



AKTUAR MOLIYA VA BUXGALTERIYA HISOBI ILMIY JURNALI

Vol. 5 Issue 03 | pp. 327-338 | ISSN: 2181-1865

Available online <https://finance.tsue.uz/index.php/afa>

NAVIGATING FINANCIAL DISTRESS: INSIGHTS INTO BANK INSOLVENCY RISKS IN UZBEKISTAN



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Abstract: Bank insolvency poses significant risks to financial systems, due to its potential ripple effects, systemic risks on national and global economies. This study investigates the key factors contributing to bank insolvency and applies CAMELS model to evaluate the factors such as macroeconomic and microeconomic risks, non-performing loans (NPLs) and liquidity constraints, which heighten insolvency risks. A comparative analysis of Uzbekistan's banking sector and international cases clearly reveals critical vulnerabilities linked to asset quality, liquidity management, and regulatory gaps. Analyzing recent bank insolvencies, identifying weaknesses, as well as, making comparisons between international and local industries might help to strengthen financial stability and mitigate future risks.

Key words: Bank insolvency, financial stability, liquidity, non-performing loans, liquidity coverage ratio, capital adequacy ratio, CAMELS model, credit risk, leverage ratio, risk-weighted assets.

1. Introduction

The world needs banks in order to stabilize the economy, to act as intermediaries between savers and borrowers. They provide capital allocation, promote economic growth, and maintain financial market stability. However, their interconnectedness is not trivial but highly important, which means insolvency in the banking sector can have devastating ripple effects on national and global economies.

Banks face unique risks, such as credit, liquidity, and operational risks. Recent trends like rising consumer debt, inadequate provisioning for non-performing loans (NPLs), and evolving market volatility have increased the likelihood of insolvency. Since banks have a strong impact on companies and budgets, even small misstatement or fraud leading to insolvency or bankruptcy can be material and that should be corrected. Therefore, Uzbekistan's banking sector alongside global counterparts is analyzed while investigating accounting practices critical to predicting bank insolvency.

2. Literature review

Scholars have provided the key factors contributing to insolvency, identifying different type of risks as the primary causes. Existing researches have primarily focused on insolvency risks in developed economies, where banking systems are more structured and regulated. However, fewer studies explore these risks in developing economies, where financial markets are more volatile.

S.Correia, S.Luck, and E.Verner (2024), in their findings suggest that most bank failures are the result of a deterioration in bank solvency.

Banks can be affected by various range of risks that make them vulnerable to financial distress. These include **credit risk**, where loans and other assets default and lose value; **liquidity risk**, where the demand for withdrawals exceeds the bank's available funds; and **interest rate risk**, where an increase in interest rates reduces the value of bonds in the bank's portfolio and forces the bank to pay more on deposits than it earns on loans. Simply, a bank is considered insolvent when its obligations exceed its assets or when it is unable to fulfill its financial commitments.

Unlike insolvencies in other sectors, their collapse poses significant systemic danger to the financial system. The grounds for opening insolvency proceedings are typically based on 'balance sheet insolvency', where liabilities exceed assets (over-indebtedness), and on 'cash flow insolvency', where the bank is unable to pay its debts as they fall due (illiquidity)¹. The depositors are the main figures, who lose their money in both cases.

Burkhanov,A., Kurbonbekova,M., Usmonov,B. (2024) examine the relationship between key monetary factors and inflation in developing economies, and find out that while money supply and market rates significantly influence inflation, the impact of the Central Bank refinancing rate is minimal. Moreover, inflation growth tends to raise money market rates and refinancing interest rates.² These findings suggest that in developing economies, inflationary trends not only shape monetary policy but also have an impact on overall financial stability, which makes it a critical factor in assessing bank insolvency risks.

