Indicators of Financial Stability of the Ukrainian Banking System

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Abstract: *The object of this paper is to identify macroeconomic indicators that are most suitable for detection of instabilities in the Ukrainian banking system and for justification of the methods of evaluation of the financial stability of the Ukrainian banking system based on an integral index. It analyzes the dynamics of macroeconomic indicators of Ukraine's economy and proposes to use the ratio of the growth rate of loans to non-financial corporations to total GDP as the key macroeconomic indicator of financial stability, with GDP dynamics and dynamics of loan/deposit portfolio ratio of Ukrainian banks being supplementary indicators. It analyzes existing methods of formation of the integral index of the financial stability of the banking system and reveals their limitations. It refines the methods of the banking system financial stability evaluation by adding calculation of taxonomic indicators for the groups of capital adequacy, liquidity, business activity, performance and finding the overall financial stability index as a geometric mean of the taxonomic indicators. It was found that the dynamics of the proposed integral index is in agreement with the stages of development of the Ukrainian banking system; therefore it is practical to use it as a financial stability indicator.*

Keywords: *financial stability, banking system, index, macroeconomic indicators, integral index of financial stability.*

1. INTRODUCTION

In order to act properly as financial intermediaries and money circulation regulators, to discharge functions of maintenance and multiplication of social capital, banks must meet the high standards of reliability and financial stability. Today Ukrainian economy faces profound changes in the banking system triggered by the significant growth of government funds allocated for restructuring of the banking sector and accumulation of heavy losses by banking institutions. Among the consequences of crisis Ukrainian banking system faces today are deterioration of quality of banks loan portfolio (as of 06.01.2015 the share of overdue loan debts in total loans amounted to 18%, the highest value since 2001), a drop in capitalization and a slump in profitability (as of 06.01.2015 return on assets was -12.42%, return on equity -168.11%), rising currency risks due to heavy dollarization of the economy, a fall in liquidity and solvency of the banking system, shrinkage of the resource base as a result of considerable deposit outflow (in 2014 it made USD 126 billion), mass-scale liquidation of banks (in 2014 as many as 33 banks were declared insolvent, 17 of which were ordered into liquidation). In these conditions the problems of early diagnostics of stability loss by the Ukrainian banking system and selection of indicators most suitable for this purpose gain special importance.

The financial stability of an economy in general and banking system in particular have been studied in a large number of works (Allen and Wood, 2005; Borio and Lowe, 2002; Bobyl, 2011; Carson and Ingves, 2003; Demirguc-Kunt and Detragiache, 1998; Diakonova and Mordan, 2015; Filippova, 2012; Kovalenko and Harkusha, 2013; Kozlov, 2014; Kuznietsova and Kovalenko, 2012; Minsky, 1992; Pohorelenko and Ostroushko, 2013; Zvieriakov and Kovalenko, 2012). These studies involved the use of macroeconomic indicators (Allen and Wood, 2005; Borio and Lowe, 2002; Demirguc-Kunt and Detragiache, 1998; Kozlov, 2014; Minsky, 1992), financial performance indicators of the banking sector (Bobyl, 2011; Carson and Ingves, 2003; Filippova, 2012; Kovalenko and Harkusha, 2013; Pohorelenko and Ostroushko, 2013), a scorecard incorporating both of the above groups (Diakonova and Mordan, 2015; Kuznietsova and Kovalenko, 2012; Zvieriakov and Kovalenko, 2012) as stability indicators.

However, available indicators need to be adjusted and updated to take account of the specifics of the economy and the banking system of Ukraine. In addition, the following questions call for an answer:

1.1. Research Questions

Q1. How adequate are macroeconomic indicators in reflecting the trends in the Ukrainian banking system?

Q2. What integral indices can be used to determine the level of financial stability of the Ukrainian banking system and its trends?

1.2. Research Objectives

- identification of macroeconomic indicators that are most suitable for the detection of instabilities in the banking system of Ukraine
- justification of the method of evaluation the financial stability of the Ukrainian banking system based on the integral index

1.3. Research Hypotheses

H1. There is a positive relationship between the growth rate of real gross domestic product (GDP) and financial stability of Ukrainian banking system

H2. The rise in the rate of growth of the loans to non-financial corporation's / total GDP ratio, the banks' loan/deposit portfolio ratio, the ratio of commercial banks assets to total assets of the banking system signal increasing vulnerability of the Ukrainian banking system to crisis factors.

