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APPROACHES TO THE CALCULATION OF THE BANKING SECTOR VULNERABILITY

Historically, banking crises have always resulted in significant economic burden, which results in major expenditures of central banks, as well as in growth of central fiscal expenditures aimed at crises resolving, along with notable slowdown in tempo of production growth and, consequently, the gross domestic product [1, p. 5]. Constantly increasing globalization of financial markets adds to the probability of financial instability emergence, that is, basically, a huge favorable factor for a crisis, in the occurrence and development of which the role of banks does noticeably increase. It is caused by the fact, that the banks form institutional system, affecting the efficiency of loans distribution, structure of interest rates, the decisions in the field of monetary policy and the retransmission of such decisions to economic agents. Similar role of the banking sector is predetermined by its stable outstripping response to changes of the market conditions compared to other economy sectors, allowing to use its behavior as an effective means of economic situation forecasting. [2, p. 202].

Existing studies tend to use different combinations of events in the financial market, e.g. merges and acquisitions or companies going bankrupt, mass deposit withdrawal, as well as volumes and frequency of government interventions for banking crises forecasting. However, approaches that include a large number of factors often mean mutual correlation of some variables, which leads to low accuracy of forecasts of the corresponding models [3, p. 11]. Attempting to get over such technical difficulties, scientists Jurgen von Hagen and Tai-Kuang Ho offered an approach, based on projects studying currency crises [3, p. 12]. They used money market pressure index, or banking sector fragility index (further – BSFI), which is a reflection of the presence and amounts of excess demand for liquidity in the foreign exchange market. There has been an assumption, that the banking crisis is characterized by a significant increase in demand

for reserves of the central bank, i.e. increasing demand for foreign currency as a means of diversification of savings and protection against the inflation process.

The central bank, as a monopoly supplier of bank reserves in its turn can react on increasing demand for the reserves in two different. If the priority is to maintain fixed volume of reserves, monetary regulator responds with increasing short-term interest rate. If its purpose is to maintain the same level of short-term interest rate it must provide the banking system with reserves [4, p. 4].

There is a strong need in justification of the chosen approach, because after understanding the manifestations of the last global economic crisis of 2008-2009, scientists have created a huge variety of econometric models and tools that can be used to form the appropriate methods of specific prediction of crises. Firstly, there is no uniform and universally accepted approach to the fundamental concept for modern forecasting - "the banking system stability", causing difficulties of differentiation of natural cyclicity of economic development and instability, as a manifestation of influence of such factors, as inefficiency of transformation and regulation of the banking system, as well as the effects of external economic shocks and financial turbulences. By O. Baranovskii, formulation of the most accurate definition of banking system stability primarily corresponds to the task of finding the optimal instruments for quantitative assessment of this phenomenon [2, p. 592].

Due to the fact that the method of calculating BSFI uses only the volume of total loans given by the central bank and volumes of non-bank deposits in the banking sector, as well as the discount rate – these figures can be obtained and utilized quickly (as they are available for public access). Consequently, this approach to banking crises forecasting by using banking sector fragility index is theoretically efficient, and can provide the foundation for swift action to reduce the effects of the crisis.

Thus, the banking crisis, as noted above, is characterized by a sharp increase in short-term interest rate and / or a significant increase in the volume of loans given by the central bank to other financial institutions [5, p. 738]. Therefore, BSFI components are as follows:

the ratio of total loans the central bank provided for the banking system to total non-bank deposits in the banking sector;

the real short-term interest rate, and the formula for its calculation, by von Hagen, is as follows [3, p. 21]:

$$BSFI = \frac{\Delta y_t}{\sigma_{\Delta y}} + \frac{\Delta r_t}{\sigma_{\Delta r}}, \quad (1)$$

where Δy_t and Δr_t – changes in the ratio of total loans of the central bank to deposits and short-term change in the real interest rate respectively;

σ – standard deviations of indicators.