Goodhart, C. (2008) defined that liquidity and solvency are the heavenly twins of banking, frequently indistinguishable. An illiquid bank can rapidly become insolvent, and an insolvent bank illiquid.³

Positive Money UK, a not-for-profit advocacy group, states that the failure of one bank could lead people to worry about the financial position of other banks. Furthermore, the insolvent bank would have certainly owed money to other banks, as would its customers. This can lead to a domino effect – a bankruptcy at one bank can lead to a 'cascade' of defaults, bank runs and insolvencies as people panic⁴. Without some regulations and management, this will ultimately destabilize the entire financial system, causing widespread economic disruption.

¹ Buckingham, S., Atanasova, S., Frazzani, S., & Véron, N. (2019). *Study on the differences between bank insolvency laws and on their potential harmonisation*. Publications Office of the European Union.

² Burkhanov, A.U., Kurbonbekova, M.T., Usmonov, B. (2024). Impact of Money Supply on Inflation in Uzbekistan – VAR Approach. In: Sergi, B.S., Popkova, E.G., Ostrovskaya, A.A., Chursin, A.A., Ragulina, Y.V. (eds) *Ecological Footprint of the Modern Economy and the Ways to Reduce It*. Advances in Science, Technology & Innovation. Springer, Cham. https://doi.org/10.1007/978-3-031-49711-7_75

³ Goodhart, C. (2008). Liquidity risk management. *Banque de France Financial Stability Review*, 11(6), 39–44.

⁴ Ryan-Collins, J., Greenham, T., Werner, R., & Jackson, A. (2012). Where does money come from. *A guide to the UK monetary and banking system*, 2.

Oino.I. (2021) observed the market of banks and come to conclusion that solvency and GDP growth are positively correlated. His research covered 10 largest banks in the UK, which collectively account for 90% of the market share. According to this result, we can conclude that the economic stability or downturns have a significant impact on the bank solvency rates.

3. Methodology

The study employs mixed-method approach, combining qualitative and quantitative data, analysis, synthesis, data collection on the bank insolvency and comparison. The research aims to provide clear understanding of the factors contributing insolvency and prediction methods to evaluate the financial stability of banks. Data was collected using bank balance sheets, insolvency reports and statistical publications of different parts of the world.

3.1. CAMELS rating model

Insolvency of banks can be predicted or assessed with several models, as one of them is named CAMELS model. It includes evaluation of Capital, Asset quality, Management, Earnings and Liquidity, the factors that are considered most important indicators in banking financial activities' stability. The following table highlights the criteria of each indicator in CAMELS model:

	Component	Weight	1	2 (%)	3 (%)	4 (%)	5 (%)
C	Capital adequacy	20%	> 11%	8 - 11	4 - 8	1 - 4	< 1%
A	Asset quality	20%	< 1.5%	1.5 - 3.5	3.5 - 7	7 - 9.5	> 9.5%
M	Management	25%	≤ 25%	30 - 26	38 - 31	45 - 39	≥ 46%
E	Earnings (ROA)	15%	>1.5%	1.25 - 1.5	1.01 - 1.024	0.75 - 1	< 0.75%
	Earnings (ROE)		≥ 22%	17 - 21.99	10 - 16.99	7 - 9.99	≥ 6.99%
L	Liquidity (L1)	10%	< 60%	60 - 65	65 - 70	70 - 80	> 80%
	Liquidity (L2)		< 60%	60 - 65	65 - 70	70 - 80	> 80%
S	Sensitivity	10%	> 80%	71 - 80	65 - 70	60 - 64	< 60%

Table 1. CAMELS model categories and ratios

3.2. Proposed rating range

The proposed limits, based on AIA's CAMEL framework for bank assessment, outline the key criteria used to determine the maximum thresholds applicable to each financial institution. These guidelines serve as a structured approach for evaluating a bank's financial health and stability:

1) Maximum and 2nd limit -for banks rated 1-2 (the CAMEL rating):

Maximum 20% of banks' shareholders' equity or 3% of total liabilities whichever is lower; may be subject to a maximum amount imposed in some countries.

2) 3rd limit-for banks rated 3 (the CAMEL rating):

Maximum 15% of banks' shareholders equity or 3% of total liabilities whichever is lower; may be subject to a maximum amount imposed in some countries.

