

# FORMALIZATION OF FACTORS THAT ARE AFFECTING STABILITY OF UKRAINE BANKING SYSTEM

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## Abstract

Intensification of financial development during last decade causes transformation of banking sector functioning. In particular, among the most significant changes over this period should be noted the next ones: convergence of financial market segments and appearance of cross-sector financial products, an increase of prevailing of financial sector in comparison with real economy and level of their interdependent, an intensification of crisis processes in financial and especially banking sector and a significant increase of the scale of the crisis consequences etc. thus, in such vulnerable conditions it is become very urgent to identify the relevant factors that can influence on the stability of banking sector, because its maintenance seems to be one of the most important preconditions of the stability of the national economy as a whole. Purpose of the article is to analyze key performance indicators of the Ukrainian banking system, clarify its main problems, identify relevant factors of the stability of the Ukrainian banking system and the character of their influence on the dependent variable. Realization of the mentioned above tasks was ensured by regression analysis (OLS regression). Analysis of key indicators that characterize current situation in the Ukrainian banking system found out the existence of numerous endogenous and exogenous problems, which, in turn, cause worsening most of analyzed indicators during 2013-2015. Unfavorable situation in Ukrainian banking system determined the necessity of identification of relevant factors of banking system stability to avoid transmission of financial shocks. According to the results of regression analysis on the stability of banking sector positively influence such factors as increase of interest margin to gross income ratio, reserves to assets ratio, number of branches, ratio of non-performing loans to total loans. Meanwhile, negative impact on stability of banking system has an increase of liquid assets to short term liabilities ratio and cost to income ratio. Empirical results of the research found out that grate damage to the stability of banking system has some parameters of banking activity, that's why the main purpose of the regulation by the National Bank of Ukraine should be strengthening of macroprudential supervision and intensification of adaptation of Basel II and Basel III requirements.

**Keywords:** Bank, Banking System, Macroprudential Supervision, Stability of Banking System

## 1. INTRODUCTION

The current stage of global economic relations is characterized by intensification of the integration and convergence processes, which in turn causes the transformation of the basic principles of functioning of economic entities. One of the most significant changes of national economies is strengthening the importance of the financial sector, namely the financialization of the economy. In this regard, the interdependence of financial and real sectors of the economy is significantly increased. One of the most destructive consequences of such convergence is the quick transmission of risks between these segments during the financial crisis of 2007-2009. However, taking into consideration that in most countries the model of financial sector functioning is banking-oriented, thus banking sector plays the most important role in ensuring the stability of the whole economic system of the country. In this regard, it's become an urgent task to realize a comprehensive analysis of the key tendencies of

development of Ukraine banking sector to identify relevant factors affecting its stability that can become the basis for development of measures to decrease potential risks.

## 2. LITERATURE REVIEW

The problem of the banking system stability measurement becomes very urgent after the global financial crisis. Different aspects of the banking system stability are researched in numerous publications of Ukrainian and foreign scientists. For example, O. V. Dziubliuk (Dziubliuk, 2009) characterizes banking system stability from microeconomic perspective and systematizes different practical tools that are used in different countries for identification of stability of certain bank. The author identifies such groups of assessment methods as coefficient approach; rating systems; comprehensive risk assessment systems; macro- and microprudential analyses. O. V.

Dziubiuk highlighted that each of these approaches is aimed to realize several procedure stages such as: 1) assessment of current financial state of certain bank; 2) forecasting of future financial state of certain bank; 3) identification of risk category of certain bank; 4) quantitative analyses and statistical procedures realization. It also should be noted that some of the approaches were adopted by the author to assess financial stability level of some Ukrainian banks. Despite numerous positive aspects of this research (fundamental analysis of theoretical aspects and practical tools and its comprehensive characteristic) there also some disadvantages, such as: 1) microeconomic perspective to the banking system stability assessment does not allow to take into consideration cumulative and contingency effects of banks interconnectedness; 2) author has just analyzed existed approaches and then used it to assess financial stability of some banks, but it should be better to develop some approach which will take into consideration pros and cons of researched tools and some specific features of banks functioning in Ukraine.

