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GOSPODARKA I INNOWACJE

LABORATORIUM WIEDZY Artur Borcuch

Volume: 60 | 2025

Economy and Innovation
ISSN: 2545-0573

For more information contact: editor@gospodarkainnowacje.pl

MAIN METHODS AND MODERN APPROACHES TO CREDIT RISK ASSESSMENT

Sherzod Akhtamovich Khamroyev
PhD, Associate Professor Department of Banking, Tashkent State University of Economics

ARTICLEINFO.

Keywords: Credit risk, loan portfolio, non-performing loans (NPL), risk assessment models, IRB approach, Uzbekistan banking sector, artificial intelligence, international experience, Basel principles, financial stability.

Annotation

This article explores the core methods and modern approaches to credit risk assessment in the banking sector of Uzbekistan, with a particular focus on the structure and quality of loan portfolios. The study analyzes the dynamics of non-performing loans (NPLs) in commercial banks from 2021 to 2025, using statistical data and comparative analysis. Moreover, it highlights the experience of advanced economies such as the United States, Germany, and the United Kingdom in applying internal rating-based (IRB) models, stress-testing, and artificial intelligence-driven credit scoring systems. The paper concludes with strategic recommendations for improving credit risk assessment practices in Uzbekistan in line with international standards.

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Introduction

In recent years, the issue of credit risk assessment and effective management has gained increasing relevance for banks amidst global financial instability, geopolitical tensions, and macroeconomic uncertainty. This is particularly critical for countries like Uzbekistan, which are transitioning to a market economy, where ensuring the financial stability of the banking sector requires a strong focus on credit portfolio quality, borrowers' solvency, and robust risk prevention mechanisms.

Alongside traditional methods of credit risk assessment, the importance of modern approaches—such as Probability of Default (PD), Loss Given Default (LGD), and Exposure at Default (EAD) indicators, stress testing, credit scoring systems, and artificial intelligence-based models—is growing. These tools enhance banks' ability to forecast potential risks and maintain the quality of their assets.

This study provides an in-depth analysis of the credit risk assessment practices employed by commercial banks in Uzbekistan and compares them with the experiences of developed countries such as the United States, Germany, and the United Kingdom. The relevance of the research lies in its potential to support the adaptation of Uzbekistan's banking sector to international standards, reduce the share of non-performing loans (NPLs), and ensure long-term financial stability.

Literature Review

In developed countries, particularly the United States and across Europe, commercial banks predominantly utilize credit scoring models—such as logistic regression, discriminant analysis, and others—along with borrower credit history when assessing credit risk. However, these traditional

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approaches often rely on static data such as historical financial indicators and tend to overlook the complex and dynamic nature of credit risk. Consequently, the global banking sector is increasingly adopting artificial intelligence (AI) and machine learning (ML) technologies to enhance predictive capabilities.

In risk modeling, commercial banks also widely apply models to forecast credit defaults (Probability of Default – PD), potential losses (Loss Given Default – LGD), and conduct stress testing to evaluate financial resilience under adverse conditions.

According to international experience, for instance, Yudina (2013) argues that in developing economies, the profitability of banks' credit portfolios is directly linked to credit risk exposure. She notes that currency depreciation significantly reduces the repayment ability of borrowers who have taken loans in the local currency, thereby increasing the risk level [1].

Analyzing a borrower's cash flow remains central to any credit assessment process. In particular, Isakov (2023), in the *Green Economy and Development* journal, emphasizes that cash flow analysis—focusing on net profit and debt service obligations—is crucial for assessing credit risk in commercial banks [2].

Kholmamatov (2023) proposes specific criteria for improving credit quality in commercial banks, notably through reserve policy. He suggests allocating reserves in proportion to credit risk classification: 1–10% for substandard loans, 11–25% for unsatisfactory, 26–50% for doubtful, and up to 100% for hopeless (non-performing) loans [3].