3) Not recommended limit- for banks rated 4 and 5:

No investment considered.⁵ Not recommended, as rating analysis states it as doubtful.

4. Results and Discussion

4.1. Macroeconomic and microeconomic factors

The assessment of some researchers suggest that, other than the influence of internal and external factors⁶, macroeconomic factors can make up significant part of the failure of banks, however they may not necessarily be the primary cause. Figure 1 provides an overview of the factors behind bank insolvency, analyzed by Caprio G. and Klingebiel D. based on 29 cases.

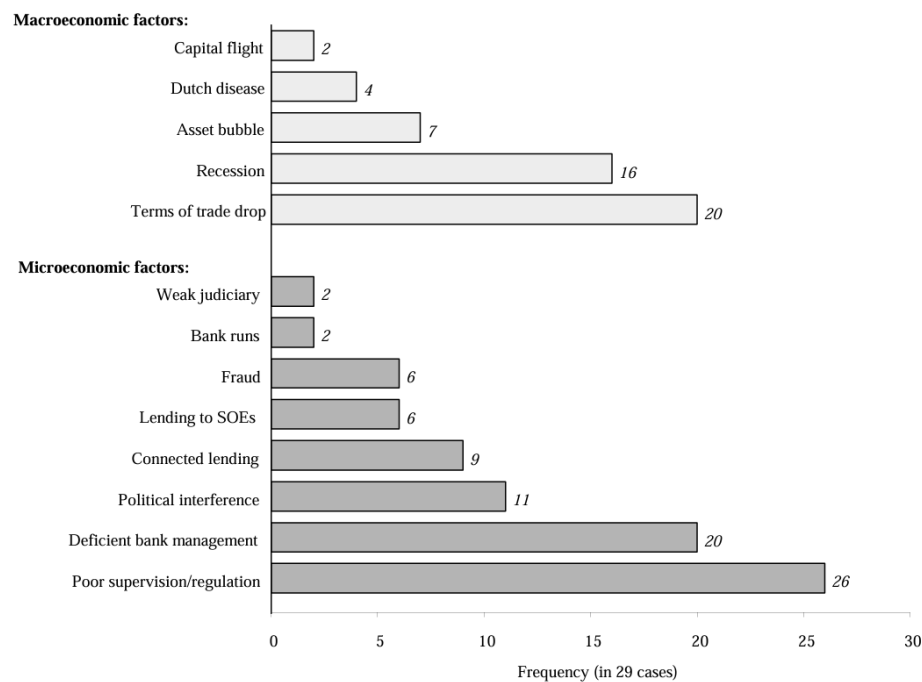


Figure 1. Factors Behind Bank Insolvency⁷

Factors are categorized into macroeconomic and microeconomic causes. As for the former, a decline in *terms of trade* was found to be the most common cause in 20 cases, whereas it was closely followed by *recessions* at 16 cases. Other macroeconomic influences appear to be relatively minor issues. However, what most lead the banks to be insolvent in the research was microeconomic factors, specifically *poor supervision and regulation* occurring in 26 cases. *Deficient bank management* is also somehow related to poor

⁵ Dang, U. (2011). The CAMEL rating system in banking supervision. A case study.

⁶Usmonov, B., Tojiboeva, S., Tashbaev, B., Omanov, S. (2023). Evaluation of Capital Efficiency of Companies in the Analysis of Financial Potential (In the Case of Uzbekistan). In: Popkova, E.G., Sergi, B.S. (eds) ESG Management of the Development of the Green Economy in Central Asia. Environmental Footprints and Eco-design of Products and Processes. Springer, Cham. https://doi.org/10.1007/978-3-031-46525-3_48

⁷ Caprio, G., & Klingebiel, D. (1996, April). Bank insolvency: bad luck, bad policy, or bad banking?. In *Annual World Bank conference on development economics* (Vol. 79, pp. 1-26).

regulation, showing the dominance in 20 cases. *Fraud, bank runs, lending to state-owned enterprises*, and other factors are less prevalent compared to the above-mentioned contributors, but still are important. Hence, this data underscores the importance of effective oversight and risk management to maintain financial stability.

