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From Stability to Collapse: Investigating the Determinants of Bank Crises in Upper Middle-Income Nations

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Abstract

This study examines the factors leading to bank crises in upper-middle-income countries by analyzing macroeconomic banking factors and financial indicators unique to individual banks. Using data from the WDI, it employs panel data regression analysis from 2001 to 2020 to assess how key macroeconomic factors, such as financial system deposits to GDP, deposit money banks' assets to GDP, and central bank assets to GDP, influence bank crises (NPL). Additionally, the study investigates how bank-specific attributes like net interest margin, noninterest income to total income, overhead costs to total assets, and return on equity (ROE) impact loan performance and credit risk management. By examining these factors collectively, the research offers insights into how financial institutions and policymakers can develop strategies to reduce credit risk, improve regulatory frameworks, and bolster banking sector resilience, ultimately contributing to the prevention of crises and sustainable economic growth. The results indicate that deposit money banks' assets to GDP, higher net interest margins, and higher ROE contribute to lower NPL, suggesting that well-capitalized banks manage credit risk more effectively. However, the increase in deposit money banks' assets to GDP has led to greater market concentration and higher non-performing loans, pointing to riskier lending practices. Meanwhile, central bank assets, net interest income, and bank deposits do not significantly impact the level of non-performing loans. These findings can assist policymakers and banking institutions in developing effective risk-management strategies to prevent future financial crises.

Keywords: NPL, ROE, Financial System Deposit to GDP, Bank Crisis

Introduction

Bank crises have consistently posed significant challenges to the stability of financial systems worldwide, often triggering severe economic downturns, a loss of public confidence, and lasting social repercussions. In an era of rapid globalization and increased financial integration, the ripple effects of bank failures are becoming more pronounced, making it essential to understand the fundamental causes of these crises. This study examines the precedents of bank crises, focusing on high-income countries, which provide a unique context where rapid economic growth and transitional financial structures coexist with inherent vulnerabilities. Upper-middle-income countries occupy a distinct position on the global economic spectrum. They are characterized by a mix of developed financial practices and emerging market dynamics, where regulatory frameworks, risk-management protocols, and banking practices are often evolving. This dual nature creates opportunities for innovation as well as risks for instability. Unlike low- and high-income economies, these countries often experience rapid industrialization and market liberalization, which have led to significant structural differences in the banking sector. While these changes are necessary for economic progress, they can also significantly expose financial institutions to unexpected risks if regulatory measures lag behind market developments. Unexpected risks if regulatory measures lag behind market developments (Almaqtari et al., 2019).

At the same time, macroeconomic factors remain central to the context of these operational metrics in the broader financial ecosystem. Variables such as the assets of deposit-taking banks to GDP, the holdings of central banks to GDP, and the deposits of the economic system to GDP are indicators of the overall health and integration of the banking sector in the national economy (Buallay, 2019). The high ratio of deposits held by deposit-taking banks to GDP may indicate a significant concentration of credit intermediation in the area of the economy, which may expose the financial system to increased risks in downturns. Similarly, the central bank assets to GDP ratio provides an insight into the extent of monetary intervention and the role of the central bank in stabilizing the financial environment. In contrast, the deposits-to-GDP ratio reflects the public's self-reliance and the banking sector's liquidity position (Bouzgarrou et al., 2018).

On the other hand, bank-specific factors belong to the internal dynamics and management of respective banks. Capital adequacy, asset quality, managerial efficiency, and earnings stability are some factors that fall under this category (Trinh et al., 2020). Despite this, poor asset quality, as demonstrated by a large number of NPLs, can potentially lead to insolvency quickly. Banks with inadequate capital buffers are more susceptible to shocks (Gupta & Kashiramka, 2020; Shah et al., 2024). When establishing a bank's ability to withstand crises, management practices, such as risk management and corporate governance, also significantly impact (Asteriou et al., 2021).

