Determinants of Non-Performing Loans (NPLs): A Study on Private Commercial Banks in Bangladesh

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Abstract: The study was conducted to explore the determining factors of non-performing loans of the private commercial banks in Bangladesh. A panel dataset, along with a fixed effect model, was used. Consistent with empirical evidence, it has been found that an increase in GDP exerts a substantial adverse outcome on NPLs, indicating that it generally transforms into more revenue which in turn contributes to lesser NPLs. This research shows a significant negative relationship between the bank's size and the state of NPLs. We have also found that large banks are not necessarily more efficient in scrutinizing loan customers compared to smaller banks. The empirical results show that higher-term loans stimulate higher NPLs. This article denotes a significant negative relationship between credit growth and NPLs, indicating the conservative lending procedure adopted by private commercial banks. Therefore, commercial banks with higher credit growth are likely to have lower non-performing loans. However, our evidence does not support the positive correlation between NPLs and the ratio of loans to an asset that apprehends the adversity of banks.

Keywords: Non-performing loans, Macroeconomic factors, Bank performance, Bank specific factors, Panel data.

1. Introduction

It is commonly approved that the percentage of Non-Performing Loans (NPLs) is often linked with bank collapses in both developed and developing countries. Almost 25 years have been surpassed since the implementation of prudential norms in the banking industry of Bangladesh in 1990. Unluckily, the banking system is still loaded with a huge amount of NPLs and lags far behind the nearest countries. So investigating the determinant factors of NPLs is a matter of significant importance for regulatory authorities

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concerned with financial steadiness and banks' management. The primary purpose of this study is to evaluate the sensitivity of non-performing loans to some macroeconomic factors and some bank-specific factors in Bangladesh. In particular, multiple regression analysis and a panel dataset of 10 private commercial banks spanning ten years (2011-2020) have been employed to examine the relationship between non-performing loans and several crucial macroeconomic and bank-specific variables. As such, this study will contribute to the empirical literature by providing evidence on the reasons for classified loans in a developing country. Therefore, the paper widens the literature on non-performing loans and uses both macroeconomic and bank-specific variables.

Along with contributing to the literature, the paper may also have vital rational implications for commercial bankers and bank regulators in the banking system of Bangladesh. For example, the findings may be utilized to build a framework for measuring and evaluating credit risk – an essential component of study for financial strength. It is found that both bank-specific and macroeconomic factors have an impact on the loan portfolios of commercial banks in Bangladesh.

2. Literature Review

2.1. Definition of Non- Performing Loan (NPLs)

Bloem and Gorter (2001) stated that applying the definition of non-performing loans to all economies of the world is possible. All the countries around the world describe and classify loans differently due to the banking laws and regulations and the variation in ways contributors and banking system defines them. Thus, there are a few definitions of non-performing loans; each focuses on significant factors showing the degree of how well or not (nonperforming) they are. Although there are a few differences, there are significant similarities in the definition of Bad Debt. Bloem and Gorter (2001) stated, "Loans are good unless there is absolute certainty that a loan is not going to be repaid under existing arrangements". This definition emphasizes the hazards revolving around the category of the loan. Maitha et al. (2014), in their more practical definition, stated that "Non-performing loans are loans that does not manage to pay interest as well and installment of principal". Fuchita's (2004) definition refers to the consequences of non-performing loans as "Any loan which fails to meet certain obligations to pay interest and/or principal". Moreover, Freeman (2003) provides a definition related to accounting where they talk about debt not being repaid. Oyama (2003) gives a bank-oriented definition, which portrays the doubtfulness about loan recovery to be termed non-performing. Montgomery (2002), who also referred to the period and consequences of NPL, stated that they are those loans that were borrowed by bankrupt borrowers, past due and past due for more than three months. Similar notations were mentioned by Rouse (1989), explaining the non-performing loans as any scheduled loans going past the due date by more than 90 days.