4.2. Risk-weighted assets

Banks hold a diverse portfolio of assets, including cash reserves, securities, and loans extended to various entities such as individuals, businesses, financial institutions, and governments. The level of risk associated with these assets varies, necessitating a structured approach to risk assessment. To quantify this, financial institutions apply risk weights to different asset classes, which serve as a measure of their potential exposure to financial instability.

$$\text{Risk-based capital ratio} = \frac{\text{Regulatory capital}}{\text{Risk-weighted assets}} \quad (1)$$

To work out how much capital banks should maintain to guard against unexpected losses, the value of the asset (i.e. the exposure) is multiplied by the relevant risk weight. Banks need less capital to cover exposures to safer assets and more capital to cover riskier exposures.⁸ The *capital ratio* (1) is the ratio of the amount of regulatory capital by the amount of risk-weighted assets. Risk-weighted assets and capital has a positive correlation, meaning that as the former increases in the amount, the more capital is needed, and vice versa. According to the Basel committee on banking supervision, banks with more regulatory capital are better able to fund lending growth. From Table 2, it is inevitable that credit risk accounts for the largest proportion of banking failures amongst the risks.

Credit risk	Market risk	Operational risk	Other
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Table 2. Risk-weighted assets

The following information states some of the **main reasons** of insolvency and failure of banks, as well as, analyses the correlation between these indicators and insolvency risk.

3.1. Poor Asset Quality: Non-performing loans

One of the main contributors of credit risk is non-performing loans (NPLs), which result in a deterioration in asset value of banks, liquidity constraints, and then lead to income shortages. During the periods of recession, banks' financial stability weakens due

⁸ Finalising Basel III – in brief. https://www.bis.org/bcbs/publ/d424_inbrief.pdf

to the rise in NPL ratios and the decline in their revenue streams, since these institutions will be unable to generate expected income from lending activities. Banks are required by law to report their ratio of non-performing loans to total loans as a measure of the bank's level of credit risk and quality of outstanding loans. A high ratio means that the bank is at a greater risk of loss if it does not recover the owed loan amounts, whereas a small ratio means that the outstanding loans present a low risk to the bank. Banks, also, may have issues regarding the assessment process in evaluating the ratios needed. Consequently, this possibly poses higher insolvency risk, if left unaddressed.

In times of COVID-19 pandemic global NPL ratio changed by nearly 1%, reaching to 4.2%. Another clear example that shows relationship between NPL and insolvency would be global financial crisis, which started in 2008. The financial crisis precipitated a systemic banking collapse, highlighting 2009 and 2010 years being the most turbulent period for banks. In euro areas, NPL ratio was above 7%. Looking at Figure 2 and Figure 3 (Example U.S.), both factors in the United States had similar trends over the course of the given period, indicating high correlation between NPL ratio and bank failures. According to the data from FDIC - Federal Deposit Insurance Corporation, there were 140 and 157 failing banks in 2009 and 2010 respectively. As for the statistics, these numbers collectively make up around one-third of all bank failures since 2000.

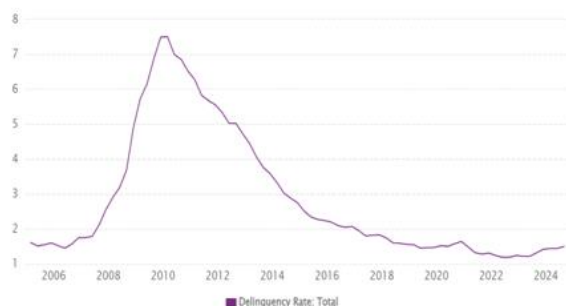


Figure 2. United States's NPL Ratio¹

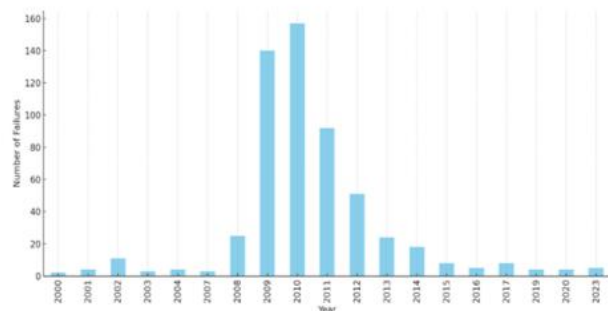


Figure 3. Bank failures in U.S.

