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Impact of Loan Default on the Sustainability of Financial Health: A Study on Selected Private Commercial Banks in Bangladesh

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Abstract - **This study aims to examine the influence of loan default over the sustainability of financial health of selected private commercial banks listed on Dhaka Stock Exchange (DSE) in Bangladesh. The banking sector of the country faces significant challenges in terms of loan defaults. The study applies panel data analysis to investigate how non-performing loan ratio (NPLR), capital adequacy ratio (CAR), provision maintenance ratio (PMR), credit deposit ratio (CDR), and cost-to-income ratio (CIR) influence the sustainability of bank performance, as measured by a profitability indicator- return on assets (ROA). The study utilizes secondary data of 19 private commercial banks over a 16-year period (2008-2023), representing strongly balanced panel data. Hausman specification test recommends fixed effect regression model which reveals that NPLR has a significant negative influence over ROA, whereas CDR shows a significant positive impact. This study provides valuable insights for bank management in Bangladesh to better manage non-performing loans and optimize credit strategies to maintain profitability.**
Keywords - **Credit deposit ratio, fixed effect regression, non-performing loan ratio, profitability**

I.INTRODUCTION

Economic growth of a country relies on the sustainability of its financial sector. Without ensuring the financial health of that industry, a country faces numerous challenges to develop its economic performance. Specifically, when an effective allocation of resources and capital is needed to be executed, a nation's banking system must be sustainable enough to safeguard its financial health. Reference [6] executes the application of panel GMM to investigate and reveals that financial instability has a significant negative influence on economic development. Not only effective fiscal policy, but also regulation of the financial institutions and markets plays a vital role to derive higher financial sustainability, leading toward economic growth [13].

To be more specific, banking sector plays a critical role in implementing such financial sustainability for an economy. Return on assets (ROA), one of the bank profitability measures, is used to assess a firm's ability to create profits by comparing profits generated and costs incurred within a given period. In this empirical research, non-performing loans (NPLs) are examined as a significant variable that negatively influences commercial banks' profitability [10]. Another study focuses on credit risk to be found as one of the specific risks faced by commercial banks because of the nature of their facilities provided. This emphasizes the association between credit risk management (NPLs and capital adequacy ratio) and commercial banks' profitability (return on assets and return on equity) [5]. A study on Chinese banks incorporates both macroeconomic (gross domestic product, inflation rate, foreign exchange rate, and effective interest rate) and banking industry-specific (banks' type, risk-taking behaviour, ownership concentration, debt, and credit quality) variables to specify the determinants of NPLs [15]. A study on Pakistan Stock Exchange examines that operating efficiency and profitability have significant negative association with NPLs, whereas capital adequacy and income diversification have insignificant positive association with NPLs [9].

To represent the company's success (profitability), non-performing loan ratio (NPL ratio), liquidity ratio, capital adequacy ratio (CAR ratio), gross domestic product (GDP), and bank size can be used as significant determinants [4]. In line with this study, there is strong positive association between CAR and profitability of Deposit Money Banks in Nigeria [12]. Another study on Indonesia reveals how economic condition, business risk, lending interest rate, and NPLs are associated with corporate financial sustainability [2].

Bangladesh has been a growth focused country where the banking industry has played a pivotal role in facilitating economic growth and advancement through financial intermediation. One of the significant challenges faced by this industry has been the looming issue of loan defaults, also known as non-performing loans. According to a latest report from Bangladesh Bank, it has been disclosed that aggregated NPLs indicate approximately 24.13% of the total loans that have been disbursed by 61 commercial banks. This designates around 25% of the total loans disseminated by the banking industry are going to be classified as troubled or have already been defaulted [7].

Reference [1] investigates how increasing volume of NPLs is leading toward a negative turn into the banking industry and the overall economy of Bangladesh. The researcher also mentions about higher percentage of NPLs that exists in Bangladesh, being compared to the worldwide standard (to be 2% or less). Another panel data analysis conducted on the corporate governance practices and NPLs of Bangladeshi banking sector reveals that banks with effective corporate governance (e.g. board size, number of independent directors, independence of audit committee chairman), can reduce the NPLs of Bangladesh [3].

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When extensive study has been conducted in explaining the factors influencing non-performing loans in Bangladesh, there has been limited literature in explaining the important variables representing default that impact profitability of Bangladeshi private commercial banks. This study is expected to guide investors, policymakers, and researchers into understanding the measures to prioritize for evaluation and decision-making. It also promotes the practice of making objective and evidence-based decisions by the users. The objective of the study is: i) to identify the significance of the association between NPLs and profitability, and ii) to determine the significant variables that influence the selected banks' profitability.

II. METHODOLOGY

The study employs a quantitative ex post facto design to examine how the selected financial indicators influence the private commercial banks' profitability in Bangladesh. The methodology is grounded in secondary data extracted from 19 listed private banks' annual reports over a 16-year period (2008-2023), resulting in a balanced panel dataset of 304 observations. The banks have been chosen considering their availability and consistency of their published financial reports over the mentioned period. Incorporating panel data allows for the tracking of both cross-sectional (across banks) and time-series (across years) variations, enabling more precise estimation by controlling for unobserved heterogeneity at the firm level.

