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**UDC 336.7**

**DOI: 10.37128/2411-4413-2024-1-9**

**USE OF DYNAMIC  
INDICATOR  
MODELS FOR  
ASSESSING BANK  
LIQUIDITY**

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*The article determines that the existence of different approaches to the interpretation of the category of «liquidity» causes not only terminological, but also practical difficulties in their use. Most of the works on this issue are devoted to theoretical aspects of liquidity, external and internal analysis of a credit institution in terms of liquidity ratios, as well as to the research of the dynamics of mandatory liquidity ratios, which tend to change in the calculation methodology. While researching the issue of compliance with the required level of bank liquidity, scholars and practitioners often draw attention to the importance of ensuring the solvency of a financial institution as a necessary component. At the same time, the analysis based on the public web application Google Trends proved the relevance of this issue.*

*Taking into consideration the existing scholarship on the categories of liquidity and solvency, it can be argued that they are interdependent and interrelated, but liquidity is a broader category than solvency. It is noted that the higher the level of liquidity of the bank, the higher the level of its solvency. These indicators are main characteristics of the financial condition of the credit institution.*

*The relevance of this issue is confirmed by Google Trends data, which shows that over the past five years, the number of Google searches for the topic «liquidity» has been higher than for the topics «solvency» and «financial stability».*

*It has been proved that one of the main tasks for ensuring the required level of bank liquidity is determining the directions for optimizing indicators. This will minimize liquidity risks and ensure quick conversion of the bank's assets into cash without significant price losses or the need to attract additional resources to fulfill obligations.*

*It has been identified that the degree of speed of transformation of assets into cash indicates the level of liquidity of a banking institution. In this paper, a model of a dynamic indicator based on the matrix method is used to calculate liquidity risk. The calculations made it possible to find out the need to increase liquid assets and revise the bank's credit policy.*

**Key words:** liquidity, bank, bank liquidity, solvency, bank solvency, risk, dynamic indicator model.

**Tabl.: 4. Fig.: 4. Ref.: 13.**

## ВИКОРИСТАННЯ МОДЕЛЕЙ ДИНАМІЧНОГО ІНДИКАТОРА ДЛЯ ОЦІНКИ ЛІКВІДНОСТІ БАНКУ

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У статті визначено, що наявність різних підходів до трактування категорії «ліквідність», обумовлює не тільки термінологічні, а й практичні труднощі у їхньому використанні. Більшість робіт із цієї проблематики присвячені теоретичним аспектам ліквідності, зовнішньому і внутрішньому аналізу кредитної установи в розрізі коефіцієнтів ліквідності, а також дослідженню динаміки обов'язкових нормативів ліквідності, які мають тенденцію до зміни в методиці розрахунку. Досліджуючи питання дотримання необхідного рівня ліквідності банку, досить часто науковці та практики звертають увагу на важливість забезпечення платоспроможності фінансової установи як необхідної складової. Водночас проведений аналіз на основі публічного web-додатку Google Trends довів актуальність зазначеної проблематики.

Зважаючи на існуючі наукові дослідження щодо категорій «ліквідність» і «платоспроможність», можна стверджувати, що вони взаємозалежні та взаємопов'язані, проте ліквідність є ширшою категорією, ніж платоспроможність. Зазначено, що чим вищий рівень ліквідності банку, тим вищий рівень його платоспроможності. Ці показники є основними характеристиками фінансового стану кредитної установи.

Актуальність цього питання підтверджується даними Google Trends, які показують, що протягом останніх п'яти років кількість пошукових запитів у Google на тему «ліквідність» була вищою, ніж на теми «платоспроможність» і «фінансова стійкість».

Доведено, що одним із головних завдань для забезпечення необхідного рівня ліквідності банку є визначення напрямків оптимізації показників. Це дозволить мінімізувати ризики ліквідності й забезпечити швидку конверсію активів банку в грошові кошти без значних втрат у ціні або потреби в залученні додаткових ресурсів для виконання зобов'язань.

Визначено, що ступінь швидкості перетворень активів на грошові кошти вказує на рівень ліквідності банківської установи. У роботі для розрахунку ризику ліквідності використано модель динамічного індикатора на основі матричного методу. Отримані розрахунки дали можливість з'ясувати необхідність нарощення ліквідних активів і перегляду кредитної політики банку.

**Ключові слова:** ліквідність, банк, ліквідність банку, платоспроможність, платоспроможність банку, ризик, модель динамічного індикатора.

**Табл.: 4. Рис.: 4. Літ.: 13.**

**Formulation of the problem.** The banking system is the leading link in the financial system. One of the main tasks in banking is to ensure the required level of liquidity of a financial institution, which is an important condition for maintaining its financial stability.

Effective functioning of the bank is possible only if it has a high degree of reliability, and given that its operating activities involve working with financial

instruments, minimizing the risk of transactions with them to ensure timely fulfillment of its obligations to customers is a prerequisite today. The specifics of the bank's activities are to raise funds from some entities and transfer them for use to other market participants. Thus, the basis for stable functioning is timely fulfillment of obligations by borrowers. The insolvency of a bank has a negative impact not only on its financial stability, but can also destabilize the entire monetary system of the state through a series of bankruptcies of credit institutions, whose main activities in the modern world are related to numerous transactions in the interbank, foreign exchange and securities markets. Ensuring the required level of liquidity is becoming one of the most important tasks in the activities of every modern bank and a fundamental basis for the activities of a financial manager in a credit institution. The introduction of modern approaches to assessing the liquidity risk of a bank makes it possible to neutralize the factors that negatively affect its financial stability.