Bloem and Freeman (2005) defined NPL from a different angle, period of difficulty payment. They wrote, "A loan is non-performing when interest payments or payments on principal have been due for 90 days or more, or payments of interest equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or existence of overdue payments of less than 90 days, with proper justification such as a debtor filing for bankruptcy that may question the full repayment of the loan". There are other authors describing non-performing loans as a borrower discontinuing the repayment of installments in a period of over six months. Cho (2002) portrayed NPL if it was past due six months or more while provisioning requirements. Dewenter et al. (2004) stated NPL as loans to a bankrupt or almost bankrupt firm, or it may also be a loan overdue for six months".

2.2. Determinants of Non-Performing Loans

2.2.1 Macro- Economic   Factors

In the literature, determinants of NPLs have been categorized into macroeconomic factors, bank-specific factors, and those caused by debt crises. Williamson (1987) expressed that nonperforming credits and their relations with macroeconomic exhibitions are grounded in hypothetical business cycle models with an unequivocal job for financial intermediation. Asiama and Amoah (2018) addressed that fragile economic conditions and volatility of the stock price are the reason for nonperforming loans in Ghana. Normally, inconsistencies in monetary guidelines and supervision influence banks' conduct and hazard management practices which are significant in clarifying cross-country contrasts in non-performing loans. The macroeconomic condition unavoidably impacts borrowers' financial reports and their debt servicing limit. Therefore, antagonistic financial stuns combined with the mind-boggling expense of capital and low-interest margins (Fofack, 2005) have been recognized to cause non-performing credits. As indicated by Goldstein and Turner (1996), the development of non-performing loans is, for the most part, credited to various components which incorporate financial downturn, macroeconomic unpredictability, terms of exchange weakening, high-interest rate, exorbitant dependence on excessively extravagant bank borrowings, and moral peril.

2.2.2 Stylized Fact

Abrupt market changes are likewise observed as variables which do represent non-performing loans. Consequently, any abrupt change in the market can influence changes in the credit market, ultimately influencing how a lot of individuals can take loans and make installments (Bloem & Gorter, 2001). If the market suddenly experiences a rise in the cost of things because of deficiency or expanded demand, lenders will have less cash to satisfy their loans which can prompt loan default. Krueger and Tornell (1999) indicated

that the credit crunch in Mexico after the 1995 emergency was somewhat ascribed to terrible loans. They discovered that banks were loaded with loans of negative real value, which diminishes the limits of the banks to give new loans to new projects. Furthermore, Agung et al. (2001) used Micro and Macro panel data analysis to examine the existence of a credit crunch in Indonesia after the emergency understood that the credit crunch was portrayed by an overabundance of demand for credits/loans, which developed in August 1997. Agung et al. (2001) likewise explored the connection between advance/loan supply and genuine loaning limit, loaning rates, real output, bank's capital ratio, and non-performing loans. Their outcomes demonstrate that the coefficients on non-performing loans are negative and noteworthy, showing that banks acknowledge supply decreases for the intensifying of the non-performing loans issue.

2.2.3 Earning Smoothing Management

Westermann (2003), contrasting Germany after the credit roar of the late 1990s and Japan result the air pocket burst in the mid-1990s, made the contention that despite the fact that the German banks were in a superior condition than Japanese banks, it is in any event far-fetched that the German credit log jam was altogether determined by demand, while that of Japan was generally brought about by an absence of supply. He further distinguished the increase in the danger of non-performing loans as one of the primary reasons for Germany's for the credit crunch after the credit boom. This is in accordance with Kaminsky and Reinharts' (1999) suggestion that an expanding pattern of non-performing loans in any nation shows the existing monetary crisis in that nation.

2.2.4 Regularity Capital and Soundness

Chimerine (1998) further asserts that awful loaning custom prompts a tremendous arrangement of unpaid credits. This results in the indebtedness of banks and lessens reserves accessible for new drives, which in the end, causes a monetary disaster. Goodhart et al. (2006) likewise associated loaning to the reasons for banks' failure. Palubinskas and Stough (1999) noticed that absence of trustworthy financial data on borrowers to help in surveying financial soundness causes a bank's disappointment. Controlling NPLs is significant for both the exhibition of an individual bank and the economy's financial condition (McNulty et al., 2001).