H3. The level of stability of the Ukrainian banking system can be measured using the integral index that integrates the individual parameters of its components

2. LITERATURE REVIEW

According to Allen and Wood (2005), the characteristics of financial stability or instability are: fears that means of payment may be unavailable at any price; efficient allocation of savings to investment opportunities; institutional instability; asset price stability; deviations from optimal savings / investment plan. Indeed, these criteria do characterize financial stability (instability), however, it is hard to have some of them measured numerically, which renders it difficult to use them as financial stability indices for the Ukrainian banking system.

According to Minsky's financial instability hypothesis (1992), growing optimism and risk appetite of economic agents lead to a financial crisis that can be measured by the ratio of the volume of loans to non-financial corporations to total GDP (Kozlov, 2014). Demirguc-Kunt and Detragiache (1998) believed that low economic growth rate leads to increased risk of a banking crisis. These indices have to be tested for conformance to trends in the Ukrainian banking systems and their feasibility for practical use to define financial stability.

Among the financial stability indices based on performance of the banking sector they distinguish: capital adequacy, asset quality, earnings and profitability, liquidity, sensitivity to market risk (Carson and Ingves, 2003). Generally, these indices match financial soundness indicators developed by the International Monetary Fund (Financial Soundness Indicators, 2006). With regard to the above indicators plausible is a view stating that a significant number and diversity of indices calculated in the framework of this approach makes it difficult to accurately assess the level of financial stability of the banking system (Diakonova and Mordan, 2015). Moreover, there are no criterial values for these indicators that can be used to diagnose soundness violation.

This disadvantage is offset by the approaches that suggest that the indicators for evaluation of the financial stability of the banking system should be as follows: indicators of a crisis in the banking system; indicators of macroeconomic instability; indicators of financial security of the banking system; risk indicators; aggregate indicators of financial soundness of the banking system (Kuznietsova and Kovalenko, 2012; Zvieriakov and Kovalenko, 2012). For this purpose each indicator is assigned its standard value. At the same time, this approach also has some limitations. Firstly, it is not possible that all of the indicators fall within the standard values, which makes it difficult to develop general conclusions; secondly, it is quite difficult to establish the precise cost of restoration of the banking system, which share in GDP belongs to financial stability indicators; thirdly, the indicators that evaluate the performance by the banking system of its main functions at the macroeconomic level, indicators that assess the effectiveness of the banking system, indicators used to evaluate the banking system's ability to resist the action of internal and external factors, laws

and regulations effectiveness indicators are hard to measure. Moreover, the latter can be defined only after a certain period of time.

The work by Bobyl presents quite a thoroughly developed model of evaluation of financial soundness of the banking system consisting of five groups: "capital adequacy "; "assets quality"; "earnings and profitability"; "liquidity"; "dynamics" (Bobyl, 2011). The "Capital adequacy" group is represented by indicators of solvency and capital provision; the "Assets quality" group combines indicators of the quality of the loan portfolio, credit risk, market risk, currency risk; the "Profits and profitability" includes the indicators of return on assets (ROA) and return on sales (ROS); the "liquidity" group is comprised of indicators of current liquidity and long-term liquidity. The "Dynamics" group includes such indicators as the dynamics of deposits and the dynamics of irregular debts. This method involves analysis of the absolute value of each parameter by establishing a relevant criterion, which, depending on the type of the specific parameter, represents optimum, limit or average value and comparison of this criterion with the actual value of the parameter. The amount of difference between the criterion and the actual value of the parameter is assigned a certain number of points. The integral financial stability index is calculated based on the evaluation of the absolute value and assessment of the dynamics. Along with the positive aspects this approach has some arguable points, in particular, the lack of validity of the definition of weighted values of the groups of indicators when calculating the integral index as well as the assumption that if 50% of banks have high integral index, the banking system can be considered stable (it is disregarded that the concentration of assets in these 50% of banks can be significantly less than 50% of the assets of the banking system).