D. V. Zavadska (Zavadska, 2011) also research banks financial stability from microeconomic perspective. The author characterizes financial stability of the bank as coordination of financial and organizational factors. Among key financial indicators the author highlights equity, assets, liquidity, solvency, profitability and risk. Group of organizational factors of financial stability of the bank consists of such parameters as: organizational structure, staff potential, information technologies, control and banking safety. Monitoring of changes and discrepancies in current to normative meaning of these indicators is the basis for banking stability level identification. The author also identifies factors that affecting stability of the bank: 1) exogenous factors: economic (investment climate, tax policy, balance of payments, overall economic system stability); socio-political; financial (interest rate policy of the central, credit policy, monetary policy, currency market state etc.); 2) endogenous factors: capital stability, stability of the resource base, organizational stability, commercial stability.

Among other Ukrainian scientists that researched the problem of the banking system stability measurement are V. O. Zinchenko (Zinchenko, 2008), (Kovalenko, 2010), R.V. Myhailiuk (Myhailiuk, 2008) and some others. All these papers have both advantages (comprehensive analysis of theoretical and practical aspects of banking stability) and disadvantages (lack of using of empirical approaches to develop unique tool of banking stability assessment and identification of key factors that affected it). Thus, it's necessary to analyze some papers of foreign scientists that are dedicated to the research of the mentioned above problem.

So, P. Hartman, S. Straetsman, C. de Vries (Hartman et al., 2005) in Working Paper of European Central Bank that is dedicated to the question of banking system stability, systematize theoretical background and provide some empirical results of banking system stability assessment that are based on new approach, which became very popular because of the crucial consequences of 2007-2009 global financial crisis. This approach is based on, so call, network analysis and uses as a background assumption about the necessity of regulating not

individual, but systemic risks in banking sector. The major reason of risk regulation system transformation is an increase of the level of interconnectedness between banks and other financial institutions. Such interdependence in financial sector (and especially, in banking system) triggers the contagion effect. This effect force to lose financial stability even those banks that were comparatively stable before crisis. Comparison of the empirical results of systemic risk realization in the USA banking system and European banking system allows authors to conclude that systemic risk in the USA is higher than in the euro area. As a conclusion it can be noted that this paper has a great theoretical and practical value, but its adoption for Ukraine is rather complicated, because network technologies need huge amount of statistical information, which, in turn, should be collected very frequently. Besides, network analysis allows to get truth contagion signal in financial sector if there is the only one regulator of the whole financial market or cooperation between sector regulators is really close and effective. Unfortunately, we have no common regulator and it can be complicated to collect an adequate data set about interconnectedness of financial institutions in value scale.

N. Jahn, T. Kick (Jahn & Kick) using the panel regression model try to identify determinants of banking system stability in Germany. The indicator, which illustrates level of stability in banking sector, consists of three parameters: probability of default of certain bank, credit spread and stock market index for the banking sector. Authors confirm the hypothesis that these indicators can be used for finding out signals of banking system destabilization on the base of calculations.

M. Segoviano, C. Goodhart (Segoviano & Goodhart, 2009) also presented some empirical results that are based on the using of network tools. They developed Banking Stability Index (BSI) as an indicator, which try to predict the amount of banks that become bankrupts as a result of bankruptcy of certain bank. The authors get rather interesting results that allows deepening the impetus and contagion processes while 2007-2009 global financial crisis. But, nevertheless this approach also has the same limitation as others that are based on some network techniques.

Thus, brief literature review allows us to understand the genesis of banking system stability assessment tools both in national and foreign practices. And also is a background of the conclusion that there is an urgent necessity of permanent updating of the key determinants of the stability of the banking system, especially taking into account national specificities of banking sector functioning and some limitations that are caused by it.

Purpose of the research is to characterize current trends of national banking sector development, identify the determinants of banking sector stability and develop recommendations for the regulator to eliminate threats of its violation.

### 3. RESULTS

Thus, the initial stage of our research is to identify the key trends of the banking system development

through the analysis of the key performance indicators of banks (Table 1) and economic standards indicators (Table 2).

