METHODOLOGY FOR CALCULATING BANK VIABILITY: ADJUSTMENTS FOR LIQUIDITY AND CAPITAL SURPLUSES

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Abstract
This article develops a comprehensive banking viability index for the Republic of Moldova's banking system, incorporating key dimensions such liquidity, capital adequacy, profitability, management efficiency and ownership structure. The study highlights the importance of adjusting viability assessments, maintaining an optimal balance of liquidity and capital, not to meet regulatory requirements only, but to prevent the misallocation of financial resources. Results indicate that incorporating adjustments for excess liquidity and capital leads to reduction in the viability index, offering valuable insights for banking supervision, policy formulation and risk assessment. Therefore, excessive capital or liquidity, while providing a buffer against risks, may lead to opportunity costs by diverting funds from productive investments that could stimulate economic growth.

Key words: *banking supervision, banking viability, scoring, supervision, Basel III requirements*

JEL Classification: *G21*

I. INTRODUCTION

In the aftermath of global financial crises and major structural shifts in the banking sector, assessing the soundness and resilience of financial institutions has become a central concern for regulators, policymakers, and researchers.

Developing reliable indicators of viability is essential not only for early warning systems but also for evaluating the adequacy of regulatory frameworks and the effectiveness of supervision – particularly in small and open economies like the Republic of Moldova.

There is no generally accepted indicator of viability in the literature, but different authors or international rating agencies have their own methods for assessing bank viability. They propose different calculation models, a narrower or broader range of qualitative and quantitative indicators, use different weights of importance, and consider or disregard some secondary indicators to make further adjustments to the primary indicators.

In system-level research, assessing banking viability goes beyond the performance of individual institutions and serves as a proxy for the resilience of the entire banking sector.

Therefore, this article proposes a systemic definition of banking viability by identifying the key factors and indicators underpinning its measurement. Based on statistical data and historical analysis, the author developed a formula for calculating the banking viability index, for the banking system of the Republic of Moldova.

II. LITERATURE REVIEW

Viability, in general, refers to an entity's ability to survive and thrive over the long term in the face of market conditions and in the face of possible challenges and risks.

In the specific context of bank viability, different authors and sources provide different definitions:

- the ability of a bank to cover „all its costs and to provide an adequate return on equity, taking into account the bank's risk profile." (Official Journal of the European Union, 2009);

- „the ability of the institution to generate sufficient income from interest rate differentials and from the difference between the value of investments and the value of borrowings to cover transaction costs and risk costs." (P. Satish, C. K. Gopalakrishna, 1997)

- „the ability of a bank to meet its financial obligations, meet capitalization standards, and generate sufficient profits to cover its costs and pay dividends to shareholders" (Benton E. Gup, 2010)

- „a bank's ability to withstand economic shocks, manage risks effectively, and maintain adequate solvency to protect its deposits and remain in the market over the long term" (Joseph J. Norton and Philip J. Linsley, 2018).

- „the ability of a rated entity to meet its obligations in the absence of extraordinary support, but also in the absence of extraordinary constraints (such as risk transfer or convertibility)"
(https://www.fitchratings.com)

Thus, the literature does not provide a clear and generally accepted definition of the concept of bank viability. All the above definitions can be divided into three broad groups of approaches:

1. Viability is seen as a balance between *performance* and *risk*.
2. Viability is associated with *liquidity* and *solvency*.
3. Viability is about the *efficient use* and *distribution* of financial resources.

To establish a clear content of banking viability, the author developed the key terms from above theoretical approaches – liquidity, solvency, profitability and capital. Subsequently, the calculation indicators were identified, creating the informational basis for analyzing the viability of the banking sector in the Republic of Moldova.

„A solvent bank is a bank that meets minimum own funds requirements". Both liquidity and solvency are „the ability of an economic agent to pay its obligations to third parties when due." The difference is that liquidity is not only about having „more assets than the total amount of its liabilities to third parties", but also about the ability to quickly turn assets into cash to honor its obligations. (Angelescu C., 2001)

In order to assess bank liquidity, the analysis incorporates indicators that reflect the availability of liquidity over both the short and long term, known in the literature as Liquidity Principles I and II. The Basel III framework introduced an additional dimension to liquidity assessment – Principle III – which focuses on liquidity gaps across maturity bands.

Socaciu-Binţiţan (2010) argues that „the profitability of the banking institution depends on the bank's ability to create liquidity and its ability to place it on the market".

Researcher Anca Socaciu-Binţiţan (2010) states that „In order to ensure the viability of a banking institution, bank management must monitor both the performance of the banking institution, namely bank profitability, and liquidity risk."

