

**Kyiv National University of Trade and Economics**

Banking department

## **FINAL QUALIFYING PAPER**

**on the topic:**

### **Instruments for early diagnosis of financial institution insolvency**

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## INTRODUCTION

**Issue determination.** At the current stage of the development of the national economy, banks play an important role by accumulating funds from the population, business and the state, using these funds for lending and investment, and ensuring settlement and payment. Over the last five years, the banking sector has seen negative trends, such as an increase in the volume of non-performing loans, low capitalization, a significant increase in the bankruptcy of banking institutions and a decrease in confidence in the banking system. Taking into account the problems in the banking sector, there is a real threat to the stability of the financial system of Ukraine as a whole. Therefore, it is necessary to create an effective methodology that will help to timely and accurately forecast the financial condition of the bank for the future and prevent the development of negative trends that could lead to the liquidation of the institution. In order to create such a methodology, it would be advisable to analyze the available tools used to forecast the financial condition of banks.

**The purpose of the research** is to identify and justify tools for early diagnosis of financial institution insolvency using the example of a bank, development of practical recommendations aimed at improving diagnostics, prevention and overcoming crisis situations in the banking sector.

**The object** of the research is banking insolvency.

**The subject** of research is the theoretical and methodological framework for the implementation of an early diagnosis of bank insolvency, financial condition of a Joint stock company OTP Bank, assessment for the probability of financial institution insolvency.

**Analysis of recent research and publications.** Due to the financial crises have become permanent, many foreign scientists are dealing with the problem of assessing

the financial stability of banks, in particular, L. Barton, D. Diamond, P. Dibwig, E. Dolan, R. Campbell, R. Miller, B. Pidzhnenburg, Y. Rosenthal, K. Herman. Besides, significant contributions to the study of theoretical and methodological approaches to the diagnosis of financial stability of banks and the banking system have made such domestic scientists as O Dzublyuk, V. Mishchenko [1], Yu. Rebryk [2], R. Mikhailuk, Zh. Dovgan, M. Zverev, V. Kovalenko, O. Sergeyev, and others.

The realization of these objectives created the necessary **tasks** that determined the logic and the structure of the work:

- investigate the theoretical and methodical backgrounds for the early diagnostic of the financial institution insolvency;
- analyze the financial institution's financial status;
- investigate the financial condition of a domestic financial institution;
- estimate the probability of financial institution insolvency;
- research foreign experience for early diagnosis of financial institution insolvency;
- improve the financial institution's early insolvency diagnostics tools;
- summarize methodological approaches to determining the bank's financial stability in order to improve them;
- develop a methodology for diagnosing the Bank's financial stability aimed at early detection and prevention of crisis situations.

**Methods of research.** The theoretical and methodological basis of the study is based on scientific papers, recommendations of the Basel Committee and the NBU's regulatory documents on transparency in banking. The research is based on general scientific and special methods of knowledge: abstract and logical - for analysis of professional literature, theoretical generalization and formation of conclusions on the

essence of financial transparency of bank lending activities and directions of its expansion; decomposition - for disclosure of the research purpose and setting of tasks.

**The information base of the research** is legislative and regulatory acts on the issues of regulating credit activity of banks; official data of the National Bank of Ukraine; analytical reviews of Standard & Poor's rating agencies, recommendations of the Basel Committee, financial statements and reports of Joint stock company OTP Bank; monographic studies and scientific publications on the problem under research.

**The scientific innovation of the obtained results.** The scientific newness consists in the deepening of the theoretical foundations of anti-crisis management of banking institutions and the development of practical recommendations to improve using the early diagnostic tools of bank insolvency and overcoming crisis situations in the banking sector.

**Practical meaning of the obtained results.** The practical meaning of the obtained results is to justify the conceptual foundations of anti-crisis management in banking institutions. A certain amount of theoretical provisions has been shown as the level of practical recommendations that can be used by the NBU for early diagnostics of banks' financial stability, by regulatory authorities for prevention of crisis events in banks, by banking institutions for development of anti-crisis management strategy and tactics. Separate results can be used to prepare regulatory and legal documents for banking regulation and in the process of developing the economic security concept for the Ukrainian banking system. The survey results can be used by banking institutions in the process of practical internal control and monitoring in order to prevent crisis situations.

**Master's personal contribution.** The graduation qualifying paper is an author's own completed study.

**Publications.** Some of the research results were reflected in a scientific article: O.Leontovych. Theoretical basis for the early diagnostics of the bank insolvency // "Business processes in credit and financial institutions: collection of scientific articles of full-time and part-time students / edited by N.P. Levsha. - Kiev: Kyiv National University of Trade and Economics, 2020. - 426 p. Also some of the research results were summed up in academic theses: O. Leontovych. CAMELSO rating system as a tool for early diagnosis insolvency of the bank on II Ukrainian Student Scientific Conference ``Financial and credit systems: the problems of theory and practice" in Kyiv National University of Trade and Economics, March 16, 2020. Kiev, p. 363.

**Volume and structure of the work.** The research consists of 3 chapters, introduction, conclusion, list of sources and annexes used. The paper is 51 pages long. The research work consists of 14 tables, 18 figures, 9 appendices and 45 scientific sources used.

## **CHAPTER I. THEORETICAL BASIS FOR THE EARLY DIAGNOSTICS OF THE BANK INSOLVENCY.**

Macroeconomic problems have always been identified as a major cause of widespread bank insolvency. However, experience in supervision and in dealing with problem banks shows evidence that mismanagement plays a major role in bank insolvency. The question of the banking system stability, regulation of bank solvency at every country in the world is always relevant in the sense that banks are heavily influential to ensure the national security of the state, development, and competitiveness of the economy countries (including the financial market), banks must respect depositor's and creditor's rights that have entrusted their funds to banks, for a timely refund of these funds. However, as business entities, banks are emerging in their activities, they are exposed to numerous risks and their bankruptcies are not excluded due to their insolvency.

Ukrainian legislation provides the definition of several categories of crisis in the bank. According to chapter 5 of the Law of Ukraine "Banks and Banking" [3], there are two categories: «problem bank» and «insolvent bank».

The National Bank of Ukraine is obliged to decide on the classification of a bank as a problem category, provided that it meets at least one of the following criteria [3]:

1. during the reporting month the bank allowed a decrease of 5 percent or more: daily regulatory capital below the minimum regulatory capital required by the National Bank of Ukraine - five or more times and/or the value of the standard of the adequacy of regulatory capital below the normative value of this standard - two or more times;
2. the bank has not fulfilled the demand of the depositor or other creditor, the term of which came five or more working days ago, and/or the facts of non-reflection

in the accounting of documents of the clients of the bank not fulfilled by the bank within the terms established by the legislation of Ukraine;

3. systematic violation by the Bank of legislation regulating the prevention and counteraction to the legalization (laundering) of proceeds of crime or terrorist financing;

4. during the reporting month, the bank allowed a decrease by 5% or more of the value of at least one of the liquidity norms below the minimum normative values established by the regulatory acts of the National Bank of Ukraine calculated: daily calculations - five or more times, every two or more times;

5. the amount of negatively classified assets of the bank (except for rehabilitation) is 40 percent and more than the total amount of assets for which the risk should be assessed and a reserve should be formed by the regulatory acts of the National Bank of Ukraine;

6. the bank does not have effective and adequate internal control and/or risk management systems, which threatens the interests of depositors or other creditors of the bank;

7. systematic submission and/or disclosure of inaccurate information or reporting to conceal the real financial position of the bank, including transactions with related parties [3].

The National Bank of Ukraine has the right to assign the bank to the category of problems on other grounds, defined by regulatory acts of the National Bank of Ukraine. The decision of the National Bank of Ukraine to classify the bank as a problem is a banking secret. A problem bank within 180 days is obliged to bring its activity in compliance with the requirements of the legislation, including normative-legal acts of the National Bank of Ukraine. Within 180 days from the day the bank is classified as



problematic, the National Bank of Ukraine has the right to decide on whether the bank's activity is in compliance with the law or on the bank's classification as insolvent [3].

The National Bank of Ukraine is obliged to classify the bank as insolvent in the case of:

1. failure of the bank to comply with the requirements of the legislation, including regulatory acts of the National Bank of Ukraine, after being classified as problematic, but not later than 180 days after its recognition as problematic;
2. reducing the amount of regulatory capital or bank capital standards to one-third of the minimum level established by law and/or regulatory acts of the National Bank of Ukraine;
3. failure by the bank within five working days in succession of two or more percent of its obligations to depositors and other creditors and/or establishment of facts of non-recording in the accounting of documents of bank clients not fulfilled by the bank within the terms established by law, after the bank has been assigned to categories of problems;
4. revealing the facts of implementation by the bank after classifying it as a problematic category (except for accrual of interest on deposits, receiving bank pay, alimony, pensions, scholarships, other social and government payments), execution (re-registration) of contracts resulting in obligations to individuals within the guaranteed amount of compensation is increased by reducing liabilities to individuals that exceed the guaranteed amount of compensation and/or liabilities to individuals and which are not covered by the Guarantees of the Guarantee Fund of individuals and/or legal entities [3];
5. non-compliance by the bank, classified as problematic, with an order, a decision of the National Bank of Ukraine (including the application of measures of influence/sanctions) and/or a request of the National Bank of Ukraine to eliminate

violations of banking legislation, normative-legal acts of the National Bank of Ukraine within the period determined by the National Bank of Ukraine term [3].

Understanding the factors that have an influence on a bank's insolvency makes it possible to identify the main tools of early insolvency diagnostics to prevent bankruptcy. The bank insolvency is influenced by internal and external factors (appendix A, table A.1). The main internal factors influencing bank insolvency are organizational, technological, financial, economic factors, and inefficient risk management policy at the bank. The main external factors are generally economic, legal and non-financial [4].

It is appropriate to consider the root causes and symptoms of a crisis that are typical for domestic financial institutions. The specific causes of loss, loss liquidity, and the bank's insolvency are described in figure 1.1.