Filippova went further in her work and extended the use of indicators of financial soundness to calculate aggregate indicator (AIFS) based on the groups of ratios of capital adequacy and loan portfolio quality, performance, liquidity followed by establishment of critical values and scoring (Filippova, 2012). It would be helpful to check this method for the correspondence of the dynamics of the proposed indicator to real situation in the banking system of Ukraine.

For comprehensive evaluation of financial soundness of the banking system they (Kovalenko, 2010; Pohorelenko and Ostroushko, 2013) proposed to use the overall index to consolidate a system of indicators: reliability index, financial leverage ratio, ratio of equity participation in the formation of assets, equity security factor, earning assets security factor, equity multiplier ratio, authorized to balance sheet capital ratio, capital/deposit ratio, general liquidity ratio, earning assets to total liabilities ratio, share of deposits in liabilities, solvency ratio, share of loans in total assets, share of liabilities used for credit investments. This method can be used in the analysis of financial soundness of the banking system provided justification of integral index levels (high, average, low).

Further studies (Kovalenko and Harkusha, 2013) suggest to analyze the stability of the banking system based on the calculation of the integral index by groups of such parameters: banking system capital adequacy (statutory capital adequacy ratio (R2) regulatory capital to liabilities statutory ratio (R3-1), reliability index, financial leverage ratio, equity multiplier ratio); liquidity (overall liquidity ratio, loans to deposits ratio, liquid assets to total assets ratio); business activity (borrowing ratio, use of term deposits in the loan portfolio ratio, total securities and equity investment ratio, credit activity ratio); performance (return on assets, return on equity, net interest margin, net spread, income, expenses, financial results); competitiveness and concentration in the banking market (the Herfindahl-Hirschman index, the concentration index, the Lerner index, the Rozenbluth index, the Gini index). The algorithm for calculation of the financial stability index of the banking system involves three steps: calculation of intermediate indicators of banks' performance for groups of indicators; estimation of the weighted average of groups of indicators of banking performance based on the hierarchy analysis; calculation of the bank's financial stability index. Without denying the benefits of the above approach, it should be noted, however, that the use of expert evaluations may render information less unbiased because it is quite hard to establish the priority ranking for indices of capital adequacy, liquidity, business activity, performance at the banking system level.

3. METHODOLOGY

Given the results of the analysis of available approaches, we consider it appropriate to estimate financial stability of the Ukrainian banking system in the period of 2000-2014 by macroeconomic indicators defined in (Kozlov, 2014): dynamics of real GDP, growth rate of the ratio of loans to non-financial corporations to total GDP, Ukrainian banks loan/deposit portfolio ratio, total assets of Ukrainian banks to total NBU assets, as well as to use the method described in (Filippova, 2012;

Kovalenko, 2010 ; Kovalenko and Harkusha, 2013) and to match the evaluation results. For this purpose it is suggested that the method (Kovalenko and Harkusha, 2013) should be refined to include calculation of taxonomic indicators by groups of capital adequacy, liquidity, business activity, performance to find the overall financial stability index as a geometric mean of taxonomic indicators. Also, the method should be adjusted to exclude indicators of competitiveness and concentration in the market of banking services as well as the regulatory capital to liabilities ratio (R3-1). The use of the groups of indicators of competitiveness and concentration in the market of banking services is arguable because there are different views regarding the relationship between competitiveness and financial stability as a part and the whole. Exclusion of the R3-1 statutory ratio from the method is due to its exclusion from the list of statutory requirements for regulation of bank activities in Ukraine in order to increase efficiency and ensure stable operation of the banks according to the Resolution of the National Bank of Ukraine No. 862 dd. 15.12.2014.

