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Determining factors of Non-Performing Loans in Commercial Banks of Bangladesh: A Case Study

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ABSTRACT

Nonperforming loan is contemplated to be one of the most challenging problems in the commercial banks of Bangladesh. This study has been concentrated on how some certain bank specific financial ratios explain the variability of nonperforming loans in the private commercial banks of Bangladesh. With a view to accomplish this study, six bank-specific financial ratios of fifteen private commercial banks of Bangladesh for a 5-year period from the year 2012 to 2016 are opted out for identifying to what extent and direction, they influence the nonperforming loan on total loan ratio epitomizing credit risk in the banks. The multiple linear regression shows that the NPL ratio has a significant affiliation with the independent variables. According to this study, the increase of nonperforming loan induces provision for loan losses, which is responsible for heightening nonperforming loan to total loan ratio. Again, the capital adequacy of banks characterizes high the nonperforming loan to total loan. Additionally, profitability indicator Net Interest Margin (NIM) shares a significantly negative association with NPL ratio.

Key words: Private Commercial Banks, Nonperforming Loan, Credit Risk, Provision for Loan Loss, Net Interest Margin (NIM)

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1. INTRODUCTION

Nonperforming loan or classified loan refers to the borrowed loan amount that the borrower is incapable of making scheduled interest and principal repayments. As per the credit risk grading (CRG) of Bangladesh bank loan categories i.e. substandard, doubtful and bad & loss are compose nonperforming loans in banks and financial companies. From the initiation of Bangladesh, the financial sector of this country has been experiencing severe nonperforming loan problem (Adhikary, 2006). Islam et al. (1999) explains the main reason of nonperforming loan severity as the 'Expansion of Credit' policies by the government from 1972 to 1981, which was resulted in the allocation of credit at a nominal term in the economy of Bangladesh. Moreover, the fragile banking infrastructure comprise of unqualified personnel also boosted NPL problem to the next level (Islam et al., 1999; Moral et al., 2000).

Bangladesh has obtained the statusof a developing country in 2018 by achieving all conditions required to be the one- economic risk, human development and per capita income. This has thrown a new challenge for Bangladesh of a strong and well-built banking and financial sector in order to contribute the economic development. However, the recent events elucidate that the banking and financial sector is becoming troublesome due to the heightening of nonperforming loan. The constant rising loan default in the

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commercial banks and financial institutions and increasing amount of loan loss provisions signifies the poor credit quality in the economy of Bangladesh (Adhikary, 2006; Khanam et al., 2013). This causes the resource distribution to unprofitable sector and eventually the prevention of economic development in Bangladesh. The rising of nonperforming loan also causes consistent lower profitability of commercial banks by experiencing colossal losses of interest income. Apparently, feeble Net interest income and net profit margin has become the major concern for the long term feasibility of commercial banks.

With a view to ensuring a distribution of resources, an economy requires a flexible and unimpeded circulation of saving-investment process for economic development (Parven, 2011). Bangladesh possesses a weak capital market, which causes the deficit spending unit (DSU) of Bangladesh to depend largely on the commercial banks of Bangladesh. However, the banking sector has been already infected with the nonperforming loan issue since 1980s. Accordingly, the commercial banks cannot accomplish the role of financial intermediary by not supplying the resources from surplus spending units to deficit spending units. Here comes the need of financial reform for the commercial banks of Bangladesh to ensure stability and strengthening their financial infrastructures (Parven, 2011).

Albeit to the financial reformation of commercial banks by the central bank of Bangladesh- Bangladesh bank regarding loan classification system changes for several periods, according to a study of Bangladesh Bank of a 5-year period from 2012-2016, average gross NPL to total loan ratio is 27.10%, where for privately owned commercial banks it is 4.90%, for foreign commercial bank is 6.50% and for state owned banks it is 22.56%. Furthermore, according to a study of Bangladesh Institute of Bank Management (BIBM), the average annual amount of rescheduled bad loan was BDT 109.10 billion from 2010 to 2014. This shed a huge unconstructive effect on the Capital to Risk Weighted Asset Ratio (CRAR) of commercial banks. Therefore, the commercial banks require some procedural actions for reducing nonperforming loan problem. In order to reduce the issue of nonperforming loan the lending functions of banks should be updated regularly based on the credit lending policies Bangladesh Bank.