**Analysis of recent research and publications.** Both domestic and foreign scholars pay considerable attention to the study of liquidity and minimization of liquidity risks. In particular, in the works of scientists S. Bezvukh [2], N. Blashchuk-Deviatkina [3], I. Hromnytska, M. Dyba, Y. Dovhan [4], S. Kataieva [5], H. Karcheva, I. Kosareva [6], D. Kramaska [6], I. Krasova, K. Marunych [3], V. Mruk [5], I. Stukan, N. Shvets [13] the problems of bank liquidity are highlighted, the factors that influence the formation of liquidity risk are identified and substantiated. However, given the dynamism of events and changes in the requirements for liquidity indicators by the regulator, it is necessary to develop the use of dynamic interval models for assessing the liquidity risk of a bank.

**Formulating the goals of the article.** The purpose of the study is to examine the theoretical and practical aspects of a banking institution's liquidity. To determine the tools that would make it possible to determine the level of liquidity of a banking institution, to find out the significance of liquidity risk and the directions of its elimination.

**Presentation of the basic material of the study.** Reducing the level of liquidity loss is extremely difficult for domestic banks due to the lack of a resource base, financial instability at the macro level, crises, political aggravations and war.

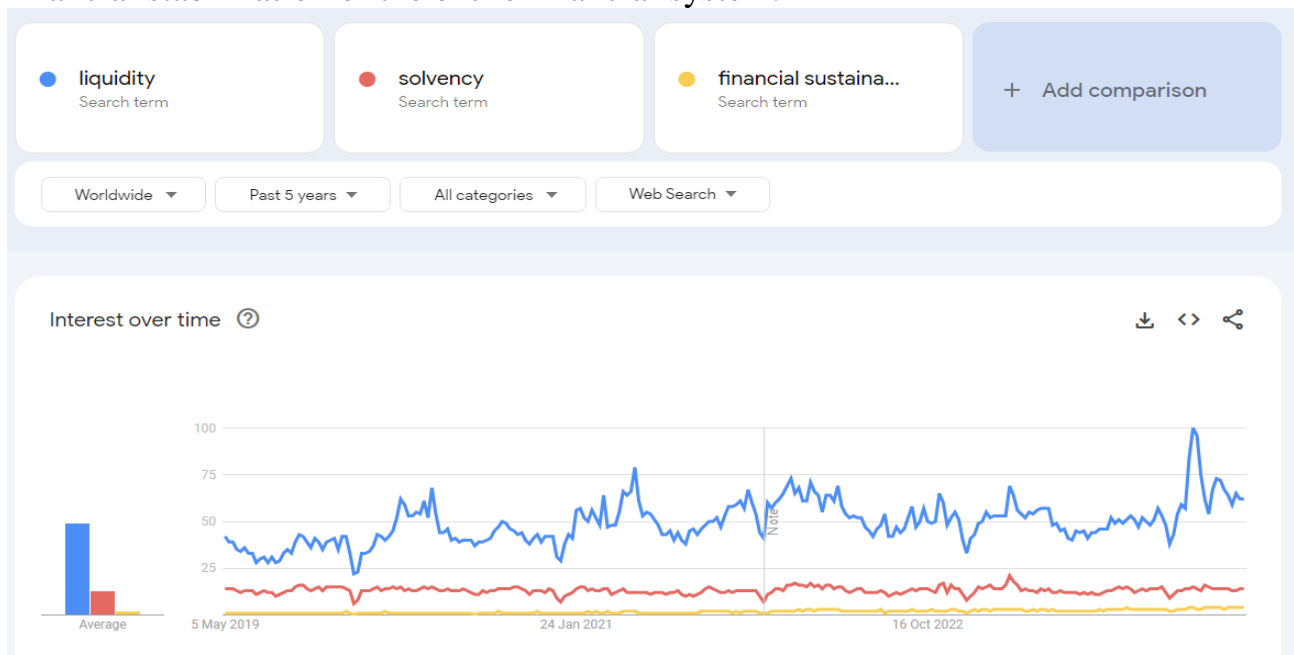
Paying attention to the theoretical essence of this issue, first of all, there is a need to study the meaning of such a category as liquidity. This range of issues related to the disclosure of the essence of liquidity, clarification of rational approaches to the methodological and instrumental analysis of bank liquidity is covered in the works of foreign and domestic economists. In the theory of banking, there are different points of view on the interpretation of the category of «liquidity», which causes not only terminological but also practical difficulties in their use. The works of a significant number of specialists are devoted to the theoretical problems of liquidity, external and internal analysis of a credit institution in terms of liquidity ratios, as well as to the study of the dynamics of mandatory liquidity ratios.

When studying the issue of compliance with the required level of bank liquidity, scholars and practitioners often draw attention to the importance of ensuring the solvency of a financial institution as a necessary component.

Taking into account the existing scientific work on the study of the categories

of «liquidity» and «solvency», we can state that they are interdependent and interrelated, but liquidity is a broader category than solvency. It is clear: the higher the degree of liquidity of a bank, the higher the level of its solvency, and these indicators characterize the financial health of a credit institution.

