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**ESTIMATING THE LEVEL OF FINANCIAL SAFETY  
IN BANKING INSTITUTIONS**

*The article considers the economic essence of the «financial safety» category. The authors identify 4 levels of financial safety of banking institutions – global, national, sectoral and banking, along with the system of negative impact factors for each level. Also the step by step process of determining the integral indicator of financial safety of banking institutions using the fuzzy logic methods has been suggested.*

*Keywords:* banking institutions; financial safety; banking system.

Інна В. Ховрак, Марина В. Петченко  
**ОЦІНЮВАННЯ РІВНЯ ФІНАНСОВОЇ БЕЗПЕКИ  
БАНКІВСЬКИХ УСТАНОВ**

*У статті розглянуто економічну сутність категорії «фінансова безпека». Виділено 4 рівні фінансової безпеки банківських установ – світовий, національний, галузевий та банківський, а також систему факторів негативного впливу для кожного рівня. Запропоновано поетапний процес визначення інтегрального показника фінансової безпеки банківських установ з використанням методів нечіткої логіки.*

*Ключові слова:* банківські установи; фінансова безпека, банківська система.

*Форм. 1. Рис. 3. Табл. 1. Літ. 23.*

Інна В. Ховрак, Марина В. Петченко  
**ОЦЕНКА УРОВНЯ ФИНАНСОВОЙ БЕЗОПАСНОСТИ  
БАНКОВСКИХ УЧРЕЖДЕНИЙ**

*В статье рассмотрена экономическая сущность категории «финансовая безопасность». Выделены 4 уровня финансовой безопасности банковских учреждений – мировой, национальный, отраслевой и банковский, а также система факторов негативного влияния для каждого уровня. Предложено поэтапный процесс определения интегрального показателя финансовой безопасности банковских учреждений с использованием методов нечеткой логики.*

*Ключевые слова:* банковские учреждения; финансовая безопасность; банковская система.

**Problem setting.** Banking system is an important component of state financial infrastructure and a driving force for economic development. Banking integrates all participants of market relations to ensure continuous and effective turnover of financial resources in society by transforming household savings into investment resources and vice versa. However, in today's conditions the stability of banking system is disturbed by a number of negative factors, namely: lack of financial resources of population and businesses, weakness of monetary system, significant level of public debt, rising budget deficits, rising shadow economy, reducing GDP, inflation, currency devaluation etc. These factors increase potential and real threats to financial safety of banking institutions.

At the same time, deepening financial globalization, expanding the range of financial services, development of information and innovative technologies, consolidation of bank capital with substantial instability of national economy require effective management of banking institutions to ensure the financial stability for each bank

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and guarantee reliability and financial safety of the whole system. It should be emphasized that a range of practical measures on the safety of banking system needs to be improved constantly according to the objective requirements of real life today.

Accordingly, permanent diagnostics and monitoring of financial safety will make it possible to carry out preventive actions and timely eliminate threats to banking system development in Ukraine. Therefore, development of estimation methods for financial safety of banking institutions has important theoretical, methodological and practical value.

**Recent research and publications analysis.** Today the issue of financial safety is widely actualized by domestic scientists: A. Baranovskiy (2004; 2006), I. Diakonova and D. Shyian (2013), A. Yefifanov et al. (2009), I. Krupka (2012), G. Voitenko and M. Kondratiuk (2014), V. Vovk (2012). Scientists state that financial safety of banking institutions is a problem not only at the national but also at the international level (Baranovskiy, 2006). Methodological approaches to estimating the level of financial safety are investigated by S. Dmitrov (2012), S. Pyrizhkov (2003), O. Tymoshenko (2014), M. Yermoshenko (2001), M. Yermoshenko and K. Goryacheva (2010), M. Yermoshenko et al. (2014).

The method of estimating the safety of banking, as a component of economic safety, was partly approved by the order «On approval of methodological recommendations for calculating the level of economic safety of Ukraine». According to this document, banking safety is «a level of financial stability of the banking institutions in the country that allows ensuring effective functioning of the banking system and protection against internal and external destabilizing factors regardless the conditions of its functioning» (Order of the Ministry for Economy and Development of Ukraine, 29.10.2013, #1277).

