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The Impact of Credit Risk Indicators on Bank Profitability in an Emerging Economy: Evidence from Pakistan

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ABSTRACT

Credit risk continues to be the major problem threatening banking stability and profitability, especially in developing countries like Pakistan, due to consistently high non-performing loans ratios that continue posing financial sustainability problems for banks. This study addresses a research gap by jointly examining the influence of NPLs, capital adequacy ratio (CAR), and loan-to-deposit ratio (LDR) on bank profitability, using recent post-2020 data capturing macroeconomic shocks such as inflation and exchange rate volatility. The objective is to assess the combined impact of these credit risk indicators on the sustainable financial performance, measured by return on assets (ROA), of Pakistan's five largest listed commercial banks (HBL, UBL, MCB, NBP, and ABL). Using a quantitative, explanatory design, the study analyze a balanced panel of 75 observations (2008–2022) sourced from audited annual reports, State Bank of Pakistan publications, and PSX records. Chow and Hausman tests confirmed the suitability of a fixed-effects regression model. Findings show NPLs have a significant negative effect on ROA ($\beta = -0.025$, $p < 0.01$), while CAR ($\beta = 0.011$, $p < 0.01$) and LDR ($\beta = 0.002$, $p < 0.05$) have significant positive effects, with the model explaining about 49% of within-bank variation in ROA ($F = 15.62$, $p < 0.001$). Descriptive statistics show mean ROA of 1.05%, mean NPL of 7.8%, mean CAR of 13.6%, and mean LDR of 68.2%. The research finds that effective credit risk management, sufficient capital cushions, and balanced lending are critical in ensuring the sustainability of bank profitability.

Keywords: Credit Risk, Bank Profitability, Return on Assets, Panel Data, Fixed Effects Model, Financial Sustainability

INTRODUCTION

The banking sector plays an extremely important role in ensuring that there is economic growth through the process of deposit mobilization, credit provision and financial intermediation. Nevertheless, credit risk, which is the risk of default on the loans provided by banks continues to be the main threat to the stability and profitability of banks (Bessis, 2015). Proper management of credit risk helps banks to ensure good asset quality and profitability in the long-run. At a global level, the 2007-2008 financial crisis

brought to light poor credit risk management whereby careless lending practices and lack of supervision led to problems in the banking sector (Acharya & Richardson, 2009). Developing countries such as Pakistan are under much pressure because of high credit risks due to a number of factors.

The banking sector of Pakistan has been subject to reforms through privatization, inclusion of foreign banks and Basel accord adoption, but the issue of NPLs still continues to persist. The SBP has shown a gross NPL ratio higher than its peers' regional average, indicating inefficiency in credit appraisal process and economic instability (SBP, 2022). Literature reveals that increasing NPL ratios have a negative impact on profitability measures like ROA and ROE, while capital adequacy ratio (CAR) serves as an important determinant in protecting banks from credit risks (Shahzad et al., 2017; Rahman et al., 2020). However, there is a dearth of literature pertaining to a complete study of NPLs, CAR and LDR together in the banking system of Pakistan especially after 2020, which reflects the economic shocks of inflation and exchange rate fluctuations. Hence, this research aims at exploring the impact of these credit risk indicators together on the sustainable financial performance of major banks of Pakistan.