An approach to prediction of crises using similar indices of pressure on the foreign exchange market or the vulnerability of the banking sector is not sufficiently developed in the world scientific literature, and these indices include various components. However, limits, that identify pre-crisis state, mild and severe crises with the use of rms deviation of the corresponding index were determined and substantiated in the work of H. Kaminsky, K. Reinhart and S. Lizondo [6, p. 15]. The characteristic features (limits) for an index described above are:

- for pre-crisis state: $\mu + 1,5\sigma > BSFI \geq \mu + \sigma$; (2)

- for mild crisis: $\mu + 2,5\sigma > BSFI > \mu + 1,5\sigma$; (3)

- for severe crisis: $BSFI > \mu + 2,5\sigma$; (4)

where μ - the expected value of the BSFI over the period;

σ - rms of the corresponding index.

For further use of the BSFI, it is necessary to determine its reliability, that is, basically, drawing parallels between actual data and the index calculated. For this we use data from the National Bank of Ukraine in the quarterly measurement from 2004 yr. to Q3 of 2013 yr., provided in table 1 [7].

Table 1

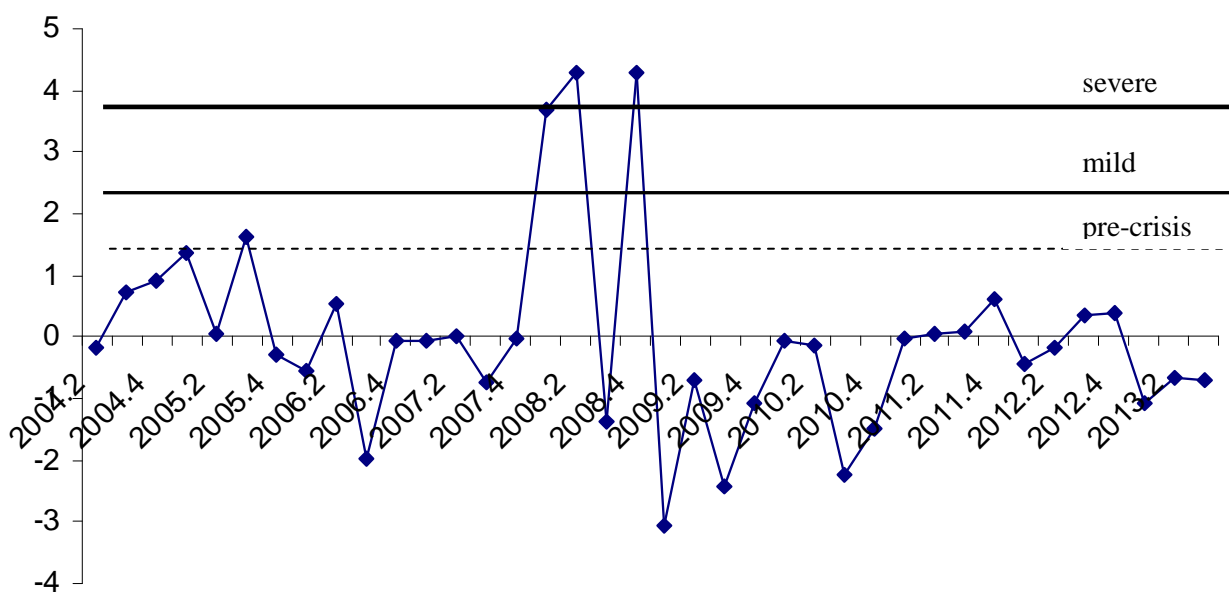
Statistics for modeling the BSF index

Year/quarter	Total loans given, billion UAH.	Total non-bank deposits, billion UAH.	Interest rate, %
2004.1	0,8727	67,1	7
2004.2	0,2623	76,8	7
2004.3	0,105	87,7	7,5
2004.4	0,8144	83,146	8
2005.1	0,0844	88,809	9
2005.2	0,4622	104,713	9
2005.3	6,4472	115,23	9,5
2005.4	5,005	132,932	9,5
2006.1	0,5358	135,752	9,5
2006.2	5,4986	148,83	9,5
2006.3	1,3846	164,796	8,5
2006.4	0,9128	184,423	8,5
2007.1	0,2657	195,492	8,5
2007.2	0,6692	215,914	8,5
2007.3	1,0153	248,041	8
2007.4	0,5735	280,107	8
2008.1	12,9	301,587	10
2008.2	38,455	321,565	12
2008.3	12,7231	340,086	12
2008.4	105,3988	357,8	12
2009.1	34,4259	313,932	12
2009.2	21,3306	316,951	12
2009.3	3,8032	318,233	11
2009.4	4,8453	327,996	10,25
2010.1	3,4	338	10,25
2010.2	0,46	364	10,25
2010.3	0,64	393,3	8,75
2010.4	0,7	414,2	7,75
2011.1	0,0079	439,6	7,75
2011.2	1,76956	461,3	7,75
2011.3	4,22254	466,9	7,75
2011.4	22,8	486,8	7,75
2012.1	10,5	497,3	7,75
2012.2	16,45	505,9	7,5
2012.3	27,75	526,6	7,5
2012.4	42,9	566,3	7,5
2013.1	6,1	591,4	7,5
2013.2	9,4	612,4	7
2013.3	11,8	641,7	6,5

Source: built according to NBU statistics: bank.gov.ua

According to formula 2, the pre-crisis state of the banking sector will be observed if $2,328183 > BSFI > 1,546314$. The limits were obtained by substituting the appropriate data from table 1, - namely, the mathematical expectation of the BSFI for the period 2004-2013 yy. and rms of the fluctuations of the index. Mild crisis is observed if the condition $3,89192 > BSFI > 2,328183$, according to formula 3 is confirmed, a severe crisis will occur if $BSFI > 3,89192$, according to formula 4.