The relevance of this issue is confirmed by the public web application Google Trends, which shows that the category «liquidity» has been higher than «solvency» and «financial stability» in Google searches over the past five years (Fig. 1). It is worth focusing on March 2020, when the World Health Organization recognized SARS-CoV-2 as a pandemic. The crisis caused by COVID-19 has forced economists from different countries to address the problem of ensuring bank liquidity for the financial stabilization of the entire financial system.



**Fig. 1. Trend in queries of the categories «liquidity», «solvency», and «financial stability» for the period 2019-2022**

*Source: compiled by the authors using Google Trends*

During this period, a number of countries have taken active steps to normalize the liquidity of the banking system:

- increasing the liquidity of the banking system by BGN 7 billion (6% of GDP) by reducing the currency risks of commercial banks (Bulgaria);
- re-introduction of the repo operation (fine-tuning) to ensure the liquidity of banks, reducing the required reserve ratio from 3.5 to 0.5% (Poland);
- daily provision of forint swap liquidity and regular increase of forints at auctions (Hungary);
- the central bank reduced rates on 2-week reverse repo operations and injected 70 billion yuan into the system (China);
- support for banking organizations that use their capital and liquidity buffers to extend credit and take other actions to support households and businesses (USA) [8].

The founder of the modern theory of liquidity is J.M. Keynes, who was the first to define this category as the ability of a bank to meet its obligations with cash and other liquid assets.

An assessment of the existing definitions further allowed us to identify three approaches to the category of «bank liquidity»:

- the ability of a credit institution to repay its own liabilities;
- the possibility to repay not only liabilities but also to expand lending and investment activities at the same time
- the capability to raise funds in the required amount.

Most often, liquidity is understood as the ability to fulfill one's obligations by transforming assets into cash. And the degree of speed of transformation indicates the level of liquidity. The bank faces the issue of effective management of assets and liabilities to maintain a balance between them in terms of timing and amounts. At the same time, a modern bank, in the face of significant competitive pressure and external destabilizing factors, faces the issue of satisfying creditors with resources in full to be able to operate in all market segments.

However, the lack of resources forces banks to prioritize and determine the segments of their work. Ensuring uninterrupted payments of the credit institution, reducing the risks of imbalance between assets and liabilities is aimed at avoiding liquidity shortages. It is worth paying attention to the problem of the conflict between liquidity and bank profitability. A high level of liquidity of assets reduces the risk percentage, which in turn reduces the level of profitability.

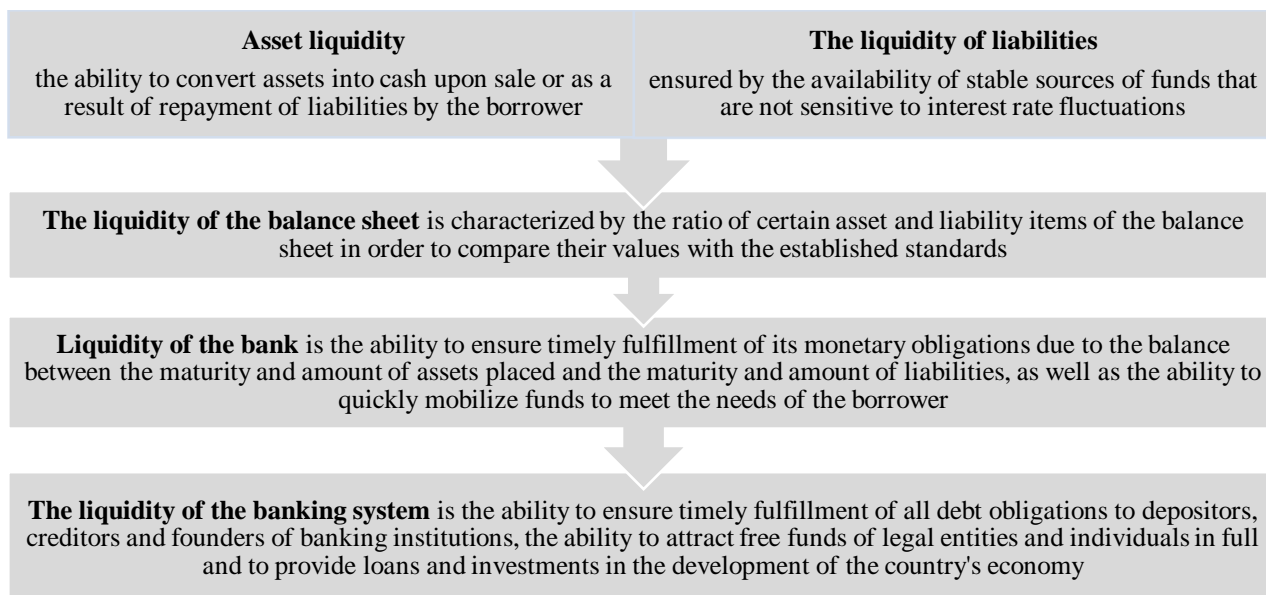
Thus, the bank's liquidity is the ability to ensure timely fulfillment of its monetary obligations due to the balance between the maturity and amount of repayment of placed assets and the maturity and amount of liabilities, as well as the ability to quickly mobilize funds to meet the borrower's needs in the credit market.

