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# IMPORTANCE OF STRESS-TESTING IN RISK ASSESSMENT OF COMMERCIAL BANKS

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**Abstract**
The article provides information on importance of using stress-testing in assessing risks in the activity of commercial banks.

**Keywords**: stress scenario, types of stress-testing.

## Introduction

The stress test is a tool for assessing the possible impact of events (risks) with a low probability of occurrence on the bank's financial condition. The main purpose of conducting a stress test of the bank's activities is to determine the resources necessary to ensure the financial stability of the bank in unfavorable conditions for the bank (including in crisis situations) and to develop measures to be implemented in these situations.

The main advantage of conducting a stress test of banks' activities is the development of the bank's risk management system. Conducting a stress test of the bank's activities provides another level of control over the bank's risk management, and as a result, strengthens the bank's risk management system and internal business policies.

Due to its importance, the stress test should be distinguished as an independent and important stage of risk management. A stress test is conducted to assess the bank's exposure to undesirable but possible situations. Such situations cannot be evaluated within standard statistical models. Thus, stress testing is used in addition to models that reflect the relatively "quiet" behavior of markets [1].

## 2. Literature Review

Mr. Martin Cihak expressed the following thoughts about stress testing: “Stress testing is a useful and increasingly popular, yet sometimes misunderstood, method of analyzing the resilience of financial systems to adverse events. [2]”

Adrian Pop says that “Stress testing is used both by banks and other financial institutions in risk management and by prudential authorities in macroprudential regulation, in order to determine how certain extreme, but still plausible, shock scenarios would affect the value of a given asset portfolio or the stability of the financial system as a whole” about stress testing.

Galeyeva Z.T. “The development of stress testing practice is also relevant at the micro level. Stress testing allows you to assess the criticality of accepted risks for the financial stability of the bank

and the need to apply measures to further limit risks. Stress tests serve as a basis for developing a contingency plan if the results of the stress tests do not indicate the need for urgent action [3]".

According to the International Monetary Fund, stress testing as "techniques for assessing the sensitivity of a portfolio to significant changes in macroeconomic indicators or to exceptional but possible events."

The Bank for International Settlements defines stress testing as "stress testing is a term that describes various methods that financial institutions use to assess their vulnerability to exceptional but possible events [4]".

The Bank of Russia defines stress testing as "an assessment of the potential impact on the financial condition of a credit institution of a number of specified changes in risk factors that correspond to exceptional but probable events"

The Financial Institutions Supervisory Board of Canada defines it as follows: "Stress testing is a risk management technique used to assess the potential impact on the financial condition of an institution of a set of specified changes in risk factors consistent with exceptional but probable events [5]".

**3. Research Methodology**

Classical methods of finance in risk minimization are researched, and the article presents infographic classification and tabular data. It also deals with data synthesis analysis and theoretical foundations.

**4. Analysis and Discussion of Results**

In most countries of the world, macro stress testing practices have been widely used as a method of ensuring the stability of the banking system and assessing the existing risks in the financial system. Macroprudential stress testing is carried out by the Central Bank as the body controlling the country's banking system. Conducting a stress test analyzes the interrelationship between financial and macroeconomic sectors, and evaluates the results of negative situations that may occur based on the mechanism of their influence on the basis of econometric and statistical analysis.

Stress testing is based on certain scenarios, the stability of the banking and financial system is assessed by calculation in accordance with the crisis situations of the past period or the expectations that can be expected. Assumptions can be made based on optimistic, normal and critical scenarios. For example, a change in GDP, an increase in the interest rate, a change in the exchange rate, a change in the share of NPL (non-performing loans) in the portfolio, an increase in real estate prices, etc.

From the point of view of bank risk, stress-testing is carried out through the analysis of scenarios. Stress scenarios are developed independently by the Bank, taking into account the risks associated with its indicators and activities. The scenario should include variable indicators and their impact on the Bank's financial situation, the macroeconomic and interbank market situation, the consequences of the scenario, and a plan of measures to be taken to eliminate them. A stress scenario may include one or several (liquidity, credit, operational, reputational, etc.) risks.