Problem Statement

At the start of 2023, several U.S. banks, including Silicon Valley Bank and Signature Bank, faced bankruptcies caused by interest rate hikes, declining asset prices, and bank runs. The crisis revealed vulnerabilities in the banking system, such as liquidity risk management and economic shifts. Emergency and regulatory measures were implemented to stabilize the financial system and protect depositors (Metrick & Schmelzing, 2023). Therefore, bank failures are often driven by liquidity risks and poor asset quality, which worsen during economic downturns. Banks struggle to manage the balance between loans and deposits, leading to liquidity crises when depositors withdraw funds. Excessive risk-taking can weaken capital and solvency, while sharp increases in interest rates can decrease the value of bond holdings and add financial strain on banks. Poorly managed or supervised banks can still fail (Saif-Alyousfi & Saha, 2021). Additionally, there is a lack of comprehensive research that integrates different banking systems across various economic environments, especially in developing countries like Pakistan, where local features, regulatory frameworks, and cultural factors can influence banking crises. This has recently gained attention due to the scarcity of detailed analyses examining how these factors interact and affect banking stability. This study bridges the gap between macroeconomic and microeconomic views on banking crises by using macroeconomic indicators and bank-level data. This dual approach not only addresses a gap in existing research but also offers real-time support to policymakers and regulators, enhancing crisis prevention strategies and regulatory frameworks.

Empirical Support

Banks are financial intermediaries that hold short-term deposits as liabilities and provide long-term, highly dependent short-term loans to businesses and consumers. When the value of these assets falls below a bank's liabilities, it is called insolvency. Credit losses happen when an asset's value declines due to a failed repayment or because a borrower refuses to pay; this is known as credit risk. To reduce credit risk, banks can carefully screen loan applicants, diversify their loan portfolios by extending credit to borrowers exposed to different risk factors, or offer loans backed by collateral. Screening helps identify projects unlikely to be profitable, but even straightforward, cost-effective projects can still fail unexpectedly. Economic mechanisms suggest that systemic banking crises are closely linked to economic shocks that heavily impact bank borrowers' performance, especially when these shocks go beyond diversifiable risk. Additionally, such shocks often lead to widespread financial instability within the banking sector. Banks with weaker capital buffers are more vulnerable to these shocks because they have fewer reserves to cover losses. Literature on banking crises often references common types of shocks that

trigger financial turmoil, such as downturns in economic activity, worsening trade terms, and sharp declines in asset prices, particularly in real estate markets. These shocks can cause banks to cut back on lending and make substantial write-downs on assets due to rising loan defaults, which can potentially lead to a systemic crisis if banks lack sufficient capital to absorb these financial stresses (Maryem Naili & Younes Lahrichi, 2022). Macroeconomic indicators are important macroeconomic data published regularly to inform traders and investors about a country's economic situation. To measure an economy, these indicators (such as GDP, GDP growth rate, consumer price index, inflation, recession, economic downturn, employment rates, etc.) are used, which are required for each country to determine the economic situation. They significantly impact the economy as a whole and leave a profound impact on all sectors, especially the banking sector. All planning and analysis of the financial sector is based on these indicators, which represent trends and data (Saif-Alyousfi & Saha, 2021).

Abbas and Pasha's (2009) study examined the financial liberalization of Pakistan's banking sector and the required impact on the balance of payments (BOP). Using monthly data from February 1964 to June 2008, researchers examined what role did financial liberalization (liberalized markets made it easier for businesses and individuals in Indonesia to borrow) on economic changes in Indonesia from the perspective of exchange rate wisdom. Their findings show that Pakistan has suffered from currency liberalization and has descended into two gigantic crises due to significant exchange rate volatility: banking and balance of payments. Although Choudhary and Jain (2021) adopt a similar cautionary tone regarding the widespread financial liberalization that took place in emerging markets over the past few decades. They contend that the opening up of these capital accounts in many cases occurs before currency and banking crises, especially in poorly regulated economies. As Abbas and Pasha (2009) observes, liberal capital flows without a solid financial architecture are prone to credit booms, asset bubbles, and consequent financial sector collapse. Sarwar (2023) explores bank liquidity creation in the SAARC region, identifying key antecedents such as financial development, governance quality, and market structure. The study also highlights consequences like credit expansion and economic growth. It emphasizes regulatory effectiveness and macroeconomic stability as critical influences on liquidity creation. Mushtaq et al. (2023) examine the impact of green banking practices on banks' ecological performance, highlighting energy efficiency, paperless transactions, and green financing. The study identifies capacity development as a key moderating factor that strengthens the relationship between sustainable practices and environmental outcomes. Baig et al. (2023) explore how fintech lending and capital regulatory requirements affect bank stability across developed and developing countries. The study finds that while fintech enhances credit access, it may increase risk exposure. Strong capital regulations are essential to maintain stability amid growing fintech disruptions.