It is worth noting the relationship between such categories as «bank liquidity» and «balance sheet liquidity», which is ensured by the liquidity of assets and liabilities. As well as the liquidity of an individual banking institution and the liquidity of the entire banking system (Fig. 2).

One of the main tasks of a financial institution is to pursue a balanced policy regarding the sources of formation and use of resources. When receiving loan applications, the bank should assess the maturity of loans already granted. When purchasing securities, it is worth paying attention to the possibility of selling them on the market. In terms of passive transactions, when a customer withdraws money, there should be a parallel opportunity to raise funds from other money market participants, and to pay off payments to the budget or dividends, the issue of deposit certificates and repurchase transactions should be used as a counterbalance.

The required level of liquidity of the bank identifies areas for optimizing indicators that would minimize liquidity risks and ensure rapid conversion of bank assets into funds without significant price losses or attracting additional resources through liabilities.

Thus, the dilemma between assets of different degrees of liquidity and profitability arises before the bank's management with a certain frequency. Fluctuations between ensuring a high level of profitability or timely, full fulfillment of obligations to depositors and borrowers' claims require the bank to build a model that would maximize the balance between the interests of the banking institution and the recipients of its services and minimize risks.

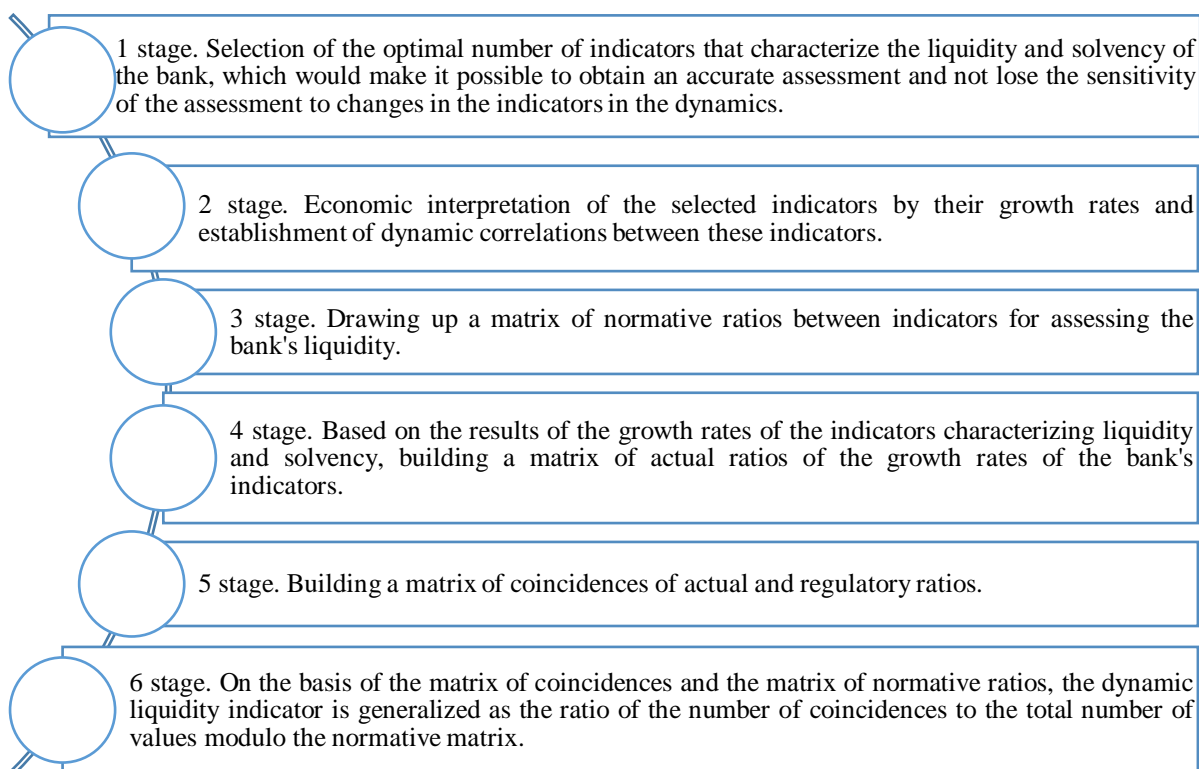


**Fig. 2. Interrelation of the concepts of «banking system liquidity», «bank liquidity», «balance sheet liquidity», «liquidity of assets and liabilities»**

*Source: systematized and compiled by the authors based on [1; 2; 3; 4; 6]*

With the development of information technology and software, there has been a rather rapid increase in the use of dynamic balance sheet models.

One of the varieties is the dynamic indicator model, which can be used to obtain a generalized assessment of liquidity risk. The calculation of the dynamic indicator in the context of this model is based on the matrix method and includes several stages (Fig. 3).