When developing stress-scenarios, it is necessary to take into account the change of the (probable) factors based on the hypothesis along with the historical change of the risk factors.

The following methods are used to conduct a stress test:

- historical scenario - a stress test based on a sharp change in risk factors that the Bank has previously faced in its practice;
- hypothetical scenario – a stress test based on changes in risk factors that have not occurred in the bank's activity, but may occur in the event of a crisis (in turn, depending on the severity of the scenario, it is divided into pessimistic, critical, catastrophic stress tests)
- one-factor – stress-test of the change of only one factor of risk (in particular, the outflow of funds from one customer or customers belonging to one sector)
- multifactor - stress test taking into account the change of several risk factors;
- conducting a stress test on an individual - specific type of risk;
- complex - conducting a stress test taking into account two or more risks (in particular, taking credit and market risks into account during the liquidity stress test);
- integrated - conducting a stress test on all types of risks specific to the bank;

Reverse stress - test to determine the crisis scenario in which the bank goes bankrupt. The risk management department uses the existing stress test method based on the market situation and risk management strategy. Analysis of the Bank's balance sheet data and cash flow movements, as well as asset and liability repayment periods, the level of accumulation of Bank loans among customers, the adequacy of the Bank's capital, the Bank's obligations to one depositor, during the stress test based on the amount and other information.

The plan of appropriate measures based on the results of the stress test will be approved by the Bank's Management, the Bank's risk control committee and, if necessary, the Bank's board.

Scenarios used in the stress test of banking activities:

- Pessimistic scenario. In this scenario, as a result of such factors as the deterioration of the Bank's economic indicators, the spread of negative information about the Bank in the mass media, there is a possibility of a crisis in the Bank.
- Critical scenario. This scenario is a deepened state of the pessimistic stage, resulting from the impossibility of preventing the crisis or insufficient measures being taken.
- Catastrophic scenario. In a catastrophic scenario, all economic indicators of the Bank will drop, customers' trust in the Bank will be almost gone, other banks will refuse to cooperate, the bank will become insolvent.
- One-factor scenario: the scenario where 3 or 5 largest customers leave the bank. According to this scenario, there is a possibility of a crisis in the bank as a result of the departure of 3 or 5 of the clients who have the largest share in the bank's resource base. Based on this scenario, the Bank's dependence on large customers will be tested.
- Scenario of large depositor of the bank leaving the bank. According to this scenario, a liquidity problem will arise in the Bank as a result of the departure of the largest client of the Bank, i.e., the largest share of the Bank's liabilities. This scenario involves stress-testing the ability to cover the exit of a large client with highly liquid assets of the Bank.
- The scenario of withdrawal of 5 (10, 20) percent of the bank's total deposit portfolio. The scenario of the withdrawal of 5 (10, 20) percent of the total deposit portfolio of the Bank is due to the influence of various internal and external factors, for example, a negative trend in the macroeconomic situation, fluctuations in the activities of the Bank's major customers, changes in the country's monetary and credit or tax-fiscal policy. the deposit portfolio will decrease.
- The scenario of forming a reserve in the amount of 5 (10, 20) percent for the obligations of the 10 largest debtors to the Bank. According to this scenario, problems are observed in the

activities of 10 clients to whom the Bank allocated the largest amount of loans (leasing, factoring, etc.) reserve is formed. The formation of reserves, in turn, affects the Bank's capital adequacy indicators.

❖ The scenario of the increase in the amount of non-performing loans (NPL) in the bank as a result of a decrease in the cash flow of customers due to emergency situations (worsening of the epidemiological situation, natural and man-made disasters, international and national level conflicts, applied economic sanctions, etc.). According to this scenario, as a result of the state of emergency, there will be instability in the activities of bank customers. Unexpected changes in cash flows occur due to disruptions in production cycles. This, in turn, leads to deterioration of the solvency of customers.

Depending on the duration of the emergency, the extent of the impact on the customers' activities, this situation will lead to an increase in the quality of the bank's loan portfolio and the amount of non-performing loans (NPL) [6].

