlsma, 2013). Therefore, the distinction of financial systems on the market-based and bank-based is universally effective tool that allows comparing the financial system between the countries.

There are some debates due to possibility of convergence of two type of financial system. From the standpoint of the principles of complementarity and consistency some researchers (Schmidt *et al.*, 2003, 2006) consider that different elements of financial system cannot be mixed. They state: the theory of complementarity suggests that a mix of the best elements of the different financial system cannot work. It would lead to inconsistencies. Since inconsistent systems are not efficient and may become unsustainable. But from other side they assert that financial systems can change in a fundamental way, which would amount to switching from a bank-based to a capital market-based system or vice-versa (Rajan *et al.*, 2003). The growth of global financial system has shifted the balance in the direction of market-based structure and its significant changes in most of the developed countries (Rajan *et al.*, 2003). However, since the financial crisis in 2008, the financial systems of countries have begun to show signs of a tendency to develop in the direction of bank-based structure (Jagric *et al.*, 2014).

Others (Levine *et al.*, 1998) argue that banks and markets can arise and develop simultaneously, performing various financial services that have a positive impact on economic growth. Also

Demyrhuk-Kunt and Maksimovic (1996), using data from companies in different countries have shown that in developing countries, the growth of the stock market leads to an increase in bank credit.

Although the existing literature using system of indicators compares the financial systems of different countries to explain why some countries are more financially developed than others, it is still not integral indicator to make comprehensive comparative analysis of countries' financial system. With regard to this motivation, we try to work out the integral indicator which allows to provide a more comprehensive assessment of financial systems regarding retrospective and to implement a more adequate comparative analysis of financial systems between countries.

We use the integral indicator to compare the financial system of Ukraine with financial systems of leading countries of CEE – the Czech Republic and Poland. Selection of Poland and the Czech Republic for comparison with Ukraine was caused by following factors. First, the similarity between these three countries can be explained by historical economic development (three countries had in the past socialist economic system). Second, Poland and the Czech Republic are more suitable for comparison than developed countries, because development gap is not so significant. Latter allows more adequately evaluate the opportunity for Ukraine to reach the level of financial system development of the Czech Republic and Poland on the basis of current trends. We also use the integral indicator to define the type of financial system in the Czech Republic, Poland and Ukraine as well as to explore the tendencies of financial development in these countries.

METHODOLOGY AND DATA

In order to evaluate the level of country's financial system development there is no unique universal indicator, because it is multi-dimensional and complex concept. It is possible to argue the abstract models which are used by researchers to evaluate the financial system that do not allow to describe the complex reality of financial relationships within the system completely. In this regard, it is appropriate to quote Myron Scholes, Nobel Laureate in Economic Sciences: "We make models to abstract reality. But there is a meta-model beyond the model that assures us that the model will eventually fail. Models fail because they fail to incorporate the inter-relationships that exist in the real world" (Bernstein, 2007).

We suggest using the principle of pragmatism to solve applied problems of comparative analysis of the financial systems of individual countries. For this purpose we develop a simplified model of integral indicator. It is based on publicly available statistics and allows considering separately two main components of the financial system – the banking sector and financial markets. We called the model

"3 + 3" in regards to the number of indicators from which it is formed (see Tab. I).

Regards to the model "3 + 3" the integral indicator is a relative level indicator of financial system development. It cannot be calculated only for one country for one year without comparison with another country (or establishing reference values). It is calculated as an area of the hexagon, with the tops in a coordinate system of 6 axes. Each axis corresponds to one of the indicators listed in the Tab. I. On each of the six axes we plot the relative values which are defined as a share of the maximum (or reference) value of the indicator for the group. The area of the hexagon can be calculated by the formula:

$$II_{FS} = \frac{1}{2} \times \left[(I_1 \times I_2) + (I_2 \times I_3) + \ldots + (I_6 \times I_1) \right] \times \sin 60^\circ, \quad (1)$$

where

II_{FS} ....integral indicator of the relative level of the financial system development;

$I_1, I_2, \ldots, I_6$....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.