Theoretical Support

Credit Risk Theory

Provides an analytical tool that, in the context of this study, helps interpret the growing non-performing loan (NPL) problem in the banking system. The Merton model considers a company's equity as a call option on its assets and is based on structural credit risk theory. According to this model, when a company's assets are worth less than its liabilities at debt maturity, it defaults. Applied to the banking sector, the model, which is designed for businesses, assumes that a default occurs when a borrower's value drops to a level where it cannot meet its obligations. This phenomenon is highly sensitive to financial conditions and macroeconomic shocks. The Merton Model is particularly relevant for upper-middle-income countries, where the exchange rate has experienced significant shocks over the years and where financial liberalization has not improved exchange rate stability, inflation volatility, or credit cycles.

The Macroprudential Theory

The Macroprudential Theory is mostly concerned with the stability of the financial system as a whole rather than individual institutions. Under this theory, the most important element of financial regulation ought to be the possibility of systemic risk, that the collapse of the individual financial institution or even a group of them might create a generalized crisis. That is why this concept, one of the key responses to the world financial crisis of 2007-2008, underlines those systemic vulnerabilities cannot be blocked by the soundness, or health, of individual banks, at a more micro level. In upper-middle-income countries, macroprudential deficiencies are sometimes quickly followed by a full-blown banking crisis, as growth in lending, foreign inflows, and financial liberalization often occur rapidly. Clustering behaviors and intertwined exposures, which magnify shocks across the system, are also stated to be the cause of these crises, according to the macroprudential approach, besides poor internal governance or risk management.

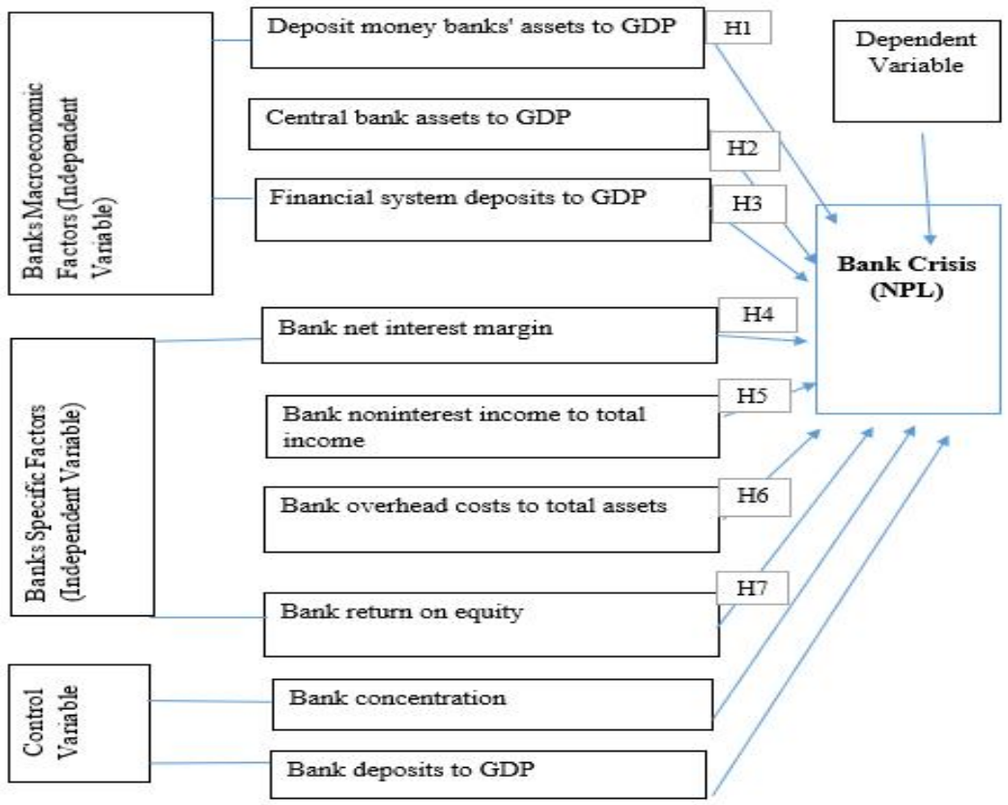
The Taylor Theory

The Taylor Theory is a monetary policy guideline formulated by economist John B. Taylor in 1993 based on the Taylor Rule that determines how central banks must adjust the short-term interest rates, which react to changes in inflation and GDP (GDP gap). It provides a systematic way of setting interest rates with the aim of promoting balance in the economy and stability in prices. When we talk about the banking crisis in upper-middle-income countries, the Taylor Theory comes in as it has the potential to create an

imbalance in the macroeconomic environment, to cause financial instability once the Taylor Rule is breached, especially when there is a continuous constraint on the interest rates held below the actual level. It connects with the Bank crisis, as many upper-middle-income countries promote inflation targeting without factoring in the aspect of financial stability into their policy frameworks. Systemic risks accumulate based on inflation rates to the extent that they seem to be constant. Although it might sound like inflation is under control, with the help of the Taylor Rule, the government can find out when the interest rates are too accommodating.