A. Panel Regression Model Development

According to the Hausman test results, the fixed effect model has been selected and the fixed effect estimations applied to explain the relationship and impact of the explanatory variables (NPLR, CAR, PMR, CDR, and CIR) on the dependent variable ROA.

Here, subscript *i* signifies the cross-sectional dimension and *t* signifies the time series effect, α stands for constant and ε_{it} is the error term,

NPLR = Non-Performing Loans Ratio,
CAR = Capital Adequacy Ratio,
PMR = Provision Maintenance Ratio,
CDR = Credit deposit ratio,
CIR = Cost-to-income ratio.

Regression equation:

$$\boldsymbol{ROA}_{it} = \boldsymbol{\alpha}_{it} + \boldsymbol{\beta}_1\boldsymbol{NPLR}_{it} + \boldsymbol{\beta}_2\,\boldsymbol{CAR}_{it} + \boldsymbol{\beta}_3\,\boldsymbol{PMR}_{it} + \boldsymbol{\beta}_4\,\boldsymbol{CDR}_{it} + \boldsymbol{\beta}_5\,\boldsymbol{CIR}_{it} + \boldsymbol{\varepsilon}_{it} \quad (1)$$

TABLE I: MEASUREMENT OF VARIABLES
Note: Yearly data is collected for all the dependent and independent variables

Variable	Measurement	Expected Sign	Reference
ROA	ROA is calculated as the percentage of net income over the total assets.	Not applicable	
NPLR	Non-performing loans ratio gives the total amount of NPLs as a percentage of the total amount of loans outstanding.	-	[8,10]
CAR	Capital adequacy ratio represents the proportion of the bank's regulatory capital as a percentage of its risk-weighted assets.	+	[4,12,16]
PMR	Provision maintenance ratio is the percentage of loan provision maintained to the required loan provision of the banks.	-	[11]
CDR	Credit deposit ratio is the percentage of total loans to the total deposits of a bank.	+	[11]
CIR	Cost-income ratio calculates the proportion of operating expenses incurred as a percentage of the operating income earned.	-	[14]

III. RESULTS

Preliminary Analysis

Table II provides the summary statistics describing the pattern of the one dependent variable ROA, and five independent variables- NPLR, CAR, PMR, CDR and CIR. The average return on assets across the 19 banks over the span of 16 years is 1.025% with a standard deviation of 1.028. The range of minimum value (-5.87%) to maximum value (4.553%) indicates that certain banks suffered substantial losses while others experienced remarkably above average profits. The mean NPL ratio is relatively high, reflecting asset quality issues with maximum NPLR reaching 50.39%. The mean CAR of 12.21% and the negative minimum value (-22.79%) suggests that several banks may have failed to maintain the Bangladesh Bank prescribed 12.5% while certain bank's capital was even negative.

Variables	No. of Observations	Mean	Std. Dev.	Minimum	Maximum
ROA	304	1.025	1.028	-5.87	4.553
NPLR	304	6.083	7.399	0.44	50.39
CAR	304	12.212	4.606	-22.79	20.45
PMR	304	64.902	33.344	0	179.51
CDR	304	84.129	8.619	51.11	109.967
CIR	304	54.825	16.644	29.83	182.4

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TABLE II: DESCRIPTIVE STATISTICS OF THE VARIABLES

Based on the correlation matrix in Table III, the strongest positive correlation of 0.580 is between ROA and CAR. Both NPLR and CIR have a negative correlation with ROA, the former being strong and the latter being moderate. Between the explanatory variables, only NPLR and CAR have a Pearson correlation coefficient of -0.7397 exceeding the -0.7 to 0.7 range.

TABLE III
PEARSON CORRELATION MATRICES

Variable	ROA	NPLR	CAR	PMR	CDR	CIR
ROA	1.000					
NPLR	-0.7367	1.000				
CAR	0.5795	-0.7397	1.000			
PMR	0.3095	-0.3508	0.1988	1.000		
CDR	0.4356	-0.4576	0.3587	0.2758	1.000	
CIR	-0.3954	0.4087	-0.3245	-0.3462	-0.188	1.00

Based on the Hausman specification test in Table IV below, the chi-squared value of 21.43 and Prob>chi2 = 0.0007 rejects the null hypothesis, thereby supporting the application of fixed effect model due to the non-systematic changes in coefficient.

TABLE IV
HAUSMAN SPECIFICATION TEST

Variables	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
NPLR	-0.963241	-0.846218	-0.0117023	0.0078382
CAR	0.0101244	0.0129121	-0.0027877	0.0021121
PMR	0.0022988	0.0011759	0.0011228	0.0009481
CDR	0.0215239	0.016249	0.0052748	0.0035297
CIR	-0.009312	-0.007381	-0.0019318	0.0019754

Followed by the Hausman Test, Table V below depicts the fixed effect regression model that gives the regression equation following (1): ROA = 0.0379 – 0.0963NPLR + 0.0101CAR + 0.0023PMR + 0.0215CDR – 0.0093CIR. ROA or profitability has a positive relation with or tends to experience an increase when CAR, PMR and CDR increase. Whereas ROA experiences a decrease as NPLR and CIR rise. The fixed effects model yields an R^2 value of 0.5648 or 56.48% indicating a moderately good fit for within bank variations over time. It is the amount of variation in the dependent variable being explained by the five explanatory variables. The rest of the percentage variation is due to other factors not included in our model and by related error term. The validity or fitness of the model can be confirmed by the F-value which is 114.74 or the p-value of 0.000. Based on this, we can infer that there is an overall meaningful influence by the explanatory variables on the profitability of the 19 banks included, at the 5% level of significance.