**Fig. 3. Algorithm of calculating a dynamic indicator**

*Source: compiled by the authors according to [5]*

It should be added that to implement the third stage, you should use the formula 1:

$$m_{ij}^A(t) = \begin{cases} -i - \text{th indicator should grow faster than the } j - \text{th indicator} \\ -1 - \text{the } i - \text{th indicator should grow slower than the } j - \text{th indicator} \\ 0 - \text{the normative ratio between the indicators is not defined} \end{cases} \quad (1)$$

Next, the matrix of actual ratios of the growth rate of indicators is formed for each moment of time  $t$   $M^f(t) = \{m_{ij}^f(t)\}_{kkk}$  (formula 2):

$$m_{ij}^f(t) = \begin{cases} 1, \text{ if } I_i(t) > I_j(t) \text{ and } m_{ij}^A = 0, \\ -1, \text{ if } I_i(t) < I_j(t) \text{ and } m_{ij}^A = 0, \\ 0, \text{ if } I_i(t) = I_j(t) \text{ and } m_{ij}^A = 0, \end{cases} \quad (2)$$

where:  $I_i(t)$  – is the growth rate of the  $i$ -th indicator at time  $t$ ;

$I_j(t)$  – is the growth rate of the  $j$ -th indicator at time  $t$ ;

$m_{ij}^A$  – is an element of the matrix of actual ratios of growth rates of indicators located at the intersection of the  $i$ -th row and the  $j$ -th column.

Formation of a matrix of coincidence of actual and normative ratios of growth rates of indicators  $M^c(t) = \{m_{ij}^c(t)\}_{kkk}$  (formula 3):

$$m_{ij}^c(t) = \begin{cases} 1, \text{ if } m_{ij}^A = m_{ij}^f \text{ and } m_{ij}^A = 0, \\ -1, \text{ if } m_{ij}^A = m_{ij}^f \text{ and } m_{ij}^A = 0, \\ 0, \text{ if } m_{ij}^A = 0, \end{cases} \quad (3)$$

The matrix of coincidence  $m_{ij}^c(t)$  of the actual ratios of the matrix  $m_{ij}^A(t)$  and the regulatory ratios of the matrix  $m_{ij}^f(t)$  is built.

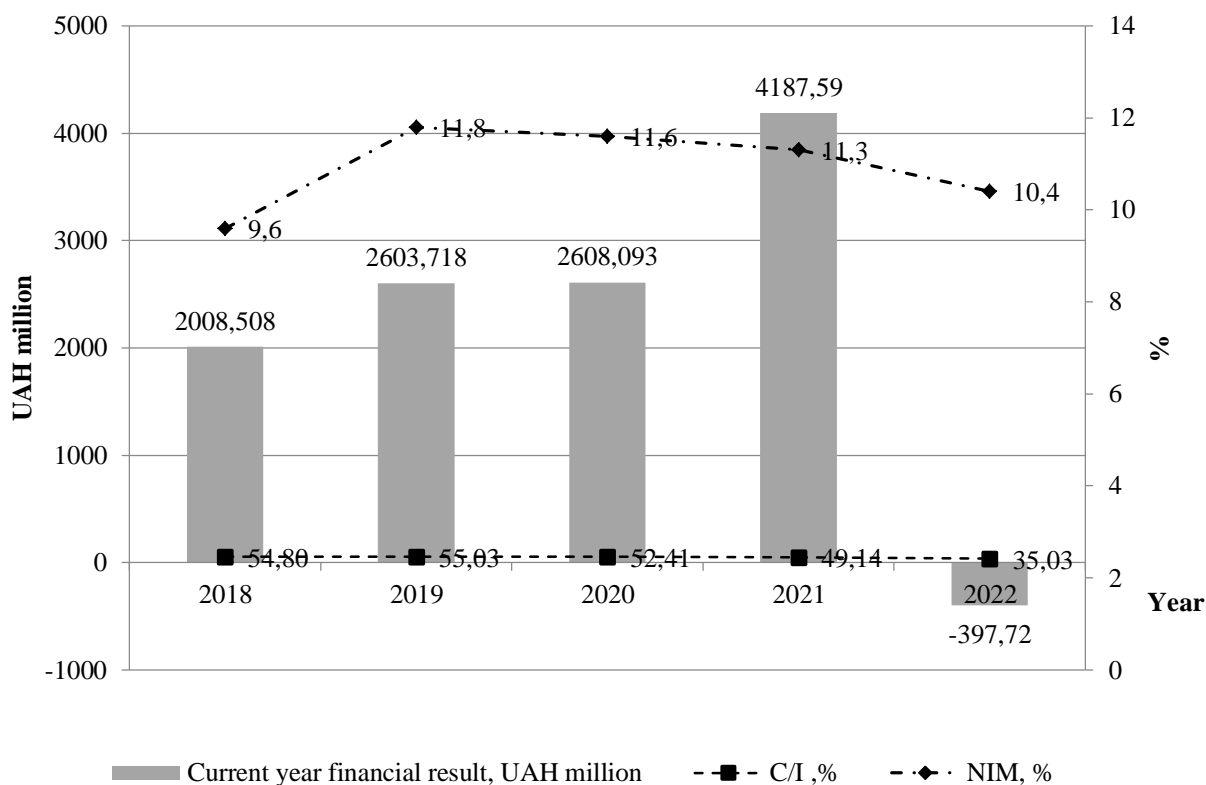
Calculation of the dynamic liquidity indicator as the ratio of the number of coincidences of regulatory and actual ratios to the number of regulatory ratios modulo  $U^2(t)$  (formula 4):

$$U^2(t) = \sum m^c(t) / \sum m_{ij}^A \quad (4)$$

The dynamic indicator takes on values ranging from -1 to +1. If at any given time  $t$  the  $U^2(t)$  score is 1, it means that all the normative ratios of the indicators are actually being met. If  $U^2(t) = -1$ , it means that the actual order of indicators is completely opposite to the normative one.