⁹The crisis led to widespread **liquidity shortages, deteriorating asset quality, and a surge in non-performing loans (NPLs)**, ultimately destabilizing financial institutions of all sizes. **Regional and community banks**, which had disproportionately high concentrations in **residential and commercial real estate lending**, were particularly susceptible to asset devaluations and loan defaults. The failure of systemically important financial institutions (SIFIs), such as *Lehman Brothers*, exacerbated market uncertainty, triggering a *credit freeze* and necessitating unprecedented government interventions, including **capital injections, monetary easing, and regulatory reforms**.

Here in Figure 4, there are images to represent how NPL ratios spread globally before, during, and after the crisis: Panel A – three years before the crisis; Panel B – first year of the crisis; Panel C – when NPLs reached the peak; Panel D – seven years after beginning of the crisis. Images demonstrate that high NPL ratios were detected when

⁹ www.ceicdata.com Federal Reserve Board

financial crisis began, however, as financial markets gradually stabilized, the number of bank failures **declined consistently post-2010**, reaching **single digits by 2015**.¹⁰

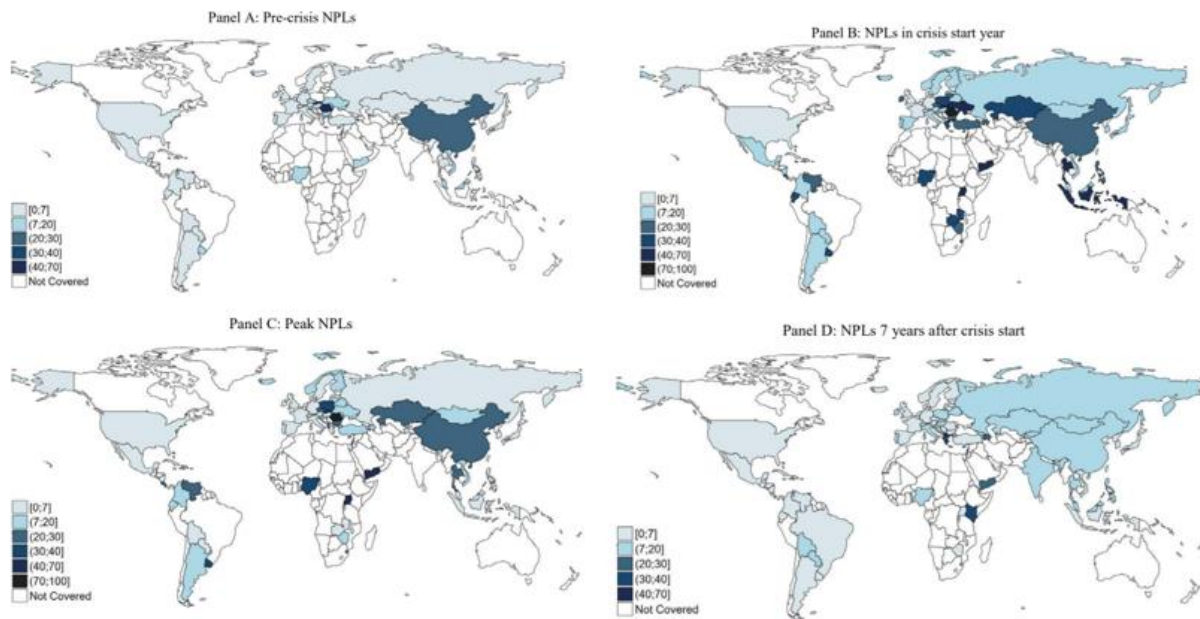


Figure 4. NPLs during banking crises around the world²

Notes: This figure plots the sample of failing banks and to the ten years before they fail. From 1865 through 1941, we define liquid assets as the sum of currency, checks, legal tender, interbank claims, bonds to secure deposits and bonds on hand, and bills of national banks and state banks. From 1959 onwards, liquid assets are defined as currency and reserves held, balances with other banks, cash items in collection, and security holdings (both government-issued and private label). With regard to the Figure 5, both given line graphs illustrate almost similar trends, more specifically, the shortage.

- Pre-World War II (1865–1935): All three asset categories—total assets, loans, and liquid assets — show a gradual increase in the years leading up to a bank's failure. Liquid assets (dark blue) initially rise but begin to decline sharply in the final years before failure, moreover loans (light blue) increase at a faster rate than total assets (red), indicating liquidity stress as banks struggle to meet obligations and may have contributed to insolvency.