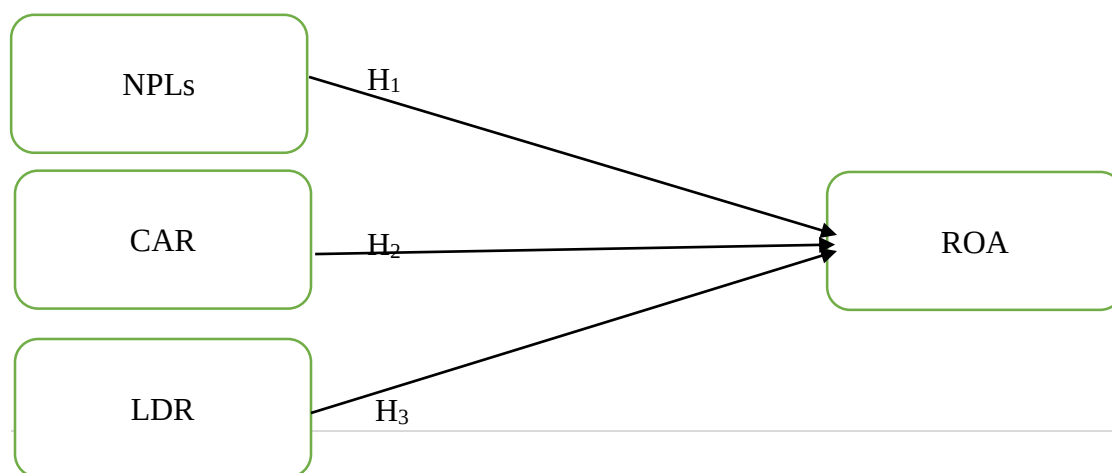
LITERATURE REVIEW

There is abundant empirical evidence available that depicts the adverse effect of credit risk on bank performance not only internationally but in Pakistan as well. For instance, Berger and DeYoung (1997) demonstrate that increased credit risk results in greater provision levels leading to lower profitability. Louzis et al. (2012), in the case of Greece and other emerging countries, prove that weak credit monitoring causes high NPLs as well as declining health status of banks. The studies focusing on Pakistan by Shahzad et al. (2017) show a significant negative relationship between NPLs and profitability ratios including ROA and ROE, which means that the defaulted loans decrease the banks' ability to generate income. The research of Rahman et al. (2020) demonstrates that better capital adequacy ratios result in increased resilience of the profitability to credit risk. Moreover, the recent study conducted by Ahmad et al. (2023) highlights the significance of proper credit risk management during the monetary tightening periods due to the increased risks of loan default. Nonetheless, many prior studies either focus on one credit risk indicator in isolation or use pre-2020 data, leaving a gap for updated, integrated analysis in Pakistan.

Conceptual Framework

Predictors

Outcome Variable



Hypotheses of the Study

H₁: NPLs have a statistically significant effect on the ROA of banks in Pakistan.

H₂: CAR has a statistically significant effect on the ROA of banks in Pakistan.

H₃: LDR has a statistically significant effect on the ROA of banks in Pakistan.

DATA AND METHODOLOGY

Research Design

The study adopts a quantitative, explanatory research design to analyze cause-effect relationships between credit risk variables and bank financial performance. Panel data techniques are employed as they effectively capture both cross-sectional (bank-specific) and time-series variations, improving estimates and controlling for unobserved heterogeneity (Baltagi, 2008; Hsiao, 2014).

Population of the Study

The population of this study includes all commercial banks operating in Pakistan from 2008 to 2022, encompassing domestic private, public sector, foreign, and Islamic banks regulated by the State Bank of Pakistan (SBP). These banks vary in size and service scope but collectively form the core of Pakistan's formal banking sector, which plays a critical role in financial intermediation and economic development (SBP, 2022). Investigating this population is essential to capture the broad impact of credit risk factors, such as NPLs and capital adequacy, on bank performance and sustainability across diverse banking institutions (Rahman, Yousaf, & Tabassum, 2020).

Sample Size and Sampling Techniques

Purposive sampling technique has been employed for selecting the five largest banks on the basis of their assets and market cap from the Pakistan Stock Exchange (PSX) which include Habib Bank Limited (HBL), United Bank Limited (UBL), Muslim Commercial Bank (MCB), National Bank of Pakistan (NBP), and Allied Bank Limited (ABL). These five banks are dominating the banking industry in Pakistan, hence the availability of relevant data. This panel data consists of 75 observations from 2008 to 2022.

Nature and Source of Data

Panel data have been used in this research study because panel data is the combination of cross-sectional and time-series data to observe the difference in various banks during the period of 2008-2022. Data have been gathered from the secondary source and include audited annual reports of the selected banks, official reports of State Bank of Pakistan like the Financial Stability Review and Banking Statistics and Pakistan Stock Exchange database (Johnston, 2017; PSX, 2023; SBP, 2022).

Model of the Study

The following panel data regression model was estimated ((Kaleemullah, Qazi, & Ali, 2025))

$$ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + \beta_3 LDR_{it} + \epsilon_{it}$$

where ROA_{it} = Return on Assets (proxy for a sustainable performance indicator) for bank "i" at time "t". Where, NPL_{it} = non-performing loans ratio, CAR_{it} = Capital adequacy ratio, LDR_{it} = Loan-to-deposit ratio, ϵ_{it} = Error term

MAIN FINDINGS

Descriptive Statistics

Table 4.1 below highlights the descriptive statistics of the variables of the sampled banks during the period from 2008 to 2022. The average ROA is 1.05% (0.20% to 2.10%) with low levels of profitability relative to the international benchmark standards (Athanasoglou, Brissimis, & Delis, 2008). The average NPLs ratio is 7.8% (4.20%–13.60%), which indicates consistent credit risks according to the State Bank of Pakistan's data (SBP, 2023). The CAR is relatively high at 13.6% and exceeds the minimum threshold of 8% under the Basel III framework (BCBS, 2019). This indicates that there are sufficient capital buffers among sampled banks. The LDR stands at an average of 68.2% (52.1% to 81.7%) indicating moderate lending activities of banks (Khan & Sattar, 2014)

Table -01: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ROA (%)	1.05	0.45	0.20	2.10
NPL (%)	7.80	2.10	4.20	13.60
CAR (%)	13.60	2.30	9.50	18.20
LDR (%)	68.20	8.40	52.10	81.70