2.2.5 Poor Policy

Poor administration and bank wastefulness have been recommended in writing as a reason for NPLs (Berger & De Young, 1997; Tsai & Huang, 1999; Altunbas et al., 2000; Fan and Shaffer, 2004; Girardone et al., 2004). They contend that chiefs in most monetary organizations with the issue of NPLs neglected to sufficiently guarantee loans and

furthermore set up poor observing and control practices. Besides, loan culture is another factor recognized as a reason for NPLs. This is on the grounds that borrowers frequently choose to apply for a loan without considering how to put the advance in gainful dares to empower them to collect enough cash to reimburse the credit. In many occurrences, credit culture can be created when borrowers take out enormous advances, not because it is monetarily savvy for them to do such but since they see others doing it, subsequently prompting defaulted loans. Berger and De Young (1997) discovered from their examination that there exists synchronization among NPLs and inefficiency. They rejected the connection spoken to by awful credits from the explicative factors of the capacity so as to abstain from decreasing the inefficiency estimated in the regression residuals on account of bad loans not because of internal variables. From their investigation, Berger and De Young (1997) concentrated on utilizing the cost function just to process the inefficiency and, after that leaving to a causality analysis, the activity of clarifying their relationship.

2.2.6 Fragile Economic Condition

Fofack (2005) credited the solid relationship between the macroeconomic components and NPLs to the undiversified idea of some African economies. Rouse (1989), in his work, demonstrated that NPLs can begin from an overdrawn record where there is no overdraft point of confinement or overdraft considered which has not been effectively worked for quite a while and overdraft taken in excess of the practical operational border. Like Berger and De Young (1997), Rouse (1989) recognized the absence of good abilities and judgment with respect to loan specialists as a reasonable justification for NPLs. Keeton (1999), utilizing information from 1982 to 1996 and a vector auto-regression model, examined the effect of credit increase and loan misconduct in the USA. In view of the investigation, a solid connection between credit development and hindered assets was built up. Further uncovered that fast credit development, which was connected with settling for what is most convenient option, added to higher loan misfortunes in some states of the USA. He characterized loan misconduct as credits which are late for over 90 days or which don't attain interest. Bercoff et al. (2002) additionally gave comparable proof like that of the USA in the wake of looking at the instability of the Argentinean Banking framework over the 1993–1996 periods. They found from their examination that NPLs are influenced by both bank-specific components and macroeconomic factors by utilizing survival analysis. Besides, utilizing a dynamic model and a board informational dataset covering the period 1985–1997 to explore the determinants of NPLs of Spanish commercial and saving banks, Salas and Saurina (2002) unveiled that genuine development in GDP, fast credit extension, bank size, capital ratio, and market power clarify variety in NPLs. Moreover, Zambrano and Saurina (2005) inspected the Spanish financial sectors from 1984 to 2003 and understood that NPLs are controlled by GDP development, high real interest rates,

2.2.7 Constrained by Scale and Scope

Hu et al. (2004) have examined the connection between NPLs and the proprietorship structure of commercial banks. Hu et al. (2004) utilized a panel dataset covering 1996–1999 in Taiwan to inspect this connection. They exhibited in their examination that managing an account with higher government proprietorship recorded lower NPLs. Furthermore, they exposed that bank size is adversely identified with NPLs while diversification may not be a factor. In like manner, the assessment of the expense of the NPLs, just as the structure of the cost capacity, is unequivocally influenced by the preference for the selection of instruments and the utilization of the potential blends which are appropriate. As indicated by Bloem and Gorter (2001), singular choices and normal occurrences mostly lead to an unsurprising degree of NPLs. However, it might change from year to year. Normally most organizations will permit bad debt provisions in their books to supply an expected percentage of NPL, despite the fact that a few organizations may safeguard against such forecasts as opposed to making arrangements. In an offer to cover these arrangements and protection, organizations frequently pass on the expense to clients by including a premium for the hazard in the interest charged on the loans conceded.