- Post-1959 Era (1959–2023): Loans rose significantly compared to the earlier period, peaking before failure. For most of the period liquid assets remain relatively stable, but decline just before failure, which indicated to reflect liquidity crisis. The pattern suggests aggressive loan expansion and declining liquidity buffers often precede modern bank insolvencies and failures.

3.1. Liquidity risk: Liquidity coverage ratio

Liquidity refers to the ability of a bank to meet short-term obligations without incurring excessive losses, as well as, considered as a critical determinant of financial

¹⁰ Ari, A., Chen, S., & Ratnovski, L. (2021). The dynamics of non-performing loans during banking crises: A new database with post-COVID-19 implications. *Journal of Banking & Finance*, 133, 106140.

stability. Liquidity risk arises when banks lack sufficient high-quality liquid assets (HQLA) to meet sudden cash demands, funding withdrawals, or market shocks. When banks do not have enough liquid assets, they are forced to sell their holdings at very low prices. This leads to a chain reaction of losses that can ultimately result in insolvency or bankruptcy. In order to prevent this type of risk, Basel III requires to have an adequate stock of unencumbered high-quality liquid assets (HQLA) that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30 calendar day liquidity stress scenario. This is known as liquidity coverage ratio, while LCR requirement for banks is 100%, established under Basel III standard (Table 3).

	1 <i>January 2015</i>	1 <i>January 2016</i>	1 <i>January 2017</i>	1 <i>January 2018</i>	1 <i>January 2019</i>
<i>Minimum LCR</i>	60%	70%	80%	90%	100%

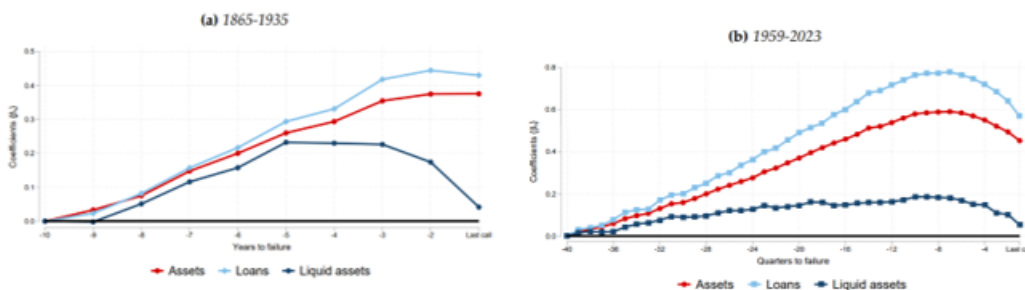
Table 3. Minimum liquidity coverage ratio

By ensuring that banks maintain sufficient short-term liquidity, the LCR enhances their ability to navigate periods of financial and economic instability, acting as a safeguard, preventing disruptions in the financial sector from negatively influencing the broader economy. Calculating LCR is as follows (2):

$$LCR = \frac{\text{high quality liquid asset}}{\text{total net cash flow}} \quad (2)$$

The empirical data on **failing banks** (Figure 5) illustrate *how liquidity erosion precedes insolvency*, with declining liquid asset ratios and excessive loan growth making banks increasingly vulnerable to financial stress.