Both methods (Kovalenko, 2010; Kovalenko and Harkusha, 2013) require validation of the level of values of the integral index of financial stability (high, average, low). For this purpose we suggest to build a scale based on the "golden section" method (Zahorulko, 2008), according to which all changes occur at the level of 38.2 % and 61.8 %. Since the difference between the maximum and minimum value of the scale is 1 (the minimum value that can be adopted by integral index of financial stability is 0, while the maximum value is 1) by multiplying the difference sequentially by 0.382 and 0.618 and subtracting each of the received figures from the "maximum" one, we can obtain the value of the scale at which, using the "golden section" method, changes are most likely to occur. In this way, the range [0; 0.382] corresponds to the low level; the range (0.382; 0.618] – to the average level, the range (0.618, 1] – to the high level of financial stability of the banking system.

4. DATA ANALYSIS AND FINDINGS

To test methods based on integral indices (Kovalenko, 2010; Kovalenko and Harkusha, 2013), for each method we calculated 15 financial ratios for 14 years that describe functioning of the Ukrainian banking system; to test the method (Filippova, 2012), we calculated 15 indicators for 10 years since financial stability indices developed by the IMF were introduced in Ukraine as late as in 2005. Macroeconomic indicators were examined for the period of 2000-2014.

4.1. Analysis of the Financial Stability of the Ukrainian Banking System by Macroeconomic Indicators

As stated in work (Kozlov, 2014), when determining the factors that cause instability of the banking system, in developing countries it is the dynamics of real GDP growth, and not its absolute value, that is more important for their banking systems. Further, based on the financial instability hypothesis (Minsky, 1992), they conclude that the vulnerability of the banking systems of countries with average level of income affects the ratio of total loans to non-financial corporations to total GDP, and particularly, its growth rate. Therefore, it is practicable to analyze the dynamics of these indicators presented in Figure 1.
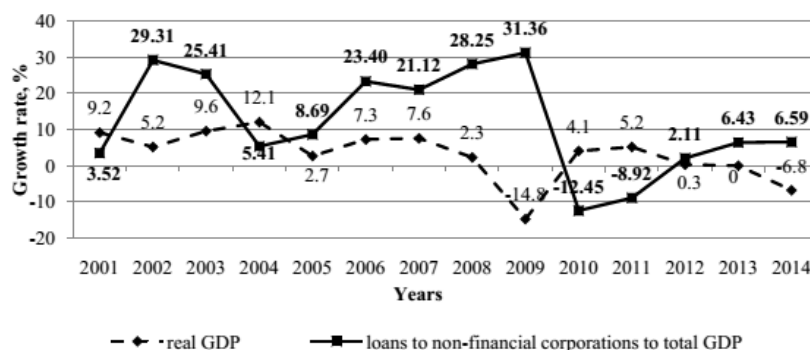
Fig1. *Ukrainian real GDP growth rate and the ratio of loans to non-financial corporations to total GDP*
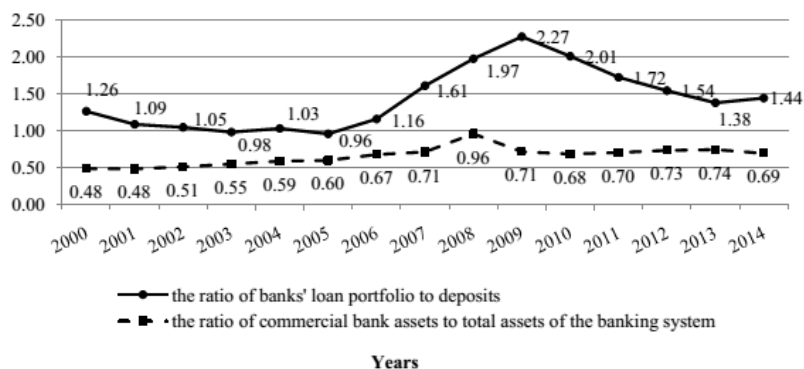
Source: *compiled by the authors according to official data of the National Bank of Ukraine, the State Statistics Service of Ukraine, the Annual Reports of the National Bank of Ukraine*