Below, as of February 1, 2024, we will stress-test the liquidity of JSC "Alokabank" under 3 scenarios, including pessimistic, critical, and catastrophic scenarios (Table 1).

**Table 1 The pessimistic scenario of Aloka Bank [7]**

| | % | to east | from 1 to 30 days | from 31 to 180 days | from 181 to 365 days | over 365 days | Total |
|---|---|---|---|---|---|---|---|
| **Cash inflow** | | | | | | | |
| **Cash** | | 335 179 | | | | | 335 179 |
| **Accounts with the central bank*** | | 635 965 | | | | | 635 965 |
| **Accounts receivable from banks and financial institutions and government securities** | | 535 540 | 0 | 230 216 | 247 672 | 870 103 | 1 883 532 |
| **Cash inflow from loan repayments** | | 384 566 | 527 802 | 1 793 273 | 1 600 580 | 5 809 364 | 10 115 585 |
| **Influx of interest and commissions. income from loan repayments** | | | 135 105 | 684 909 | 821 891 | 1 643 783 | 3 285 689 |
| **Expected deterioration of the additional loan portfolio of UPL* =>** | 10% | 0 | -437 346 | -247 818 | -242 247 | -745 315 | (1 672 726) |
| **Other** | | 1 179 439 | | | | 2 280 287 | 3 459 726 |
| **Inflow of funds, total** | | **3 070 688** | **225 562** | **2 460 580** | **2 427 897** | **9 858 222** | **18 042 949** |
| **Total inflow of funds (cumulative)** | | **3 070 688** | **3 296 249** | **5 756 830** | **8 184 727** | **18 042 949** | **18 042 949** |

According to the pessimistic scenario, due to the simultaneous occurrence of several risk factors (in particular, 946.9 billion soums due to the withdrawal of 15% of the deposits placed in the bank, the reduction of the limits on the attraction of interbank deposits and the withdrawal of the currently attracted deposits 6.6 billion soums at the expense of 953.6 billion soums in one month. a net outflow of som funds is observed [8].

892.4 bln. funds will remain in the amount of soums. That is, according to this scenario, the bank faces difficulties in making payments, but does not lose its ability to pay. The bank is financed by loans returned during the period under analysis of customer payments and current liabilities. In this case, 10% of the loans returned during this period are kept in the bank in order to ensure the bank's liquidity [9].

In such conditions, the bank does not need to make drastic decisions based on high costs, but it is necessary to organize systematic work to increase the bank's liquidity, improve the quality of the loan portfolio, and strengthen the customer base. The bank's solvency will not suffer an excessive loss, at the same time, there is a possibility that the bank will not fulfill the economic norms established by the Central Bank regarding the bank's liquidity (Table 2) [10].

**Table 2 The critical scenario of Aloka Bank [7]**

| | % | to east | from 1 to 30 days | from 31 to 180 days | from 181 to 365 days | over 365 days | Total |
|---|---|---|---|---|---|---|---|
| **Cash inflow** | | | | | | | |
| **Cash** | | 335 179 | | | | | 335 179 |
| **Accounts with the central bank*** | | 635 965 | | | | | 635 965 |
| **Accounts receivable from banks and financial institutions and government securities** | | 535 540 | 0 | 230 216 | 247 672 | 870 103 | 1 883 532 |
| **Cash inflow from loan repayments** | | 384 566 | 527 802 | 1 793 273 | 1 600 580 | 5 809 364 | 10 115 585 |
| **Influx of interest and commissions. income from loan repayments** | | | 135 105 | 684 909 | 821 891 | 1 643 783 | 3 285 689 |
| **Expected deterioration of the additional loan portfolio of UPL* =>** | 15% | 0 | -463 736 | -371 727 | -363 371 | -1 117 972 | (2 316 806) |
| **Other** | | 1 179 439 | | | | 2 280 287 | 3 459 726 |
| **Inflow of funds, total** | | **3 070 688** | **199 172** | **2 336 671** | **2 306 773** | **9 485 565** | **17 398 869** |
| **Total inflow of funds (cumulative)** | | **3 070 688** | **3 269 859** | **5 606 531** | **7 913 304** | **17 398 869** | **17 398 869** |