**Unresolved issues.** At the same time, despite a significant development, the authors consider only some organizational, technical and legal aspects of estimating the financial safety of banks, so there is no united system understanding of the integral indicator and justification of the selection criteria of key indicators and their threshold values. Also, the concepts «financial safety of banking institution» and «financial safety of banking system» should be development further. Complex and multifaceted problem of measuring the level of financial safety needs further reflection and systematization, as the clear definition of the essence of financial safety facilitates the formation of the system providing financial safety for banking institutions, improving confidence in banks, the development of national economy.

**The research objective** is the analysis and systematization of the contemporary approaches to the definition of economic essence and estimating the level of financial safety of banking institutions.

**Key research findings.** Constant evolution of understanding of the essence of financial safety leads to the emergence of its various definitions (Figure 1). Systematization of opinions suggests that financial safety is a complex concept and its estimating should take into account the current activities of banking institutions, provide a comparison of the obtained results in the dynamics and predict the perspective level of financial safety. Overall, financial safety of banking institutions characterizes their financial situation, resistance to internal and external threats, the capacity for sustainable balanced development and protect of financial interests.

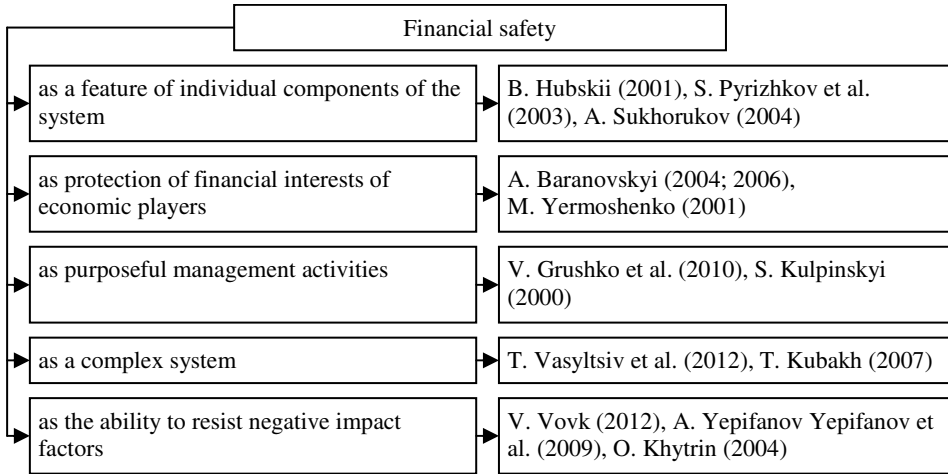


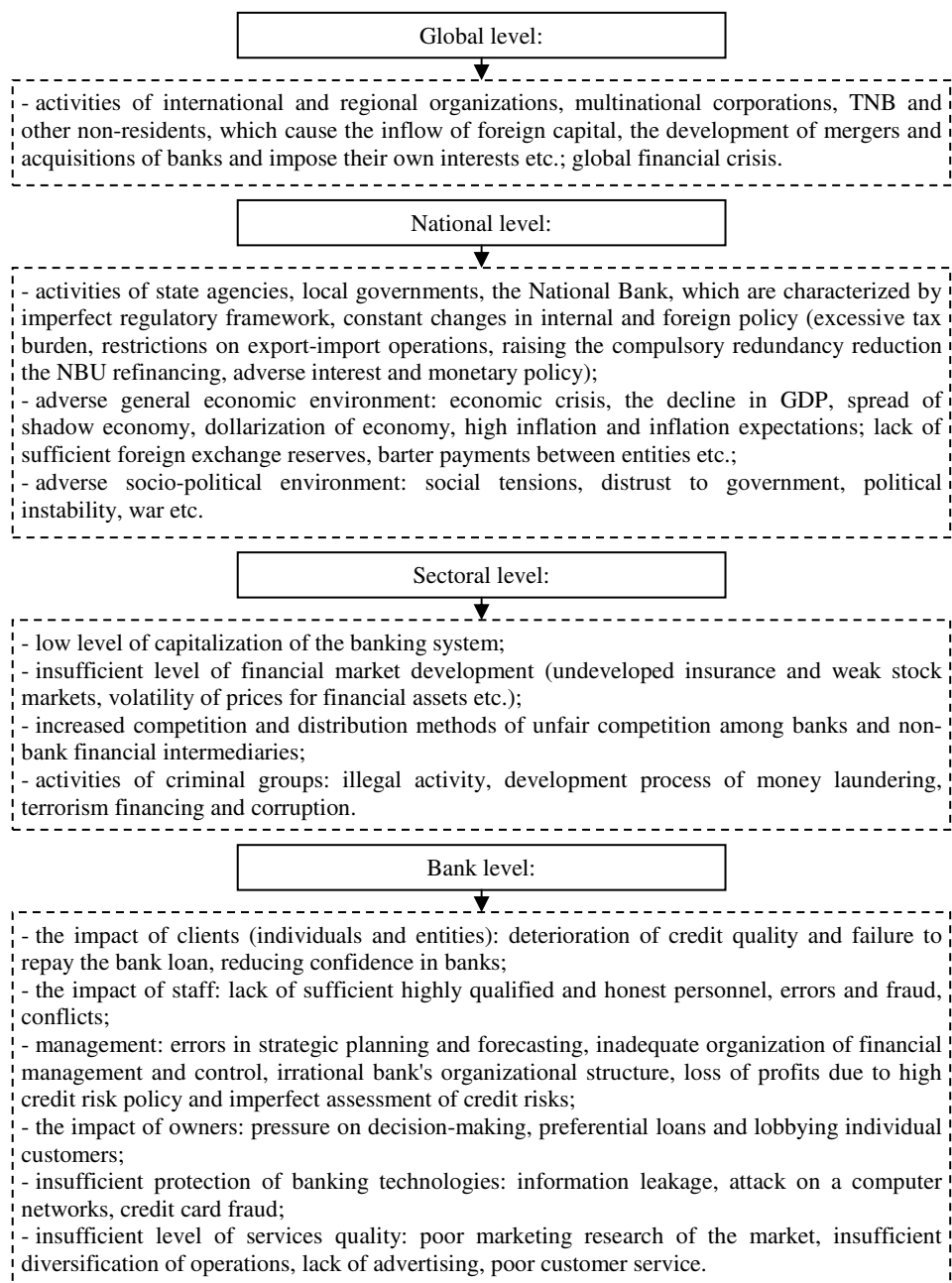
Figure 1. Characteristics of the "financial safety" term