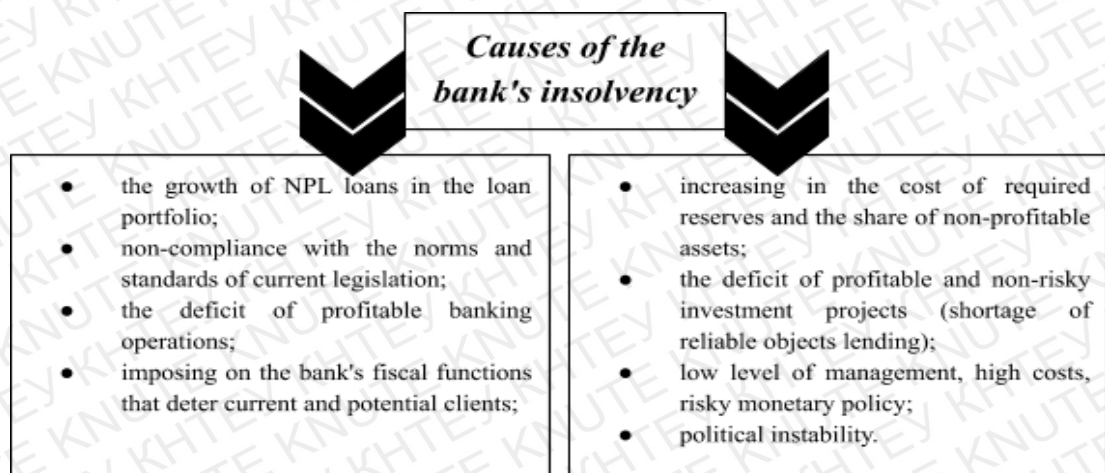


Figure 1.1. Causes or the bank's insolvency\*

\*Note: built by the author according to [4].

The purpose of early bankruptcy diagnostics is to identify weak or problematic banks before the point of insolvency and the bank's default. This issue is value for the effective and stable functioning of not only the individual bank but the whole banking system. In Ukraine, the banking crisis began in 2014 and continued until mid-2017. The

formal end to the crisis can be considered a statement made at the beginning of 2017 by the head of the NBU on the transition to the final stage of cleaning the banking system (National Bank of Ukraine, 2017). This crisis has brought many losses for Ukrainian banks. In particular, with the 181 banks operating in January 2014 until the end of 2020 – 74. Overall, from 2014 to 2018 was at record levels - against 96 banks had instituted proceedings in bankruptcy. At the same time peak "fall banks" came in 2014 and 2015 (33 banks annually), gradually decreasing (in 2016 - 21 banks, 2017 - 8 banks in 2018 - only 1 bank) [5].

According to all of the above, there is a problem in identifying weak points in the bank activities in the early stages of diagnosis. This is done using a variety of tools that help prevent crisis events, bank failures at the micro-level, and prevent the instability of the banking system as a whole. Analysis of world and domestic experience has shown that the most common methods of diagnosing the potential insolvency of financial institutions are: rating systems, coefficient analysis and analysis of banking system and financial institutions, integrated risk assessments, statistical models [6].

Scientists identify several basic tools for early diagnosis of bank insolvency (appendix B, table B.2). Analysis of financial statements is one of the main instruments of early diagnostic of bank insolvency. It involves the preparation by the Banking Authority of a financial ratio's package based on the financial information of the bank, to evaluate the activities and financial condition of the bank. The analysis involves comparing the financial performance of individual banks with that of a group of similar banks and examining trends in changes in indicators. The analytics package typically includes capital adequacy, asset quality, profitability and liquidity ratios. According to the results of the analysis, a warning is generated if certain coefficients go beyond a pre-set critical level or fall within a predetermined interval [7].

We will focus more on early warning systems and supervisory rating systems, the comparisons of which are shown in appendix C, table C.1.

CAMELSO is an officially recognized advanced rating system for banks used by supervisor (National Bank of Ukraine) in Ukraine, PATROL – in Italy, SAABA – in France. Other approaches - Kohonen maps (SOM), hierarchical clustering, and clustering of k-averages are widely used in data mining and statistics to early identification of problem banks in many countries of the world [7].

Supervisory and prudential statistics is the next way to early diagnostic of bank insolvency. These statistics include information on banks directly supervised by Banking Supervision that are designated as significant institutions and report under the common reporting and financial reporting frameworks at the highest level of consolidation. Supervisory statistics cover several aspects of bank activity which are the following: balance sheet composition and profitability, capital adequacy and leverage, asset quality, liquidity, funding conditions [8].

Macroprudential statistics also is one way to early diagnostic of bank insolvency. The indicators in the database are grouped into the following seven categories, each of which include various sub-categories: macroeconomic and financial market indicators, debt and credit indicators, residential real estate indicators, commercial real estate indicators, banking sector indicators, non-bank indicators, interconnectedness indicators. They go beyond banking sector data to also provide relevant information on financial markets, the non-banking sector (insurance corporations, pension funds, and other financial institutions), the overall macroeconomic environment, and real estate markets [8].

A useful instrument is supplying the banks with comparative reports as education material for bankers. Such material will make them aware of their own problems at an early stage and of the way they are perceived by the supervisor [8].

Pre-crisis management should be prepared even in the case when the bank is in a good situation to “switch” quickly the fixed rescue mechanism. Bank crisis management system includes all its activities and requires the formation of a systematic approach to management, including monitoring, planning, regulation and control of bank liquidity and solvency [8].

In Ukraine, using the regulatory ratios for banks ensures the stable activity of banks and timely fulfillment of their obligations to depositors, as well as prevents misallocation of resources and loss of capital due to risks inherent in banking activities. Economic ratios are the main pillar of the prudential regulation of banks in Ukraine. The concepts of Basel I - Basel III apply here [9]. Their calculation is done mainly based on regulatory capital. This is one of the main tools for early diagnosis of bank insolvency. Regulatory ratios for banks - indicators established by the National Bank of Ukraine to regulate banking activities based on visa-free supervision to monitor the performance of individual banks and the banking system as a whole [8].

The National Bank of Ukraine sets the following economic standards, which are mandatory for all banks:

1. Capital ratios: minimum regulatory capital - R1 (UAH 500 million); adequacy (adequacy) of regulatory capital - R2 (not less than 10%), the common equity adequacy ratio - R3;

2. Liquidity ratios: LCR - liquidity coverage ratio, that banks must comply according to the Basel III standards at 100% [10]. R6 - short-term liquidity ratio, which is, also as R4, R5, planned to be abolished in 2020 after the introduction of a net stable funding ratio (NSFR)[11], which aim is to increase banks' ability to absorb liquidity shocks in 1 year and stimulate financing of banks' activities due to reliable sources;

3. Credit risk ratios: the maximum amount of credit risk per counterparty is R7 (no more than 25%); high credit risks - R8 (no more than 8 times the amount of regulatory

capital); the maximum amount of loans, guarantees, and sureties given to one insider - R9 (not more than 5%), the maximum total amount of loans and guarantees granted to insiders - R10 (maximum 30%);

4. Investment standards: investment in securities separately for each institution - R11 (not more than 15%); the total investment amount is R12 (not more than 60%) [8].

To prevent and reduce risks of insolvency, in accordance with the Basel Committee recommendations in Ukraine [10], some macroprudential tools should be implemented for early diagnostic of bank insolvency (appendix D, table D.1) [12]. According to the NBU (2018), “The National Bank made the transition to a new bank evaluation in carrying out the banking supervision “Supervisory review and evaluation process” (SREP)[13] based on the risks assessment and quality of management risks in the bank (risk-based approach)”. The assessment using the risk-based approach has become continuous and is implemented simultaneously by all banks through assessing the size of risks and the quality of their management, analyzing current trends in the banks’ activities, in particular, with comparing the key performance indicators of a bank with a “peer group” of similar banks. It also can be used as the tool for early diagnostic of bank insolvency.

In conclusion, it is important for banks to timely analyze the financial results of their activities. Sustained financial results are a key element of a banking institution's success and a guarantee of stable long-term development. Modern economic practice highlights a large number of methods and tools for analyzing the financial performance of the banking institution. They are necessary for determining the bank's efficiency through the use of appropriate tools for early diagnosis of bank insolvency and the prevention of banking institutions' bankruptcy.

## **CHAPTER II. ANALYSIS OF THE FINANCIAL INSTITUTION'S FINANCIAL STATUS**

### **2.1 Investigation for the financial condition of a domestic financial institution**

The analysis of Bank activity carried out through a variety of indicators of activity of commercial bank, which we take from the documents that form the information base of economic analysis. Financial statement analysis is a process which aims to assess current and past financial condition of the bank and of the main results of its activities. The main goal of the analysis is the definition of the generalized assessment and prediction of future performance of the bank.

Public Joint Stock Company OTP Bank has represented the Ukrainian market since 1998, being a socially responsible, reliable and sustainable financial institution providing its consumers with services of European quality standards. JSC OTP Bank in Ukraine is captaining a financial group, which includes OTP Capital Asset Management Company, OTP Leasing LLC and OTP Factoring Ukraine LLC. All OTP Group companies have been showing outstanding performance taking the leading positions in their segments. OTP Bank is one of the largest Ukrainian banks with foreign capital. Within 21 years OTP Bank in Ukraine offers its clients only the best service and services, in particular: performance of daily operations, credit and deposit products, insurance, asset management, leasing and factoring, corporate and investment banking, services of the issuer and the investor [14].

Manage the activities of commercial banks based on pre-existing data analysis. Analysis of the Bank's balance sheet is one of the most important directions of

economic work. We conducted an analysis of the consolidated financial statements of this bank for 2015 – 2019 years [14 - 18].

The purpose of the analysis the Bank's balance sheet is, on the one hand, the assessment of rationality of the actual structure of assets and liabilities from the point of view of ensuring the profitability and stability of the Bank, and with another - to identify ways of optimizing the structure of bank resources, their efficient allocation.

Analyzing assets balance we investigated that the total value of assets of JSC OTP Bank significantly increased in the reporting period compared to the baseline period. Compared with the end of December 2015 asset balance increased in absolute terms amounted to 19220048 thousand UAH. It was changed to 75 % [14 - 18].