In a market economy, profit is the reason to be of any economic agent, being considered as a gain that remunerates the basic, classical factors of production (capital, land, labor). Pimentel (2005) defines profitability as the final dimension of economic success obtained in correlation with invested capital.

Like any commercial company, banks operate on the basis of profitability, always aiming to make a net profit. The main function of banks is financial intermediation, being financial institutions that attract and distribute capital. As the main intermediaries in the savings-investment relationship, banks both mobilize temporarily available resources from economic agents or individuals and distribute them in the form of loans, in a relative balance between liabilities and own assets. Under these conditions, interest is the main source of income and it is obvious that the greater the difference between interest received and interest paid, the greater the profitability of a bank. Over time, banking has become much more complex, with deposit-taking and lending being only part of the typical banking business. The sources of profitability for banks have become financial market trading and fees. This change in the profit structure of banks makes it possible to improve profitability without increasing the credit risk stemming from loan portfolios.

Banks obviously want to make as much profit as possible from their activities and also to minimize risks, which is why banking performance aims not only at a positive result between income and expenses, but also at an efficient use and allocation of resources.

Thus, profitability is measured in both absolute and relative terms. In absolute terms, the most common indicator is net profit. In relative terms, the most common indicators are ROA (return on assets) and ROE (return on equity).

Table 1. Conceptual differences between viability, profitability and liquidity

Concept and definition	Indicators
Viability - Analysis of the overall business model; Ability of the bank to generate income exceeding expenses within a long-term perspective.	Capital, liquidity, profitability indicators from a long-term perspective; risk profile; internal governance, management framework; specific approaches to risk exposure and systemic importance.
Capitalization - capital adequacy to cover different types of risks	Minimum capital requirements; Capital adequacy
Liquidity - ability to turn assets quickly into cash	Liquidity Principles I, II, III
Profitability - ability of a bank to generate income exceeding expenses within a short-term outlook	Net profit; ROA; ROE

Source: created by author based on the information from www.thebalancemoney.com

The stability and safety of banks and the entire banking system starts from the capital of financial institutions. A high level of capital adequacy demonstrates the ability of banks to manage and redistribute the flows of available funds (Jora, 2010)

According to Goddard (2004), profitability and capital must be inversely proportional or negatively correlated. Overcapitalization of a bank is usually a sign of an unutilized investment opportunity (Thakor, 1996). On the other hand, other authors argue that well capitalized banks do not normally need external sources of funding, which may improve their profitability (Pasiouras et al., 2006).

In the above definitions we find the financial (quantitative) dimension of the concept of bank viability at the micro level. The rating agency Fitch further mentions that, in addition to the Financial Profile, bank viability ratings take into account various factors such as:

- industry profile and operating environment;
- company profile and risk management;
- management strategy and corporate governance.

Also, an article published in the Financial Times (Anat Admati, et al, 2010) writes that the aim of the recent wave of regulation is to have a healthier banking system, not necessarily more profitable banks and „higher returns for shareholders and managers, at the cost of taxpayer losses and failing economies", offering a macro view of bank viability. According to ECB Governor Mario Draghi (1999), the term „healthy banking system" has three main characteristics - flexibility, resilience and stability – that means the banking sector is capable to adapt effectively to rapid changes in the economic environment, to continue to function even under economic shocks and is not a generator of major economic shocks leading to a financial crisis.

Thus, in the author's view, „banking viability" is the ability of a bank to generate long-term financial performance with a high-quality loan portfolio, optimal resource consumption and an appropriate management framework, and to demonstrate resilience and effective risk management practices in times of crisis. Bank viability is the antonym of bank failure and is essential to enhance the confidence of the public, depositors and investors in a bank's ability to meet its objectives and manage its risks responsibly.

The viability of individual banks is seen as a precondition for the stability of the banking system. A banking system in which banks are viable contributes to the overall stability of the system, but stability implies aiming at the integrity and cohesion of the entire banking system, ensuring that no major event destabilizes the banking sector and the economy.

Bank viability is a crucial concept as it concerns the very survival of institutions within the banking system. This concept gains even greater significance in emerging economies, where banks are often viewed as barometers of economic growth. (Makkar A. et al, 2015)

Both the viability and stability of the banking system are determined by regulation and supervision. Banking supervision requires banks to comply with regulations on capital, liquidity and risk management requirements. Compliance with these regulations helps banks to be solvent, liquid, well capitalized and resilient to economic shocks. Supervision also involves continuous analysis of the risks to which banks are exposed, such as credit risk, liquidity risk, market risk, etc. By assessing these risks, it is possible to spot the warning signs that may affect the viability of a bank and the stability of the entire system.