It should be noted that in the process of estimating the level of financial safety of the banking system, the focus should be made on the factors that can negatively influence its operation and development. In our opinion, it is necessary to allocate 4 levels of financial safety – global, national, sectoral and banking which are affected by negative influence (Figure 2). It should be added that in spite of the common economic and legal environment, there are contradictions between the interests of different levels of financial safety, where the negative impact of factors is presented.

Evaluating the level of financial safety of banking institutions in Ukraine it is worth noting that the IMF has developed a system of 40 indicators of financial stability, including 25 indicators for the sector depository corporations and 15 indicators for customers of the sector depository corporations, including other financial corporations (2 indicators), non-financial corporations (5 indicators), households (indicator 2), market liquidity (indicator 2) and real estate markets (4 indicators) (Sviridov, 2011: 85). In accordance to the Methodical recommendations on calculating of the level of economic safety in Ukraine, the aggregate evaluation of banking safety is determined by 7 key indicators. In its turn, the National Bank of Ukraine quarterly generates and disseminates data about on the indicators of financial stability of the sector depository corporations (banking institutions), 12 of which are essential and 10 are recommended. The key indicators should represent the ratios of regulatory capital to risk-weighted assets; non-performing loans net of provisions to capital and gross loans; liquid assets to total assets and current liabilities; high risk to capital; customer deposits to total loans.