The analysis of presented statistical data (Table 1) confirming the reduction in the number of banks (during the period their number decreased by 59 institutions or 33.72%) that brightly illustrates the crisis in the banking sector. In addition, it should

be highlighted the tendency to the outflow of foreign capital from the banking system of Ukraine that is evidenced by a significant decrease in the number of banks with foreign capital. During the research period there was more than twofold increase in the value of banks' assets, but the destabilization of the socio-economic conditions led to the deterioration of the assets over 2015.

**Table 1.** Dynamics of the key performance indicators of banks in Ukraine in 2008-2016 years (at the beginning of the period)

Ratio	Year								
	2008	2009	2010	2011	2012	2013	2014	2015	2016
Amount of banks	175	184	182	176	176	176	180	163	116
including banks with foreign capital	47	53	51	55	53	53	49	51	41
Assets, bln. UAH	599,37	926,09	880,30	942,09	1054,28	1127,19	1278,09	1316,85	1254,38
including loans, bln. UAH	485,37	792,24	747,35	755,03	825,32	815,33	911,40	1006,36	965,09
The share of overdue loans in total loans, %	1,3	2,3	9,4	11,2	9,6	8,9	7,7	13,5	22,1
Liabilities of banks, bln. UAH	529,82	806,82	765,13	804,37	898,79	957,87	1085,50	1168,83	1150,67
ROA, %	1,50	1,03	-4,38	-1,45	-0,76	0,45	0,12	-4,07	-5,46
ROE, %	12,67	8,51	-32,52	-10,19	-5,27	3,03	0,81	-30,46	-51,91

Source: The National Bank of Ukraine

Despite the existence of positive trends in the expansion of lending by Ukrainian banks, it is negative that the scale and intensity of this kind of active banking operations are decreased at the beginning of 2016. The intensification of destructive processes in the economy and the banking sector in particular realized in a significant increase of the share of overdue loans in total bank loans in recent years. The power of crisis processes in the banking sector of Ukraine also clearly illustrates negative trends in the return on assets and the return on equity during past two years. Thus, it can be noted that the analysis of key performance indicators of the bank allows confirming the presence of a number of problems in the banking sector of Ukraine.

In the context of characteristics of compliance the threshold of economic standards by Ukrainian banks (Table 2), it should be noted that there is a negative trend of reduction the level of regulatory capital of banks in Ukraine in 2015-2016. In particular, the average value of regulatory capital at the beginning of 2016 slightly exceeds the required level (120 mln. UAH. for banks that were registered to 11/07/2014). In addition, there was a significant reduction in the level of regulatory capital adequacy, but the level of this parameter is within regulatory requirements (at least 10%). The level of capital adequacy (at least 4%) during the entire period was in diapason that does not break its critical level (in 2015-16 this indicator was not calculated). Economic standards that concerning the liquidity of Ukrainian bank (N4-N6) were kept within acceptable limits in 2008-2016, and during the last three years there was a significant increase of these indicators, but this trend can't be considered absolutely positive because the existence of excess liquidity among banks could be the reaction on their negative expectations, due to which they retain most of the assets in liquid form. This assumption is also confirmed by the decrease of the level of standards on investment (N11, N12), reflecting the fading of investment activity among Ukrainian banks due to the unfavorable economic and political conditions.

**Table 2.** Dynamics of values of economic standards in the banking system of Ukraine

Among the indicators that characterize the level of credit risk of banks only standard N7 approaching its critical value (25%), while the remaining parameters are within the determined by regulator limits.

Thus, on the base of the analysis of the key trends in the banking system of Ukraine, we can identify certain problem aspects that can be divided into two parts: endogenous and exogenous destructive factors. So, among the adverse external factors of the worsening of crisis in the banking sector of Ukraine the most crucial ones are the next: unstable economic and political environment, especially war conflict in Eastern Ukraine, Crimea occupation; reduction of public confidence in the banks; reduction of business activity; high inflation and decrease of real incomes; reduction of foreign investment and credit ratings; increase of the budget deficit and the size of public debt etc.

Among the endogenous factors of negative influence on the development of Ukrainian banking system the most significant, from our point of view, are the next ones: significant number of bank liabilities generated in foreign currency (currency risk); high susceptibility to interest rate risk; imbalance between the terms of investment and borrowing; high level of credit risk; insufficient capitalization of banks etc.