After analyzing the structure of assets, we can conclude that loans and advances to customers were the majority of assets at the end of 2019 amounted to 25469028 thousand UAH, 57% of the whole assets. It was decreased by 11% for the investigated time period. Investments held for repayment amounted to 7212296 thousand UAH, 16%, which increased by 4 % compared to 2015. Banks are the next huge part of assets. It amounted to 4308470 thousand UAH in 2019, 10%, and increased by 1% compared to 2015. The investment provided for sale took 8 % of the total assets, Balances with the National Bank of Ukraine – 7%, property and equipment and intangible assets– 1%, deferred tax assets, current taxes assets, and other assets – less than 1% each of them (appendix E, picture E.1, table E.1).

The amount of total liabilities and equity was increased on 19045623 thousand UAH, 74 %, where total liabilities were changed on 9050149 thousand UAH, 33%, total equity - 9995474 thousand UAH, -531 %. Customer accounts took 96 % of total liabilities at 2019 and increased on 31 % for the investigated time period, due to banks and other financial institutions and other liabilities – 2 %, Current and deferred income tax assets – less than 1 % (appendix E, table E.2).



Bank capital is the difference between a bank's assets and its liabilities, and it represents the net worth of the bank or its equity value to investors. The amount of share capital was decreased on 1432708 thousand UAH, 19 %, share premium was unchanged, other additional capital was increased on 2136 thousand UAH, 0,2% . Revaluation reserve - 76745 thousand UAH, 1336%, accumulated deficit – 113449301 thousand UAH, 102% (appendix E, table E.2).

To sum up the changes of total assets, liabilities and equity for 2015-2019, each of them has a positive dynamic. This increase was achieved through an increase in the share of consumer loans in the structure of the working loan portfolio, improved efficiency of operating processes and a balanced approach to credit risk management policy (figure 2.1).

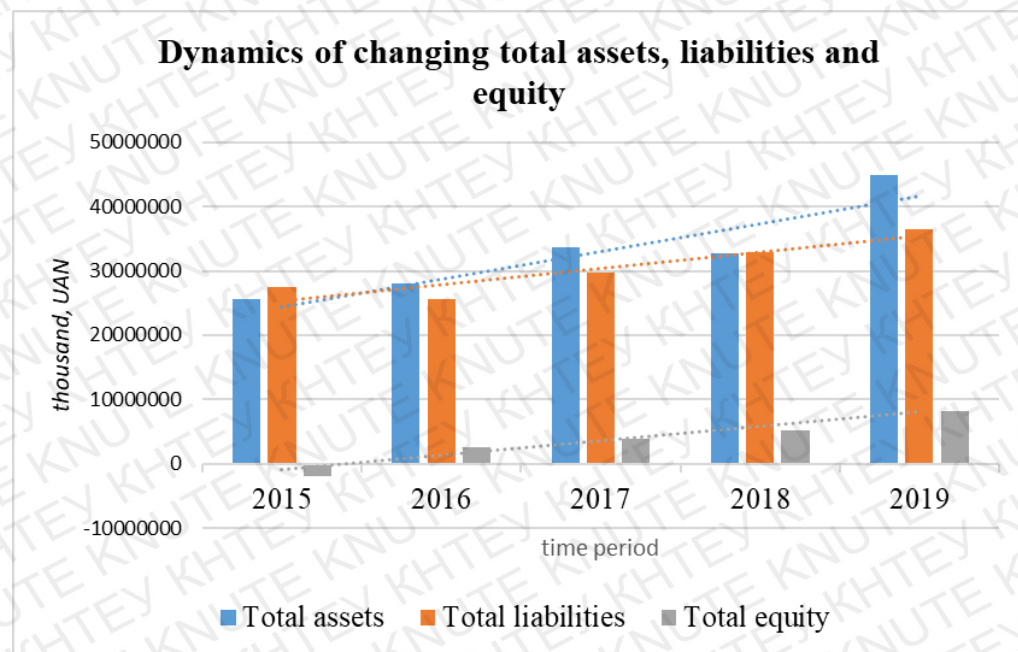


Figure 2.1. Dynamics of changing total assets, liabilities and equity for 2015-2019, thousand UAH

\*Note: built by the author according to [14 - 18]

Positive cash flow indicates that a bank is adding to its cash reserves, allowing it to reinvest in the bank, pay out money to shareholders, or settle future debt payments. The amount of net cash flows from operating activities was increased on 8342996 thousand UAH. Net cash flows used in investing activities was changed on 3829527 thousand UAH. However, negative cash flow from investing activities might be due to significant amounts of cash being invested in the long-term health of the bank, such as research and development. Net cash flows used in financing activities shows the net flow of funds used to run the company including debt, equity, and dividends. This indicator had a negative result, and was increased on 3856230 thousand UAH during the investigative period of time [14 - 18].

Analyzing financial statements, we investigated that the total cash and cash equivalents were increased in absolute terms amounted to 38830961 thousand UAH in the reporting period compared to the baseline period. It was changed on 126 % (figure 2.2).

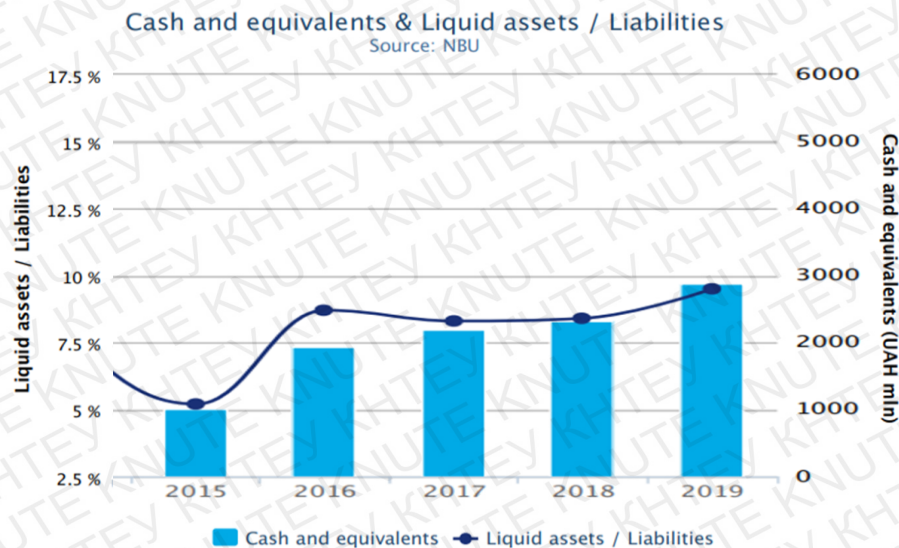


Figure 2.2. Dynamics of changing cash, and liquid assets / liabilities, thousand UAH

\*Note: built by the author according to [14 - 18]

Banks depend on borrowers to maintain their scheduled loan repayments as a major source of revenue. When a borrower has not made regular payments for at least 90 days, the loan is considered a non performing loan, or NPL. The nonperforming loan ratio, better known as the NPL ratio, is the ratio of the amount of nonperforming loans in a bank's loan portfolio to the total amount of outstanding loans the bank holds.

The NPL ratio measures the effectiveness of a bank in receiving repayments on its loans. Dynamics of changing NPL ratio of JSC OTP bank for 2015-2019 is positive, because this ratio decreased on 27,6%. For the bank or lender, interest earned on loans acts as a main source of income. Therefore, non-performing assets will not negatively affect their ability to generate adequate income and thus, their overall profitability. It is important for banks to keep track of their non-performing assets because too many NPAs will adversely affect their liquidity and growth abilities (figure 2.3).

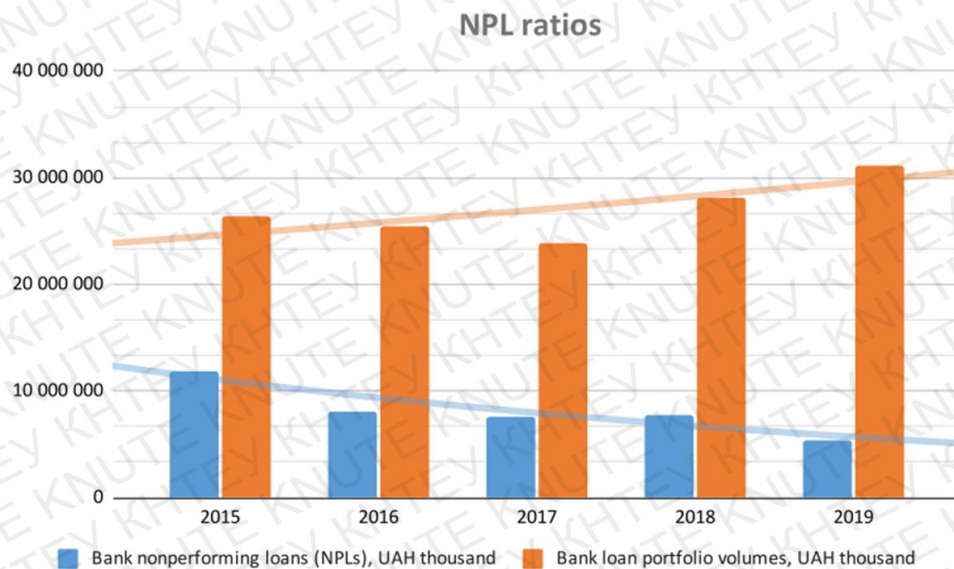


Figure 2.3. Dynamics of changing NPL ratio for 2015-2019, thousand UAH

\*Note: built by the author according to [14 - 18]

The analysis of banks and banking stocks has always been particularly challenging because of the fact banks operate and generate profit in such a fundamentally different

way than most other businesses. While other industries create or manufacture products for sale, the primary product a bank sells is money. Among the key financial ratios, investors and market analysts specifically use to evaluate companies in the retail banking industry are net interest margin, the loan-to-assets ratio, and the return-on-assets (ROA) ratio.

Net interest margin is an especially important indicator in evaluating banks because it reveals a bank’s net profit on interest-earning assets, such as loans or investment securities. Since the interest earned on such assets is a primary source of revenue for a bank, this metric is a good indicator of a bank's overall profitability, and higher margins generally indicate a profitable bank. Dynamics of changing net profit, and net interest margin was different for 2015-2019, but this indicator has positive dynamic and increased from 9,1 % at 2015 to 11,8 % at 2019. It was caused by a number of factors that can significantly impact net interest margin, including interest rates charged by the bank and the source of the bank's assets (figure 2.4).