In considering the issue of assessing financial safety it should be noted that there are some conditions for effective and safe operations, in particular to ensure loans repayment, increase profitability, liquidity support, reducing bank risks, deposit insurance etc. (Table 1). Indicators and their threshold values which are the maximum allowable values of indicators are important for the level of financial safety of banking institutions. Failure to comply with certain limits leads to destabilizing, destructive process and threatens the financial security of a banking institution. That is one of the most important steps, since the value of the integral indicator of financial safety depends on the cor-

rect set of normative values of indicators. All indicators of financial safety should be divided into stimulants (have a stimulating (positive) effect on the integral indicator of financial safety) and disincentives (lowering the level of financial security).



**Figure 2. The key factors of negative impact on the banking system of the country, constructed by the authors**

Table 1. The basic indicators of banking institutions' financial safety

Indicators	The threshold values
Capital adequacy ratio	0.15–0.5
Share of foreign capital in banks, %	30–40
Share of overdue loans in total loans granted by banks to residents of Ukraine, %	no more than 5
Share of foreign banks in the total quantity of banking institutions in the country, %	no more than 30
Profitability of assets, %	no more than 1.5
Value for bank loans and deposits in foreign currency, %	no more than 1
Value of long-term (over 1 year) loans and deposits, times	no more than 1
Money supply, % of GDP	no more than 50
Amount of cash, % of GDP	no more than 4
The volume of bank lending real sector, % of GDP	no more than 30

Compiled by the author according to (Diakonova and Shyian, 2013: 159; Yevenko, 2012; Krupka, 2012: 171; Tymoshenko, 2014: 36).

The process of assessing financial safety of banking institutions has been carried out in 4 main stages and is based on a number of principles (Figure 3). We believe that for the integral indicator calculation one should use fuzzy logic, which allows formalizing the subjectivity and uncertainty of this process. The necessary condition for the solution of this problem is the presence of dependencies:

$$y = f_y(x_1, x_2, \dots, x_{10}), \quad (1)$$

where  $x_1, \dots, x_{10}$  – a set of values of input variables (Table 1);  $y$  – the corresponding value of the output variable (the integral indicator of financial safety).

After calculating the values of the set of input parameters it's necessary to do fuzzification of input and output indicators. To analyze the level of financial safety of banking institutions the authors propose to use the orderly term-set of values, which consists of 4 terms: critical (characterizes serious problems in the structure of financial safety), minimum (indicates the number of problems in bank's activities, which can cause a crisis in the future), sufficient (testifies financial stability condition of the bank in the short term) and high (characterizes the possibility to keep a high level of financial safety in the long term). Terms are listed in the order from the most negative to the most positive ones. This term-set of values is one of the most common, when describing linguistic variables are used for trapezoidal membership functions, in which the lower basis of trapezoid reflects the set of permissible values of fuzzy factor, and the upper – those that fully correspond to the value of the linguistic variable. The side edges of trapezoid reflect the change of affiliation from 1 to 0. The membership function determines the subjective confidence of expert in that particular set of basic values of the scale corresponds to fuzzy sets. Furthermore, this structure of term-set is rational in cases of economic interpretation of simulation results based on the rating approach.

At the stage of formation of the set of rules we should remember that the accuracy of analysis depends on the amount and accuracy of logical rules of financial safety in the system of fuzzy logic equations.

Defuzzification output linguistic variable describes the transformation of fuzzy sets in a clear value of the output variable through membership functions. Software implementation evaluation can be made in MATLAB, package fuzz-Logic Toolbox.