In light of the reviewed literature, it tends to be understood that reviews on the determinants of NPLs in commercial banks are sparse, and thusly this examination fills the hole by researching the topic. In particular, this examination considers the determinants of NPLs for a pool sample which involves 10 banks and sub-samples of large and small banks. This will advise us in designing policies explicit for large and small banks.

3. Methodology

Our study used an unbalanced panel with 10 private commercial banks in Bangladesh. The dataset was based on the annual frequency figures for 2011–2020. According to Rinaldi and Sanchis-Arellano (2006), unbalanced panel data includes more observations, and their results are less dependent on a particular time period. Data used in the empirical analysis came from two main sources. The data for the bank-specific determinants (equity to total assets ratio, ROA, ROE and growth of gross loans) were collected from the 10 private commercial banks' websites. The financial information was derived from balance sheets, income statements and notes from the annual reports. Bank scope had up to 15 years of data available, which covered the total sample period.

Furthermore, data for the size variable were also obtained from the Bank scope. The data for macroeconomic determinants (unemployment, percentage of the total labor force, GDP growth (annual percentage), inflation, consumer prices (annual percentage) and domestic credit to the private sector (percentage of GDP)) were obtained from the World Development Indicators (WDI) database. Before attempting to identify potential internal and external determinants of NPLs, it was necessary to identify the dependent determinant. In the literature to date there is no internationally harmonized definition

that has been applied in all or most countries of the world for a considerable period of time. Rather, efforts toward harmonizing NPL definitions have been gathering steam only in recent years in the wake of the financial and economic crisis (Jakubík & Reininger, 2013). In this analysis, our dependent variable was the ratio of impaired (NPL) to total (gross) loans. It is worth mentioning that the Bank scope reports the level of 'impaired loans,' which may be different from the official classification of NPLs. 'Impaired loans' is an accounting concept which reflects cases in which it is probable that the creditor will not be able to collect the full amount that is specified in the loan agreement, while 'NPL' is a regulatory concept which primarily reflects loans that are more than 90 days past due. Acknowledging these differences, we treated 'impaired loans' as NPLs in this analysis. Within our presentation of the independent determinants, we considered both bank-specific determinants as well as macroeconomic characteristics. Factors that we used as control determinants, which may explain the NPLs of banks, included the following: Macroeconomic determinants: GDP Growth (GDPG); Inflation (INF); Unemployment (UN); Domestic Credit to the Private Sector (percentage of GDP) (DCPS). Bank-specific determinants: ratio of Equity to Total Assets (ETA); ratio of net income divided by total assets (ROA); ratio of net income to total equity (ROE); Growth of Gross Loans (GGL).

3.1. Econometric Model and Estimation Procedure

The model used in this paper is a simple linear regression function that relates the ratio of NPLs to the total loans ratio and some important macroeconomic and bank-specific variables. The regression equation is in the following form:

$$NPL\_L_{i,t} = \beta_{0i} + \beta_1\, \Delta GDP_t + \beta_2\, \Delta INF_t + \beta_3\, L\_A_{i,t} + \beta_4\, Size_{i,t} + \beta_5\, \Delta Loan_{i,t} + \beta_6\, Maturity_{i,t} + \varepsilon_{i,t}.\ For\ i = 1,\ldots N,\ t = 1,\ldots T$$

where: $NPL\_L_{i,t}$ stands for the ratio of NPLs to total loans for bank i in year t; ΔGDP_t symbolizes the annual growth in real GDP at time t; ΔINF_t represents annual growth of the annual inflation rate at time t; $L\_A_{i,t}$ indicates the loans to total asset ratio for bank i in year t; $Size_{i,t}$ is the ratio of the relative market share of each bank's assets that capture the size of the institution at time t; $Maturity_{i,t}$ indicates the ratio of long term loan (loans with maturity of more than 5 years) to the total loans of bank i at time t; and $\varepsilon_{i,t}$ is the white noise error term. The model captures the idiosyncratic behavior of commercial banks is captured by the coefficient β_{0i}.