According to the critical scenario, due to the simultaneous occurrence of various risk factors (in particular, 1,578.3 billion soums due to the withdrawal of 25% of deposits placed in the bank), the bank lost a total of 1,589.3 billion soums in one month. a net outflow of som funds is observed. As a result, there is a risk of not being able to fulfill the payment and demands of customers on time and not meeting the established standards for liquidity. In this scenario, the total amount of the bank's loan portfolio will tend to decrease. Financing of new loans creates a high level of liquidity risk in the bank [11].

95.2 bln. funds will remain in the amount of soums. The possibility of the bank to fully fulfill its obligations may disappear, as well as deviation from the norms established by the Central Bank regarding the bank's liquidity may occur [12].

In order to eliminate the short-term liquidity problems of the bank, the bank should increase its liquid assets, attract interbank deposits for a period of more than one month, offer new attractive deposits to residents and legal entities, and prevent the departure of customers from the bank. it is necessary to take measures to attract new customers with benefits (Table 3) [13].

**Table 3 The catastrophic scenario of Aloka Bank [7]**

| | % | to east | from 1 to 30 days | from 31 to 180 days | from 181 to 365 days | over 365 days | Total |
|---|---|---|---|---|---|---|---|
| **Cash inflow** | | | | | | | |
| **Cash** | | 335 179 | | | | | 335 179 |
| **Accounts with the central bank*** | | 635 965 | | | | | 635 965 |
| **Accounts receivable from banks and financial institutions and government securities** | | 535 540 | 0 | 230 216 | 247 672 | 870 103 | 1 883 532 |
| **Cash inflow from loan repayments** | | 384 566 | 527 802 | 1 793 273 | 1 600 580 | 5 809 364 | 10 115 585 |
| **Influx of interest and commissions. income from loan repayments** | | | 116 399 | 590 076 | 708 091 | 1 416 182 | 2 830 747 |
| **Expected deterioration of the additional loan portfolio of UPL* =>** | 20 % | 0 | -490 126 | -476 670 | -461 734 | -1 445 109 | (2 873 639) |
| **Other** | | 1 179 439 | | | | 2 280 287 | 3 459 726 |
| **Inflow of funds, total** | | **3 070 688** | **154 075** | **2 136 895** | **2 094 609** | **8 930 827** | **16 387 094** |
| **Total inflow of funds (cumulative)** | | **3 070 688** | **3 224 762** | **5 361 658** | **7 456 267** | **16 387 094** | **16 387 094** |

Due to the occurrence of high-risk risk factors in the catastrophic scenario (in particular, 2,209.6 billion soums due to the withdrawal of more than 35% of the deposits placed in the bank), the bank lost a total of 2,225.1 billion soums in one month. a net outflow of som funds is observed. Despite all the measures taken to support the bank's liquidity, the bank lost 723.4 bln. there is a deficit of som funds [14]. The bank cannot execute payment orders of its clients. Lending practices are drastically reduced due to lack of funds. 30 percent of the resources formed due to the return of loans will be directed to support the bank's liquidity, but it will not be possible to restore the bank's solvency in a short time [15].

In this case, taking unsecured loans from the Central Bank of the Republic of Uzbekistan, organizing various meetings with the bank's large customers regarding the attraction of resources, strengthening the restrictions on the bank's asset operations, considering the issues of temporary suspension of long-term lending, drastically increasing the volume of lending reduction and

financing of only highly liquid projects, strengthening efforts to attract customers to the bank, including customers with large deposits in their accounts, making changes to the bank's tariffs, developing bonuses and benefits for them, and media advertising about benefits should be given.

**Conclusions and Suggestions**

In coclusion, conducting a stress test of commercial banks' activities will improve the risk management efficiency of these banks. By stress testing bank can determine its risk profile and risky situations that may occur, as well as its consequences. After that bank develops a plan of measures which would be done if this risky situations occurs.

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