The graph shows that from 2000 to 2004 no significant fluctuations in real GDP growth rate were observed, while in 2004-2005 it slumped from 12.1% to 2.7%, which is concurrent with the "deposit fever" triggered by the "Orange Revolution". The problems in the banking sector in this period were

sparked by political factors alone, although they provoked speculations in the foreign exchange market causing the dollar frenzy and early withdrawal of bank deposits by the depositors. The NBU managed to stop the devaluation of the national currency by currency interventions. It also ensured sale of currency to the population via commercial banks in order to curb the demand for currency and introduced restrictions on deposit withdrawal. This situation demonstrates that the banking sector is affected greatly by panic sentiments among the population due to unstable political situation, which is also true today and is one of the factors contributing to imbalances in the banking system. One can also see correspondence of real GDP dynamics to the banking crisis of 2008-2009 that lead to a 25% drop in industrial production and a significant plunge of real GDP (growth rate reduction from 2.3% to -14.8%), which was one of the worst GDP figures in the world. Considering the above, one can make a general conclusion regarding existence of common trends in the dynamics of real GDP and financial stability of the Ukrainian banking system.

The analysis of the ratio of loans to non-financial corporations to GDP shows that in the years preceding the crisis of the Ukrainian banking system, its growth rate had been increasing, and during the periods of stabilization it had slowed down. Starting from 2005 lending to the real sector of the economy compared to the nominal GDP saw gradual increase, which fact signaled economic imbalance and the eventual crisis phenomena in the banking system most notably seen in 2009. Due to lack of timely stabilization measures, despite a temporary drop of the index in 2010, its upward trend is observed even today and is an evidence of the deepening crisis in the banking sector of Ukraine. Therefore, the growth rate of the ratio of loans to non-financial corporations to total GDP is directly related to the crisis in the banking system of Ukraine, which allows using this figure to predict its soundness troubles.

An important characteristic of the banks excessive risk appetites as a result of credit portfolio growth rate in the banking sector is their loan/deposit portfolio ratio (Kozlov, 2014). The stability of the banking systems is affected not only by the characteristics of the national banking sector, but also the ability of the central bank to support commercial banks should they face negative impacts. In this regard, it is practicable to study the trends for the ratio of assets of Ukrainian banks to total assets of Ukrainian banks and the NBU. The dynamics of these parameters is shown in Fig. 2.

Fig2. *Dynamics of the ratio of loan portfolio of Ukrainian banks to deposits and the ration of assets of Ukrainian banks to the volume of the banking system*

Source: *compiled by the authors according to official data of the NBU*

The graph shows that the upward trend in the loan/deposit portfolio ratio of Ukrainian banks was observed in the period from 2005 to 2009. During this period the banks actively built up their deposit portfolios by means of development of new deposit products and increase of the number of offers, at the same time the market of credit services was booming. The growth of the banks' loan/deposit portfolio ratio indicated the presence of systemic crisis in the banking sector in 2008-2009, which was due to the imbalance between assets and liabilities of domestic banks and their highly risky activities. In 2012-2013 the value of this indicator had been gradually going down as a result of shrinkage of lending to the economy due to stricter requirements for potential borrowers and introduction of a number of restrictions on credit operations, particularly for currency loans on the part of the NBU. These trends signaled a short-term improvement in the banking sector of Ukraine. However, as early as in 2014 the rapid drop of the exchange rate of the national currency against the dollar, the degradation of performance by Ukrainian banks, the introduction of restrictions on currency transactions on the back of the general economic and political crisis substantially undermined

confidence in the banking system on the part of economic agents, which ultimately led to a significant outflow of deposits. This contributed to the growth of the loan/deposit portfolio ratio of Ukrainian banks.

With regard to the ratio of assets of Ukrainian banks to assets of the banking system, one can mark the following trends. During 2000-2008 the share of assets of Ukrainian banks in total assets of Ukrainian banks and the NBU had gradually increased from 48% in 2000 to 96% in 2008. The reason behind the Ukrainian banks assets growth was their growing credit portfolios due to growth of loans to business entities and individuals as well as raise of investment in securities, including government ones. The NBU assets, too, showed an upward trend caused by growth in refinancing loans and stabilization loans to commercial banks to support their liquidity levels and to cope with the financial difficulties. According to the NBU data, lending to tier-two banks in 2008 went up from UAH 1692 mln to UAH 60926 mln as compared to 2007 (36 times). This is an evidence that the NBU supported commercial banks in times of banking crises. Nevertheless, the ratio of assets of commercial banks to total assets of the Ukrainian banking system is not always a reliable indicator of a crisis in the banking sector.