Banking supervision not only promotes prudential principles in banking, but also imposes reporting and transparency obligations, thus ensuring continuous monitoring of their financial situation and taking action at the first signs of financial instability or risk of failure.

Banking supervision is also designed to intervene in the event of major problems at a bank in order to avoid a systemic crisis. Corrective or even rescue measures can be imposed to protect the viability of a bank and prevent contamination of the entire financial system.

III. STATISTICAL ANALYSIS

Ensuring a high level of capital adequacy is one of the requirements of the Basel III standards. Capital requirements under Basel I only covered credit risk, while Basel II required the calculation of capital requirements taking into account credit, market and operational risks.

Regulated capital requirements in the Republic of Moldova have been significantly higher than those applied internationally, but there was a standardized approach for all banks regardless of their systemic significance or risk exposure.

According to the new banking law created to apply Basel III standards, the NBM requires additional

(internal) capital formation, the size of which differs from bank to bank and depends on each bank's exposure to various categories of risks.

Table 1. Prudential limits for indicator, regulated by the National Bank of Moldova

Period / Prudential indicators	2013-2015	2016-2017	2018-2021	2022-2024
	Regulated limits			
1. Total capital ratio	>16%	>16%	>10%	>10%
14. Principle I	≤ 1			
15. Principle II	≥ 20%			X
16. LCR	X			≥ 100%
17. Principle III	X	>1		

Source: created by author based on the data of the National Bank of Moldova, www.bnm.md

In addition to the Total capital ratio, in 2021, the NBM introduced the leverage ratio indicator. This indicator aims to limit the risk of excessive leverage of the banking sector during periods of economic growth and the risk of a significant decline in bank assets during downward phases of the economic cycle.

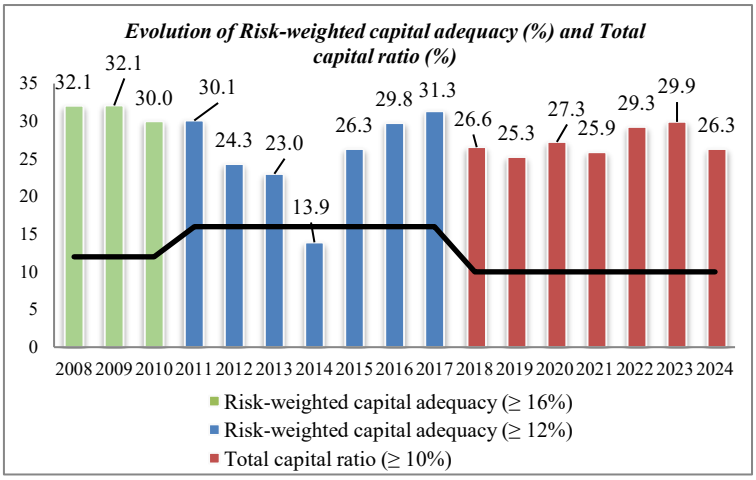

Figure 1 – Evolution of capital indicators in the banking system of Republic of Moldova (2008-2024)

The evolution of the total own funds ratio between 2018 and 2024 indicates that banks in the Republic of Moldova continue to be adequately capitalized relative to their risk profile. Under the revised calculation methodology, the total own funds ratio now considers not credit risk only, but also market and operational risks. Consequently, it is natural for this indicator to be lower than the one calculated prior to 2018. Since the implementation of the revised total own funds ratio, the indicator has shown a generally increasing trend, evolving from 26.55% in 2018 to 26.32% in 2024.

With regard to liquidity ratios, Basel III came with an important reform of liquidity requirements, aimed to responding to criticisms that Basel II had treated liquidity superficially and did not regulate it sufficiently to avoid the 2008 international financial crisis. Basel III introduces two measurement models – the liquidity coverage requirement (LCR) and the net stable funding ratio (NFSR).

- LCR refers to adequate liquidity reserves to enable banks to cope with possible imbalances between liquidity inflows and outflows in a severe crisis within 30 days. In 2022, NBM introduced in the banking rules the LCR and the Principle II has no longer been calculated;
- NFSR refers to monitor credit risk over time horizons, including overnight. The NSFR limits overreliance on short-term interbank funding and thereby promotes stability in bank funding.