The calculations of the quarterly banking sector fragility index with correspondent limits is shown below on a picture 1.



Pic. 1. The calculations of the quarterly BSFI, 2004-2013 yy.

Banking sector fragility index clearly reflects pre-crisis situations, such as the reaction of the banking sector on the wheat crisis in late 2004, as well as “gas crisis” of the mid-2005, associated with the rapid growth in gas price level for Ukrainian producers. Similarly, the index figures, which are greater than the threshold for a severe crisis, were calculated for 2008 and early 2009, together with the general volatility of the index during this period indicate a serious scale of deployment of the global financial crisis, which undoubtedly affected the banking sector and led to his unstable activity.

Selected approach to the dating of banking crises consists in calculation of the index of vulnerability of the banking sector by the formula containing only figures,

which are in operational access (the volume of total loans given by the central bank and volumes of non-bank deposits in the banking sector, as well as the discount rate), and further comparison of the obtained values with thresholds for pre-crisis situations, as well as mild and severe crises types without the use of huge arrays of primary statistical data.

Reproduced index can be used in practice. However, there is a need for further study of the problem of crises forecasting in the domestic banking sector, taking into account the absence of persistent trends in exaggerated shock processes and crises due to the difference of their causes and preconditions, and therefore, prediction models require permanent improvement and operational perfection.

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Погореленко Н.П. ПІДХОДИ ДО РОЗРАХУНКУ РІВНЯ ВРАЗЛИВОСТІ БАНКІВСЬКОГО СЕКТОРУ

Мета. Формування та впровадження ефективного та надійного підходу до розрахунку рівня вразливості банківської системи, як одного з факторів забезпечення її стабільності.

Методика дослідження. В процесі дослідження використовувались загальнонаукові методи, зокрема: методи теоретичного узагальнення – для дослідження теоретичних основ та методичного інструментарію прогнозування банківських криз; систематизації – для визначення передумов та наслідків відповідних шоків ситуацій; моделювання – для обчислення шоквартального значення індексу вразливості банківського сектору.