It should be noted that in addition to simplicity and affordability, one of the significant advantages of the proposed model "3 + 3" is visual interpretation, which is associated with the construction of geometric shape (hexagon) using a spider chart in Excel (or similar software package). Ratio of individual parts of hexagons plotted for financial systems of different countries allows to identify relatively more (or less) developed components of the financial system.

Visualization of integral indicator can be used to identify the type of financial system (bank-based or market-based). For this purpose we should use etalon values of indicators of financial system of countries which are clearly identified as a bank-based or market-based (for example, Germany has bank-based system and the US has market-based system).

The model "3 + 3" allows analyzing the dynamics of the financial system development of each country. For this purpose the integral indicator is calculated according to the formula (1) for a number of years during the analyzed period. Time series of indicators

for financial systems of individual countries may be compared with each other in order to identify the trends of the financial systems development and with time series of other indicators, such as GDP per capita for analysis of the financial systems impact on the economy.

Using the model "3 + 3", it is possible to compare the individual components of financial system such as a banking sector and financial markets. For this purpose it is necessary to consider the appropriate half hexagon and its area, calculated by the formula (1), or a triangle and its area, calculated by the following formula:

$$II_{BS} = \frac{1}{2} \times \left[(I_1 \times I_2) + (I_2 \times I_3) + (I_3 \times I_1) \right] \times \sin 120^\circ, \quad (2)$$

where

II_{BS} ....integral indicator of the relative level of the banking sector development;

I_1, I_2, I_3 ....relative values of banking sector indicators.

Using similar formula it is possible to calculate the integral indicator of the relative level of market component of the financial system based on the I_4–I_6 – the indicators of financial market component of the financial system (in accordance with Tab. I).

For more comprehensive analysis of financial system development of individual country using the model "3 + 3" the coefficient of variation of the integral indicator of the relative level of the financial system development can be used. It is calculated as the ratio of the standard deviation of the integral indicator to its average value:

$$V_{FS} = \frac{\sqrt{\sigma^2}}{\overline{II_{FS}}}, \quad (3)$$

where

V_{FS} ....the coefficient of variation of the integral indicator of the relative level of the financial system development;

σ^2 ....the standard deviation of the integral indicator of the relative level of the financial system development;

$\overline{II_{FS}}$ ....the average value of the integral indicator of the relative level of the financial system development for the analysed period.

I: *The indicators of model "3 + 3"*

Indicator	The components of financial system	
	Banking sector	Financial markets
Scale (extensity development)	Commercial bank branches (per 100,000 adults)	Listed domestic companies (per 1,000,000 adults)
The resources	Deposit liabilities (% of GDP)	Market capitalization of listed companies (% of GDP)
The efficiency	Domestic credit to private sector by banks (% of GDP)	Stocks traded, total value (% of GDP)

Source: authors development on base the World Bank (2015b)

The standard deviation of the integral indicator of the relative level of the financial system development (σ^2) is calculated in the traditional way:

$$\sigma^2 = \frac{\sum_{i=1}^{n} (II_{FS_i} - \overline{II_{FS}})^2}{n}, \qquad (4)$$

where

n .... number of years of analyzed period.

We used data from the World Bank (World Bank, 2015a, 2015b), the European Central Bank (ECB, 2015), National Bank of Ukraine (NBU, 2015), the Federal Reserve System (FRS, 2015), Bank of Russian Federation (CBRF, 2015) for the time-series analysis and cross-country comparisons and analysis of above presented indicators.

RESULTS

Using the model "3 + 3", we compared the relative level of the financial system development of the Czech Republic, Poland and Ukraine during the period from 2004 to 2012. At the beginning of this period (in 2004) the integral indicator of the relative level of the financial system development in the Czech Republic significantly exceeded integral indicator of Poland and Ukraine (see Tab. II and Fig. 1).

