few years, various startups as well as traditional financial institutions have been actively developing fintech.

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DOES INTEREST RATE AFFECT NON-PERFORMING LOANS? EMPIRICAL EVIDENCE FROM COMMERCIAL BANKS IN UZBEKISTAN

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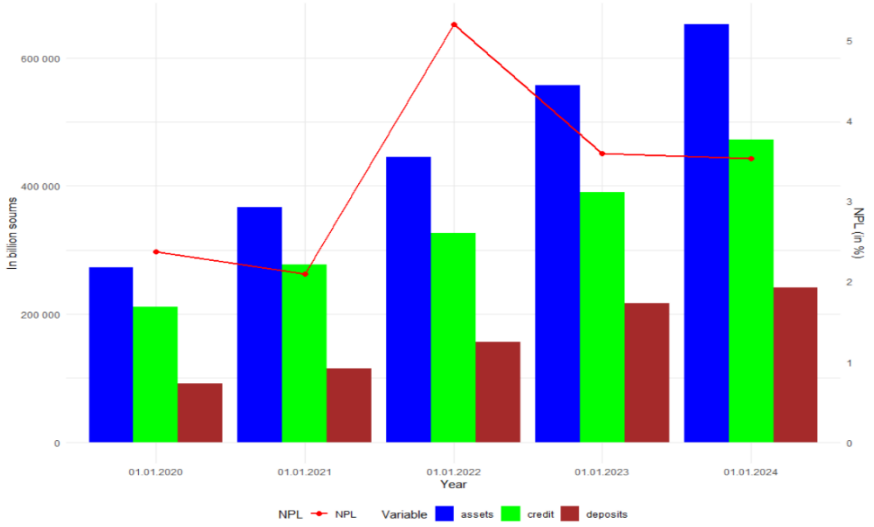
Abstract. *This study investigates non-performing loans (NPL) and credit risk in Uzbekistan's commercial banking sector, focusing on the period post-2016. Using dynamic panel approach, bank-specific and macroeconomic factors have been included in the econometric model to estimate their effects on NPL. According to STATA results, loan-deposit ratio, GDP growth and loan interest rates have positive impact on NPL. On the other hand, banks with foreign ownership experience lower rate of NPL compared to local banks.*

Since the beginning of 2017, the volume of loans have been increasing significantly. As of July 1st, 2024, the total outstanding loans in commercial banks of Uzbekistan amounted to 494 trillion Uzbek soums [1] which comprises approximately 44% of the GDP of Uzbekistan. Significant expansion of loans to greater population and improvements in financial inclusion are associated with higher NPL ratio in credit portfolios. While this ratio was fluctuating between 2% and 3% until the end of 2020, it started increasing during the pandemic period reaching as high as 6.2% during mid 2021 (See Picture 2.5). This can be partially explained by the fact that many households faced financial troubles during

pandemic lockdowns and they had to postpone their loan payment obligations. Picture 1 illustrates the dynamic change of NPL for the beginning periods of 2020 – 2024 along with three financial indicators of commercial banks: total assets, total deposits and total credit. According to the graph, all three indicators have experienced significant growth while NPL has shown sharp increase during the 2021-2022 period.



Picture 1. Comparative illustration of NPL and main financial indicators of commercial banks in Uzbekistan.

This study examines the main factors affecting the non-performing loans of commercial banks, both bank-specific factors, such as leverage, size, loan-to-deposit ratio, state ownership, as well as macroeconomic factors, such as annual GDP growth rate, weighted average interest rate on loans and exchange rate. Using panel data of 35 commercial banks of Uzbekistan on quarterly basis over the period 2019-2023, we estimate the impact of aforementioned variables on NPL. The brief description of each variable and its expected impact on NPL are provided in Table 1.

Considering a dynamic panel data analysis in this study helps us to examine the relationship between variables over time while taking into account individual-specific effects and potential endogeneity issues. It also allows for the inclusion of multiple time periods and considers the dynamic nature of the data, capturing both the cross-sectional and time-series dimensions. This technique became more prominent with the introduction of the Generalized Method of Moments (GMM) estimators by Arellano and Bond in 1991 [2]. They introduced a GMM estimator for dynamic panel data models, addressing issues like autocorrelation, heteroskedasticity, and the presence of lagged dependent variables. Later, Blundell and Bond [3] proposed a system GMM estimator, which combines equations in levels and first differences to improve efficiency, especially in cases with persistent data.