Methodology

Figure 1: Conceptual Framework



Source: Author's Estimation

The Data

The study provides a detailed overview, covering the period 2001-2020. This 20-year period provides a sound basis for analyzing the causes of bank crises, as it covers different economic cycles, such as expansion, recession, and recovery, including the global financial crisis and its aftermath. The world development indicators have been consistently used to collect data year after year, ensuring high reliability and cross-time comparability. Purposive sampling is used in the current study due to various reasons like, it enhances the depth and relevance of the analysis by focusing on entities that are most likely to exhibit the patterns and issues under investigation. In addition, the researcher only needs to gather and examine data from a subset of the population that is most instructive for the research question, rather than a large, diverse population, which makes resource allocation more efficient (Ames et al., 2019).

Table 1: Tabulation of the Country

Country	Freq.	Percent	Cum.
Albania	20	2.56	2.56
Argentina	20	2.56	5.13
Armenia	20	2.56	7.69
Belarus	20	2.56	10.26
Bosnia and Herzegovina	20	2.56	12.82
Botswana	20	2.56	15.38
Brazil	20	2.56	17.95

Bulgaria	20	2.56	20.51
China	20	2.56	23.08
Colombia	20	2.56	25.64
Costa Rica	20	2.56	28.21
Dominican Republic	20	2.56	30.77
Ecuador	20	2.56	33.33
Fiji	20	2.56	35.90
Gabon	20	2.56	38.46
Georgia	20	2.56	41.03
Guatemala	20	2.56	43.59
Iraq	20	2.56	46.15
Jordan	20	2.56	48.72
Kazakhstan	20	2.56	51.28
Lebanon	20	2.56	53.85
Malaysia	20	2.56	56.41
Maldives	20	2.56	58.97
Mauritius	20	2.56	61.54
Mexico	20	2.56	64.10
Moldova	20	2.56	66.67
Montenegro	20	2.56	69.23
Namibia	20	2.56	71.79
North Macedonia	20	2.56	74.36
Panama	20	2.56	76.92
Paraguay	20	2.56	79.49
Peru	20	2.56	82.05

Source: Author's Estimation

The Variables

For this study, the macroeconomic factors: Deposit money banks' assets to GDP, Central bank assets to GDP, Financial system deposits to GDP, and micro (banks' specific) factors, Bank net interest margin, Bank noninterest income to total income, Bank overhead costs to total assets, and Bank return on equity are used.

Table2: Description of Variables

Sr No	***Source***	***Series***	***Banks Macroeconomic Factors (Independent Variable)***
1	WDI	GFDD.DI.02	Deposit money banks' assets to GDP
3	WDI	GFDD.DI.06	Central bank assets to GDP
4		GFDD.DI.08	Financial system deposits to GDP
	Banks' Specific Factors (Independent Variable)		
1	WDI	GFDD.EI.01	Bank net interest margin
2	WDI	GFDD.EI.03	Bank noninterest income to total income
3	WDI	GFDD.EI.04	Bank overhead costs to total assets
4	WDI	GFDD.EI.06	Bank return on equity

	Control variables		
1	WDI	GFDD.OI.01	Bank concentration
2	WDI	GFDD.OI.02	Bank deposits to GDP
	Dependent Variable		
1	WDI	GFDD.OI.19	Bank nonperforming loans

Source: Author's Estimation

Results And Discussions

Table 3: Descriptive Statistics

Variables	***Obs***	***Mean***	***Std. Dev.***	***Min***	***Max***
Bank nonperforming loans	780	6.288	5.051	0.806	23.819
Deposit money banks' assets to GDP	780	57.616	37.685	3.447	218.22
Central bank assets to GDP	780	5.046	7.965	0	57.088
Financial system deposits to GDP	780	49.29	39.418	5.803	251.24
Bank net interest margin	780	5.261	2.418	1.087	21.358
Bank noninterest income to total income	780	35.832	13.011	9.627	95.421
Bank overhead costs to total assets	780	4.128	4.169	0.475	84.336
Bank return on equity	780	12.611	13.714	-41.22	259.01
Bank concentration	780	68.902	20.039	22.31	100
Bank deposits to GDP	780	49.456	39.229	5.803	251.24
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Source Author's Estimation