The high relative level of the financial system development of the Czech Republic was caused by two significant advantages: the resources of banking sector and the efficiency of financial markets. As regards the first advantages of financial system of the Czech Republic, then, as shown by further analysis, it has been preserved over the next years (up to 2012), but a second advantage was gradually lost. After the first wave of the global financial crisis, Poland showed higher efficiency indicator of market component of the financial system. In 2012, the market component of the Polish financial system got significant comparative advantage over the financial system of the Czech Republic, as a result the integral indicator of the financial system development of Poland was higher in general (see Fig. 2).
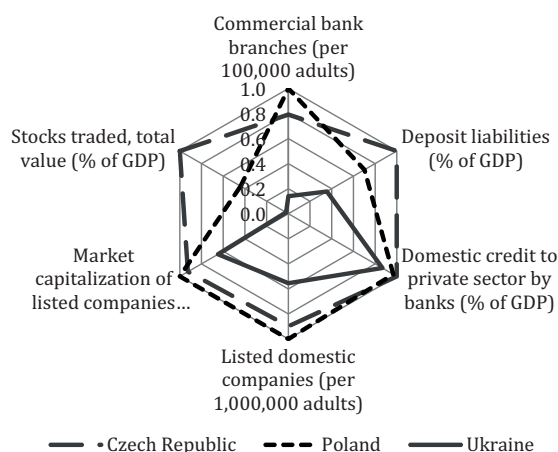
1: *The relative level of the financial system development of the Czech Republic, Poland and Ukraine in 2004 according to the model "3 + 3"* authors calculations
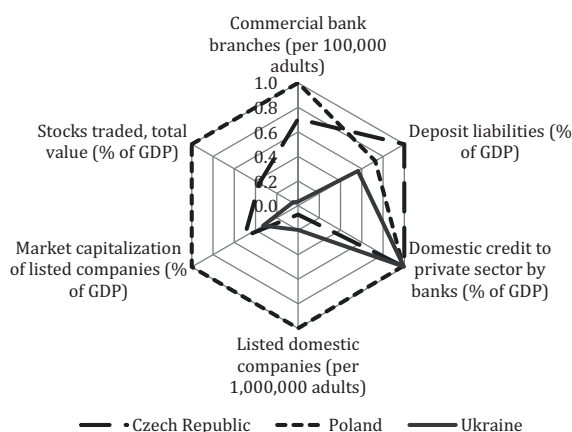
2: *The relative level of the financial system development of the Czech Republic, Poland and Ukraine in 2012 according to the model "3 + 3"* authors calculations

Poland had one advantage during the whole reference period in particular according to scale (extensity development). Moreover, this advantage was detected in both market and bank components of financial system. In 2012, this advantage was particularly noticeable in the market component of the financial system.

II: *The integral indicator of the relative level of the financial system development of the Czech Republic, Poland and Ukraine, 2004–2012*
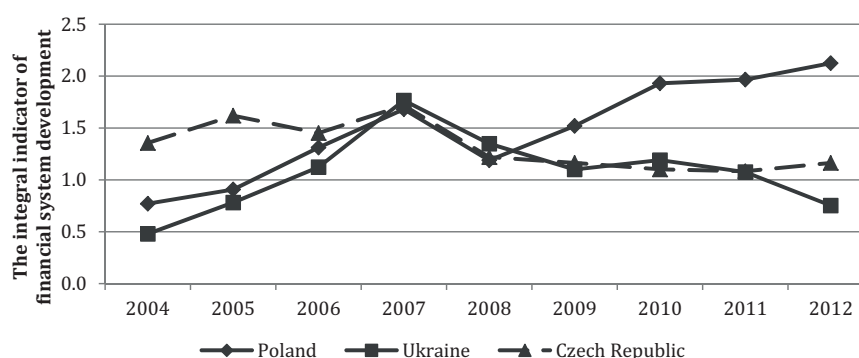
Year	Czech Republic	Poland	Ukraine
2004	2.268	1.831	0.525
2005	1.976	1.666	0.800
2006	1.639	1.945	0.867
2007	1.367	1.679	0.859
2008	1.454	1.681	0.714
2009	1.212	2.146	0.509
2010	0.938	2.225	0.504
2011	0.985	2.314	0.473
2012	0.977	2.352	0.372