Research Methodology

This study investigates the practices of credit risk assessment and modern approaches employed by commercial banks in Uzbekistan. A quantitative and comparative analytical methodology was applied, analyzing data from the Central Bank of Uzbekistan and "Hamkorbank" JSCB for the period 2021–2025. The study examined the dynamics of non-performing loans (NPLs), the volume of loan portfolios, and associated risk trends.

Analytical techniques used included structural and dynamic analysis, as well as cross-country comparisons with international practices. Particular attention was paid to the relevance and applicability of modern credit risk evaluation tools such as Probability of Default (PD), Loss Given Default (LGD), Exposure at Default (EAD), stress testing, and AI-based scoring systems. The study justifies the necessity of implementing these advanced models in the Uzbek banking sector.

The findings provide both theoretical and practical insights to support the improvement of risk management systems in commercial banks.

Analysis and Results

In Uzbekistan's banking sector, credit risk assessment is primarily focused on the quality of the credit portfolio. Given the high share of loans in the structure of bank assets, credit institutions place particular emphasis on carefully verifying documentation and assessing the financial condition of borrowers prior to loan disbursement. Traditional methods include defining prudent lending policies, analyzing the borrower's financial indicators, and adhering to diversification principles in credit allocation.

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Table 1. Non-Performing Loans (NPLs) of Commercial Banks in the Republic of Uzbekistan

Year	Total Loans (billion UZS)	NPLs (billion UZS)	NPL Ratio (%)
01.01.2021	276,975	5,785	2.1%
01.01.2022	326,386	16,974	5.2%
01.01.2023	290,049	13,992	3.6%
01.01.2024	471,406	16,621	3.5%
01.01.2025	533,121	21,185	4.0%

Source: Compiled by the author based on the official data from the Central Bank of Uzbekistan.

Between 2021 and 2025, the total volume of loans issued by commercial banks in Uzbekistan has shown a consistent upward trend. The credit portfolio increased from UZS 276.98 trillion in 2021 to UZS 533.12 trillion by 2025 — nearly a twofold increase — reflecting the enhanced role of the banking sector in financing the economy.

However, during the same period, the volume of non-performing loans (NPLs) also increased significantly, rising from UZS 5.8 trillion in 2021 to UZS 21.2 trillion by 2025. Particularly in 2022, the NPL ratio peaked at 5.2%, suggesting a notable decline in credit quality. This could be attributed to post-pandemic recovery challenges, the expiration of grace periods, and increased financial pressures.

Although the NPL ratio decreased to 3.6% in 2023, it rose again to 4.0% in 2025. This underscores the continuing relevance of credit risk management in the banking sector and the need for robust mechanisms to maintain credit quality and minimize default risks.

The fluctuating NPL levels highlight the need for banks to improve risk management strategies, enhance borrower due diligence, and strengthen credit monitoring. While the growing loan volumes reflect increased financial intermediation, the inability to stabilize the NPL ratio may pose threats to financial stability. Hence, the adoption of advanced credit risk models — including PD, LGD, and stress testing — as well as the integration of AI-based scoring systems, becomes crucial for future resilience and sound credit risk governance.

Table 2. Non-Performing Loans (NPLs) "Hamkorbank" JSCB **(Uzbekistan)**

Year	Total Loans (billion UZS)	NPLs (billion UZS)	NPL Ratio (%)
01.01.2021	4,455	41	0.9%
01.01.2022	8,030	235	2.9%
01.01.2023	15,408	181	1.2%
01.01.2024	26,586	375	1.4%
01.01.2025	31,584	1,437	4.5%

Source: Compiled by the author based on data from the Central Bank of Uzbekistan.

In commercial banking operations, the quality of the credit portfolio is a key indicator of a bank's financial stability and resilience to risk. The data from "Hamkorbank" JSCB for the period 2021–2025 demonstrates that while the total loan volume increased almost sevenfold — from UZS 4.46 trillion to UZS 31.58 trillion — the volume of non-performing loans (NPLs) also grew significantly.