The dynamic analysis of the values recorded by liquidity indicators shows that banks in Republic of Moldova are liquid and over-liquid, respecting the regulated limits (principle I and principle II of liquidity) even in the crisis years (2008-2009 and 2020)

Thus, in the period 2008-2024, long-term liquidity varies around the coefficient of 0.7 (Fig.2). The exception is 2014, when the maximum regulated was exceeded due to the liquidity indicators reported by the problematic banks that bankrupt in the same year.

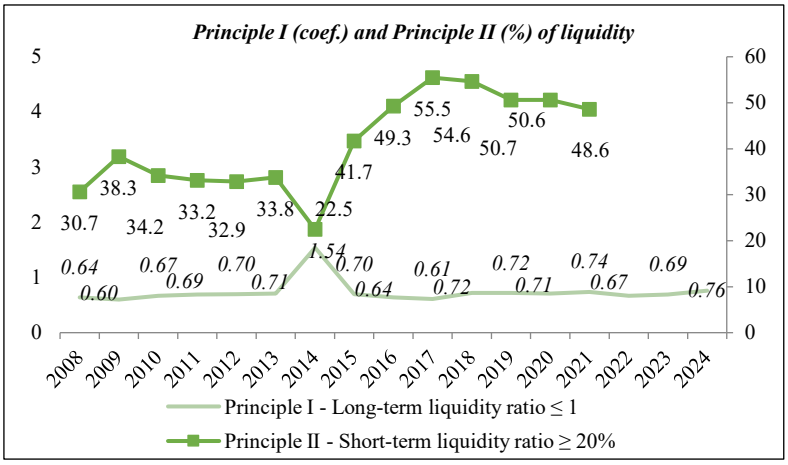

Figure 2 – Evolution of liquidity indicators in the banking system of Republic of Moldova (2008-2024)

Between 2008 and 2013, the current liquidity ratio fluctuated between 20% and 40%. In 2014, due to the three problematic banks, the ratio decreased to 22.5%. Starting from 2015, it exceeded 40%, reaching a maximum of 55.5% in 2017 and remaining close to 50% until 2021. As of January 2022, the Liquidity principle II was replaced by the LCR. The LCR enregistered values well above the minimum regulatory limit, standing at 235.47% in 2022; 282.12% in 2023 and 274.13% in 2024.

In order to harmonize the legislation of the Republic of Moldova with the European one, since 2016, Principle III - Liquidity by maturity bands (>1) was also implemented. Thus, until 2016, there were some gaps in the NBM's regulatory acts in terms of liquidity indicators, because liquidity needs were not calculated in the period from 1 month to 2 years. Because banking operations have different maturities and often uncertain, the task of matching bank liabilities to bank assets is difficult to effectively minimize liquidity risk. Principle III has come to fill these regulatory gaps.

According to the statistical data for the period 2016-2022, Liquidity Principle III exceeded the regulatory threshold of 1 for all maturity bands, being well above this regulatory minimum.

Table 2. Liquidity Principle III (>1)

	2016	2017	2018	2019	2020	2021	2022	2023	2024
< 1 month	2,9	2,7	2,9	2,7	2,3	1,9	2,2	2,2	1,8
1-3 months	14,8	18,4	19,1	18,1	19,7	19,6	20,4	16,1	12,7
3-6 months	4,7	2,7	3,1	12,9	14,7	14,4	12,1	12,5	12,3
6-12 months	4,2	3,1	2,4	8,8	10	9,9	7,5	9,5	8,3
>12 months	5,3	4,5	4,3	8,7	8	8,3	7,2	8,4	8,1

Source: created by author based on the data of the National Bank of Moldova, www.bnm.md

Thus, the banking sector of the Republic of Moldova does not have problems in terms of liquidity indicators, which means that it has sufficient resources to support bond payments and a high degree of resilience to potential external shocks. However, the fact that banks are exceeding the regulated limits had let to a super liquid banking system, which comes with certain risks and opportunity costs. By hoarding liquidity, the banks miss the opportunity to transform these assets into long-term bank loans and profits.

At the same time, excess liquidity complicates the central bank's efforts to effectively transmit monetary policy decisions, especially when adjusting instruments in line with inflationary expectations or crisis scenarios. Also, theoretically, the accumulation of liquidity in the banking system could undermine the financial intermediation function of banks and their role in supporting economic growth.

In this context, identifying the optimal level of capital and liquidity becomes essential for assessing banking performance more accurately. Therefore, the author calculates the banking viability based on statistical data for the banking system of the Republic of Moldova.