This study intends to examine the effect of nonperforming loan due to the changes of several selected bank specific determinants. The Problem of this study is "How bank specific factors influence the nonperforming loan of private commercial banks in Bangladesh". The scope of this study is limited to the effect of some selected financial ratios of selected private commercial banks of Bangladesh. The foreign commercial banks and state owned commercial banks are not included in this study. The major objective of this study is to identify to what bank specific financial ratios influence the nonperforming loans in banks of Bangladesh.

Literature Review

Literature review elucidates the focus areas of the preceding research works of diverse scholars regarding a currently conducted study. The literature review of a study facilitates the mechanism of a research that various researchers adopted previously as well as the outcome of their studies along with their perspectives about the subject matter. The literature review of this study will explicate the past research works of many different authors who have done some unparalleled working papers concerning nonperforming loans issues of the commercial banks of miscellaneous nations.

The focal point of this study under discussion is how the nonperforming loan of commercial banks in Bangladesh responds in the presence of various bank specific financial ratios. As is commenced, the banking and financial sectors of Bangladesh is persistently affected by the rising amount of classified loans. This creates a disruption in the profitability and efficiency of commercial banks (Rundassa& Batra, 2016, Berger & DeYoung, 1997). Studies have executed d by Berger &DeYong (1997), Parven (2011) and Islam et al. (2005) identified the causes of nonperforming loan in the commercial banks.

Inefficient lending mechanism of commercial banks, irrational rescheduling of classified loans, insufficiency of proper nonperforming loan management, ineligible credit risk grading devices adopted by the commercial banks are the causes of increasing nonperforming loan in the economy of Bangladesh as per the study conducted by Parven (2011). Besides, Islam et al. (2005) drew attention to lower and irregular scrutinizing of the borrowers' repayment ability, bank's failure to detect the extent of unfamiliar lower risks, which will lead to rigorous risk exposure, incongruous loan expansion, incompetent lending management, irregular and meager monitoring of loan repayment by the borrowers, as few of the many rationale for nonperforming loans in the commercial banks of Bangladesh. They distinguished that short term credit performs better than the long-term credits. Again, syndicated financing ensures income and regular repayments of principal by the borrower as well as business loans are less risky than individual credits. They suggest that, strict enforcement of laws and regulations, risk assessment by the lender as per the guidelines of Bangladesh Bank on regular basis, proper management of securities and collaterals, ensuring appropriate training for the personnel of credit risk management committee are effectual for timely recovery of nonperforming loan by the commercial banks.

Vatansever&Hepşen (2013), Saba et al. (2012), Das & Ghosh (2007), Ekanayake& Azeez (2015) and Messai&Jouini (2013) are the scholars, who concentrated on some factors that affect the fluctuation of nonperforming loan in the commercial banks. The determinants affecting nonperforming loan are divided into two segments- bank specific factors and macroeconomic factors.

Vatansever&Hepşen (2013) consider nonperforming loan as a financial performance approach. They categorized a significant association between nonperforming loan and different bank specific financial ratios along with macroeconomic indicators in Turkey. According to their

study, bank specific determinants- return on equity and capital adequacy ratios have a significant positive relationship with NPL ratio and inefficiency ratio of all banks calculated by operating expense by operating income has a negative effect on the nonperforming loan. The macroeconomic indicators- industrial production index and Istanbul Stock Exchange 100 Index share a negative and unemployment rate shares a positive relationship with nonperforming loan.

In accordance with the research work of Saba et al. (2012) using the data of US Banking Sector, the NPL to total loan ratio has a significant association with the independent variables- real GDP per capita, interest rates and total outstanding loans and lower coefficient values, which dictates the banks ought to update and control the credit risk management policies for shrinking NPL based on these variables.