Figure 5. Liquid and Illiquid Assets in Failing Banks



3.2. Case of Uzbekistan

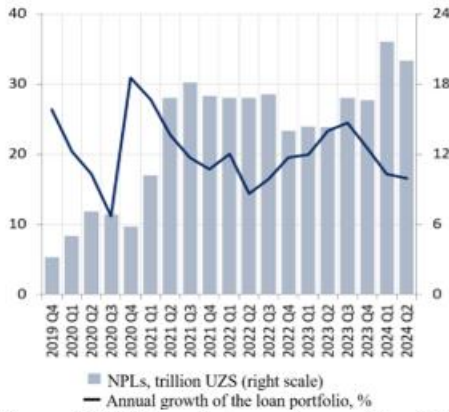


Figure 6. NPL and Annual growth of the loan portfolio

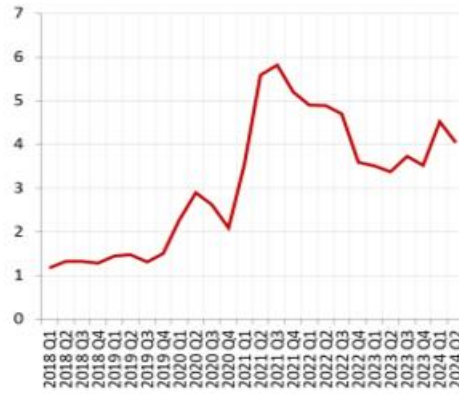


Figure 7. Share of NPL in total loans, %

As of July 1, 2024, Figure 6 shows non-performing loans (NPL) that constituted 4% of total loans, reflecting an increase of 0.7 percentage points from the previous year. This rise is driven by a significant 55% annual increase in NPL volume, while the total loan portfolio's growth rate has decreased by 7% (Figure 5). The red line shows a gradual increase, pointing around the 4% mark, and this may suggest potential systemic risks within the banking sector.

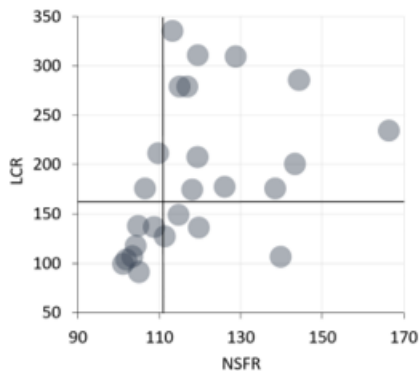


Figure 8. Liquidity indicators by banks as of July 1, 2024, %



Figure 9. Ratio of HQLA to total assets, %

In Figure 7, the continuous lines in the graph illustrate the liquidity indicators of the banking system as of July 1, 2024. Banks that have Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) values exceeding 400% and 200%, respectively, are not included in this representation.¹¹ According to the statistics of CBU, the liquidity metrics for the banking system are currently below the median level and are approaching the lower 25th percentile. Specifically, as of July 1, 2024, the NSFR is 8% lower than the median.

Additionally, from July 1, 2023, to July 1, 2024, the LCR saw an increase of 16%, yet it remains 47% below the median value. This rise in the LCR is attributed to a 27% increase in high liquid asset volumes. The upward trend in high liquid assets within the banking

¹¹ Молиявий барқарорлик шарҳи 2024 йил I ярим йиллик. Ўзбекистон Республикаси Марказий банки

sector persists (Figure 8). For instance, in the first half of 2024, the proportion of high liquid assets relative to total assets reached 14.4%, marking an increase of 0.8% when compared to the same period in 2023.