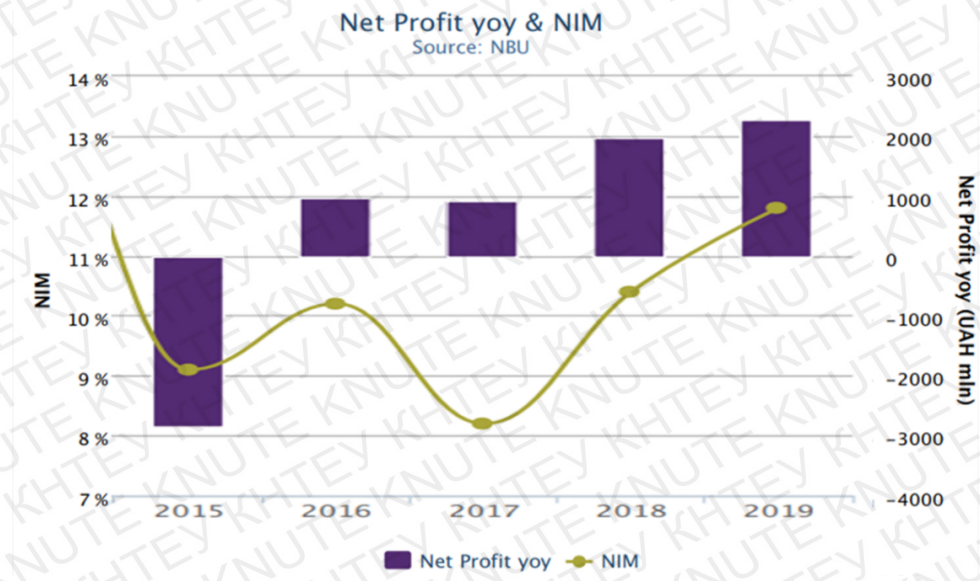


Figure 2.4. Dynamics of changing net profit, and net interest margin, thousand UAH, %

\*Note: built by the author according to [14 - 18]

The loan-to-assets ratio is another industry-specific metric that can help obtain a complete analysis of a bank's operations. Banks that have a relatively higher loan-to-assets ratio derive more of their income from loans and investments, while banks with lower levels of loans-to-assets ratios derive a relatively larger portion of their total incomes from more-diversified, non interest-earning sources, such as asset management or trading. Banks with lower loan-to-assets ratios may fare better when interest rates are low or credit is tight. They may also fare better during economic downturns. This rate varied in the range from 87% to 93% and had a maximum in 2015 (appendix E, table E.4).

The return-on-assets (ROA) ratio is frequently applied to banks because the cash flow analysis is more difficult to accurately construct. The ratio is considered an important profitability ratio, indicating the per-dollar profit a company earns on its assets. Since bank assets largely consist of money the bank loans, the per-dollar return is an important metric of bank management. The ratio was increased on 4,87% due to the increase in total net profit for the reporting period (figure 2.5).

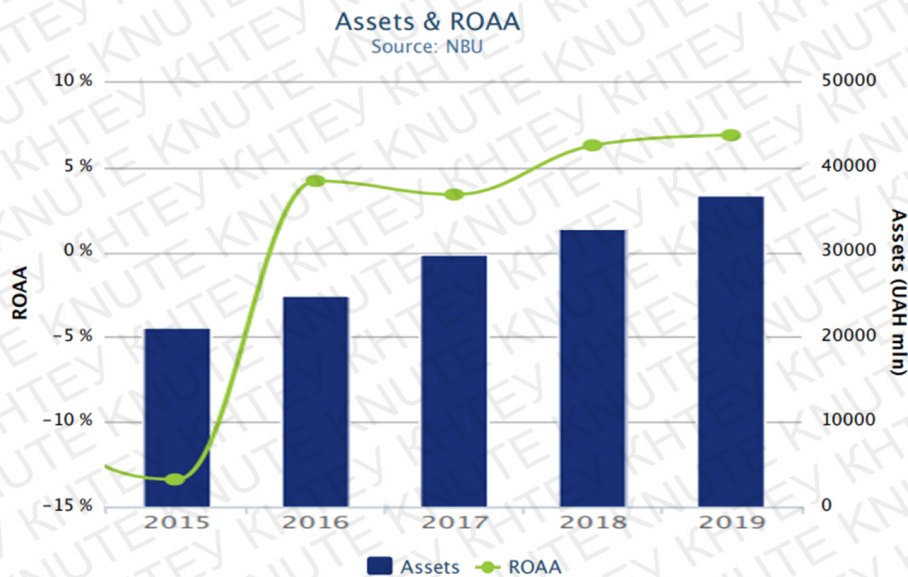


Figure 2.5. Dynamics of changing assets, and ROA, thousand UAH, %

\*Note: built by the author according to [14 - 18]

The return on average equity (ROAE) refers to the performance of a company over a financial year. This ratio is an adjusted version of the return of equity that measures the profitability of a bank. The ratio was increased on 230,7% (picture 2.4). This was due to the increase in total assets for the reporting period. A high ROAE means a bank is creating more income for each dollar of stockholders' equity. It also tells the analyst about which levers the bank is pulling to achieve higher returns, whether it is profitability, asset turnover, or leverage (Figure 2.5).

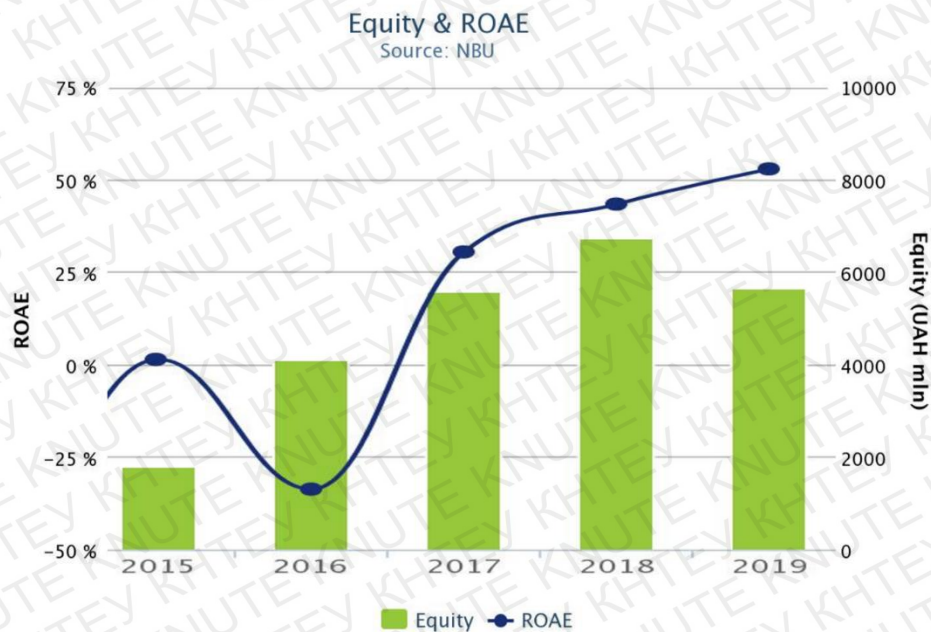


Figure 2.5. Dynamics of changing equity, and ROAE, thousand UAH, %

\*Note: built by the author according to [14 - 18]

To make a conclusion, financial stability depends on the actions of all branches of management in the bank. Its provision requires the concerted and coordinated efforts of all parties. In 2019 JSC OTP Bank assets have essentially accelerated growth and have reached the level of UAH 448000000 that is on 75% more than at the beginning of the investigated time period. Return on assets has continued to grow to the level of 6,9% in annual terms [14 - 18].

The increase in the level of profitability was achieved due to the growth in the share of consumer loans in the structure of the working credit portfolio, increased efficiency of operating processes and balanced approaches to credit risk management policy. Following the results of the year, the Bank entered the TOP-10 (9th place) of the largest Ukrainian banks in terms of net assets and took 5th place in terms of net profit [19]. The bank directs its activities to service individuals, small and medium-sized businesses, as well as corporate clients. The positive dynamics in all areas of activity was due to credit decisions to customers as well as deposits in the corporate and private segments. During the last 5 years, the bank demonstrated strong financial results that have a positive effect on its credit rating and solvency. Further, uncertainty may have the greatest impact on the Bank, the result of which depends on the following from future events that are not under the Bank's direct control, but which may affect the Bank's financial statements in the future. At the same time, the Bank has a significant liquidity and capital reserve to ensure timely settlement of all liabilities to customers, including in case of possible increase in outflows of customer funds due to the aggravation of the situation with the spread of COVID-19 and its impact on the socio-economic situation in the country. Therefore, an assessment for the probability of bank insolvency is the way to predict future preconditions and causes of such a situation.

## **2.2 Assessment for the probability of financial institution insolvency**

The financial stability of a commercial bank is a qualitative dynamic integral characteristic of the bank's ability to perform its functions effectively and ensure targeted development by transforming resources and minimizing risks under the influence of external and internal environment factors. The financial stability of the bank is ensured through compliance with certain parameters of the bank's activities

(capital, liquidity, solvency, profitability, level of problem assets, etc.) within acceptable limits. This means a balanced growth of positive and decreasing negative parameters of the bank's activity within the acceptable risk limits.

For assessment the probability of financial institution insolvency we suggest using the following model when commercial banks use prediction of expected results by taking into account forecast macroeconomic information. In this direction, we can distinguish the following algorithm for accounting a forecast macroeconomic information when using models of impairment expected incomes and losses in the bank (figure 2.6).