3.2. Bank Specific Variables

Along with macroeconomic variables, there is adequate empirical studies that suggest that several bank specific factors are important determinants of NPLs such as, profit

margins, size of the institution, efficiency, risk profile of banks (calculated by several alternatives including loans to asset ratio and total capital to asset ratio)the terms of credit (interest rate, size and maturity). However, in this study, only four bank-specific variables have been considered due to data availability. These are: bank size (SIZE), annual growth in loans (ΔLOAN), Maturity and the ratio of loans to total asset (L_A) (Table 1).

Table 1: Summary of Variables used in Regression Model

Variables	Definitions	Expected sign
$NPL\_L_{i,t}$	The ratio of non-performing loans to total loans for bank i in year t. $$NPL\_A_{i,t} = \frac{NPL_{i,t}}{Total\_Loans_{i,t}} \times 100\%$$	
ΔGDP_t	The annual growth in real GDP at time t computed as follows: $$\Delta GDP_t = \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \times 100\%$$	(-)
ΔINF_t	The annual inflation rate at time t. $$\Delta INF_t = \frac{INF_t - INF_{t-1}}{INF_{t-1}} \times 100\%$$	(+)
$Size_{i,t}$	$$Size_{i,t} = \frac{Asset_{i,t}}{\sum Asset_{i,t}} \times 100\%$$	(+) / (-)
$\Delta Loan_{i,t}$	The growth in loans of bank i at time t computed as follows: $$\Delta Loan_t = \frac{Loan_{i,t} - Loani_{,t-1}}{Loan_{i,t-1}} \times 100\%$$	(+) / (-)
$Maturity_{i,t}$	$Maturity_{i,t}$ is the ratio of long term loan to the total loans of bank i at time t. $$Maturity_{i,t} = \frac{LTL_{i,t}}{TotalLoan_{i,t}}$$	(+)

Source: Estimated

4. Data Analysis and Regression Results:

In this study, we have used a fixed effect panel model to determine the factors affecting the NPLs of private commercial banks in Bangladesh. Hypotheses testing will also clarify the significance of the association between NPLs and independent variables. The null hypothesis (H0) and alternative hypothesis (H1) are given below:

H0: There is no relationship between macroeconomic or bank-specific factors and non-performing loans.

H1: There is a relationship between macroeconomic or bank-specific factors and non-performing loans.

The results of our regression model are summarized in Tables 2, 3 and 4, which are estimated using least squares with a fixed effect estimator. We estimated the model with a balanced panel dataset that consists of both macroeconomic and firm-specific data covering 2011 to 2020.

Table 2: Regression Results (Model Summary)

Regression Statistics	
Multiple R	0.65792788
R Square	**0.53286910**
Adjusted R Square	0.39628001
Standard Error	0.04444665
Observations	100

Source: Estimated

Table 3: ANOVA

	df	SS	MS	F	Significance of F
Regression	6	0.14023	0.02337	11.83055	0.00000000008023
Residual	93	0.18372	0.00198		
Total	99	0.32395			

Source: Estimated

The values of multiple R, R², and adjusted R² are shown in the above table. R² represents how much variation in one variable can be explained by the other. In this model, R² =53.29%. It indicates that 53.29% of changes in nonperforming loan can be explained by both macroeconomic and bank-specific variables.

Again, the probability associated with the calculated or observed value of the test statistics ANOVA is 0.0000000008023. This is less than the level of significance of 0.05. Hence, the null hypothesis is rejected. That means there is a significant relationship between macroeconomic or bank-specific factors and non-performing loans.

Table 4: Regression Results (Coefficients)

Variables	Coefficients	Standard Error	t Stat	P-value
Macro-Factors				
GDP Growth	-0.15353296	0.14084694	-1.09006954	0.02784989
Annual Inflation	0.03102372	0.01641021	1.89051308	0.06180293
Bank-Specific Factors				
Size	0.74126802	0.16534558	4.48314366	0.00002095
Growth in Loan	-0.07739745	0.02765536	-2.79864159	0.00623898
Maturity	0.07961259	0.02852846	2.79063748	0.00638290
Loan to TA	-0.22421247	0.09102823	-2.46310925	0.01561358