Moreover, the bank specific financial ratios- operating expenses and bank size as well as the macroeconomic indicator- GDP growth are important controlling determinants of nonperforming loan for the state-owned commercial banks of India as per the study performed by Das & Ghosh (2007).

On the other hand, Ekanayake& Azeez (2015) identified that the diminishing management efficiency of commercial banks in Srilanka induces the nonperforming loan. Again, the asset quality represented by total loan to total asset is positively related with NPL, which indicates the rising of NPL due to credit expansion of Srilankan commercial banks. Besides, the increase of GDP and inflation cause to decline NPL but loan default will be increased due to high prime lending rate.

The enhancement of GDP and the bank profitability symbolized by return on asset (ROA) results in radical drop of nonperforming loan of commercial banks of Tunesia because of the rising of real economy as indicated by the study of Messai&Juini, (2013). They also detected that progress of bank profitability reflects the efficient lending mechanism through the plunging of nonperforming loans of banks. On the contrary, the unemployment rate, loan loss reserve and another macroeconomic indicator interest rate have a positive authority over the nonperforming loan according to the study of Tunesia. Furthermore, Alexandri&Santoso, (2015) put evidence of significantly negative association of nonperforming loan to total loan ratio with return on asset.

Asymmetry of information may inflate classified loans in commercial banks the including the probability of loan default. The lenders may fall in the high degree of credit risk due to the banks obtain less information than the borrowers have (Kingu et al., 2018). Thus, the increase in information asymmetry may give rise to the more non-performing loan in the banking sector. Again, there is also a thin line of management efficiency is associated with the adverse selection and lower interest income (Kingu et al., 2018; Berger & DeYoung, 1997). Poor management efficiency signifies the advancement of adverse selection, eventually the greater flow of bad loans in the economy.

Various studies have found that the management competency as well as credit risk management, and classified loan recovery units require strong mechanism of commercial banks fuel the nonperforming loan in the banks. The discovery of rudimentary causes of emerging problem loans and bank failures and the estimation of cost efficiency in financial institutions were executed by Berger & DeYoung, (1997) using Granger-causality analysis. The major causes of upward problem loans are- external events representing bad luck, low cost efficiency of financial institutions as bad management, allocation of resources for long-term profits may cause feeble cost efficiency encouraging problem loans referring as skimping and moral hazard subsists in banks with lower capital, which are responsible for growing problem loans due to enlarge the riskiness of loan portfolio. The high level of nonperforming loan will eventually decrease the cost efficiency of banks and vice versa, which will provoke the incompetent credit management, riskiness of loan portfolio and thus reduce the profitability of banks.

A comparative study between Malaysia and Singapore regarding the relationship of bank efficiency and nonperforming loan was accomplished by Karim & Hassan, (1999) deduces that commercial banking system of Singapore a higher average cost efficiency. According to this analysis, the degrading cost efficiency will excite nonperforming loans in banks. Their study supports the notion of Berger & DeYoung, (1997) about the deteriorating bank management will results in high degree of problem loans.

Meanwhile, the analysis of the management of nonperforming loan in Bangladesh signifying the magnanimous amount of nonperforming loan in state owned commercial banks and financial institutions due to fragile lending management examined by Khanam et. al. (2013). The inappropriate allocation of credit and information asymmetry by the borrower incites nonperforming loan in the SCBs and financial institutions of Bangladesh. In addition, insufficiency of apposite credit management policy of public commercial banks and financial institutions is also responsible for the boost of nonperforming loan apparently.

According to the empirical study obtained by Islam & Nishiyama (2016), adverse selection by the borrowers is accountable to the heightening of nonperforming loan. Additionally, the banks specific indication of unqualified bank management, cost efficiency, diversification of revenue, bank size; industry-specific variable representing industry concentration ratio as well as macroeconomic factors- GDP growth rate and inflation also explicate the magnitude of nonperforming loans.

The recurrent loan fraud had given rise to severe nonperforming loan inclination in Bangladesh in recent years. The acute condition of nonperforming loan problem in the state owned commercial banks in Bangladesh studied by Lata(2015). As mentioned in the study, nonperforming loan to total loan ratio of the state owned commercial banks is extremely high and they hold half of the total NPLs of banking sector of Bangladesh from FY2006 to FY2013.