IV. METHODOLOGY: CONSTRUCTING THE BANKING VIABILITY INDEX

The calculation of viability indicator is performed in several stages:

- selection of six relevant factors and disaggregation in eighteen prudential indicators (Tabel 3);
- collection of all historical data for all eighteen indicators, for the period 2013-2024, for the fourteen banks (including the three banks that went bankrupt in 2014)

- assignment of systemic importance weights to each indicator;
- definition of performance intervals and corresponding scores;
- aggregation into a composite viability index, calculated for every year.

After collecting all historical data, *performance ranges* with corresponding *scores* were identified for all sub-indicators. To this end, the 25th percentile (P25), median (P50), and 75th percentile (P75) were calculated based on the historical distribution of data at the banking system level for the period 2013-2024. In the case of indicators with regulated maximum/ minimum limits, these limits were integrated into ranges. Each indicator is scored on a scale from 0 to 4.

Considering all above-mentioned steps, the formula for calculating the banking viability on the system is:

$$S_{j,t}^{system} = \sum_{i=1}^{n} (s_{ij,t} \cdot \alpha_{j,t} \cdot \omega_{i,t})$$

where:

- $s_{ij,t}$ – scor for bank i for indicator j in year t
- $\alpha_{j,t}$ – the weight reflecting the importance of indicator j at time t
- $\omega_{i,t}$ – the weight of bank i in the system at time t, based on its systemic relevance

The systemic score for indicator j in year t, denoted as $S_{j,t}^{system}$ is computed as the weighted sum of individual bank scores. Each bank score for the given indicator is multiplied by the weight reflecting the importance of indicator and the systemic importance of each bank based on assets share in total assets per system.

As was mentioned above, the evaluation of viability score covers eighteen sub-indicators, fourteen banks over a 10-year period (2013–2022), resulting in approximately 2520 bank-indicator observations.

Table 3. Factors and indicators considered and weights of importance

Factor	Weight
A. Capital adequacy (CA)	***0,25***
1. Total capital ratio	0,175
2. Total debts / Total capital	0,075
B. Quality of the loan portfolio (PQ)	***0,2***
3. Balance of non-performing credits debt/ Balance of credit debt	0,09
4. Calculated amount of the allowance for balance of credit debt / Balance of credit debt	0,05
5. Calculated amount of allowances for impairment losses on assets and provisions made for losses on conditional commitments, according to IFRS	0,03
6. Balance of credit debt / Total assets	0,03
C. Management efficiency (ME)	**0,15**
7. Non-interest related expenditure / Total income	0,045
8. Balance of credit debt / Balance of deposits	0,015
9. Return on equity (ROE)	0,06
10. Annualized interest-related income / Monthly average interest-bearing assets	0,03
D. Quality of revenues or profitability (P)	**0,15**
11. Interest-related net income / Total income	0,0525
12. Net interest margin (NIM)	0,0375
13. Return on assets (ROA)	0,06
E. Liquidity (L)	**0,20**
14. Principle I - Long-term liquidity ratio	**variable***
15. Principle II - Short-term liquidity ratio	**variable***
16. Liquidity Coverage Ratio (LCR)	**variable***
17. Principle III - Liquidity on maturity bands	**variable***
F. Shareholding (SH)	**0,05**
18. Share of foreign capital	0,05
Sum of weights (A+B+C+D+E+F)	**1,00**

* *The weight of importance for liquidity indicators is variable, considering the liquidity indicators changed during the analysis period* (see Table 4).

Source: created by author

Using the formula below, the author calculated the aggregated bank viability index recorded annually for the period 2013–2024.

$$BVI = S_{CA,t}^{system} + S_{PQ,t}^{system} + S_{ME,t}^{system} + S_{P,t}^{system} + S_{L,t}^{system} + S_{SH,t}^{system}$$

where:

- $S_{CA,t}^{system}$ – scor for Capital adequacy in year t

- $S_{PQ,t}^{system}$ – scor for Quality of the loan portfolio in year t
- $S_{ME,t}^{system}$ – scor for Management efficiency in year t
- $S_{P,t}^{system}$ – scor for Profitability in year t
- $S_{L,t}^{system}$ – scor for Liquidity in year t
- $S_{SH,t}^{system}$ – scor for Shareholding in year t

In the initial calculation stage, the author used a monotonic scoring for liquidity and capital indicators, meaning that the score increases or decreases in line with the indicator, following a linear relationship, rather than a parabolic one (Appendix A).