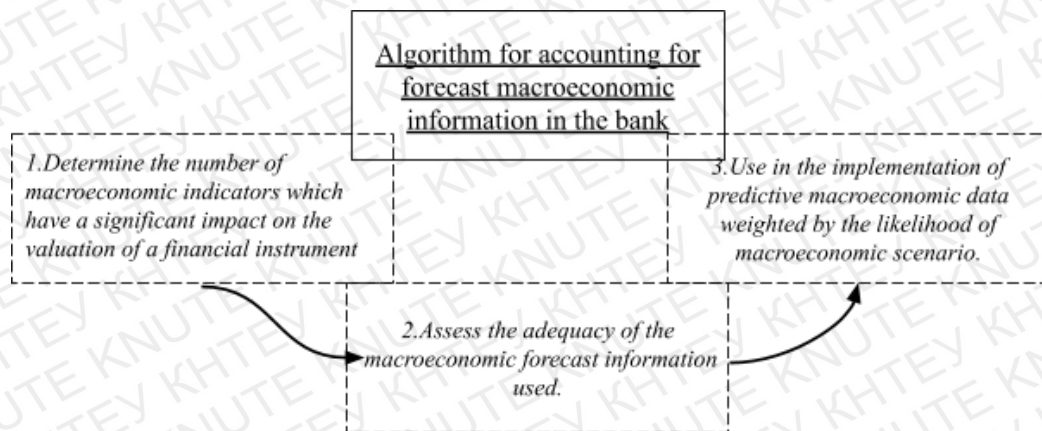


Figure 2.6. Algorithm for accounting for forecast macroeconomic information when using models of impairment of expected incomes and losses in the bank

\*Note: built by the author according to [21].

Our task is to predict the following performance indicators of the Bank using a mathematical model:

- a) total liquidity of the bank's liabilities;
- b) profitability of the bank in the form of two indicators: ROAE and ROA;
- c) volume of deposits and loans.



These results will range from low and high probabilities of internal and external factors affecting the bank's financial stability. Summing up the indicators, we will obtain an analysis of the probability of bank solvency or insolvency.

In order to build graphical forecasts of the selected indicators, we used the relevant functionality of Microsoft Excel software. The FORECAST.ETS function calculates or predicts future values based on existing (historical) values using the AAA version of the exponential smoothing algorithm (ETS). The predicted value is an extension of the historical values on a specified target date and must be an extension of the timeline [30].

The first indicator is total liquidity of the bank's liabilities. Bank liabilities are the debts incurred by a bank, what a bank owes. Liability management is the process of managing the use of assets and cash flows to reduce the bank's risk of loss from not paying a liability on time [22]. That's why it is very important to understand what financial institutions will be able to expect in the next time period. The forecasted bank's liabilities data of JSC OTP Bank is shown in the positive dynamic (appendix F, figure F.1).

The second indicator is asset because it is a resource controlled by the bank as a result of past events and from which future economic benefits are expected to flow [22]. It is the result of a past event or transaction, therefore is good data to determine the probability of further financial condition of the bank, in our case JSC OTP Bank. As we have shown a positive growth trend in the years to come, we see that this trend is being carried forward into the forecast period. Therefore, until 2023 assets, assuming different scenarios, may range from 51748973 to 60259227 thousand UAH (appendix F, figure F.2).

Generally, the higher the return on assets ratio, the better. Banks that account for more than half of the sector's net assets have ROA of more than 3% and ROE of over

30% [23]. For Ukraine, these are record highs [24]. The strong results have been driven mainly by a high net interest margin and growth in fee and commission income on the back of stronger demand for banking services. How the forecast is shown, the further data of this ratio will be able to be higher than the average in Ukraine now (appendix F, figure F.3).

One of the next indicators to predict is total equity. A positive growth trend in the years to come let's forecast a huge rising until 2023 year, assuming different scenarios, this indicator may range from 12149730 to 17187347 thousand UAH (appendix F, figure F.4).

Return on equity is an important measure of a bank or country's banking sectors profitability. Return on Equity looks at how well a bank's management is using its assets to create profits [23]. The forecast has a negative dynamics It could be caused by a low ratio -188,5% in 2015, and a decrease to 30,2% in 2017. However, the indicator stays higher than the average in Ukraine (appendix F, figure F.5).

The loan-to-deposit ratio is used to assess a bank's liquidity by comparing a bank's total loans to its total deposits for the same period. Typically, the ideal loan-to-deposit ratio is 80% to 90%. A loan-to-deposit ratio of 100 percent means a bank loaned one dollar to customers for every dollar received in deposits it received [25]. Analyzing the Bank's annual reports we were able to predict that this indicator will increase to 88% in 2023 in the worth case or even to 113% under the best circumstances. The LDR helps to assess the health of a bank's balance sheet and tell about the solvency of JSC OTP Bank (appendix F, figure F.6).

Net income margin is equal to how much net income is generated as a percentage of revenue. This indicator is one of the most important indicators of a bank's financial health [25]. As we have shown a positive growth trend in the years to come, we see that this trend is being carried forward into the forecast period. Therefore, until 2023 assets,

assuming different scenarios, may range from 12,22 to 16,32. Analyzing NIM, we obtain one more positive indicator of bank solvency and good financial condition nowadays and in the future (appendix F, figure F.7).

Among the methods of statistical analysis for building a model for forecasting the bank's financial position, we chose the logistic regression method. Logistic regression is used to predict the probability of the occurrence of an event by the values of multiple features [26].

The following algorithm was used to build a financial forecast model for the bank:

1. formation of an array of data to be used in the process of building the model;
2. the selection and calculation of indicators against which the financial condition of the bank will be assessed;
3. checking the significance of the factors selected for the model using the twin F-test for dispersion;
4. building a doubles matrix (correlation coefficients)
5. building the logit regression equation using the Excel programme and checking its quality [26].

This model is binary choice. For example, the financial condition of a bank is a sign with two categorical values:

- 1 is bankruptcy;
- 0 is a satisfactory financial condition [28].

The function is called a logistic regression or logit model. Using the method of logistic regression, it is possible to assess the probability of the Bank's bankruptcy [28]. The Bank's financial position ( $z$ ) is a dependent variable that accepts the value is 1 or 0, and many features  $x_1, x_2, \dots, x_p$ . The formula is as follows:

$$p_i = 1 / (1 + e^{-z_i}) \quad (2.1) [28]$$

where:

- $\pi_i$  - probability of the event;
- $z_i$  - a linear combination of predictive parameters (predictors).

The linear combination of prognostic parameters has a form (formula 2):

$$z_i = b_0 + b_1 \cdot \chi_i + b_2 \cdot \chi_i + \dots + b_k \cdot \chi_i \quad (2.2)[28]$$

where:

- $b_0 \dots b_k$  – data of variate indicators;
- $\chi_i$  is the value of the  $j$ -th predictor for  $i$ -th observation ( $j = 1, \dots, k; i = 1, \dots, n$ ).

The main advantages of logistic regression are the quantitative estimation of probability in the explicit. In addition, the logistic regression is characterized by high stability. Regression there are certain inaccuracies in the description of enumeration variables and its insensitivity to certain values numerical variables [28].

After analyzing the set of factors, we identified the significant indicator of the future model that is compared to the average in the bank of Ukraine (table 2.1).

*Table 2.1*

### **The significant indicator the logistic regression method**

<b>Indicators</b>	2019	the average in group
Liabilities/assets (x1)	82%	86%
Return on assets (x2)	7%	5%
Return on equity (x3)	42%	37%
Loans to deposits (x4)	85%	88%
Net income margin (x5)	12%	20%

\*Note: built by the author according to [18]

After that we built the matrix of paired correlation coefficients for selected indicators (table 2.2)

Table 2.2

**Matrix of paired correlation coefficients for selected indicators**

	LTA	ROA	ROE	LTD	NIM
LTA	1,00	0,01	0,56	0,58	0,49
ROA	0,99	1,00	0,52	0,57	0,51
ROE	0,44	0,48	1,00	0,22	0,20
LTD	0,42	0,43	0,78	1,00	0,01
NIM	0,51	0,49	0,80	0,99	1,00

\*Note: built by the author according to [18]

Our calculations show the linear combination of prognostic parameters has been built to forecast bankruptcy of banks as follows:

$$Z_i = 0,546 - 0,05X_1 + 0,32X_2 + 0,11X_3 - 0,04X_4 - 0,69X_5 \quad (2.3) [28]$$

Using the method of logistic regression, it is possible to assess the probability of the Bank's bankruptcy. The Bank's financial position (p) is a dependent variable that accepts the value is 1 or 0. Judgement on the probability of the Bank's bankruptcy is made depending on the value of p indicator:

- if  $0.8 < p < 1$  - maximum bankruptcy risk;
- if  $0.6 < p \leq 0.8$  - high bankruptcy risk;
- if  $0.4 < p \leq 0.6$  - average bankruptcy risk;
- if  $0.2 < p \leq 0.4$  - low bankruptcy risk;
- if  $0 < p \leq 0.2$  - minimum bankruptcy risk [29].

After the whole calculation we obtained 0,346 or 34,6% of the probability of financial institution insolvency. This is a low bankruptcy risk [29].

On this basis, it can be concluded that the model is adequate. The model has a high classification quality because it corresponds to the positive predictive indicators of the The FORECAST.ETS function of Microsoft Excel software [30]. Thus, the binary logistic regression tools used made it possible not only to identify, but also to

quantitatively describe the most important indicators determining the probability of insolvency of commercial banks [30].

Analysis of the financial institution's financial status let to sum up the following results:

1. Following the results of the year, the JSC OTP Bank entered the TOP-10 (9th place) of the largest Ukrainian banks in terms of net assets and took 5th place in terms of net profit;
2. During the last 5 years, JSC OTP Bank demonstrated strong financial results, that have a positive effect on its credit rating and solvency
3. For assessment the probability of financial institution insolvency we made an analysis by building the graphical forecasts of the selected indicators (used the relevant functionality of Microsoft Excel software, the FORECAST.ETS function) obtained the positive results of changes to the majority indicators.
4. Using the logistic regression method, we investigated that the probability of financial institution insolvency is 0,346 or 34,6%. This is a low bankruptcy risk.

The development of forecasting models of the financial state of a bank is necessary for early assessment of the probability of financial institution insolvency. The purpose of such analysis is to diagnose in a timely manner the probability of the bank's or the entire system's collapse through continuous monitoring and control of financial soundness indicators, showing the factors that are sensitive to the impact of possible risks of external and internal environment in order to take appropriate decisions to strengthen the financial position and ensure the financial soundness of the bank or the banking system.