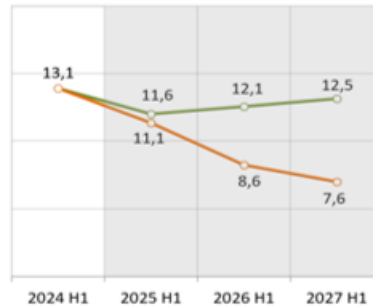


Figure 10. Leverage ratio of the banking sector in the baseline and address scenarios, %

Calculations of Cental Bank in Figure 9 reveal that, in the context of both baseline and adverse scenarios, the leverage ratio within the banking system has exceeded the established minimum requirement. The baseline scenario shows a notable improvement in bank profitability, driving a significant increase in Tier 1 capital levels. This development results in the banking system's leverage ratio being well above the mandated minimum of 6% by 2027. In contrast, the adverse scenario reveals that a downturn in economic growth is likely to lead to loan losses and operational costs, and consequently diminishes the net profit of banks. Furthermore, a reduction in retained earnings from previous periods, along with an increase in total assets, impacts the capital adequacy ratio, dropping it to 7.6%. Despite these challenges, the leverage ratio remains above the requirement, because of the growth in interest income and non-interest income.

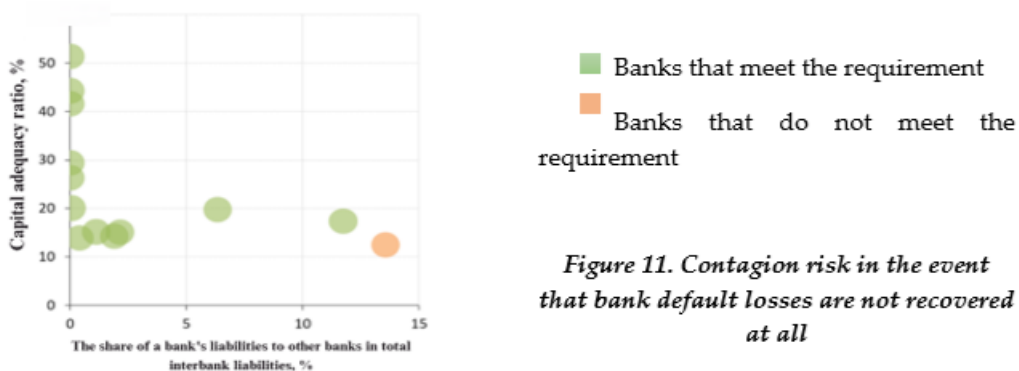


Figure 11. Contagion risk in the event that bank default losses are not recovered at all

The diagram discusses banks that have a capital adequacy ratio below 60% and owe money to other banks, but still those that meet the minimum requirement of 13%. The risk

of one bank's failure affecting the entire banking system is currently at a low level. A single failure can only impact others if its CAR drops below the minimum. If a bank is at risk of default, the potential losses for other banks are related to how low that bank's capital ratio is. In cases where banks face irreversible losses (*Figure 10*), usually, only one bank fails to meet the minimum capital requirements. When a bank with a low capital ratio defaults, it could mean that other banks lose their loans or deposits tied to it. However, banks that are likely to fail aren't very interconnected with others, hence this situation does not create significant difficulties for other banks to meet their capital requirements.

5. Conclusion and suggestions

This studied research demonstrates that insolvency is more significant issue for banks compared to the companies, due to the fact that banks are connected to several sectors of the economy. Factors such as capital adequacy, asset quality, and liquidity risks, non-performing loans play critical roles in bank's financial stability. The rating models like CAMELS should be used in order to be able to predict insolvency or evaluate the financial performance of these institutions.

Uzbekistan's banking sector has historically maintained relative stability. However, rising non-performing loans (NPLs), liquidity pressures, and fluctuations in capital adequacy pose crucial risks amid ongoing financial reforms. Despite the factors that might negatively affect the performance of banks, calculations of Central Bank so far indicating potential growth, meeting the requirements well above its minimum level. The study suggests continued reforms, improved supervision, and greater financial transparency to ensure long-term stability in the country's banking sector.

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