Average nonperforming loans in banks stand at 6.29%, with a high standard deviation of 5.05%, indicating variability in loan quality across banks. Deposit money banks' assets relative to GDP average 57.62%, but with a high dispersion of 37.69%, reflecting differences in sector development. Central bank assets as a percentage of GDP are low at 5.05%, yet they are highly volatile at 7.97%, with some cases even showing no central bank assets. Deposits relative to GDP average 49.29%, with a high variance of 39.42%, pointing to differences in financial depth. This suggests variability in banking efficiency and profitability, as the average bank's net interest margin is 5.26%, ranging from 1.09% to 21.36%. Revenue diversity is evident, with noninterest income averaging 35.83% of total income, but with a broad range from 9.63% to 95.42%. The average overhead cost to total assets ratio is 4.13%, while the maximum recorded is 84.34%, indicating significant operational costs for some institutions. The average return on equity (ROE) is 12.61%, but a high standard deviation of 13.71% and extreme values from -41.22% to 259.01% reveal considerable differences in profitability. Bank concentration (C5) averages 68.90%,

with a wide dispersion of 22.31% to 100%, suggesting varying levels of competition within the sector. Finally, bank deposits relative to GDP are 49.46%, with substantial variation of 39.23%, indicating differing degrees of financial intermediation at the extremes.

Table 4: Correlation Matrix

Variables	*NPL*	*DMBA to GDP*	*CBA to GDP*	*FSD to GDP*	*BNIM*	*BNI to TI*	*BOC to TA*	*BROE*	*BC*	*BD to GDP*
NPL	1									
DMBA to GDP	-0.1	1								
CBA to GDP	0.013	0.281	1							
FSD to GDP	0.045	0.817	0.531	1						
BNIM	-0.08	-0.56	-0.01	-0.52	1					
BNI to TI	0.015	-0.25	-0.09	-0.19	-0.06	1				
BOC to TA	-0.1	-0.3	-0.07	-0.29	0.352	0.428	1			
BROE	-0.12	-0.17	-0.03	-0.13	0.209	0.029	0.047	1		
BC	0.14	-0.17	-0.08	-0.11	0.1	-0.12	-0.16	0.008	1	
BD to GDP	0.045	0.814	0.524	0.997	-0.52	-0.19	-0.29	-0.14	-0.1	1

Source Author's Estimation

The correlation analysis highlights the key links between banking and financial parameters. Net interest margin (-0.08) and return on equity (-0.12) show a slight negative relationship with bank nonperforming loans, indicating that fewer nonperforming loans are associated with higher profitability. We observe a positive relationship with bank concentration (0.14), suggesting that more concentrated markets may have slightly higher nonperforming loans. The correlation between deposits to GDP within the financial system and assets to GDP by deposit money banks is high (0.817), as deposits tend to be larger in countries with bigger banking systems. However, these variables negatively correlate with net interest margins (- 0.56 and- 0.52), implying that larger financial systems tend to compress net interest margins, possibly due to increased efficiency or competition. Central bank assets to GDP are modestly positively correlated with deposits in the financial system (0.0.531) and show weak positive links with bank profitability measures. The near- identical values of financial system deposits and bank deposits to GDP (0.0.997) emphasize the significance of financial system deposits in these ratios, while their negative correlations with net interest margin (-0.52) and overhead costs (-0.29) support the idea that in well- developed financial systems, banks tend to be more cost-efficient and less reliant on interest spreads. The net interest margin is positively correlated with overhead costs (0.0352) and return on assets (0.209), indicating that banks with higher costs often charge higher margins, and that interest margins contribute to profits. The correlation between bank overhead costs and noninterest income is moderate (0.428), suggesting that banks with higher operating expenses generate more income from non-lending activities. Conversely, bank return on equity shows weak correlations with most of these variables, implying that factors beyond financial system size and efficiency influence labor productivity and overall bank profitability.