## **CHAPTER III. FIELDS FOR IMPROVEMENT OF THE EARLY DIAGNOSTICS INSTRUMENTS OF FINANCIAL INSTITUTION INSOLVENCY**

### **3.1 Foreign experience for early diagnosis of financial institution insolvency**

The banking system of any country plays a leading role in the development of the state financial system. In this context, the bank insolvency will have a negative impact both on certain participants and the country's economy as a whole, since banking activities have a significant impact on the objective processes of its functioning, especially on the efficiency and stability of economic development. The bank's insolvency can be prevented by the following solution such tasks as: timely quality and complete control over the bank's activities, implementation of effective asset and liability management, achieving and maintaining the quality structure of the loan portfolio, and developing measures to improve the efficiency of the bank as a whole. It should also be noted that when the bankruptcy of a small bank can be relatively painless for the country's economy, the liquidation of a large banking institution (a giant bank), or a network of banking institutions will have negative consequences not only for the financial sector, but also for the country as a whole [31].

The assessment of financial stability in most countries is included in the system of micro- and macro-prudential regulation of banking activities by central banks and provides for the implementation of this procedure on an ongoing basis. At the same time, great emphasis is being placed on this issue in European countries. In this perspective, it will be important to compare the financial stability of European banking

systems with the current measures taken by government authorities to improve its level in order to respond in a timely manner to the early signs of bank failure [32].

The main directions of financial reform in the EU countries are as follows:

- increase in the level of capitalization and liquidity of banks;
- improvement of efficiency of supervision and regulation of banking activities;
- reducing dependence on credit ratings;
- creation of unified instructions for settlements;
- shadow banking risk management [33].

In transition countries there is a lack of information about operations of banks or asymmetric information. Management is not responsible enough or interested enough to publish information about the situation in the bank. Objection to quality of information disclosed by banks can be easily given, but it should also be kept in mind that banks have difficulty collecting information, for example about creditors. Therefore, they often resort to collateral, whose value is difficult to estimate because it is manifested only when materialized, that is put on the market [34].

Problem of insufficient market discipline in transition countries is tried to be alleviated by tightening supervision of the banking sector, and by improving and applying accounting and auditing standards. In all transition countries, the impact of politics on addressing insolvency of banks is high. The authorities generally have the same approach, reflected in delay of solutions, and putting things under the carpet. Previous experience shows that the collapse of banks in the observed countries is most often caused by a variety of reasons, most often stated: poor management of banks, inadequate regulatory agencies, strong interference by governing entities, lack of analysis of client creditworthiness, lending to related parties, weak internal control mechanisms, embezzlement and the so-called creative accounting [35].



In addition to the traditional quantitative indicators of the bank's activities, such as capital, assets, a profit of the credit institution, and others, relative indicators are of particular importance for assessing the effectiveness of banking activities. It is necessary to evaluate both quantitative and qualitative indicators of the activity of credit institutions, the synergy of which will enable them to identify the components of financial soundness and their assessment. An assessment of the financial stability of an individual credit institution is possible only based on the results of a comparison with the industry average components of financial stability [36].

It should be noted that the approaches to assessing the financial stability of credit institutions used in foreign practice can be classified as follows:

1) coefficient analysis - within the framework of this approach, such assessment systems as BAKIS (Germany), Bank Monitoring Screens (BMS) (USA) are used. They promptly determine deviations in the bank's activities and ensure the completeness and complexity of the analysis based on comparing the actual values of indicators with the established normative ones, or averages for a group of homogeneous banks;

2) rating systems of assessment, which can be divided into insider and remote, are based on a formalized procedure for analyzing the reliability and financial stability of banks by supervisors. At the same time, the insider system is used in the USA, Ukraine, Kazakhstan, Czech Republic, Slovakia, Poland, Baltic countries. And remote (remote) rating systems, in turn, are used in Italy, France, Argentina;

3) Comprehensive methods for assessing banking risk, based on the index method and the method of expert assessments, have become widespread in the UK and the Netherlands (RAST, RATE);

4) Statistical models use methods such as SEER Rating (USA), SCOR (USA) in predicting bankruptcies and calculating expected losses; SEER Risk Rank (USA), Bank Calculator - OCC (USA), SAABA (France);

5) macroprudential analysis includes the use of systems such as PFCs and stress testing based on scenario analysis, portfolio sensitivity analysis, and the method for calculating maximum losses (table 3.1) [34].

*Table 3.1*

**Foreign monitoring systems for the bank's financial condition**

<b>Approaches to monitoring the bank's financial condition</b>	<b>Monitoring systems for the bank's financial condition.</b>	<b>The main methods of analysis and financial stability assessment used in monitoring systems</b>
Coefficient analysis and homogeneous group analysis systems	BAKIS (Germany), Bank Monitoring Screens - BMS (USA).	method of actual comparison values of relevant indicators with established rules (planned) values; method for comparing actual values indicator values with average values their group values homogeneous banks;
Rating assessment systems	"insider" systems - CAMELS (USA); CAMELS (Ukraine); CAMELS (Poland, Czech Republic, Slovakia, Turkmenistan, Kazakhstan, Uzbekistan, Armenia, Baltic countries); UBSS (USA); CAMEL (RF); BOPEC (USA); CAMEO (USA); ROCA (USA); "distant" systems - CAEL (USA); PATROL (Italy); ORAP (France); CAMELS (composition of BASIC) - Argentina.	index method, ballroom method, method of comparison with indicators of leading banks; factor analysis; comparison method of actual indicator values with their average values for a homogeneous bank group;
Complex banking risk assessment systems	RUST (Netherlands), RATE (UK).	an index method; an expert method;
Statistical models: calculation of ratings and rating downgrades, forecasting bankruptcies and "Survival", expected losses	SEER Rating (USA), SCOR (USA); SEER Risk Rank (USA), Bank Calculator - OCC (USA); SAABA (France).	discriminant analysis; correlation analysis; analysis of the individual indicators' growth rates; factor analysis; regression analysis; method of dynamics analysis and trend building;
Macro- and microprudential analysis	PFC system, stress testing (IMF member countries).	scenario analysis; portfolio sensitivity analysis; method calculation of maximum losses

\*Note: built by the author according to [34]

Off-site supervision or inspection techniques mandate intermittent reports of the bank such as consolidated annual financial reports, disclosure reports regarding financial and operational risk and other important reports gathered by the concerned departmental examiner. Off-site supervisory systems have several advantages such as it is very cheap as compare to the cost incurred on on-site supervisory examinations, it can be easy and regularly updated with the inflow of new information such as quarterly reports and these supervisory systems are good enough to segregate those financial risks that may lead the bank to future problems. Some of the most important and familiar off-site supervisory bank rating systems are ORAP, PATROL and CAMELS rating systems [35].

In addition to these methods, complex rating systems contain the ability to identify the need for intervention by the bank's management and supervisory authorities over the bank's activities (CAMELS [36]), the need and likelihood of bank support to prevent default (methods of Fitch, Standard & Poor's, Moody's Investors Service); assess the impact of corporate governance on the bank's credit and financial strength rating (Moody's Investors Service); improve assessments in the direction of flexible adjustment of the significance of factors (Fitch) and their efficiency (Standard & Poor's) [37].

One of the most used foreign rating systems is PATROL, which has been used by the Bank of Italy since 1993. It is carried out on the basis of remote analysis of the financial condition of credit institutions and includes five components: capital adequacy, profitability, credit quality, organization, and liquidity [37].

The main inputs for the PATROL off-site analysis include information from monthly, semi-annual and annual regulatory reporting data received by the Bank of Italy. Each component of PATROL is rated on a scale of 1 (best) to 5 (worst) based on supervisory criteria and guidelines. Five individual component ratings are converted

into a composite rating, also on a scale of 1 (best) to 5 (worst), which includes all other quantitative and qualitative information available to the analyst. Ratings assigned are validated through comparisons with the actual results of on-site examinations [37].

Even though the final assessment makes use of both qualitative assessment and quantitative information available to the analyst in the current year, the quantitative assessment mainly relates to data for the previous year and the rating itself is available only with a considerable time lag. It should also be noted that PATROL ratings only reflect the condition of the banking institution at a point in time and therefore are highly responsive to changes in bank performance and economic conditions related to business cycles. In particular, the ratings are found to be highly variable in the case of banking institutions previously rated 3 [37].

The French Banking Commission introduced the annual Organisation and Reinforcement of Preventive Action (ORAP) rating system in 1997 as a multi-factor analysis system for individual institutions. The objective of the system is to detect potential weaknesses in banking institutions by examining all components of risk associated with the activity and environment of each institution making use of quantitative and qualitative information. ORAP has a different approach, which, using a multifactorial system of statistical indicators, determines problems in banking on the basis of calculating all risk factors. The analytical system includes 14 indicators, which, in turn, are divided into five groups: balance sheet and off-balance sheet indicators (asset quality); prudential ratios (liquidity, capital, etc.); market risk indicators; quality criteria (management, shareholders, internal control); income indicators [37].

The most famous rating system in the world is the CAMELS system, used by the US supervisory authorities, which includes an assessment of capital adequacy, asset quality, quality of management, profitability, liquidity and an assessment of sensitivity to risk [36]. The score for each component and the final comprehensive assessment

reflect the presence of deviations and shortcomings in the bank's activities, as well as the need for intervention by the bank's management and supervisors.

A wider range of factors is taken into account when assigning credit ratings by Fitch: quantitative financial indicators (capitalization, profitability, liquidity, asset quality, risk indicators), qualitative factors (customer base, management, risk management), economic environment, regulatory environment, industry specifics, factors of ownership and support [38]. The flexibility of the method is due to the fact that the significance of the factors is not constant and can be adjusted depending on the goals of the assessment. The final result characterizes the bank's stability and contains a conclusion about the need for financial support to prevent default.

In the methodology of the Standard & Poor's (S&P) rating agency, financial and business factors (ownership structure, market position, strategy and management) are used to assign credit ratings to banks, takes into account capitalization, the ability to cover losses from assumed risks and confidential information from the issuer [39], which, in our opinion, can compensate for some non-transparency of the bank, but allows for unexplained subjective adjustments due to changes in ratings.

In the context of consideration of this issue we consider it necessary to study credit ratings of Ukraine, which have been assigned by international rating agencies, as it is the credit rating that characterizes the investment attractiveness of the country (appendix G , table G.1). At the same time, the inflow of foreign investments is important for banks because it reduces negative trends in the economy, allows them to increase foreign exchange reserves and volume of operations in the foreign exchange market by increasing the national currency rate.