TABLE V
FIXED EFFECT REGRESSION MODEL

Variables	Fixed Effect Panel Regression		
	Coefficients	t-value	p-value
Constant	0.037898	0.04	0.968
NPLR	-0.0963241	-3.04	0.007
CAR	0.0101244	0.25	0.805
PMR	0.0022988	0.89	0.386
CDR	0.0215239	3.87	0.001
CIR	-0.0093129	-1.34	0.195
R2	0.5648		
Adj. R2	0.4076		
F-Stat	114.74		0.0000

According to Table VI below, the modified Wald test for group-wise heteroskedasticity revealed a significant result of chi2 value 1193.38 and p-value of 0.0000, suggesting the presence of heteroskedasticity in the data. Furthermore, the statistically significant skewness and kurtosis test for normality reveals that residuals are also not normally distributed (chi2=196.65 and p-value=0.0000).

TABLE VI
SUMMARY OF POST-DIAGNOSTIC TESTS

Tests	Statistics	p-value
Modified Wald Test	1193.38	0.0000
Skewness and kurtosis tests for normality	196.65	0.0000

To control the issues with heteroskedasticity where variance of the error term is not constant across observations and non-normal distribution of residuals, the regression has been run with the robust option given in Table IV above. Under the robust option, NPLR and CDR continue to have significant impact on ROA based on their p-values (0.007 and 0.001) and statistically significant t-values. The notable change is observed in the variable CIR which becomes insignificant after incorporating robust test. The other variables experienced no major changes other than slight differences in their t-values and standard error.

Based on the VIF test in Table VII below, it is concluded that there is no sign of multicollinearity as the mean VIF is 1.76.

TABLE VII
VARIANCE INFLATION FACTORS TEST

Variables	VIF	1/VIF
NPLR	2.71	0.368819
CAR	2.24	0.445829
PMR	1.29	0.772708
CDR	1.28	0.782172
CIR	1.25	0.800294
Mean VIF	1.76	

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IV. DISCUSSION

A. Non-performing loans (NPLR) and ROA

NPLR has a coefficient value of -0.0963, t-value of -3.04 and p-value of 0.007. The analysis shows a significant negative association between NPL ratio and bank profitability across all model specifications. This finding aligns with existing literature [8,10] which views rising NPLs as a direct drain on earnings due to higher provisioning costs and reduced interest income.

B. Capital adequacy ratio (CAR) and ROA

CAR has a coefficient value of 0.0101, t-value of 0.25 and p-value of 0.805. While theory supports that higher capital buffers enhance resilience and investor confidence [4,12,16], CAR did not show a statistically significant positive influence on profitability.

C. Provision maintenance ratio (PMR) and ROA

PMR has a coefficient value of 0.0023, t-value of 0.89 and p-value of 0.386. Although provisioning is a critical part of a bank's risk management framework intended to absorb expected credit losses [11], it appears that variations in PMR across banks or over time were not sufficient to explain changes in profitability.

D. Credit deposit Ratio (CDR) and ROA

CDR has a coefficient value of 0.0215, t-value of 3.87 and p-value of 0.001. CDR shows a significant positive influence on profitability [11], suggesting that more aggressive credit deployment relative to deposits contributes positively to returns.

E. Cost-to-income Ratio (CIR) and ROA

CIR has a coefficient value of -0.0093, t-value of -1.34 and p-value of 0.195. Reference [14] suggests that higher CIRs correlate negatively with ROA as cost inefficiencies erode bank profitability. However, this relationship was found to be statistically insignificant possibly due to the impact not being consistent or strong enough in this dataset to draw firm conclusions.

V. CONCLUSION

One of the major problems existing in the banking industry of Bangladesh has been the problem of non-performing loans. There are many factors that instigate loan default and create the environment for this problem to sustain. Lack of strict regulatory policy building and monitoring allows for banks to be lax about their lending and provision policies. Lending huge funds based on informal and personal relations have caused major credit risk to many banks in Bangladesh, eventually pushing them towards bankruptcy.

Banks have also shown lenient recovery practices and scheduling policies that allow more potential defaulters to thrive causing a spike in the volume of non-performing loans in our country. Thus, the significant measures from this study should be taken under consideration to increase the private commercial banks' profitability and to ensure the overall economic growth of the country.

VI. RECOMMENDATION

To combat this issue, strict policy measures including above-mentioned variables must be implemented and monitored by the central bank, besides strengthening and intensifying the internal control and risk management of the banks themselves.

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