Source: authors calculations

III: *The dynamics of the financial system development of the Czech Republic, Poland and Ukraine according to the model "3 + 3", an integral indicator of the relative level calculated for each country, 2004–2012*

Year	Czech Republic	Poland	Ukraine
2004	1.356	0.771	0.479
2005	1.619	0.907	0.781
2006	1.451	1.312	1.123
2007	1.717	1.681	1.765
2008	1.219	1.189	1.349
2009	1.164	1.520	1.101
2010	1.101	1.930	1.190
2011	1.083	1.966	1.075
2012	1.163	2.125	0.753

Source: authors calculations

3: *The dynamics of the financial system development of the Czech Republic, Poland and Ukraine according to the model "3 + 3", 2004–2012*
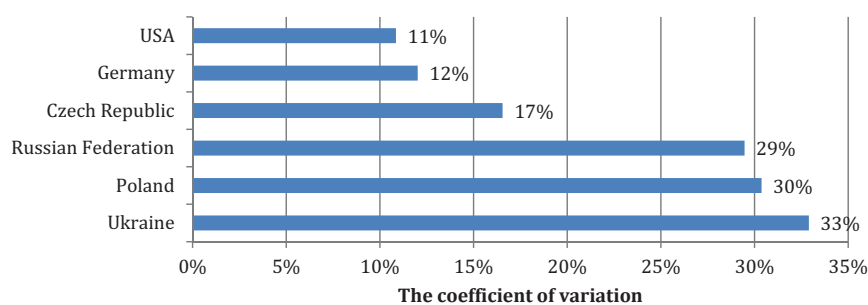authors calculations

The financial system of Ukraine chronically lagged behind the financial system of the Czech Republic and Poland (see Fig. 1 and 2). Particularly, Ukraine had outsider position concerning the market component of the financial system, as well as the extensiveness of the banking component development. Although during pre-crisis 2007 financial system of Ukraine demonstrated advantages in comparison with the financial systems of the Czech Republic and Poland due to: 1) resources of market component of financial system; 2) efficiency indicator of market component of the financial system, it has lost them over the past few years. The integral indicator of the relative level of Ukraine's financial system development could be much higher if the country had established adequate incentives for moving the significant amounts of capital to regulated stock-exchange market from semi-legally circulation beyond. Also, the reason of insufficiency of the relative development of Ukraine's financial system market component is the lack of demand on financial instruments by institutional investors. The latter is explained by distrust of individual investors to joint investment institutions and delaying the country's pension and health insurance reforms.

The above analysis provides restrained optimism about the possibility of Ukraine's financial system to reach to level of the financial system development of the Czech Republic and Poland in the medium term, if the pre-crisis positive trends are restored. This conclusion is confirmed by the analysis of the dynamics of the financial system of the Czech Republic, Poland and Ukraine using the model "3 + 3", which was performed separately for each country. The results are illustrated in Tab. III and Fig. 3.

According to the data of Tab. III and Fig. 3 in the pre-crisis period Ukraine's financial system has developed the highest rates compared to the financial system of the Czech Republic and Poland, proving its viability as an independent integrated system. It should also be noted that only the Polish financial system could successfully overcome the crisis recession of 2008 and fully compensate the reduction of negative development in 2010.

It should be emphasized that it is important for financial system not only overall growth as growth of integral indicator but also stability, which according to the model "3 + 3" possible to estimate as the coefficient of variation of the integral indicator. Particularly, the stability of financial system is very important for countries with financial system development level which is enough for the efficient functioning of economy. The financial system of the Czech Republic showed the highest stability.