Standard & Poor's credit rating for Ukraine stands at B with a stable outlook. Moody's upgraded Ukraine's long-term issuer and senior unsecured ratings to B3 from Caa1, with a stable outlook, after the country secured a new financing program with the

International Monetary Fund. The program will ease the country's near-term funding challenges and help anchor reform progress from recent years, the agency said. Fitch's credit rating for Ukraine was last reported at B with stable outlook. In general, a credit rating is used by sovereign wealth funds, pension funds and other investors to gauge the credit worthiness of Ukraine thus having a big impact on the country's borrowing costs [39].

In recent years, the level of confidence of the Ukrainian population to the banks has been gradually increasing (10.3% in 2017, 10.6% in 2018 and 19.3% in 2019), but in spite of this, it is still very low compared to other countries. For example, research by Ernst & Young has shown that the level of confidence in banking institutions in Nigeria is 71%, the USA 57%, Germany 56%, Mexico 55%, Australia 51%, the UK and France 48% and 39% respectively [39].

Therefore, with such a low level of confidence in the domestic banking system, it is the rating that becomes one of the criteria for assessing a bank's solvency, as it characterises the reliability and stability of banking institutions.

The NBU commits to implementing the 2020 Action Plan and reporting on progress in 2021 [40]. By promulgating this document, the central bank demonstrates unwavering loyalty to its values: patriotism, professionalism, transparency, honesty and partnership. The Action Plan aims to pursue the seven goals of the current NBU Strategy approved in 2018. These include ensuring low and stable inflation, maintaining a stable, transparent, and effective banking system, resuming lending, introducing effective regulation of the financial sector, developing free flow of capital, financial inclusion, and further developing the central bank as a modern, open, and effective institution.

Summing up the above material, early diagnosis of insolvency is the process of early recognition of the problems in the bank's activity at the stage of crisis by the banking

regulators. Administration of assets is the first stage of identifying insolvency proceedings, the main goal of which is protection of the debtor's assets from unreasonable disposal and the formation of the creditors' committee that is authorised to decide on further insolvency steps. The main functions of the asset manager are to maintain the debtor's assets, to identify the debtor's creditors and to convene the creditors' meetings and creditors' committee meetings.

Therefore, foreign experience is extremely important for early diagnosis of financial institution insolvency in Ukraine. Coefficient analysis, rating systems of assessment, comprehensive methods for assessing banking risk, statistical models, and macroprudential analysis which are used abroad are extremely important for predicting probability of bank insolvency in Ukraine. Banks face multiple challenges in respect of liquidity, profitability, and capital adequacy. The insolvency problems in the Ukrainian banking sector are significant, but not insurmountable. A permanent monitoring of new concepts, tools, and methods, which are successfully implemented abroad, will make it possible to analyze the possibility of their application in Ukraine. This will make it possible to prevent losses, make technological and operational adjustments in a timely manner, which can lead to a significant quick profit.

### **3.2 Improvement of the financial institution's early insolvency diagnostics tools**

Using advanced modeling techniques can get relevant indicators for which may provide a quantitative assessment of banking risks, which in fact is the first and the most necessary component in the system of insolvency diagnosis of a banking institution.

A fundamentally new Regulation on the Licensing of Banks is a new way to reduce the probability of bank insolvency.

The excessive concentration of problems can lead to a loss of solvency in the bank. In order to prevent such a situation, European banking institutions and American are actively using mechanisms for the transfer of problem loans to a third party, among which are the following: acquisition of assets and commitments (P&A – Purchase and Assumption), transitional bank (Bridge Bank), a hospital bank (Bad Bank). It is this mechanism that underlies the functioning of the banking systems of Sweden and Germany, whose financial institutions, in dealing with bad assets, prefer to use the hospital bank mechanism [41].

*Table 3.1*

**Anti-crisis management of governments and foreign countries' central banks**

<b>Country</b>	<b>Anti-crisis measures</b>
USA	“Bridge bank”; government liability for mortgage companies' debt; redemption of bad loans by the state; increasing liquidity in the bank by lending through a discount window
Great Britain	providing government guarantees to banks participating in the recapitalization schemes; providing by the Bank of England loans for recapitalization under adequate security
France	stress-testing; reorganization; guarantees on interbank loans; during crisis 41 million EUR were provided for bank's recapitalization; key rate reduction
Austria	monitoring and often diagnosis; government subsidies in the event of liquidity problems; state guarantees protect private savings for 100%
Ireland	Stress-testing; providing absolute deposit guarantees at all banks
Italy	providing auctions by the Bank of Italy to exchange banks' assets for government securities; risk management
Germany/Sweden	practice of "hospital bank"; discounted buyout of problem loans by the Special Financial Market Stabilization Funds ; providing state guarantee for deposits

\*Note: built by the author according to [41]



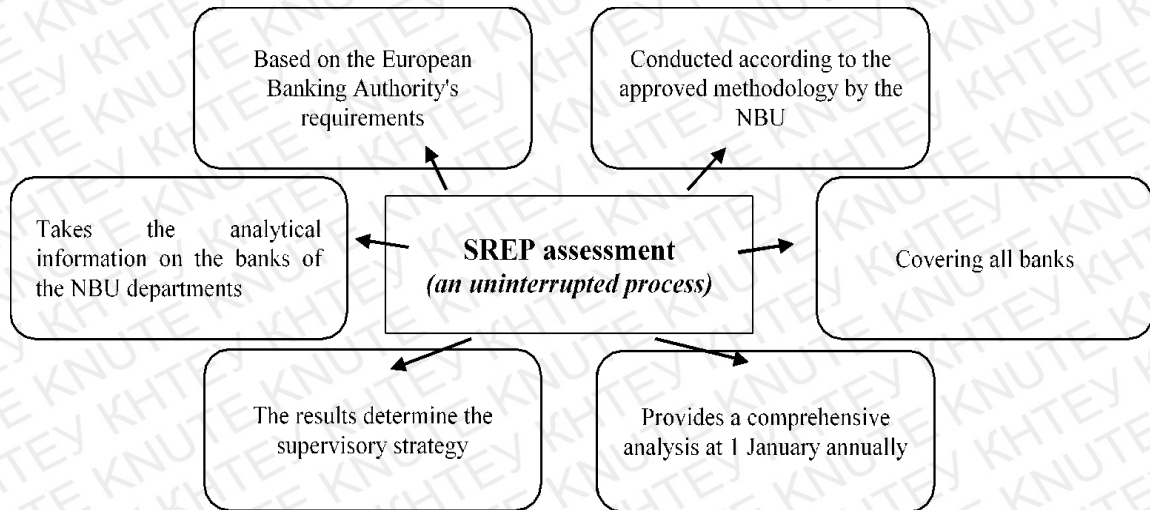
The National Bank of Ukraine is constantly improving the standards of public information disclosure by banks. Investors, customers, banking market participants from now on have more opportunities to analyze the financial condition of Ukrainian banks. In 2018, all Ukrainian banks for the first time in history have disclosed their results of asset quality assessment and stress testing [42].

Modern banking supervision is based on the methodology SREP (Supervisory Review and Evaluation Process). This model is a developed and revised version of the ICAAP (Internal Capital Adequacy Assessment Process) [42].

The SREP analysis is based on nine interrelated areas of analysis:

1. the classification of financial institutions (banks) according to the results of cluster analysis;
2. monitoring of key indicators;
3. analysis of business model;
4. assessment of internal governance as well as internal control system (ICS);
5. capital risks and adequacy (ICAAP);
6. liquidity risks and adequacy;
7. summarizing total assessment;
8. definition and communication of regulatory measures;
9. early intervention of supervision [43].

The bank assessment process is a continuous process that is carried out simultaneously for all banks by assessing risks and the quality of their management on the basis of an analysis of existing trends in the activity of banks, including comparison of the key performance indicators of the bank with peer-groups (similar banks), the current monitoring of the banks' financial situation (figure 3.1).



**Figure 3.1 The monitoring and assessment process (SREP) in the NBU**

\*Note: built by the author according to [43]

Banking supervision places great emphasis on managing risk and assessing banks' risk profile. The National Bank of Ukraine defines a profile of risks as an assessment of the bank's vulnerability to risks in aggregated form and in the context of all types of risks carried out on a certain date based on current or projected assumptions. Requirements for risk management systems are set forth in the Regulation on the organization of a risk management system in banks of Ukraine and banking groups. According to the requirements of the National Bank of Ukraine, each bank should determine the risk level (Risk Capacity) in its internal documents. The permissible level of risk characterizes the maximum risk that the bank can assume for all types of risks. This level depends on the size of the bank's capital and risk management systems. Each bank determines its own risk appetite using risk appetite indicators [43].

In our opinion, it is necessary to develop and improve instruments for early insolvency diagnostics in domestic banks:

1. The National Bank of Ukraine:

- to further develop and update the regulatory framework for the regulation of banking risks;

- to provide greater incentives for banks to introduce integrated risk management systems;
- consider reserving funds for operational risks by the banks;
- to establish strict requirements for the functioning of integrated risk management systems in the largest and large banks. In the case of medium and small banks, these functions may be assigned to one of the staff specialists [42-43].

## 2. Commercial banks:

- to form an optimal organisational structure, which organically covered risk management at all stages of banking operations;
- implement integrated risk assessment systems (in particular, the largest banks with top-down assessment systems).
- assess the possibilities of introducing modern methods, in particular mathematical and statistical ones, into everyday practice of risk assessment and acceptance;
- to create an information database necessary for risk assessment using modern approaches;
- ensure the functioning of a single risk management department and its complete independence (structural and financial) from the bank's divisions, directly accept risks (front offices) and divisions registering the fact of accepting the risk and controlling its magnitude (back offices) [42-43].

In the nearest future, the following steps need to be taken within the program of reforming the Ukrainian banking system:

- to develop a method of calculation and introduce Net Stable Funding Ratio (NSFR);
- to intensify the risk-oriented approach in the banking supervision process;
- to introduce requirements for organization of non-performing asset management process;

- to further remove restrictions on foreign currency operations;
- to reinforce the requirements for the collective suitability of the Board and management of the bank;
- to improve approaches to building the risk-management in banks;
- to update the requirements for the internal control system in banks;
- improve the internal systems of financial monitoring of banks;
- to improve the quality of public information disclosure by banks;
- improve the licensing rules of non-banking financial institutions [42-43].