Table 4. The banking viability index, aggregated on the system (2013-2024)

Year	CA	PQ	ME	P	L	SH	BVI (14 banks/ 11 banks)
2013	0,54	0,46	0,44	0,21	0,40	0,12	1,62/2,20
2014	0,38	0,40	0,27	0,26	0,32	0,12	1,35/1,77
2015	0,59	0,37	0,24	0,27	0,45	0,14	2,09
2016	0,68	0,25	0,31	0,29	0,52	0,13	2,21
2017	0,72	0,30	0,34	0,29	0,60	0,13	2,38
2018	0,60	0,38	0,34	0,27	0,52	0,13	2,26
2019	0,64	0,46	0,40	0,29	0,53	0,15	2,51
2020	0,67	0,56	0,17	0,24	0,56	0,15	2,37
2021	0,62	0,53	0,29	0,29	0,52	0,15	2,43
2022	0,65	0,49	0,42	0,40	0,53	0,15	2,65
2023	0,64	0,62	0,43	0,31	0,57	0,15	2,73
2024	0,57	0,71	0,37	0,30	0,54	0,15	2,63

Source: created by author

Based on the total score, the banking system attains a specific level of banking viability, which can be interpreted according to the performance ranges presented in Table 5.

Table 5. Interpretation of the BVI score

General score	Level of banking viability
≥3,2	High level of banking viability
2,6 – 3,2	Stable level of banking viability
2,1 – 2,6	Satisfactory level of banking viability
1,7 – 2,1	Low level of banking viability
≤1,7	Critical level of banking viability (non-viability)

Source: created by author

Fig. 3 shows a general improving of the banking viability index trend in recent years, moving from a *critical viability level* in *2013–2014* to *satisfactory levels* in the following years (*2015-2021*), and *stable levels* during the last three years (*2022–2024)*.

The observed declines in the banking viability index align with critical events, including the bankruptcy of three problematic banks during 2013–2014, the implementation of Basel III regulatory standards, and the economic repercussions of the COVID-19 pandemic.

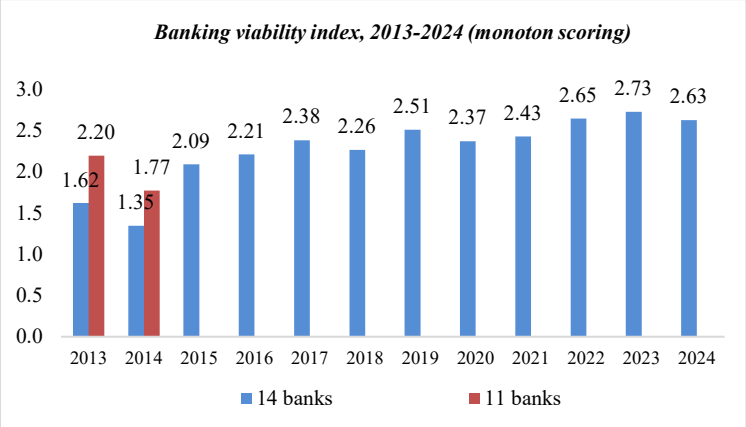

Figure 3 – Evolution of banking viability index, monotonic scoring (2013-2024)

To enhance the relevance of the banking viability index for supervisory purposes, the author determined an optimal level for liquidity and capital indicators applying non-monotonic scoring. In this way, the banking viability index is penalized reflecting the opportunity cost of liquidity and capital surpluses.

The optimal levels of liquidity and capitalization were determined through a rigorous methodology involving parabolic relationships between each indicator of liquidity and ROA and each indicator of capital and ROE.

For this purpose, a regression analysis with a parabolic correlation will be performed to determine the optimal level using the equation below.

$$y = a * x^2 + b * x + c$$

where:

- a is the coefficient of the quadratic term, representing the curvature of the relationship between variables x and y (in our case, indicator of liquidity/ capital and rentability).
- b is the coefficient of the linear term, representing the slope of the linear relationship between x and y, indicating the direct effect of x on y.
- c is the constant term or intercept, representing the theoretical value of y when x equals zero.

Based on this equation, the optimal level of x can be calculated as:

$$x\_opt = (-b)/2a$$

These calculations were performed across multiple periods, reflecting changes in prudential regulatory requirements over time.