4: *The coefficient of variation of the integral indicator of the relative level of the financial system development of the Czech Republic, Poland and Ukraine according to the model "3 + 3", 200–2012*
authors calculations
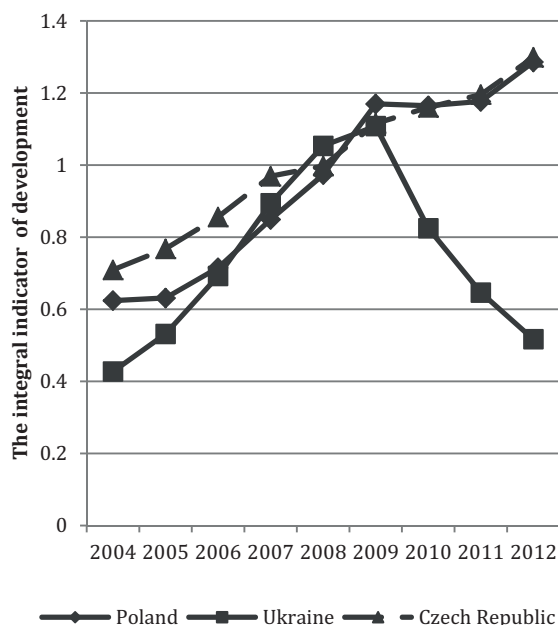
5: *The dynamics of the bank component of the financial system of the Czech Republic, Poland and Ukraine according to the model "3 + 3", 2004–2012*
authors calculations
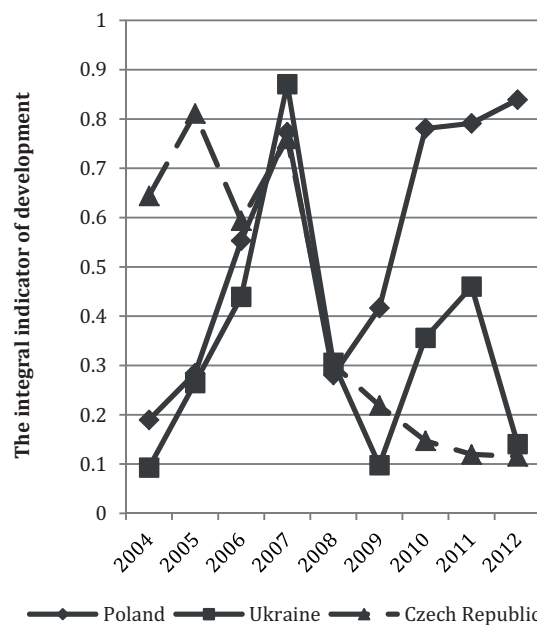
6: *The dynamics of the market component of the financial system of the Czech Republic, Poland and Ukraine according to the model "3 + 3", 2004–2012*
authors calculations

Value of the coefficient of variation of the integral indicator of the relative level of the financial system development of the Czech Republic is about twice lower than in Poland and Ukraine, and is close to the value of such highly developed countries like Germany and the United States (see Fig. 4).

The high value of the coefficient of variation of the integral indicator of the relative level of the financial system development in Poland and Ukraine indicate the presence of high risk in the medium term: for Ukraine it is complete decline of the financial system; for Poland – emergence of a situation "overheating" of the financial system with further adverse consequences.

The components of the financial system (banking sector and financial market) influenced differently on the general development of the financial system of the Czech Republic, Poland and Ukraine. We estimated this effect using the model "3 + 3", which is illustrated in Fig. 5 and 6.

There are two interesting observations due to the development of bank component of financial system. First, the integral indicator of the relative level of the banking component of the financial system of the Czech Republic and Poland has been growing steadily, despite the crisis in the financial sector. This fact confirms the efficiency of banking sector support policy, which was realized in these countries and the EU in general during the outbreak of the financial crisis. Second, the integral indicator of the relative level of the banking component of the financial system of Ukraine decreased rapidly during 2009–2012, which was accompanied by anomalous stability of the country's national currency – in this period exchange rate was practically unchanged and amounted to about 8 UAH for 1 USD. This fact refutes the statements of some political forces about seemingly successful financial policy of the Azarov government which was eliminated during the Revolution of Dignity.