In 2021, the NPL ratio stood at just 0.9%, indicating high portfolio quality. However, in 2022, this ratio jumped to 2.9%, likely due to the bank's aggressive lending strategy and expansion into new customer segments. This spike may also reflect declining borrower discipline or weaknesses in credit evaluation mechanisms.

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By 2023, the NPL ratio declined sharply to 1.2%, signaling improvements in credit risk containment, debt monitoring, and collection strategies. It is reasonable to assume that during this period, the bank returned to a more conservative and structured lending policy.

Nevertheless, in 2025, the NPL ratio surged dramatically to 4.5%. This figure represents a significant risk signal. Such a rise may be attributed to macroeconomic instability, inflationary pressures, fluctuations in interest rates, or defaults among major borrowers. Additionally, it may reflect deficiencies in the bank's credit risk assessment and monitoring systems, underscoring the need for immediate improvements in internal control and early warning mechanisms.

During the period from 2021 to 2025, the dynamics of non-performing loans (NPLs) observed in the activities of "Hamkorbank" JSCB indicate that the strategies for diversifying credit risks were not sufficiently applied during the rapid expansion of the bank's credit portfolio. In particular, the 4.5% NPL ratio recorded in 2025 exceeds the sectoral average and underscores the need to enhance credit quality monitoring, conduct in-depth borrower assessments, and implement modern risk models such as PD (Probability of Default), LGD (Loss Given Default), and EAD (Exposure at Default).

At the same time, this experience highlights the importance of diversifying credit risks by sector, loan maturity, and customer type. Commercial banks like "Hamkorbank" must stabilize the quality of their credit portfolios through the implementation of digital credit scoring systems, real-time monitoring mechanisms, and advanced credit policies.

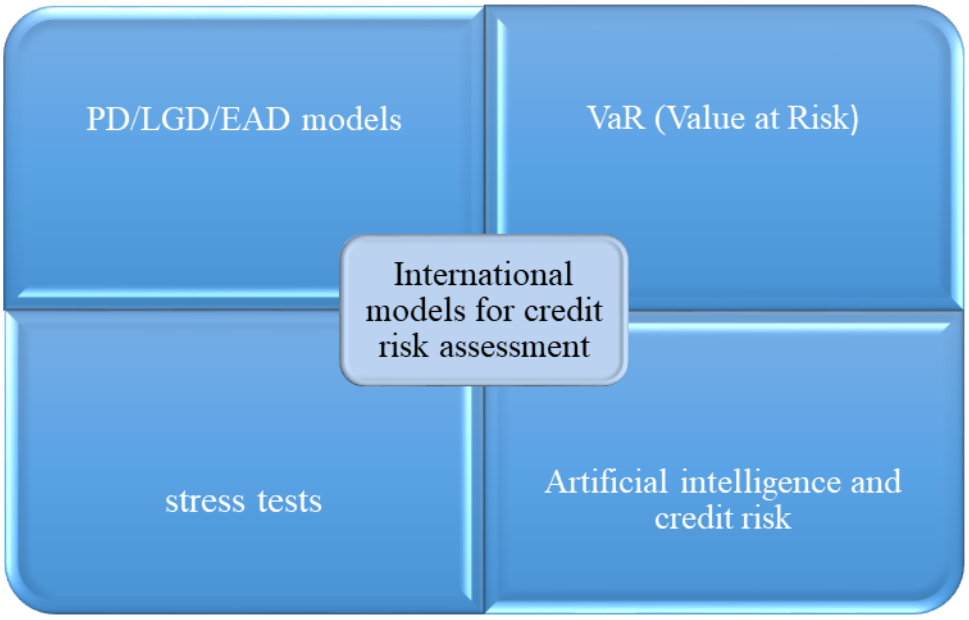

Figure 1. Widely Used Models in International Practice for Credit Risk Assessment.