The subject of the study was Joint Stock Company «First Ukrainian International Bank (further – JSC «FUIB»)), which is a universal bank that is part of one of the most powerful financial and industrial groups «SCM».

Analyzing the financial result of the bank for the period 2018-2022, it should be noted that the greatest negative impact on its activities was experienced during the armed aggression of the Russian Federation against Ukraine. It was in 2022 that the bank experienced a 109% drop in the growth rate of its financial result and stopped at a loss of UAH 397.72 million (Fig. 4).



**Fig. 4. Performance indicators of JSC «FUIB» in 2018-2022**

Source: calculated by the authors based on the financial statements of JSC «FUIB» [7; 11]

At the same time, it should be noted that net operating income grew by 26% on average each year, and 2022 was no exception, showing an increase of 30%. On the contrary, operating expenses in 2022 decreased by 8%. Thus, the main financial factor that contributed to the bank's unprofitability in 2022 was an increase in the amount of allocations to the provision for loans, which was a forced measure due to an increase in non-performing loans. Thus, the amount of allocations to provisions in 2022 increased by 1008% compared to 2021. It should be noted that a significant increase in this indicator of 356% and a simultaneous decrease in profit growth of 0.17% was also observed in 2020, which was a consequence of the slowdown in the development of domestic business due to quarantine restrictions due to COVID-19, which negatively affected the economic activity of business entities in many sectors of the economy.

The operating efficiency ratio (C/I) is also noteworthy, which, according to European practice, should be in the range of 65-70% to be «conditionally safe». This indicator of JSC «FUIB» is even lower than the above standard, and its decline since 2019 indicates that the bank reduces the amount of operating expenses to earn 1 hryvnia. The C/I value of 35.03% indicates that the bank spent 35 kopecks on marketing and advertising, salaries, etc. to earn one hryvnia of income. The achievement of such an indicator was possible due to the growth of operating income by 31% while reducing operating expenses by 8%.

To determine the liquidity risk for JSC «FUIB» for 2018-2022, according to the above model, we group eight indicators that allow us to characterise the bank's liquidity and solvency (Table 1).



**Dynamics of certain indicators of JSC «FUIB» in 2018-2022,  
thousand hryvnias**

| Indicator                   | Year  |       |       |        |        | Growth index |           |           |           |
|-----------------------------|-------|-------|-------|--------|--------|--------------|-----------|-----------|-----------|
|                             | 2018  | 2019  | 2020  | 2021   | 2022   | 2019/2018    | 2020/2019 | 2021/2020 | 2022/2021 |
| Total assets (A)            | 59336 | 63215 | 80871 | 110135 | 127792 | 1.07         | 1.28      | 1.36      | 1.16      |
| Highly liquid assets (Va)   | 22036 | 14526 | 20218 | 25862  | 12580  | 0.66         | 1.39      | 1.28      | 0.49      |
| Government securities (GS)  | 8411  | 7716  | 14446 | 17026  | 12580  | 0.92         | 1.87      | 1.18      | 0.74      |
| Non-performing loans (NPLs) | 7362  | 4171  | 4047  | 2844   | 7879   | 0.57         | 0.97      | 0.70      | 2.77      |
| Non-performing assets (NPA) | 7307  | 6810  | 5772  | 8836   | 14438  | 0.93         | 0.85      | 1.53      | 1.63      |
| Balance sheet capital (BC)  | 6318  | 9067  | 9684  | 12561  | 11696  | 1.44         | 1.07      | 1.30      | 0.93      |
| Current liabilities (CL)    | 39780 | 42753 | 57515 | 80872  | 90300  | 1.07         | 1.35      | 1.41      | 1.12      |
| Household deposits (Hd)     | 16610 | 20779 | 27296 | 35282  | 38130  | 1.25         | 1.31      | 1.29      | 1.08      |

Source: calculated by the authors based on the financial statements of JSC «FUIB» [7; 11]

To determine the liquidity risk for JSC «FUIB» for 2018-2022, according to the above model, we will group eight indicators that allow us to characterize the liquidity and solvency of the bank (Table 1).

In accordance with the above algorithm, we will build a normative matrix of ratios between individual indicators, the results are presented in Table 2. When constructing this matrix, we adhere to the requirements of minimizing liquidity risk: if the i-th indicator should grow at a higher rate than the j-th indicator, the corresponding element of the matrix is equal to «+1», otherwise - «-1».

Table 2

**Matrix of normative ratios between indicators for assessing the liquidity of  
JSC «FUIB»**

| Indicator                   | A  | Va | GS | NPLs | NPA | BC | CL | Hd |
|-----------------------------|----|----|----|------|-----|----|----|----|
| Total assets (A)            | 0  | -1 | -1 | 1    | 1   | -1 | 0  | 0  |
| Highly liquid assets (Va)   | 1  | 0  | 0  | 1    | 0   | 0  | 1  | 1  |
| Government securities (GS)  | 1  | 0  | 0  | 1    | 0   | 0  | 0  | 0  |
| Non-performing loans (NPLs) | -1 | -1 | -1 | 0    | 0   | -1 | 0  | 0  |
| Non-performing assets (NPA) | -1 | 0  | 0  | 0    | 0   | -1 | 0  | 0  |
| Balance sheet capital (BC)  | 1  | 0  | 0  | 1    | 1   | 0  | 1  | 1  |
| Current liabilities (CL)    | 0  | -1 | 0  | 0    | 0   | -1 | 0  | 0  |
| Household deposits (Hd)     | 0  | -1 | 0  | 0    | 0   | -1 | 0  | 0  |

Source: calculated by the authors based on the financial statements of JSC «FUIB» [7; 11].