4.2. Analysis of the Financial Stability of the Ukrainian Banking System by Integral Indicators

In accordance with the objectives of the study, it will be practical to calculate the integral index of financial stability using different methods followed by comparison of the results. As noted above, for this purpose the following methods were selected: #1 - method presented in (Kovalenko and Harkusha, 2013) and improved by the authors; # 2 - adjusted method (Kovalenko, 2010); # 3 - method presented in (Filippova, 2012).

Taxonomic indicators by groups of financial stability of the banking system and overall integral index calculated using method #1 are presented in Fig. 3. The results of calculations suggest close relationship between the established levels of financial stability of the Ukrainian banking system and crises phenomena that accompany the development of the banking system. The financial stability of the Ukrainian banking system in 2001-2004 was on the average level except for 2003, when the political processes heated up shortly before the "Orange Revolution". Starting from 2006, the level of financial stability of the banking system of Ukraine began gradual decline. Unprofitable loans, outflow of bank deposits, falling profitability, liquidity and business activity of banks under the influence of the negative effects of the global financial crisis contributed to imbalances in the Ukrainian banking sector.
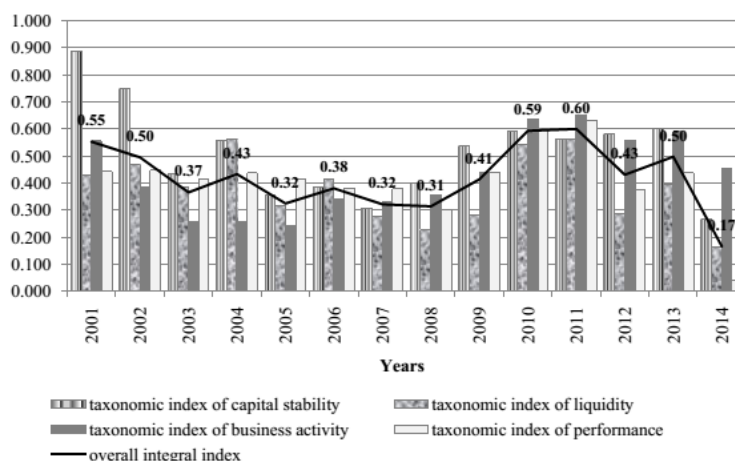
Fig3. *The dynamics of individual taxonomic indicators and the overall integral index of the financial stability of the Ukrainian banking system*

Source: *compiled by the authors*

Active measures by the NBU in the period from 2010 to 2012 yielded some results and restored confidence of the population in domestic banks. Despite the temporary stabilization, the banking sector saw no complete recovery and revitalization of the banking sector. And as early as in 2014 the situation quickly grew worse amid general economic slowdown and instability in the country's political system. The negative trends of weakening national currency, decline in foreign exchange reserves, increasing inflation caused an increase in speculative currency transactions and lack of consistent action by the NBU resulted in the level of financial stability of the banking system of Ukraine falling to a record low value (0.17).

The results of calculation of integral indicators of financial stability of the banking system and its ranking using the three methods are presented in the Table. 1.

Table1. *The financial stability scores of the Ukrainian banking system ranked on the basis of integral indices*

Year	Method #1		Method #2		Method #3	
	Integral index	Financial stability level	Integral index	Financial stability level	Integral index	Financial stability level
31.12.2001	0.55	average	0.95	high	–	–
31.12.2002	0.50	average	0.80	high	–	–
31.12.2003	0.37	low	0.49	average	–	–
31.12.2004	0.43	average	0.61	average	–	–
31.12.2005	0.32	low	0.37	low	2.95	satisfactory
31.12.2006	0.38	low	0.45	average	3.01	unstable
31.12.2007	0.32	low	0.34	low	2.34	satisfactory
31.12.2008	0.31	low	0.46	average	2.63	satisfactory
31.12.2009	0.41	average	0.57	average	2.56	satisfactory
31.12.2010	0.59	average	0.65	high	2.25	satisfactory
31.12.2011	0.60	average	0.60	average	2.09	satisfactory
31.12.2012	0.43	average	0.61	average	1.76	normal
31.12.2013	0.50	average	0.59	average	1.84	normal
31.12.2014	0.17	low	0.24	low	2.76	satisfactory