The comparison of Figs. 5 and 6 indicates the significant differences in the development of two major components of the financial system. The peculiarity of the dynamics of the market component of the financial system for all three countries is represented by significant fluctuations in the values of the integral indicator which are related to volatility of market prices of financial instruments and unstable activity of stock market participants during financial crisis. The dynamics of the market component of the financial system of each country may be described as follows: for the Czech Republic – steady decline (curtailing); for Poland – unstable growth; for Ukraine – turbulent position.

The results of analysis of the financial systems of the Czech Republic, Poland and Ukraine using the model «3 + 3» in comparison with the financial systems of Germany and the US provide an opportunity to make a conclusion that these three
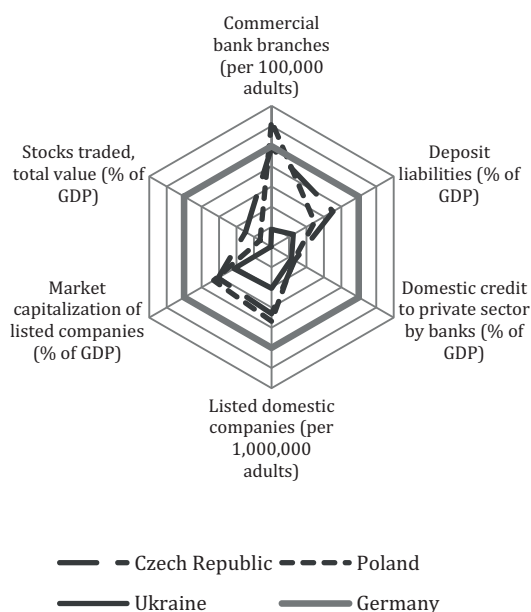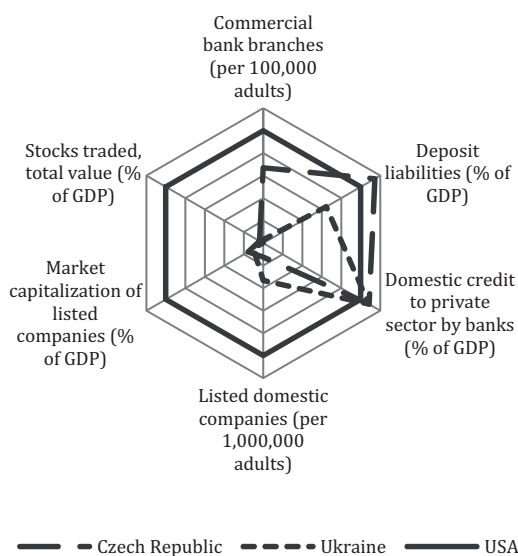