Table 6. Optimal level for liquidity and capital indicators

Indicators	Period	Equation	Optimal level
Principle I	2016-2021	$y=-2.9855x^2+3.5748x-0.0235$, $R^2 = 0.8301$	0,599
	2022-2024	$y=-9.6573x^2+6.0017x-0.0478$, $R^2 = 0.9452$	0,31
Principle II	2016-2021	$y=0.0008x2+0.0338x-0.0157$, $R^2 = 0.8065$	21,12%
Principle III	2016-2021	$y=-0.0403x^2+0.2747x-0.0314$, $R^2 = 0.4022$	3,41
LCR	2022-2024	$y=-5*10^{-5}x^2+0.0152x-0.0932$, $R^2 = 0.813$	152%
Total capital ratio (normalized data)	2013-2017	$y=-188.49x^2+100.96x-13.07$, $R^2 = 0.5739$	34,56
	2018-2024	$y=-2.6198x^2+1.7233x+0.0076$, $R^2 = 0.3129$	20,89
	2015-2024	$y=-3.221x^2+2.0861x-0.039$, $R^2 = 0.3416$	25,35
Debts/ Capital (normalized data)	2013-2024	$y=7.8794x^2-7.1223x+1.8572$, $R^2 = 0.6806$	3,85

Source: created by author

Considering the optimal levels, the author attributed new scores for liquidity and capital indicators (Appendix B) and the banking viability index was recalculated.

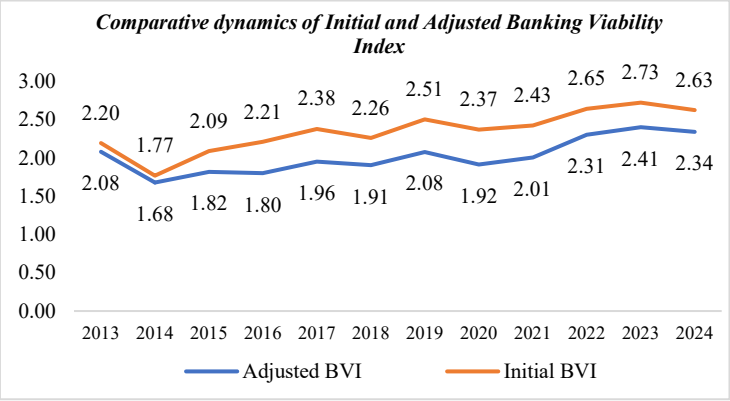

Figure 4 – Banking viability index, monotonic scoring and non-monotonic scoring (2013-2024)

When BVI is adjusted, the values of the index decrease significantly. In 2014, the adjusted BVI approaches the critical threshold (1.68), while the previously highest values - 2.73 - classified within the stable viability range, fall to 2.41 – classified into the satisfactory level.

VI. CONCLUSIONS

The basic characteristics of Moldovan banking system is over-capitalization and over-liquidity. In the context of Basel III application, the regulated requirements became more conservative. While such buffers enhance stability, they may also signal inefficiencies in resources allocation, concerning more opportunity costs for the banks and for the economy.

The calculation model of the BVI proposed in the article supports a nuanced and forward-looking supervisory framework, in line with the principles of risk-based supervision and optimal capital use.

The observed decrease in the BVI following the application of non-monotonic scoring suggests the sensitivity of the BVI to excess capital and liquidity levels, emphasizing the importance of setting optimal thresholds rather than assuming that higher buffers always equate to higher resilience.

The penalization mechanism incorporated through the non-monotonic scoring approach reveals hidden inefficiencies within the system that might otherwise remain undetected under traditional monotonic assessment frameworks.

Consequently, the adjusted BVI provides a more accurate reflection of systemic banking viability. Beyond serving as a monitoring tool for identifying underperforming banks, it also allows for assessing the effectiveness of regulatory and supervisory institutions themselves in maintaining a sound and stable banking system.