Source: Authors own calculation

Correlational Analysis

The correlation analysis (Table-02) shows bank profitability (ROA) is strongly and negatively related to NPLs ($r = -0.61$, $p < 0.01$), confirming that higher credit risk reduces profitability, consistent with Louzis et al. (2012) and Shahzad et al. (2017). ROA is positively related to capital adequacy ratio ($r = 0.49$, $p < 0.01$) and loan-to-deposit ratio ($r = 0.29$, $p < 0.05$), suggesting that strong capitalization and efficient lending enhance profitability, in line with Athanasoglou et al. (2008) and Alper and Anbar (2011). NPLs are negatively correlated with CAR ($r = -0.41$, $p < 0.05$), indicating that rising credit risk weakens capital buffers (Makri, Tsagkanos, & Bellas, 2014), while their negative but insignificant link with LDR ($r = -0.22$) shows no clear evidence that higher lending raises defaults, though Chaibi and Ftiti (2015) caution otherwise. Finally, CAR and LDR display a weak, insignificant positive association ($r = 0.19$), reflecting regulatory and institutional influences (Demirgüç-Kunt & Huizinga, 1999).

Table -02: Correlation Matrix

Variables	ROA	NPL	CAR	LDR
ROA	1			
NPL	-0.61***	1		
CAR	0.49***	-0.41**	1	
LDR	0.29**	-0.22	0.19	1

Source: SPSS results, *** $p < 0.01$, ** $p < 0.05$

Model Selection Tests

According to the model selection criteria (table-03), the Chow test (18.42, $p = 0.000$) rejects the pooled OLS for FE model because it implies the presence of unobserved heterogeneity among banks. The Hausman test ($\chi^2 = 12.87$, $p = 0.0023$) also rejects the random effects model implying that individual effects are correlated with the explanatory variables. Both findings agree with Baltagi (2008) and Hsiao (2014) who recommend the use of FE models for financial panel data.

Table-03: Model Selection Tests

Test	Stat. Value	p-value	Decision
Chow Test (Pooled OLS vs. FE)	18.42	0.000	Reject Pooled OLS, accept FE
Hausman Test (FE vs. RE)	12.87	0.002	Reject RE, accept FE

Source: Author's estimation using EViews 12

Regression Results

Regression results revealed that increased NPLs significantly affect bank profitability ($\beta = -0.025$, $p < 0.01$), reflecting the adverse effects of loan losses and provisioning on earnings. This is consistent with findings from Kamara (2024), who reports a significant negative relationship between NPLs and profitability in banks. Conversely, the positive and significant impact of the Capital Adequacy Ratio on ROA ($\beta = 0.011$, $p < 0.01$) repeats empirical evidence that robust capital buffers enhance banks' risk absorption capacity and financial resilience. Hussain and Rasheed (2022) establish that higher CAR levels positively predict profitability metrics including ROA, reinforcing capital adequacy's role in safeguarding stability during economic stress. The LDR is also found to exhibit a modest but significant positive effect ($\beta = 0.002$, $p < 0.05$), indicating that efficient credit deployment contributes to profitability, though with balanced credit risk exposure. This aligns with findings by Soatov (2025), who reports liquidity measures such as LDR positively influencing bank profitability in emerging markets. The model explains about 49% of the within-bank variation in ROA, and the overall model is statistically significant ($F = 15.62$, $p < 0.001$).

Table -0 4 Fixed Effects Regression Results

Variable	Coeff.	Std. Error	t-stat	p-value	Sign.
NPL	-0.025	0.006	-4.17	0.000	***
CAR	0.011	0.004	3.14	0.002	**
LDR	0.002	0.001	2.57	0.011	*

R-.Squared. (within) = 0.51

Adjusted R² (within) = 0.49

F-statistic 15.62 $p < 0.001$

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Source: Author's estimation using EViews 12.

CONCLUSION AND RECOMMENDATIONS

In conclusion, this research has explored the impact of credit risk indicators on bank profitability in Pakistan, contributing to the existing body of knowledge. Through rigorous analysis of a fifteen-year

panel dataset (2008–2022), this study provides valuable insight into how non-performing loans, capital adequacy, and loan-to-deposit ratios shape the financial performance of Pakistan's largest commercial banks. All three research hypotheses were confirmed, with the fixed-effects regression model presenting compelling evidence that credit risk indicators materially influence bank profitability. The findings demonstrate that rising NPLs erode profitability, while stronger capital buffers and balanced lending activity reinforce it, offering a deeper understanding of the credit risk-profitability nexus in an emerging economy. By addressing a gap in the literature, this research also offers practical implications for banks, regulators, and policymakers, whose insights can assist the State Bank of Pakistan and bank management in strengthening credit appraisal and capital planning strategies to support financial stability. However, certain limitations should be acknowledged, including the limited sample of five banks, reliance on secondary data, and the use of ROA as the sole profitability measure. These constraints offer opportunities for future research to expand the sample, incorporate additional profitability measures such as ROE, and build on these findings.

Policymakers and practitioners can take various measures including the improvement of credit risk assessment and recovery policies to reduce NPLs. It is essential for regulators to enforce Basel III norms in terms of capital and credit risk. Furthermore, a prudent approach towards lending will result in sustainable growth.

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