Consequently, these problems negatively affect performance of the banking sector of Ukraine. Therefore, taking into consideration the importance of detecting the destructive signals of violation of the stability of the banking sector on the early stage of its germination, it becomes very urgent to clarify key determinants of banking sector stability.

The basis for the realization of mentioned task is regression analysis (in particular, the construction of regression by the method of ordinary least squares). The time horizon of the study covers the period 2005-2015. The statistical base of the study is formed by indicators that characterize different aspects of the Ukrainian banking sector performance.

in 2008-2016 (at the beginning of the period)

Ratio	2008	2009	2010	2011	2012	2013	2014	2015	2016
Standard of minimal level of regulatory capital (N1), mln. UAH	72264,7	123065,6	135802,1	160896,9	178454,0	178908,9	204975,9	188948,9	129816,9
Standard of regulatory capital adequacy (N2), %	13,92	14,01	18,08	20,83	18,90	18,06	18,26	15,60	12,31
Standard of capital adequacy (N3), %	8,91	11,82	13,91	14,57	14,96	14,89	13,98	X	X
Standard of instant liquidity (N4), %	53,60	62,38	64,45	58,0	58,48	69,26	56,99	57,13	78,73
Standard of current liquidity (N5), %	75,31	75,16	72,90	77,33	70,53	79,09	80,86	79,91	79,98
Standard of short-term liquidity (N6), %	39,93	32,99	35,88	91,19	94,73	90,28	89,11	86,16	92,87
Standard of the maximum credit risk on one contractor (N7), %	22,56	23,04	21,56	21,04	20,76	22,10	22,33	22,01	22,78
Standard of big credit risks (N8)	171,06	187,36	169,21	161,20	164,46	172,91	172,05	250,04	364,14
Standard of maximum amount of loans, guarantees and warranties to one insider (N9), %	2,01	1,66	0,93	0,81	0,57	0,37	0,36	0,13	X
Standard of maximum total amount of loans and guarantees granted to insiders (N10), %	6,84	5,76	3,31	2,25	2,51	2,41	1,63	1,37	X
Standard of investment in securities by each institution (N11), %	0,58	0,22	0,07	0,05	0,06	0,09	0,04	0,01	0,002
Standard of total sum of investment (N12), %	9,05	5,52	3,12	3,35	3,24	3,48	3,15	2,97	1,10

Source: The National Bank of Ukraine

In particular, as an dependent variable Z-score was selected, because this indicator is developed by the World Bank specialists as a measure of banking sector stability assessment. It was calculated using the formula:

$$z - score = \frac{ROA + \frac{Equity}{Assets}}{sd(ROA)} \quad (1)$$

where *ROA* - returns on assets, %;  
*Equity* - value of equity, mln. UAH;  
*Assets* - value of assets, mln. UAH;  
*sd(ROA)* - standard deviation of *ROA*.

In turn, the set of independent variables were formed by the following indicators: interest margin to gross income ratio (x1); liquid assets to short term liabilities ratio (x2); reserves to bank assets ratio (x3); cost to income ratio (x4); number of banks branches (x5); the ratio of non-performing loans to total loans (x6). The choice of these parameters is due to their relevance regarding dependent variable and considerations to avoid collinearity between the factors of the model (in the regression analysis there were tested much more independent variables, but this set of them was yielded the best results avoiding factors collinearity).

Statistical base of the research is formed on the basis of official data of the National Bank of Ukraine and the World Bank.

Practical realization of the task mentioned above was done with the help of program product Stata 12/SE, in particular, Stata command «reg». The results of regression analysis are presented in Table 3.

Thus, on the base of the presented results we can make the following conclusions:

- the model is adequate, because the value of coefficient of determination (adjusted R<sup>2</sup>) is almost 1, that's mean that the real trend of influence of the factors on the stability of banking system in 99.71% could be explained by the model 4;

- all coefficients in the model are effective, because the value of «P>|t|» in each case is lower than 0.1, that proves the significance of the coefficients in 90% confidence level;

- among factors that positively influence on the stability of banking sector are: interest margin to gross income ratio (an increase of this factor by unit will lead to the increase of Z-score in 0.402); reserves to assets ratio (causes the increase of dependent variable on 0.511); number of bank branches (1.607) and the ratio of non-performing loans to total loans (indicator is characterized by weak cohesion with dependent variable and the lowest among all coefficients level of efficiency);

- the group of factors that cause the deterioration of the stability of the banking system include short-term liquidity and cost to income ratio.