Результати. Обґрунтовано доцільність пристосування існуючих методик прогнозування банківських криз до особливостей вітчизняної банківської системи. Визначено дієвість використаного в роботі підходу щодо можливості його використання у якості оперативного інструменту по зменшенню кризових наслідків. Проведено його емпіричне тестування на надійність шляхом зіставлення реальних статистичних даних та обчисленим індексом.

Наукова новизна. Наведений індекс вразливості банківського сектору достатньо чітко показує кореляцію фактичних даних із встановленими межами щодо передкризового стану, м'якої та жорсткої криз, не використовуючи для його розрахунку великий масив первинної статистичної інформації

Практична значущість. Отримані результати дослідження є підґрунтям для вирішення питання щодо пристосування існуючих методик до особливостей банківської системи України. Вони можуть бути використані при побудові стратегії забезпечення стабільності банківської системи України.

Ключові слова. Банківська система, банківські кризи, центральний банк, вразливість банківського сектору, прогнозування, стабільність.

Погореленко Н.П. ПОДХОДЫ К РАСЧЕТУ УРОВНЯ УЯЗВИМОСТИ БАНКОВСКОГО СЕКТОРА

Цель. Формирование и внедрение эффективного и надежного подхода к расчету уровня уязвимости банковской системы, как одного из факторов обеспечения её стабильности.

Методика исследования. В процессе исследования использовались общенаучные методы, в частности: методы теоретического обобщения – для исследования теоретических основ и методического инструментария прогнозирования банковских кризисов; систематизации – для определения предпосылок и последствий соответствующих шоковых ситуаций; моделирования – для расчета ежеквартального значения индекса уязвимости банковского сектора.

Результаты. Обоснована целесообразность приспособления существующих методик прогнозирования банковских кризисов к особенностям отечественной банковской системы. Определена действенность использованного в работе подхода в части его использования в качестве оперативного инструмента уменьшения кризисных последствий. Проведено его эмпирическое тестирование на надежность путем сопоставления реальных статистических данных и расчетным индексом.

Научная новизна. Приведенный индекс уязвимости банковского сектора достаточно четко показывает корреляцию фактических данных с установленными границами для предкризисного состояния, мягкого и жесткого кризисов, не используя для его расчета большой объем первичной статистической информации.

Практическая ценность. Полученные результаты исследования являются основой для решения вопроса о приспособлении существующих методик к особенностям банковской системы Украины. Они могут быть использованы при построении стратегии обеспечения стабильности банковской системы Украины.

Ключевые слова. Банковская система, банковские кризисы, центральный банк, уязвимость банковского сектора, прогнозирование, стабильность.

Pohorelenko N.P. APPROACHES TO THE CALCULATION OF THE BANKING SECTOR VULNERABILITY

Purpose. Formation and implementation of effective and reliable approach to estimation of the banking sector vulnerability, as a factor of banking system stability ensurance.

Methodology of research. General scientific methods were used in the process of study, such as: methods of theoretical generalization – for the study of theoretical basis and range of methodological tools of banking crises forecasting; systematization – for determination of preconditions and consequences of corresponding shock situations; modeling – for calculation of banking sector fragility index.

Finding. The expedience of adaptation of existing banking crises forecasting techniques to the peculiarities of the Ukrainian banking system is proved. Effectiveness of the approach used in the study in the context of possibility of its use as an operative means for reducing the crises consequences is estimated. Empirical testing in terms of reliability of the approach is held by comparing real data with calculated index.

Originality. Reproduced banking sector fragility index shows the correlation between the actual data and established limits for pre-crisis state, mild and severe crisis quite clearly, without using a large array of primary statistical data.

Practical value. Research results are the basis for deciding whether the adaptation of existing methods of banking crises forecasting to the peculiarities of the Ukrainian banking system should be held. Results can be used for development of national banking system stability ensurance strategy.

Key words. Banking system, banking crises, central bank, banking sector vulnerability, forecasting, stability.