Source: Estimated

Consistent with existing literature, we have found a significant inverse relationship between NPLs and ΔGDP_t (Khemraj and Pasha (2009); Salas and Suarina, 2002; Rajan and Dhal, 2003; Fofack, 2005; and Zambrano and Saurina, 2005). Resembling these studies, we can interpret our findings to mean that GDP growth usually improves the income which eventually increases the loan payment capability of the borrower. Eventually, it contributes to lower problem loans. According to previous studies, inflation can have a positive or negative association with non-performing loans depending on the economy. Our results suggest that there is a positive relationship between non-performing loans and inflation. It depicts that the current period's high inflation causes commercial banks

to incur higher bad loans. When the economy faces increased inflation, and salaries/wages are sticky, the real income of the borrower decreases. Consequently, the loan payment capacity of the borrowers may be weakened. Moreover, in the presence of variable interest rates, lenders adjust the lending rates to adjust their real return. Again it reduces loan holders' debt payment capacity.

5. Findings

We find a significant positive relationship between the size of the bank and NPLs, similar to Khemraj and Pasha (2009). The rationale behind the result is that large banks are not necessarily more efficient in scrutinizing and monitoring loan customers that usually convert into superior loan portfolios while comparing to their smaller banks.

The relative credit growth of commercial banks demonstrates a significant inverse relationship with non-performing loans. This result is also similar to previous studies by Khemraj and Pasha (2009). The result suggests that commercial banks which disburse relatively higher levels of credit are likely to incur lower bad loans. This result probably reflects the strict and conservative lending policy adopted by private commercial banks of Bangladesh.

The result of this study shows that the maturity terms of credit exert a significant positive impact on non-performing loans of the private commercial banks of Bangladesh. It indicates that higher-term loans (loans with a maturity of more than five years) induce higher NPLs.

The article result demonstrates a significant negative relationship between loan-to-asset ratio and NPLs. The extent of this relationship is quite strong. It suggests that banks with a greater penchant for risk-taking incurred lower bad loans. It indicates that high-risk takers banks are not necessarily likely to incur greater levels of NPLs if they can make sure their loan quality. In this case, our results are contrary to the previous literature, which suggests a positive association between loan to asset ratio and NPLs (Nadham & Nahid, 2015).

6. Conclusion

The main purpose of this study is to find out the determinants of NPLs in the Bangladeshi private commercial banking sector. From the study, we found evidence of a significant inverse relationship between GDP and non-performing loans. It indicates that when the real economy performs strongly, it will result in lower non-performing loans. The empirical results, however, depict that inflation is not a key determinant of NPLs in the Bangladeshi banking system. With respect to the bank-specific variables, our results show that there is a significant negative relationship between the size of a banking institution and the level of NPLs. It reveals that large banks may not always tactfully screen out and monitor their loan customers compared to their smaller counterparts. We also find

that the credit growth of commercial banks exhibits a significant negative relationship with NPLs. It, therefore, suggests that commercial banks with higher credit growth are likely to have lower non-performing loans. Probably the rationale behind this result is that private commercial banks of the country adopt the conservative lending policy at the time of approval of loans.

However, contrary to previous evidence, we find that banks which have a desire to take risk do not tend to experience greater loan delinquencies (or NPLs). This is evident from the significant inverse relationship between NPLs and loan to assets ratio. Based on our findings, it is clear that in order to reduce the level of non-performing loans, commercial banks should be aware of several factors while extending loans. Specifically, commercial banks need to pay attention to the performance of the real economy when providing loans because impaired loans are likely to be higher during periods of economic slowdown. Large private commercial banks should make their credit management policy stricter while sanctioning loans. As higher-term loans induce higher NPLs, banks should be careful while providing long-term loans. Finally, the banks of Bangladesh should strengthen their credit monitoring framework while evaluating loan customers.

7. Future Research Directions

For further research, there is scope for additional insights. This study was focused on private commercial banks of Bangladesh. A future study can be done, including public banks, to have an idea about the determinants of NPLs of public banks. In this study, we highlighted macroeconomic and bank-specific variables of non-performing loans. In future studies, some social and political factors affecting non-performing loans can be included in the sample frame.

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