At the next stage, we build a matrix of actual ratios of growth rates of indicators (Table 3), which are used to assess the liquidity of JSC «FUIB» in 2019-2022.

**Matrix of actual ratios of growth rates of JSC «FUIB» indicators,  
2019-2022**

| <b>2019</b>  |    |    |    |      |     |    |    |    |
|--|----|----|----|------|-----|----|----|----|
| Indicator  | A  | Va | GS | NPLs | NPA | BC | CL | Hd |
| Total assets (A)   | 0  | +1 | +1 | +1   | +1  | -1 | 0  | -1 |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | -1 | 0  | -1 | +1   | -1  | -1 | -1 | -1 |
| Government securities (GS)   | -1 | +1 | 0  | +1   | -1  | -1 | -1 | -1 |
| Non-performing loans (NPLs)  | -1 | -1 | -1 | 0    | -1  | -1 | -1 | -1 |
| Non-performing assets (NPA)  | -1 | +1 | +1 | +1   | 0   | -1 | -1 | -1 |
| Balance sheet capital (BC)   | +1 | +1 | +1 | +1   | +1  | 0  | +1 | +1 |
| Current liabilities (CL)   | +1 | +1 | +1 | +1   | +1  | -1 | 0  | -1 |
| Household deposits (Hd)  | +1 | +1 | +1 | +1   | +1  | -1 | -1 | 0  |
| <b>2020</b>  |    |    |    |      |     |    |    |    |
| Total assets (A)   | 0  | -1 | -1 | +1   | +1  | +1 | -1 | -1 |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | +1 | 0  | -1 | +1   | +1  | +1 | +1 | +1 |
| Government securities (GS)   | +1 | +1 | 0  | +1   | +1  | +1 | +1 | +1 |
| Non-performing loans (NPLs)  | -1 | -1 | -1 | 0    | +1  | -1 | -1 | -1 |
| Non-performing assets (NPA)  | -1 | -1 | -1 | -1   | 0   | -1 | -1 | -1 |
| Balance sheet capital (BC)   | -1 | -1 | -1 | +1   | +1  | 0  | -1 | -1 |
| Current liabilities (CL)   | +1 | -1 | -1 | +1   | +1  | +1 | 0  | +1 |
| Household deposits (Hd)  | +1 | -1 | -1 | +1   | +1  | +1 | -1 | 0  |
| <b>2021</b>  |    |    |    |      |     |    |    |    |
| Total assets (A)   | 0  | +1 | +1 | +1   | -1  | +1 | -1 | -1 |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | -1 | 0  | +1 | +1   | -1  | -1 | -1 | -1 |
| Government securities (GS)   | -1 | -1 | 0  | +1   | -1  | -1 | -1 | -1 |
| Non-performing loans (NPLs)  | -1 | -1 | -1 | 0    | -1  | -1 | -1 | -1 |
| Non-performing assets (NPA)  | +1 | +1 | +1 | +1   | 0   | +1 | +1 | +1 |
| Balance sheet capital (BC)   | -1 | +1 | +1 | +1   | -1  | 0  | -1 | +1 |
| Current liabilities (CL)   | +1 | +1 | +1 | +1   | -1  | +1 | 0  | +1 |
| Household deposits (Hd)  | -1 | -1 | +1 | +1   | -1  | -1 | -1 | 0  |
| <b>2022</b>  |    |    |    |      |     |    |    |    |
| Total assets (A)   | 0  | +1 | +1 | -1   | -1  | +1 | +1 | +1 |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | -1 | 0  | -1 | -1   | -1  | -1 | -1 | -1 |
| Government securities (GS)   | -1 | +1 | 0  | -1   | -1  | -1 | -1 | -1 |
| Non-performing loans (NPLs)  | +1 | +1 | +1 | 0    | +1  | +1 | +1 | +1 |
| Non-performing assets (NPA)  | +1 | +1 | +1 | -1   | 0   | +1 | +1 | +1 |
| Balance sheet capital (BC)   | -1 | +1 | +1 | -1   | -1  | 0  | -1 | -1 |
| Current liabilities (CL)   | -1 | +1 | +1 | -1   | -1  | +1 | 0  | +1 |
| Household deposits (Hd)  | -1 | +1 | +1 | -1   | -1  | +1 | -1 | 0  |

*Source: calculated by the authors based on the financial statements of JSC «FUIB» [7; 11]*

In order to calculate the dynamic indicator, we will build a matrix of coincidences of normative and actual ratios (Table 4).

Based on the results obtained in the matrix of coincidences and the matrix of normative ratios, we will calculate a generalized liquidity indicator using formula 4 for each year.

Thus, based on the indicators for JSC «FUIB», the value of the dynamic liquidity indicator will be as follows:

- 2019 year  $U^2(t) = 10/26 = 0,39$ ;
- 2020 year  $U^2(t) = 14/26 = 0,54$ ;
- 2021 year  $U^2(t) = -4/26 = -0,15$ ;
- 2022 year  $U^2(t) = -26/26 = -1$ .