In order to implement modern European experience and to bring it closer to capital management standards, Basel III [44] and the provisions of the EU Capital Requirements Directive (CRD IV), in 2015 the NBU announced its intention to gradually introduce new capital requirements for banks, in particular the R3 capital adequacy standard, a new standard for maximum credit risk for operations with bank-related persons - R9 (to replace the standard for maximum loans, guarantees and sureties issued to one insider R9 and maximum aggregate amount of loans, guarantees and sureties issued to insiders R10), reserve buffer (conservation) and countercyclical capital buffer for all banks and system buffer for systemically important banks; also for systemically important banks the values of R4 and R7 standards have been increased, it is planned to introduce a buffer of system importance (see appendix H, table H.1).

The new capital requirements for banks were approved by Resolution of the Board of the National Bank of Ukraine No. 312 dated 12 May 2015 "On Approval of Amendments to the Instruction on Procedures for Regulating Banking Activities in Ukraine" [45].

As for the global practice of introducing new capital buffers, their introduction was started in parallel and should have taken place from 1 January 2016 to the end of 2018.

Both steel buffers have been available since 01 January 2019. The standard value of the capital reserve buffer has now been set at 2.5%. Each country can introduce a higher countercyclical capital buffer standard. In this case, the introduction procedure will not be applied. The creation of a countercyclical capital buffer will ensure that banks will create a capital reserve in the non-crisis period in excess of the minimum requirement for the absorption of potential losses that arise during the general economic downturn, without violating the capital adequacy ratio in the future. This instrument will contribute to achieving the objectives of the National Bank's financial stability strategy by strengthening the banks' ability to absorb losses [45].

In terms of the system importance buffer, according to Basel III, 5 groups of systemically important banks have been identified depending on the required level of loss absorption (system importance): 5 group - 3.5%; 4 group - 2.5%; 3 group - 2.0%; 2 group - 1.5%; 1 group - 1.0% [44].

In Ukraine, the NBU has allocated 3 groups to calculate the system importance buffer. As of 1 July 2019, 14 systemically important banks were identified [45].

The distribution by groups and the corresponding buffer of importance are shown in appendix I, table 2

To make a conclusion, the issue of banks' problems remains a controversial one. The problem appears already at the first stages of negative changes in banking activity, which, in turn, may be both significant and insignificant. The last stage of the problem is bankruptcy of banks.

Current market economy requirements from Ukrainian banking institutions are united into a single task - to improve the efficiency of banking management. activity. An important function in carrying out this task is evaluation the financial position of the banking institution through which:

- developing the institution's strategic and tactical development;

- generating management plans and decisions;
- implementing the function of monitoring their implementation;
- it is possible to identify efficiency improvement reserves for conducting active and passive operations;
- assessment of the functioning of the banking institution and its individual units;
- the real directions for optimising their financial position is being identified.

Thus, in order to improve existing regulatory measures during anti-crisis management, we suggest:

1. to provide coefficient analysis to define the real internal condition in which bank is functioning; to identify all of the risks by which bank is affected the most; to provide justified complex procedure in which reactive and preventive tools will be logically related to each other and continue the each anti-crisis procedure stage;
2. to conduct stress-testing, SWOT-analysis during the analytical stage, define the level of problem in the early steps of analyzes .
3. to highlight more in special directive next options for solving possible negative consequences: recapitalization of banking institutions through public funds – thorough assessment of crisis situation to receive it; the establishment of a regulatory framework for capital requirements, and for the procedure for calculating capital ratios reveal the institutional aspect of the above process.
4. to evaluate the effectiveness of the provided procedure and make a new strategy depend on the received results; to develop the program by which assessment of received results will be provided.

The main reasons for banks' problems include insufficient capital, risk transactions and failure to meet the requirement for reserves for active operations. Banking regulation is a complex, multi-dimensional category, which can be defined as a dynamic process of influence under the appropriate conditions of the National Bank of

Ukraine, other state authorities, international organizations, the Association of Ukrainian Banks and other associations of individuals and legal entities on the activity of banks in order to achieve a certain goal using methods and appropriate tools. While the crisis in the economic and banking system in Ukraine is escalating the banking business is accompanied with higher risks and threats of significant deterioration of their financial situation. This situation is a result of the customer deposits outflow accelerating, asset quality worsening, including loan portfolios, the national currency devaluation etc. We consider it appropriate not to deal with the consequences of certain management actions, which are then reflected in negative changes in the balance sheet, but instead to prevent their occurrence.

Ukraine's integration into the European and global space is a top priority and a defining task in its development. The main focus of global cooperation is on the transformation of the banking system; these are innovations that contribute to its effectiveness. The expected direction in this area is the formation of effective financial markets with secure financial institutions that are able to manage them intelligently.

## CONCLUSIONS AND SUGGESTIONS

Over the past five years, the situation in the Ukrainian banking sector has changed dramatically. Over 100 banks become insolvent. The share of state-owned banks in the market has become dominant. Millions of depositors have lost their savings. The economic losses owing to the crisis exceeded 40% of GDP. The public confidence in banking institutions has shaken. This requires rethinking of the regulation mechanism of the banking sector in Ukraine, which was unable to withstand financial risks, and the development of a new, more effective mechanism for increasing banking stability. To address the challenges of the financial crisis, the central banks of the leading world countries have thoroughly revised a number of basic principles concerning banking system governance. Since, according to the program documents, Ukraine has undertaken to align its banking legislation with international standards. So, it is necessary to analyze the main Basel III innovations to determine the possibility of their adaptation to the features of the domestic banking sector, to determine their possible impact on Ukrainian banking institutions, to develop a plan for the introduction of new principles, standards and methods in Ukraine.

During research of financial institution insolvency we made the necessary tasks :

- investigate the theoretical and methodical backgrounds for the early diagnostic of the financial institution insolvency;
- analyze the financial institution's financial status;
- investigate the financial condition of a domestic financial institution;
- estimate the probability of financial institution insolvency;
- research foreign experience for early diagnosis of financial institution insolvency;



- improve the financial institution's early insolvency diagnostics tools;
- summarize methodological approaches to determining the bank's financial stability in order to improve them;
- develop a methodology for diagnosing the Bank's financial stability aimed at early detection and prevention of crisis situations.

The bank's financial stability is the subject of analysis by different financial market participants. The purpose of such analysis is to diagnose in a timely manner the probability of the bank's or the entire system's collapse through continuous monitoring and control of financial soundness indicators, showing the factors that are sensitive to the impact of possible risks of external and internal environment in order to take appropriate decisions to strengthen the financial position and ensure the financial soundness of the bank or the banking system.

According to the capture I, ukrainian legislation provides the definition of several categories of crisis in the bank. According to chapter 5 of the Law of Ukraine “Banks and Banking” [3], there are two categories: «problem bank» and «insolvent bank».

The main internal factors influencing bank insolvency are organizational, technological, financial, economic factors, and inefficient risk management policy at the bank. The main external factors are generally economic, legal and non-financial.

Analysis of world and domestic experience has shown that the most common methods of diagnosing the potential insolvency of financial institutions are: rating systems, coefficient analysis and analysis of banking system and financial institutions, integrated risk assessments, statistical models. We used them to investigate the financial condition of JSC OTP Bank and understand the current state of its solvency. in the second capture.

According to the ranking of the National Bank of Ukraine in terms of assets, JSC OTP Bank is among the largest Ukrainian banks. On June 4, 2020, at the meeting of

the Rating Committee of RA "Expert-Rating" it was decided to update the long-term rating of JSC OTP Bank at the level of uaAAA on the national Ukrainian scale. According to the Resolution of the Cabinet of Ministers of Ukraine 65665 of April 26, 2007, a bank or a separate debt instrument with a rating of uaAAA is characterized by the highest creditworthiness compared to other Ukrainian banks or debt instruments. In deciding to update the rating, the Agency took into account the results of the Bank's work for the first quarter of 2020.

Investigation of the financial institution's financial status in the second capture led to sum up the following results:

1. Following the results of the year, the JSC OTP Bank entered the TOP-10 (9th place) of the largest Ukrainian banks in terms of net assets and took 5th place in terms of net profit;
2. During the last 5 years, JSC OTP Bank demonstrated strong financial results, that have a positive effect on its credit rating and solvency
3. For assessment the probability of financial institution insolvency we made an analysis by building the graphical forecasts of the selected indicators (used the relevant functionality of Microsoft Excel software, the FORECAST.ETS function) obtained the positive results of changes the majority indicators.
4. Using the logistic regression method, we investigated that the probability of financial institution insolvency is 0,346 or 34,6%. This is a low bankruptcy risk.

Analyzed of the foreign experience in the third capture we investigated the approaches to assessing the financial stability of credit institutions using abroad can be classified as follows:

- 1) coefficient analysis
- 2) rating systems of assessment
- 3) comprehensive methods for assessing banking risk

- 4) statistical models
- 5) macroprudential analysis.

Basel III, which is mandatory for implementation in EU countries and is gradually being implemented in Ukraine, aims to increase the ability of the banking sector to withstand financial stress; improve corporate governance and, in particular, risk management system; to expand the list of public information on banks' activities, which will increase their credibility.

Nowadays, Ukrainian banks operate in conditions of unstable economic and political situation and overcoming negative consequences of the global financial crisis, accompanied by various losses, risks or threats both for the banking institutions themselves and for potential users of their services. In such circumstances, the bank's top managers need to pay much more attention to timely and comprehensive assessment of its performance indicators, it is advisable to carry out on the basis of ratings, which allow not only to draw real conclusions, but also to develop long-term forecasts of reliability. At the same time, the results of the ratings of banks by national and international rating agencies are increasingly used as a guide in the process of selecting the most stable and reliable bank for customers and counterparts. In other words, the rating is a kind of indicator of the state of a banking institution, can be used as a universal tool to create and maintain a positive image and business reputation of a bank, and is considered a prerequisite for market transparency and increasing the investment attractiveness of the economy of any country. That is why, the rating of banks remains a topical problem, especially at the current stage of development of the Ukrainian banking system. Ensuring the financial stability of the bank provides an objective determination of its current planned state, effective management of bank financial resources, acceptance management decisions that would improve the financial stability of the bank and the banking system as a whole.

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