Source: *compiled by the authors*

Based on the found levels of financial stability of the banking system, it can be stated that the results that best match the real situation were produced by method # 1 as improved by the authors. According to method #2 the state of the banking system during the period from 2001 to 2007 was characterized by ongoing fluctuations of the level of financial stability, with minimum value of this indicator reached in 2007. According to this method the beginning of the positive trend in the dynamics of the integral index of financial stability falls on 2008, and in 2010 the level of financial stability according the adopted scale can be viewed as high, which is inconsistent with facts.

The aggregate indicator of financial soundness of the banking system (AIFS) under method # 3 was calculated, unlike in the previous methods, for the period starting from 2005 since the key financial stability indices proposed by the IMF and used by the method have been estimated in Ukraine only since 2005. The method involves the following scale to evaluate the financial stability the Ukrainian banking system: [1-1.5] – steady development; (1.5-2] – normal level of financial stability with little risks; (2-3] – stable level with a trend for risks increase; (3-3.5] – instable level; >3.5 – critical level. Based on the calculation of the AIFS, it can be concluded that the method is not free from some shortcomings since the calculated integral index of financial stability provides only a partial match to the actual situation in the banking sector of Ukraine. Thus, according to estimates in 2006 the level of the banking system was unstable, and in 2008-2009 it changed to stable with presence of risks, when in fact it was the time of the peak of the financial crisis. Also, the level of financial stability in 2013-2014 under this method was more optimistic than the level that was obtained by the previous methods. This fact suggests that the IMF indicators are not always adequate for evaluation of the level of financial stability of the domestic banking system, which probably can be accounted for by internal, country-specific factors of the Ukrainian economy.

Based on the above correlation of the trends of integral indices of financial stability of the banking system and its real dynamics it can be concluded that the value of the integral index calculated using method #1 as improved by the author provides the best match to real figures, hence, the use this parameter as an indicator of destabilization of the Ukrainian banking system is viable.

5. CONCLUSION

The study examined the possibility of using macroeconomic indices and integral indices of the Ukrainian banking system as indicators of its financial stability. The main objectives of this research were: 1) to identify macroeconomic indicators that are most appropriate for detection of loss of stability by the Ukrainian banking system; 2) to justify the method of evaluation of the financial stability of the Ukrainian banking system based on the integral index. In order to achieve objective 1 the paper suggested and tested two hypotheses. Both hypotheses were accepted. It was found that the use of only one of the studied macroeconomic indices as a universal indicator of banking crises is not

effective. As far as the real GDP dynamics indicator is concerned, when matched against banking crises in Ukraine, it was found to be mostly in agreement with the banking system development trend. The growth rate of the ratio of loans to non-financial corporations to total GDP is in direct relationship to the probability of a banking crisis. More detailed information on trends in the banking sector of Ukraine and prediction of possible crisis signs requires further analysis of the Ukrainian banks loans to deposit ratio, which can be used to identify the presence or lack of balance between banks' assets and liabilities.

In order to achieve objective 2 it was supposed that the level of stability of the banking system of Ukraine can be measured by an integral index that incorporates separate indices contributing to stability. In order to prove this hypothesis we analyzed and tested three methods to develop integral indices and one of the methods was updated by building taxonomic indicators for groups of ratios of capital adequacy, liquidity, business activity, performance and integrated them to form a integral index using the geometric mean method, as well as defined the levels of financial stability on the basis of the "golden section" method. The dynamics of the integral index of the financial stability of the Ukrainian banking system under this method is in agreement with the stages of its development, which proves the practical effectiveness of this approach. The application of the second and third methods showed that the levels of financial stability and trends established using them are inconsistent with the real situation.

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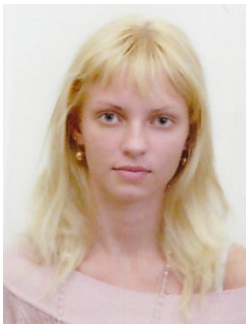
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