Table 1.

The description of variables being used for the analysis.

Variable	Description	Expected Sign
Dependent variable		
Non-performing loans (NPL)	Troubled loans/Total loans	
Independent variables		
Bank-specific		
Loan-deposit ratio (LDR)	Total loans/ Total deposits	Negative/Positive
Size	Natural logarithm of total assets	Negative/Positive
Leverage	Total liabilities/Total assets	Negative/Positive
State-ownership	= 1 if state ownership, 0 otherwise	Positive
Foreign-ownership	= 1 if foreign ownership, 0 otherwise	Negative
Macroeconomic		
Interest rate	Weighted average interest rate on loans, %	Positive
Exchange rate	Change in UZS/USD exchange rate, %	Negative
GDP growth rate	Annual GDP growth rate, %	Negative

The specified regression model used in the study is as follows:

$NPL_{i,t} = \beta_0 NPL_{i,t-1} + \beta'_i X_{i,t} + \varepsilon_{i,t}$ (1)

with $\varepsilon_{i,t} = \eta_i + \nu_{i,t}$

here the subscript i denotes the cross-sectional (banks) and t denotes time dimension of the panel sample. $NPL_{i,t}$ is non-performing loan ratio, $NPL_{i,t-1}$ is its lagged value, β'_i is a 1xk vector of parameters, $X_{i,t}$ is a vector of independent variables including their lagged values and $\varepsilon_{i,t}$ is the error term. $\varepsilon_{i,t}$ has two orthogonal components: η_i are the unobserved individual effects and $\nu_{i,t}$ are the observed specific errors.

Table 2.

Estimation results using system GMM. Source: Author's calculations

	System GMM	
Variable	**Coefficient**	**Std. Error**
$NPL_{(i-1)}$	0.7528***	0.0300
LDR	0.0035*	0.0019
Size	-0.0115	0.0118
Leverage	0.0716	0.0534
Exchange	0.0077	0.1420
GDP	0.8799***	0.1704
ROE	0.0021	0.0018
State-own	0.0440	0.0709
Interest	0.0075***	0.0019
Foreign-own	-0.1419***	0.0396
Constant	-0.1454*	0.0749
Observations	454	
Wald Chi Square	1149.87***	

*, **, *** indicate significance at 10%, 5% and 1%, respectively.

The positive and significant coefficients in both models indicate that past values of NPL significantly influence current values of NPL. Specifically, a 1 percentage point increase in the previous period’s NPL is associated with a 0.7528 percentage point increase in the current period’s NPL. Loan-deposit-ratio, GDP growth and interest rates are also found to have positive impact on NPL. The dummy variable for foreign ownership produced a coefficient of -0.1419 with a standard error of 0.0396. This negative and statistically significant (at 1%) coefficient indicates that foreign-owned banks tend to have lower NPL compared to commercial banks with no foreign ownership. Previous studies have also found similar relationship between foreign ownership and NPL and they indicate that these institutions capitalize on their international expertise to implement effective risk management practices in host countries, which helps to reduce the likelihood of loan defaults and NPL [4], [5].

Based on the empirical results, the following policy recommendations are provided to address the challenge of rising non-performing loans:

- Since loan-deposit ratio (LDR) have positive impact the regulators should set prudential limits on LDR to ensure banks maintain adequate liquidity and avoid excessive risk-taking.
- The positive impact of loan interest rates on NPL suggests that higher rates may be making loan repayments more burdensome for borrowers. Banks could be encouraged to offer more flexible and competitive loan terms or introduce risk-based pricing strategies that adjust interest rates based on borrower creditworthiness and risk profile.
- Since banks with foreign ownership have lower NPL rates, encouraging more foreign investment and partnerships in the banking sector could help improve risk management practices and bring in international expertise.

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