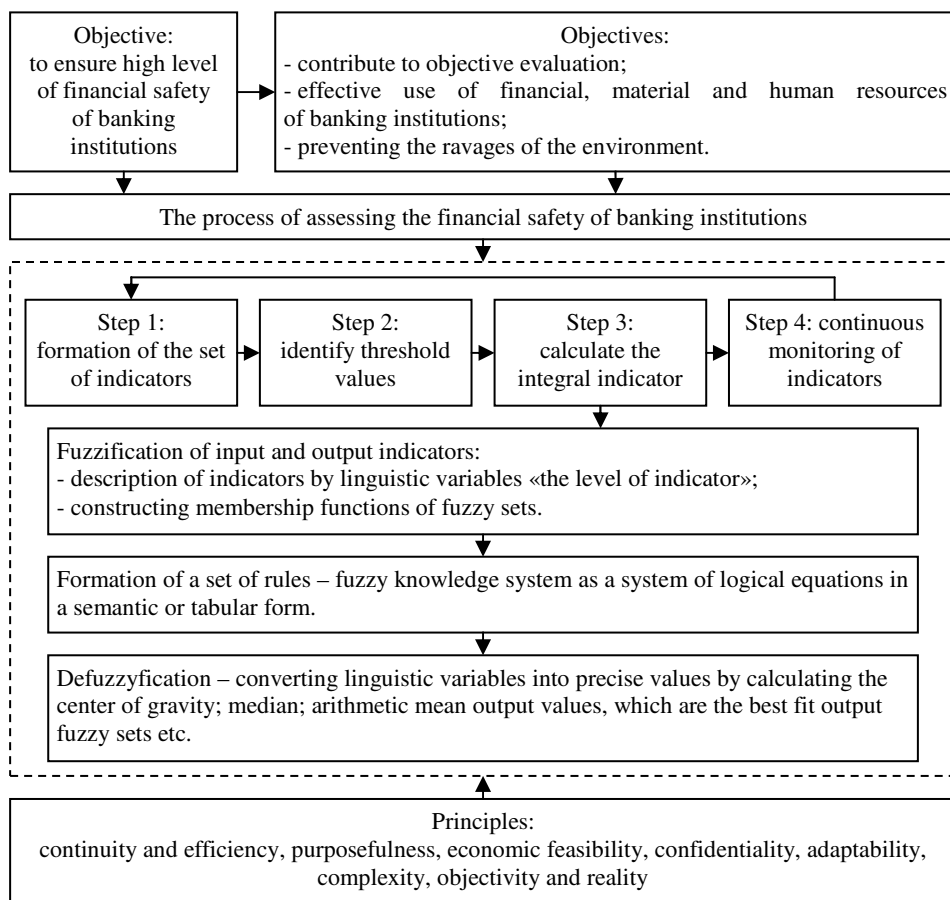


Figure 3. The process of assessing the financial safety of banking institutions, constructed by the authors

The next stage is the comparison of the actual indicators with their planned status, and assessment of the comparison results. If the real state corresponds to the target one, management decisions are made to support or increase the level of financial safety. Otherwise, it is necessary to determine the size of deviations of the actual results from the planned ones and a research should be conducted on the causes that led to such deviations. This stage also involves the determination of measures to correct the obtained results.

**Conclusions.** In terms of strengthening macroeconomic instability, financial market development, complexity of its infrastructure, increasing competition, growth of external and internal threats the financial safety of banking institutions is an important instrument to increase the financial potential for quantitative and qualitative growth, expansion in the banking market, ensuring normal operations and sustainable development of the banking system in Ukraine.

Analysis of existing theoretical approaches and tools for the research of financial safety of banking institutions was conducted in this article. In particular, the authors

have substantiated the expediency consideration during the evaluation of financial safety the impact of environment at the global, national, sectoral level and the level of banking institutions. Banking institution is an open system, which in the course of its financial activity interacts with the surrounding environment.

In addition to providing direct financial safety of banking institutions potential customers should be actively informed about the appropriate level of financial safety. The proposed method of calculating the integral indicator based on fuzzy logic will provide an opportunity to customers and owners to analyze the financial safety of the most important parameters that characterize monetary organization, the scope of payments and settlements, lending, presence of foreign capital and so on. It should be specified that fuzzy models have some drawbacks: the existence of subjectivity in the choice of membership functions and rules base formation; lack of awareness about the method; the need for special software, and specialists who are able to work with it. However, despite its drawbacks and limitations, the fuzzy logic method is considered to be promising. It should be remembered that the adequacy of current banking financial safety evaluation affects the completeness, timeliness and effectiveness of administrative preventive measures and contributes to overcoming the existing and potential threats in the banking system of Ukraine.

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