**Table 3.** Results of the regression analysis of determination the impact of factors on the stability of the banking system of Ukraine

Variable	Coefficient	Standard error	t	P> t
x <sub>1</sub>	0,402	0,015	36,41	0,001
x <sub>2</sub>	-0,042	0,007	-5,88	0,028
x <sub>3</sub>	0,511	0,038	13,38	0,006
x <sub>4</sub>	-0,237	0,007	-35,19	0,001
x <sub>5</sub>	1,607	0,067	23,91	0,002
x <sub>6</sub>	0,006	0,002	3,52	0,072
Cons	-9,551	0,598	-15,98	0,004
R <sup>2</sup>	0,9971			

Source: authors' calculations

Overall, the impact of factors on the dependent variable can be described by the following equation:

$$z - score = 0,402x_1 - 0,042x_2 + 0,511x_3 - 0,237x_4 + 1,607x_5 + 0,006x_6 - 9,551 \quad (2)$$

So, summarizing all the above, it should be noted that one of the main destabilizing factors for the banking system is the expansion of the

accumulation of high liquid assets that actually serves an indicator of expectations of banks to intensify the destructive processes, especially regarding increased risks of insolvency. In addition, the dependent variable is negatively affected by the growth of the cost to income ratio, which can be possible in several cases: rising of costs and constant income, reducing of income and constant costs or advancing growth rate of expenditure over income (the last option is typical on the current stage of development of the banking system of Ukraine). Thus, realization of one of the defined scenarios will characterize worsening of the efficiency of banks.

However, positive impact of certain factors on the financial stability of banks can be explained as follows: increase in interest margin to gross income ratio shows an increase in basic operations that are realized by bank, while at the present stage of development of the banking system of Ukraine fee revenue increases but not interest income, which is the result of reducing the intensity of realization the function of financial intermediary by banks. The positive influence of the reserves to assets ratio on the stability of the banking system is quite natural, because the growth of reserves creates "insurance cushion" in case of an unfavorable situation. The growth of the branch network of banks positively affects the level of stability because an expand of the number of branches is economically feasible only if favorable market conditions, which, in turn, can be considered as a signal of positive expectation of banks. However, it is fair to note that the last factor refers to the group of positive factors because of the time horizon of the research: at the present stage of banking development the tendency to the virtualization of banking activity becomes more popular, and therefore there will be no need to create additional branches in nearest future.

## CONCLUSIONS

The analysis of the main trends of the development of the banking system of Ukraine helped to identify the negative tendency to the worsening of a range of key performance indicators of the banking sector. Aggravation destructive processes lead to a number of endogenous and exogenous problems that affecting the level of stability of banks.

Evaluation of the factors that ensure the stability of the banking system of Ukraine makes it possible to establish the origin of the determinants of its violation. In particular, if in a certain period of time the dynamic stability of the banking system of Ukraine has been violated, it's possibly would have an objective and endogenous reasons for this.

The National Bank of Ukraine developed a comprehensive program of the development of the financial sector of Ukraine to 2020 (resolution of the NBU № 392 from 18.06.2015), which aims to achieve financial stability and development of the financial sector of Ukraine. However, among the determined in this document quantitative indicators support of sufficient capacity to maintain the financial stability of the banking system of Ukraine is not mentioned, especially taking into consideration liquidity ratios, reserves policy, reduction of problem assets. Thus, it

becomes a very urgent task to increase the efficiency of banking regulation and supervision in Ukraine, in particular, according to the vector of the implementation of the Basel II and III requirements, which aimed at the development and implementation of macro-prudential approaches. An important component of macro-prudential supervision is monitoring of changes of a set of banking system' stability indicators. Monitoring of the indicated parameters by the regulator can be the basis for identifying signals of growing risks of large-scale transmission of financial shocks caused by the decline in the stability of the banking sector.

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