7: *The level of the financial system development of the Czech Republic, Poland and Ukraine relatively the equivalent of Germany's financial system in 2004 according to the model "3 + 3"*
authors calculations
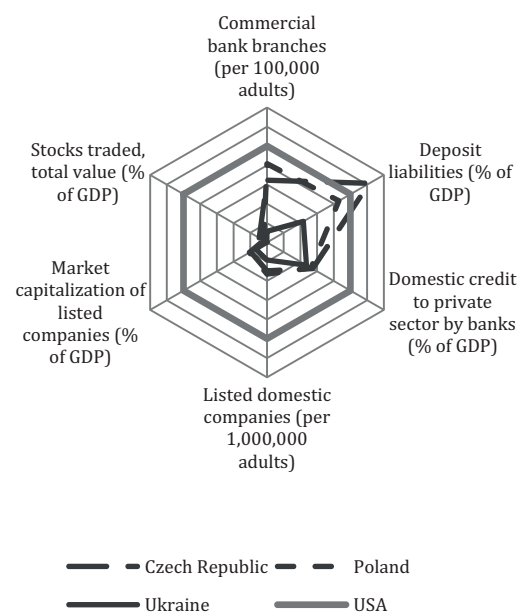
8: *The level of the financial system development of the Czech Republic, Poland and Ukraine relatively the equivalent of the USA's financial system in 2004 according to the model "3 + 3"*
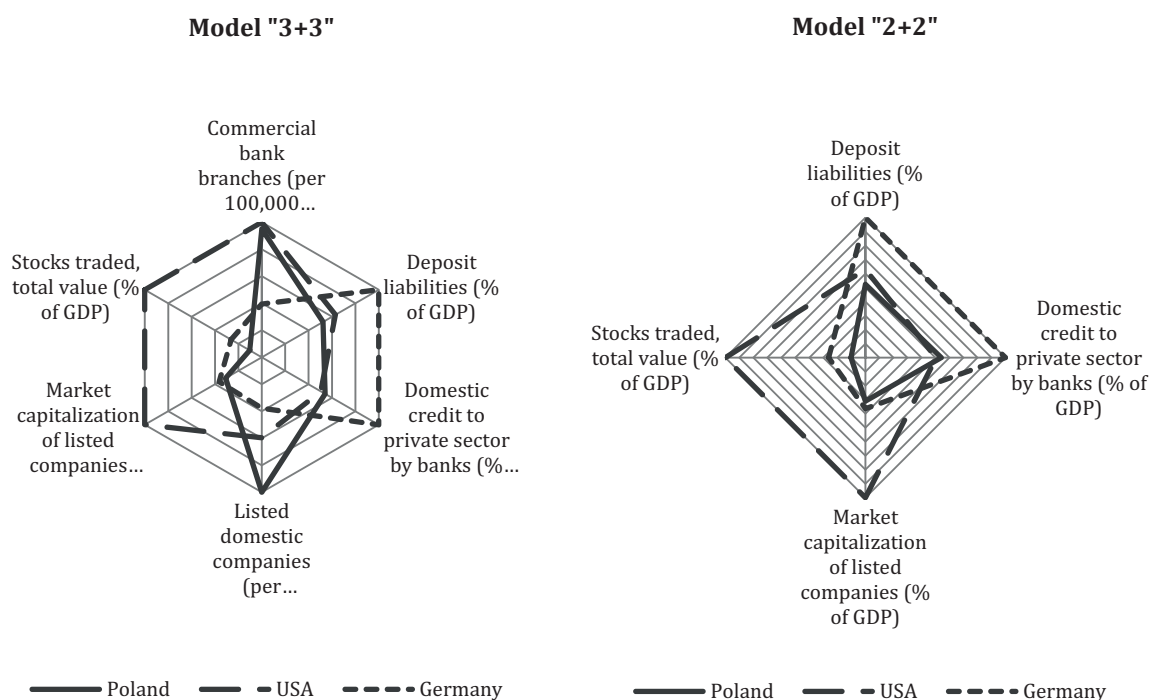authors calculations
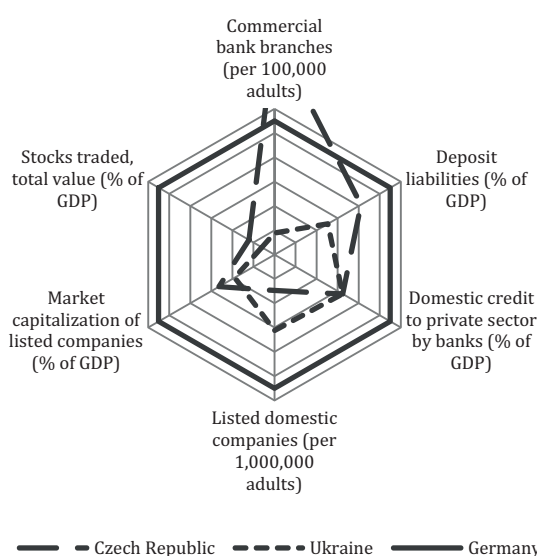
9: *The level of the financial system development of the Czech Republic, Poland and Ukraine relatively the equivalent of Germany's financial system in 2012, according to the model "3 + 3"*
authors calculations