PD/LGD/EAD Models:

Within the Basel II/III Internal Ratings-Based (IRB) approach, the primary components of credit risk assessment are the *Probability of Default (PD)*, *Loss Given Default (LGD)*, and *Exposure at Default (EAD)*. PD measures the likelihood that a borrower will default, LGD assesses the expected loss in the event of default, and EAD estimates the outstanding exposure at the time of default. Currently, commercial banks in Uzbekistan primarily rely on standardized approaches; however, there are growing prospects for the development of PD and LGD models based on credit registry databases in the near future.

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Value at Risk (VaR):

Although primarily used to assess market risk, some large financial institutions have begun adapting VaR-based methods to estimate credit risk through scenario analysis and credit-VaR calculations. While this model is widely applied by major banks in developed financial markets, its adoption in Uzbekistan is expected to occur in subsequent stages of financial sector development.

Stress Testing:

Banks employ stress-testing scenarios to evaluate their financial stability under adverse macroeconomic conditions. The Central Bank of Uzbekistan has introduced a macro-model-based stress-testing framework. According to a recent IMF technical assistance report, the dynamic modeling of NPLs incorporates variables such as GDP growth, monetary policy conditions, and exchange rate volatility. In 2023, commercial banks implemented a macroeconomic scenario-based NPL forecasting model. Moreover, starting in 2024, calculations based on IFRS 9—Expected Credit Loss (ECL) methodology—are expected to be fully integrated, encouraging banks to enhance PD and LGD estimation processes.

Artificial Intelligence and Scoring Systems:

As in developed economies, Uzbekistan is exploring the use of AI technologies in credit evaluation. Theoretical studies on advanced credit assessment technologies are being integrated into higher education curricula, while in practice, banks widely utilize data from the Credit Information and Analytical Center (CIAC). For instance, in 2023, commercial banks and non-bank credit institutions accessed approximately 62.8 million credit reports from CIAC, allowing for more accurate borrower profiling. The implementation of statistically grounded credit scoring systems is expected to enhance the reliability of lending decisions.

International Practice in Credit Risk Assessment:

Banks in highly developed countries possess robust institutional frameworks and advanced modeling techniques for credit risk assessment. For example, leading banks in the United States and the United Kingdom have developed internal IRB models to calculate PD, LGD, and EAD based on their proprietary borrower data, resulting in data-driven risk control. German banks similarly rely on IRB-based systems.

Comparative international data show that U.S. banks are subject to rigorous stress-testing under the Federal Reserve's Comprehensive Capital Analysis and Review (CCAR). In the UK and EU, banks undergo regular stress tests conducted by the European Banking Authority (EBA) and the Bank of England (BoE). Notably, these countries maintain significantly lower NPL ratios compared to Uzbekistan: by the end of 2024, U.S. banks reported an average NPL ratio of only ~1.7%, while in Germany, this figure stood at approximately 1.2% as of 2022. These outcomes are largely attributed to the use of global best practices in credit risk assessment—external credit ratings, comparative financial ratios, and sophisticated statistical modeling tools.

In developed countries, credit scoring systems—such as FICO in the U.S. and Schufa in Germany—are widely adopted and increasingly enhanced with artificial intelligence algorithms. For instance, banks in the United Kingdom and the United States have integrated machine learning tools to analyze and manage their credit portfolios. In contrast, such systems remain limited within Uzbek banks; however, projections suggest that with ongoing digital transformation and improved data exchange frameworks, the practice of credit risk assessment using advanced technologies will expand in the coming years.

Credit risk management in Uzbekistan's banking system is currently conducted in accordance with prudential norms set by the Central Bank and the core Basel principles. Large banks predominantly rely on simplified standardized approaches, assessing credit portfolios by grouping exposures. Capital reserves and loss provisions for credit risk are formulated in line with International Financial Reporting

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Standards (IFRS), particularly IFRS 9.