Table 5: Ordinary Least Squares (Macro factors)

Banks non-performing loans	**Coef.**	**St. Err.**	**t-value**	**p-value**	**[95% Conf**	**Interval]**	**Sig**
Deposit money banks' assets to GDP	-.061	.009	-7.17	0.000 ***	-.078	-.044	***
Central bank assets to GDP	-.071	.027	-2.61	0.009 ***	-.125	-.018	***
Financial system deposits to GDP	.061	.009	6.63	0.000 ***	.043	.079	***
Constant	7.153	.323	22.12	0.000 ***	6.518	7.788	***
F-test	17.747		Prob > F		0.000		

Akaike crit. (AIC)	4695.206	Bayesian crit. (BIC)	4713.843

*** p<.01, ** p<.05, * p<.1

Source: Author's Estimation

We can discuss several statistically significant relationships in our regression results for non-performing loans (NPLs) concerning various macroeconomic indicators. The coefficient for Deposit Money Banks assets to GDP is -0.061 ($p < 0.01$), which suggests that the more assets commercial banks hold relative to their deposits, the lower the NPLs. This implies that a higher relative size of economic activities by deposit money banks to GDP corresponds with a lower ratio of non-performing loans to total assets. Similarly, the Central Bank's assets to GDP have a coefficient of −0.071 ($p = 0.009$), again indicating a significantly negative effect on NPLs. In other words, increases in central banks' assets and GDP are associated with decreases in NPLs. In contrast, the "Financial system deposits to GDP" variable has a positive coefficient of 0.061 ($p < 0.01$), showing that as the ratio of financial system deposits to GDP increases, NPLs tend to rise. As indicated by the stars in the table, all three independent variables used in this model have a significant effect, $p<0.01$. The main results are premised on the key macroeconomic determinants of non-performing loans, and the included positive and negative effects shed light on the dynamics of banking sector performance at large. However, these results are aligned with (Ahmed et al., 2021; Foglia, 2022; Gashi et al., 2022; Lee et al., 2022). The regression results in bank-specific financial indicators of NPL numbers of bank non-performing loans. Bank net interest margin: -0.022 (0.793). NPL Bank noninterest income to total income, which is marginally significant at the 10% level (coefficient 0.026, p-value 0.099), indicates that the higher the proportion of noninterest income to total income, the larger the NPLs. Conversely, "Bank overhead costs to total assets" and "Bank return on equity" are positively and significantly related to NPLs. The coefficients are -0.139 ($p = 0.008$) for overhead costs (higher is better, so NPLs decrease) and -0.042 ($p = 0.002$) for return on equity (NPLs also decrease as a function of greater returns on equity).

Table 6: Ordinary Least Squares (Banks Specific Factors)

Bank nonperforming loans	**Coef.**	**St. Err.**	**t-value**	**p-value**	**[95% Conf**	**Interval]**	**Sig**
Bank net interest margin	-0.022	0.084	-0.26	0.793	-0.186	0.142	
Bank noninterest income to total income	0.026	0.016	1.65	0.099 *	-0.005	0.057	*
Bank overhead costs to total assets	-0.139	0.052	-2.65	0.008 ***	-0.242	-0.036	***
Bank return on equity	-0.042	0.013	-3.16	0.002 ***	-0.069	-0.016	***
Constant	6.578	0.711	9.25	0.000 ***	5.181	7.975	***
F-test	5.285		Prob > F		0		
Akaike crit. (AIC)	4727.975		Bayesian crit. (BIC)		4751.271		

*** p<.01, ** p<.05, * p<.1

Source: Author Owned Developed

The regression results show that bank net interest margin has no significant effect on nonperforming loans. Noninterest income has a weak positive association ($p<0.1$), suggesting that banks earning more from non-lending activities may have slightly higher loan defaults. Overhead costs have a significant negative impact ($p<0.01$), implying that more efficient banks tend to have fewer bad loans. Return on equity is also significantly negative ($p<0.01$), indicating that more profitable banks experience lower default rates. The model is statistically significant overall ($F=5.285$, $p<0.01$), with the constant showing a baseline nonperforming loan rate of about 6.58%. Information criteria (AIC/BIC) suggest reasonable model fit. The constant term is very significant (t-value = 9.25, $p < 0.01$), having an estimated value of 6.578, which might also indicate that NPLs are due to other unobserved factors. Hence, despite the model's very low explanatory power, some bank-specific variables, such as return on equity and overhead costs, are statistically relevant in explaining the amount of non-performing loans. However, these results are aligning with; (Ahmed et al., 2021; Annas et al., 2024; Erdas & Ezanoglu, 2022; Siddique et al., 2022)

Table 7: Ordinary Least Squares (Combine)