10: *The level of the financial system development of the Czech Republic, Poland and Ukraine relatively the equivalent of the USA's financial system in 2012, according to the model "3 + 3"*
authors calculations

Model "3+3"　　　　　　　　　　　　　**Model "2+2"**

11:　The level of the financial system development of Poland, USA and Germany relatively the equivalent of Germany's financial system in 2012, according to the models "3 + 3" and "2 + 2"
authors calculations

countries have a bank-based financial system. It should be noted, that three countries had clear features of bank-based financial system in 2004 (see Figs. 7–8).

We can see that hexagons of financial system of the Czech Republic, Poland and Ukraine locate in the middle of the hexagon of the Germany's financial system (see Fig. 7). The latter confirms that reference countries have bank-based financial system. The slight lengthening of hexagons in case of the Czech Republic and Poland is caused by high value of the scale (extensity development) indicator of the bank component of the financial system. Although hexagons of financial system of three countries are located within the hexagon of the USA's financial system, there is a clear shift to the side of bank component of financial system (right side of the hexagon-equivalent) (see Fig. 8).

In 2012 the financial system of the Czech Republic and Ukraine could indicate as bank-based (see Figs. 9–10). The slight lengthening of the Czech financial system hexagon beyond the German financial system hexagon, as well as in 2004, is the result of overly extensive development of the bank component.

There is no clear conclusion in regard to the type of Polish financial system in 2012 (see Fig. 11).

For confirmation that Poland had bank-based financial system in 2012 we simplified the model, ignoring indicators of scale, and moved to model "2 + 2" (see Fig. 11). But the evaluation of the Poland's financial system according to the model "3 + 3" in comparison to the US and Germany' financial systems provide a conclusion that Poland has transitional (interim or mixed) type of financial system.

DISCUSSION AND CONCLUSION

The new simplified model of integral indicator – "the model "3 + 3" – has demonstrated its suitability and allowed to conduct adequate estimation of the relative level of the financial system development of the Czech Republic, Poland and Ukraine in general and in terms of their basic components – bank sector and financial market, and to identify the type of financial system in these countries.

The financial system of Ukraine in comparison with the financial systems of the Czech Republic and Poland showed the worst level of development and lowest level of stability during 2004–2012. But the pre-crisis period (till 2007) was an exception: the financial system of Ukraine was developing much faster than the financial system of the Czech Republic and Poland, as a result the integral indicator of the relative level of financial system development significantly improved. In 2007 Ukraine got advantages over the Czech Republic and Poland concerning the resource indicator of market component of financial system and efficiency indicator of the bank component of financial system.

It was determined that in the period of intensification of transformation processes in the financial systems of the world over the last 10 years some countries can rather quickly lose their leading position and relative advantages regarding the level of the financial system development. In particular, the comparative analysis showed that in the pre-crisis period the Czech Republic in comparison with Poland lost its comparative advantage concerning the level of the financial system development. But in the period after the world financial crisis Poland's financial system looked like the clear leader in comparison with the Czech Republic. Such examples of changes in leadership positions allow increasing the probability of getting leadership for outsiders during the expert assessment of the prospects of their financial system development. It concerns the countries like Ukraine.

The analysis shows that the financial systems of the Czech Republic, Poland and Ukraine can be classified as bank-based. It means the presence the basic prerequisites for integrating financial systems of these countries. Also Ukraine can adopt the advanced practice of the Czech Republic and Poland concerning the functioning of financial system.

The comparative analysis shows there is restrained optimism about the possibility of Ukraine's financial system to reach to the level of financial system development of the Czech Republic and Poland in the medium term, if Ukraine overcomes political instability and restores the pre-crisis trends.

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