V. APPENDICES

APENDIX A

Indicator	Performance ranges and scores	
1. Total capital ratio	2013-2017 *(>16% regulated limit)*	>43.9% – 4 p 31-43.89% – 3,5 p 23.2-30.99% – 3 p 16-23.19% – 2 p <16% – 0 p
	2018-2024 *(>10% regulated limit)*	>40.8% – 4 p 31.7-40.79% – 3.5 p 24.4-31.69% – 3 p 10-24.39% – 2 p <10% – 0 p
2. Total debts / Total capital	>7.2% – 1 p; 5.4-7.19% – 1,5 p; 4.5-5.39% – 2 p; 3.2-4.49% – 2,5 p; 1.8-3.19% – 3,5 p; <1.8% – 4 p	
3. Balance of non-performing credits debt/ Balance of credit debt	>11.7% – 1 p; 7.3-11.69% – 2 p; 5.1-7.29% – 3 p; <5.1% – 4 p	
4. Calculated amount of the allowance for balance of credit debt / Balance of credit debt	>3.6% – 1 p; 2.4-3.59% – 2 p; 1.8-2.39% – 3 p; <1.8% – 4 p	
5. Calculated amount of allowances for impairment losses on assets and provisions made for losses on conditional commitments, according to IFRS	>52.8% – 1 p; 45.1-52.79% – 2 p; 38.5-45.09% – 3 p; <38.5% – 4 p	
6. Balance of credit debt / Total assets	>10.7% – 1 p; 7.2-10.69% – 2 p; 5.9-7.19% – 3 p; <5.9% – 4 p	
7. Non-interest related expenditure / Total income	>66.2% – 1 p; 57.7-66.19% – 2 p; 49.1-57.69% – 3 p; <49.1% – 4 p	
8. Balance of credit debt / Balance of deposits	>0.8% – 1 p; 0.7-0.79% – 2 p; 0.5-0.69% – 3 p; <0.5% – 4 p	
9. Return on equity (ROE)	>13.8% – 4 p; 8.5-13.79% – 3 p; 4.8-8.49% – 2 p;	

	1-4.79% – 1 p; <1% – 0 p
10. Annualized interest-related income / Monthly average interest-bearing assets	>9.5% – 4 p; 8.1-9.49% – 3 p; 6.4-8.09% – 2 p; <6.4% – 1 p
18. Share of foreign capital	- Bank owns foreign capital originating from countries with an A country rating: 100% - 4 p; 51%-99% - 3,5 p; <51% - 2,5 p - Bank has foreign capital originating from countries with a country rating <A: 51-100% - 3 p; <51% - 2 p - Bank has no foreign capital - 1 p
13. Return on assets (ROA)	>2.3% – 4 p; 1.7-2.29% – 3 p; 1-1.69% – 2 p; 0-0.99% – 1 p; <0% – 0 p
11. Interest-related net income / Total income	>43.9% – 4 p; 39.6-43.89% – 3 p; 35.7-39.59% – 2 p; <35.7% – 1 p
12. Net interest margin (NIM)	>5.9% – 4 p; 4.7-5.89% – 3 p; 3.8-4.69% – 2 p; <3.8% – 1 p
14. Principle I - Long-term liquidity ratio	>1% – 0 p; 0.8-1% – 1 p; 0.7-0.79% – 2 p; 0.6-0.69% – 3 p; <0.6% – 4 p
15. Principle II - Short-term liquidity ratio	>56.3% – 4 p; 48.7-56.29% – 3.5 p; 39-48.69% – 3 p; 20-38.99% – 2 p; <20% – 0 p
16. Liquidity Coverage Ratio (LCR)	>470.1% – 4 p; 318.5-470.09% – 3.5 p; 256.6-318.49% – 3 p; 100-256.59% – 2 p; <100% – 0 p
17. Principle III - Liquidity on maturity bands	>17.9% – 4 p; 12.8-17.89% – 3.5 p; 8.7-12.79% – 3 p; 1-8.69% – 2 p; <1% – 0 p

Source: created by author

APPENDIX B

Liquidity indicators	Adapted intervals	Non-monotonic scoring
14. Principle I - Long-term liquidity ratio	>1	0
	0,7-0,99	1
	0,6-0,69	2
	0,51-0,59	3
	<0,5	4
15. Principle II - Short-term liquidity ratio	>40%	0,5
	30-39,99%	1
	25-29,99%	2
	21-24,99%	3
	20-20,99%	**4**
	<20%	0
17. Principle III - Liquidity on maturity bands	> 4,8	1
	4,3-4,79	2
	3,7-4,29	3
	3,2-3,69	**4**
	2,6-3,19	3
	2-2,59	2
	1-1,9	1
	<1	0
16. Liquidity Coverage Ratio (LCR)	>301	0

	221-300	1
	181-220	2
	164-180	3
	141-163	**4**
	126-140	3
	100-125	2
	<100%	0

Source: created by author

APPENDIX C

Capital indicators	Period	Adapted intervals	Non-monoton scoring
1. Total capital ratio	2013-2017	>38,2%	2,5
		30,8-38,19%	4
		23,4-30,79%	3
		16-23,39%	2
		<16%	0
	2018-2024	>22,89	2,5
		18,6-22,89	4
		14,3-18,59%	3
		10-14,29%	2
		<10%	0
2. Total debts / Total capital	2013-2024	>3,9	1,5
		3,5-3,89	1
		3,2-3,49	2
		3,0-3,19	2,5
		2.8-2,99%	3,5
		<2.8	4

Source: created by author

VII. REFERENCES

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