Through continuous monitoring and periodic audits, non-performing loans and risk factors are identified. International assessments emphasize the importance of evaluating the legal and financial standing of borrowers prior to loan disbursement, typically involving rigorous due diligence procedures. Nonetheless, some analysts highlight that while state-owned banks operate under a less stringent default policy, the full-scale implementation of internal rating-based (IRB) models remains incomplete. Meanwhile, the Central Bank of Uzbekistan has adopted certain international practices, including stress testing and financial stability assessments. Banks use scenario-based stress test models to monitor asset quality and capital adequacy.

Currently, Uzbek banks are working to expand the scope and sophistication of their data sources and risk models. The credit registry introduced in 2018 is seen as a foundational step in this direction. In the near future, this data infrastructure could enable the development of internal PD and LGD models. At the same time, aligning with global standards requires strengthening credit policies, implementing risk-based pricing strategies, and improving digital transaction capabilities. Diversification of credit portfolios—by borrower type and sector—will also be crucial in mitigating concentration risk.

While credit risk assessments in Uzbekistan's commercial banks have traditionally relied on conventional methods, there is an increasing trend toward incorporating macroeconomic scenarios and digital technologies. The application of uncertainty metrics such as PD and LGD, as well as stress testing, should become more widespread. Furthermore, greater use of data from the credit registry and the Credit Information and Analytical Center (CIAC) will enable banks to better predict borrower behavior and improve credit risk management systems.

International experience shows that effective credit risk management requires the implementation of Internal Ratings-Based (IRB) models, high-quality data, and independent credit assessment systems. Practical outcomes indicate that although the share of non-performing loans (NPLs) in Uzbekistan has declined in recent years—from 6.2% in 2021 to 3.6% in 2023—further improvements are needed.

To optimize the credit evaluation process, the following recommendations are proposed:

- **Develop integrated models** using data from the credit registry and credit bureaus (e.g., credit summary systems, use of artificial intelligence).
- **Implement pilot projects** focused on internal assessment models, particularly Probability of Default (PD) and Loss Given Default (LGD).
- **Broaden the application of international experience** in stress-testing and macro-financial modeling.
- **Enhance credit pricing and interest rate policies** in accordance with market conditions, and enforce strict adherence to diversification principles.

These measures will support Uzbekistan's banking sector in aligning its credit risk assessment practices with international standards and improving the overall financial stability of the system.

Conclusion

The research findings indicate that while commercial banks in Uzbekistan have achieved certain progress in credit risk assessment, the overall approach remains predominantly traditional. Between 2021 and 2025, the volume of issued loans nearly doubled; however, the proportion of non-performing loans (NPLs) also increased. For instance, the sector-wide NPL ratio reached 5.2% in 2022, reflecting inadequate post-pandemic risk controls. Specifically, the rise of NPLs to 4.5% in “Hamkorbank” ATB in 2025 suggests weaknesses in internal risk assessment systems.

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In comparison, developed countries such as the U.S., Germany, and the UK implement Internal Ratings-Based (IRB) models, stress tests, credit scoring, and artificial intelligence, which help maintain relatively low NPL levels (e.g., ~1.7% in the U.S. and ~1.2% in Germany).

While Uzbekistan has initiated steps to implement modern tools like PD, LGD, and EAD through the credit registry, CIAC, and macroeconomic stress-testing, these systems are not yet fully integrated.

Based on the analysis, the following conclusions are drawn:

- Banks should implement IRB models and predictive statistical mechanisms aligned with Basel II/III international standards;
- Diversification of loan portfolios by sector, term, and currency is necessary to reduce concentration risks;
- Wider use of CIAC and credit registry data will facilitate the adoption of digital scoring systems and AI-based models, enhancing risk resilience;
- A strict, transparent, and risk-oriented credit policy remains vital for improving asset quality.

In summary, accelerating the transition toward advanced technological and analytical approaches in credit risk assessment will strengthen the stability and credibility of Uzbekistan's banking sector, reduce NPL levels, and boost competitiveness in international financial markets.

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