**Matrix of coincidences of normative and actual ratios between the indicators of JSC «FUIB», 2019-2022**

| 2019   |    |    |    |      |     |    |    |    |
|--|----|----|----|------|-----|----|----|----|
| Indicator  | A  | Va | GS | NPLs | NPA | BC | CL | Hd |
| Total assets (A)   | 0  | -1 | -1 | +1   | +1  | +1 | 0  | 0  |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | -1 | 0  | 0  | +1   | 0   | 0  | -1 | -1 |
| Government securities (GS)   | -1 | 0  | 0  | +1   | 0   | 0  | 0  | 0  |
| Non-performing loans (NPLs)  | +1 | +1 | +1 | 0    | 0   | +1 | 0  | 0  |
| Non-performing assets (NPA)  | +1 | 0  | 0  | 0    | 0   | +1 | 0  | 0  |
| Balance sheet capital (BC)   | +1 | 0  | 0  | +1   | +1  | 0  | +1 | +1 |
| Current liabilities (CL)   | 0  | -1 | 0  | 0    | 0   | +1 | 0  | 0  |
| Household deposits (Hd)  | 0  | -1 | 0  | 0    | 0   | +1 | 0  | 0  |
| 2020   |    |    |    |      |     |    |    |    |
| Total assets (A)   | 0  | +1 | +1 | +1   | +1  | -1 | 0  | 0  |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | +1 | 0  | 0  | +1   | 0   | 0  | +1 | +1 |
| Government securities (GS)   | +1 | 0  | 0  | +1   | 0   | 0  | 0  | 0  |
| Non-performing loans (NPLs)  | +1 | +1 | +1 | 0    | 0   | +1 | 0  | 0  |
| Non-performing assets (NPA)  | +1 | 0  | 0  | 0    | 0   | +1 | 0  | 0  |
| Balance sheet capital (BC)   | -1 | 0  | 0  | +1   | +1  | 0  | -1 | -1 |
| Current liabilities (CL)   | 0  | +1 | 0  | 0    | 0   | -1 | 0  | 0  |
| Household deposits (Hd)  | 0  | +1 | 0  | 0    | 0   | -1 | 0  | 0  |
| 2021   |    |    |    |      |     |    |    |    |
| Total assets (A)   | 0  | -1 | -1 | +1   | -1  | -1 | 0  | 0  |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | -1 | 0  | 0  | +1   | 0   | 0  | -1 | -1 |
| Government securities (GS)   | -1 | 0  | 0  | +1   | 0   | 0  | 0  | 0  |
| Non-performing loans (NPLs)  | +1 | +1 | +1 | 0    | 0   | +1 | 0  | 0  |
| Non-performing assets (NPA)  | -1 | 0  | 0  | 0    | 0   | -1 | 0  | 0  |
| Balance sheet capital (BC)   | -1 | 0  | 0  | +1   | -1  | 0  | -1 | +1 |
| Current liabilities (CL)   | 0  | -1 | 0  | 0    | 0   | -1 | 0  | 0  |
| Household deposits (Hd)  | 0  | +1 | 0  | 0    | 0   | +1 | 0  | 0  |
| 2022   |    |    |    |      |     |    |    |    |
| Total assets (A)   | 0  | -1 | -1 | -1   | -1  | -1 | 0  | 0  |
| Highly liquid assets (cash and bank metals, funds on demand at the NBU and other banks) (Va) | -1 | 0  | 0  | -1   | 0   | 0  | -1 | -1 |
| Government securities (GS)   | -1 | 0  | 0  | -1   | 0   | 0  | 0  | 0  |
| Non-performing loans (NPLs)  | -1 | -1 | -1 | 0    | 0   | -1 | 0  | 0  |
| Non-performing assets (NPA)  | -1 | 0  | 0  | 0    | 0   | -1 | 0  | 0  |
| Balance sheet capital (BC)   | -1 | 0  | 0  | -1   | -1  | 0  | -1 | -1 |
| Current liabilities (CL)   | 0  | -1 | 0  | 0    | 0   | -1 | 0  | 0  |
| Household deposits (Hd)  | 0  | -1 | 0  | 0    | 0   | -1 | 0  | 0  |

*Source: calculated by the authors based on the financial statements of JSC «FUIB» [7; 11]*

The results show that in 2022, the actual order of the indicators is completely opposite to their normative value, which indicates an increased liquidity risk, which became possible due to a significant increase of 2.77 times in non-performing loans and a significant decrease in highly liquid assets and government securities, with a simultaneous decrease in the resource base. The best indicator is 2020, when the trend was the opposite. These results require the bank to review its credit policy and increase the volume of liquid assets.

**Conclusions.** The research has established that ensuring bank liquidity is a prerequisite for the financial stability of a credit institution. At the same time, depending on the factors of influence and the available resource base, a credit institution should choose policies and tools to ensure the required level of solvency and liquidity. Liquidity risk assessment helps a financial institution to identify and assess

the extent of the problem and find out the main factors of negative and positive impact.

A dynamic liquidity indicator enables determining the level of liquidity risk of the bank, which contributes to a timely response to the loss of financial stability of the institution.

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УДК 332.1:351.74:338.46

DOI: 10.37128/2411-4413-2024-1-10

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