Bank nonperforming loans	***Coef.***	***St. Err.***	***t-value***	***p-value***	***[95% Conf***	***Interval]***	***Sig***
Deposit money banks' assets to GDP	-0.07	0.009	-7.96	0.000 ***	-0.087	-0.052	***
Central bank assets to GDP	-0.046	0.028	-1.61	0.107	-0.101	0.01	
Financial system deposits to GDP	0.053	0.009	5.61	0.000 ***	0.034	0.071	***

Bank net interest margin	-0.204	0.102	-2.01	0.045 **	-0.404	-0.004	**
Bank noninterest income to total income	-0.001	0.016	-0.05	0.959	-0.032	0.031	
Bank overhead costs to total assets	-0.116	0.051	-2.3	0.022 **	-0.215	-0.017	**
Bank return on equity	-0.048	0.013	-3.68	0.000 ***	-0.073	-0.022	***
Constant	10.11	1.077	9.39	0.000 ***	7.996	12.222	***
F-test		12.308		Prob > F			0
Akaike crit. (AIC)		4672.441		Bayesian crit. (BIC)			4710

*** p<.01, ** p<.05, * p<.1

Source: Author Owned Developed

The results show that deposit money banks' assets to GDP have a strong negative effect on nonperforming loans (p<0.01), indicating that larger banking systems experience fewer defaults. Central bank assets to GDP are not significant. Financial system deposits to GDP are positively associated with nonperforming loans (p<0.01), suggesting that higher deposit volumes may coincide with increased credit risk. Net interest margin is significantly negative (p<0.05), implying that higher lending spreads are linked to lower defaults. Overhead costs (p<0.05) and return on equity (p<0.01) also have significant negative effects, meaning more efficient and profitable banks face fewer bad loans. The model is highly significant overall (F=12.308, p<0.01) with good explanatory power (AIC/BIC values indicating reasonable fit). Moreover, the results align with (Ahmed et al., 2021; Kjosevski & Petkovski, 2021; Loang et al., 2023). The regression analysis provides statistically significant relationships between nonperforming loans, several macroeconomic and bank-specific variables, and control variables.

Table 8: Ordinary Least Squares

Bank nonperforming loans	***Coef.***	***St. Err.***	***t-value***	***p-value***	***[95% Conf***	***Interval]***	***Sig***
Deposit money banks' assets to GDP	-0.066	0.009	-7.42	0.000 ***	-0.083	-0.049	***
Central bank assets to GDP	-0.041	0.028	-1.45	0.148	-0.097	0.015	
Financial system deposits to GDP	0.11	0.058	1.9	0.058 *	-0.004	0.224	*
Bank net interest margin	-0.227	0.102	-2.23	0.026 **	-0.427	-0.027	**
Bank noninterest income to total income	0.002	0.016	0.13	0.896	-0.029	0.033	
Bank overhead costs to total assets	-0.093	0.051	-1.83	0.068 *	-0.194	0.007	*
Bank return on equity	-0.047	0.013	-3.68	0.000 ***	-0.073	-0.022	***
Bank concentration	0.024	0.009	2.63	0.009 ***	0.006	0.041	***
Bank deposits to GDP	-0.06	0.057	-1.04	0.299	-0.172	0.053	
Constant	8.286	1.306	6.34	0.000 ***	5.722	10.849	***
F-test	10.524			Prob > F		0	
Akaike crit. (AIC)	4668.48			Bayesian crit. (BIC)		4715.073	

*** p<.01, ** p<.05, * p<.1

Source: Author Owned Developed

Conversely, "central bank assets to GDP" is statistically insignificant (p = 0.148) or has no relevant link with the NPLs. For bank-specific factors, " Bank net interest margin" carries an important, significant negative coefficient (-0.227) (p < 0.05), which indicates that higher net interest margins lead to lower NPLs. In contrast, "Bank noninterest income to total income" is statistically insignificant (p = 0.896) and does not influence NPLs.

Results Discussions

As the results indicate, the coefficient of Deposit Money Banks Assets to GDP is highly negative (Assets to GDP: -0.066, p=0.000), which demonstrates that the bigger a banking sector is, the more developed, and thus the higher its financial depth, the lower its NPLs are, probably because of its risk management and stability (Alamsyah & Astuti, 2025; Iqbal & Riaz, 2022; Rybinski, 2020). Central Bank Assets to GDP negatively but not significantly influence the result (a0.041; p=0.148), thus leaving room to focus on the potential but not assured connection to the decreased NPLs (Ahrens & McMahon, 2021; Zahner, 2021). Financial System Deposits to GDP present a positive marginally significant coefficient (0.11, p=0.058), which ostensibly indicates that over-liquidity can bring down the lending criteria, risking default (Dogra et al., 2022; Zahner, 2021). Net Interest Margin greatly influences the negative effect (0.227, p=0.026) of the results (Silaban, 2017; Sukmadewi, 2020), which implies that banks with a higher margin could be well-prepared to absorb losses and make effective credit assessments. The proportion of Noninterest Income to Total Income is also marginal (0.002, p=0.896), implying that no direct correlation between loan quality and fee-based revenues is present (Riadi, 2018; Smith et al., 2003). Overhead Costs as a percentage of Total Assets is also slightly negative (p=0.068), which may be related to monitoring and due diligence investment to enhance loan performance (Benthem, 2017; Makri et al., 2014). The negative relationship with NPLs is high (as measured by Return on Equity, -0.047, p=0.000), indicating that the more profitable a bank is, the better the healthiness of its loan portfolio (Rahadian & Permana, 2021; Vellanita et al., 2019). The probability value of the parameter Bank Concentration is positive and significant (0.024, p=0.009), which means that in less competitive markets, the risk control may be less strenuous (Çifter, 2015; Karadima & Louri, 2021). Lastly, a negative, yet insignificant coefficient can be seen regarding the variable Bank Deposits to GDP (a coefficient of -0.06, with a p-value of 0.299), which contributes to the argument that the presence of deposits is not a guarantee of improved loan quality (Ayhan & Kartal, 2021; Ozili & Ndah, 2024).

Conclusion

The main objective of this research is to examine the main determinants affecting NPLs and their effect on banking sector stability and financial crises. High levels of non-performing loans are often an early warning sign of a banking problem, signaling deteriorating asset quality, increasing credit risk, and likely liquidity problems. This study aims to analyze how different banking and macroeconomic indicators contribute to the build-up of NPLs, which, if left unchecked, could escalate into a systemic financial crisis. The study examines the relationship between the assets of deposit-taking banks and GDP. It assesses whether a more significant banking sector relative to the economy contributes to financial stability or encourages excessive risk-taking, leading to higher non-performing loans (NPLs). The study analyses the relationship between central bank assets and GDP and assesses whether a substantial bank balance sheet reduces credit risk or whether an insufficient monetary policy leads to financial instability. The main objective is to assess the impact of financial system deposits on GDP and whether the increase in deposits increases the lending capacity of banks or contributes to an aggressive and unsustainable credit expansion, thus increasing the risk of default and banking crises. The research examines the relationship between the net interest margin of banks and non-performing loans (NPLs) and whether improved profitability improves credit risk management or whether banks with lower margins resort to riskier lending practices to maintain profitability, making them more vulnerable to financial distress. Conversely, the researchers identified that increased non-performing loans are caused by increased market concentration and increased deposits in the financial sector. It implies that aggressive demand for deposits and weak competition in the banking sector can stimulate riskier lending, thus raising credit risk. The report points out that the NPLs do not have a significant effect on the degree of central bank capital regarding GDP, bank non-interest earnings regarding bank returns, and the bank deposits regarding GDP. This means that a definite or consistent connection to these variables, as well as the performance of the loan, is not quite evident. The results will lead to the formulation of effective risk management strategies by the banks and policymakers to avoid financial crisis with clarity of the parameters that induce non-credit loans and how the same will affect financial stability.

Recommendations

Enhancing Banking Sector Stability (Avoid Bank Crisis) and Mitigating Nonperforming Loans. Strengthen capitalization and improve financial efficiency. Implement robust credit risk management strategies. Maintain adequate capital buffers and optimize net interest margins and ROE. Adopt stricter lending policies and enhanced risk assessment models. Monitor market concentration levels and promote healthy competition. Regulate liquidity provisions and credit expansion to maintain financial stability. Focus on prudent income diversification and use fintech and AI-driven credit scoring. Future research should integrate macroeconomic factors, improve data transparency, and explore country-specific regulatory environments.

Limitations

Study Limitations on NPLs and to avoid a bank crisis. Focuses on financial and banking indicators, neglecting macroeconomic variables like inflation, interest, and exchange rates. Findings may be specific to specific banking environments and economic conditions, limiting generalizability. Faces potential endogeneity issues, requiring advanced econometric techniques for validation. Does not fully account for regulatory and policy differences across countries, potentially affecting NPL determinants. Relies on data from a specific period, potentially influenced by external factors like financial crises, policy changes, or technological advancements. It recommends longitudinal analysis for better future research.

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