Again the profitability of banks is negatively influenced by the NPL ratio, which reduces the net interest income of the banks in Bangladesh according to the study.

Akter& Roy (2017)focused on the unfavorable profitability condition of the listed banks in Dhaka Stock Exchange (DSE) due to high nonperforming loans from 2008 to 2013. The major negative consequence of NPL is on the bank profitability. Moreover, net profit margin of the listed banks with DSE is inversely related to classified loan ratio.

Adhikary (2006) concentrated on the degree of nonperforming loan and adequacy of prudential policies regarding loan classification and loan loss provisioning in 1990. Nonperforming loan corrodes the bank capitals by reducing current earnings and causing high loan loss provision. In consequence, this will lead to high price of loan due to high risk premium, which will cause financial crisis and low investment rate, eventually emerging low economic development. Albeit to recurrent prudential reforms and quality international standards of loan classification and provisioning, the banking sector of Bangladesh is still struggling with the nonperforming loan at a high rate comparative to the other South Asian countries..

2. RESEARCH METHODOLOGY

2.1. Type of study

This paper identifies some financial factors that illustrate the variability of the nonperforming loan of a bank unswervingly. How some particularly selected bank specific financial ratios influence the loans are not repaid in regular basis of commercial banks in Bangladesh and their degree of relationship will be drawn attention in this research.

2.2. Sample size, data source and analysis tools

This study concerns with the effect of nonperforming loan to the profitability of fifteen private commercial banks of Bangladesh. The 5-year data of these fifteen banks from 2012 to 2016 are collected to conduct the study. To perform this study, essentially secondary data are accumulated from financial statements and annual reports of the selected banks from 2012 to 2016, survey reports, various books and research papers as well as scholarly articles. To find the validity of this study, six statistical tools are applied. Firstly, correlation analysis is conducted to recognize the existence of multicollinearity problem in dataset. Multicolliearity problem is minimized by removing highly correlated independent variables. Secondly, descriptive statistics is applied for explaining the quantitative features of data used in this study. Thirdly, multiple linear regression analysis is done for identifying whether there are any linear relationship exists between dependent and independent variables. Fourthly, ANOVA test is adopted for identifying whether the group of variables is jointly significant. Fifthly, Haushman test is done for identifying the fixed effect or random effect in the model. Finally, T-test is completed to identify the difference between dependent and each independent variable on the basis of samples drawn from each group. Statistical software Statistical Package for Social Sciences (SPSS) is applied for executing the statistical analysis.

2.3. Model Specification

This study contains one dependent variable to represent the profitability of state owned commercial banks and four independent variables that explain the effects of financial strength of banks.

- Independent variable: Return on Asset (ROA), Net Interest Margin (NIM), Growth of Non Performing Loan (NPLG), Provision for nonperforming loan to total loan ratio (PROVTL) , Loan to Deposit Ratio (LD), Capital to Risk Weighted Assets (CRAR).
- Dependent Variable: Non-Performing Loan to Total Loan ratio (NPLTL).

Therefore, the model for Net Profit Margin (NPM) of empirical study is followed

NPL= *f* (ROA, NIM, NPLG, PROVTL, LD,CRAR)

The model can be transformed into following econometric model:

$$\hat{Y}_{i\,(NPLTL)} = \alpha + \beta_1 X_{ROA} + \beta_2 X_{NIM} + \beta_3 X_{NPLG} + \beta_4 X_{PROVTL} + \beta_5 X_{LD} + \beta_6 X_{CRAR} + 6\,€$$

Where,

- $\hat{\mathbf{Y}}_{\mathbf{i\,(NPLTL)}}$ **:** Nonperforming Loan of Bank *I* at time *t* as expressed by Non Performing Loan to Total Loan ratio (NPLTL)
- **α :** Intercept
- β_1 **to** β_6 **:** Coefficient parameters
- $\mathbf{X_{ROA}}$: Return on Asset of bank *I* at time *t*
- $\mathbf{X_{NIM}}$: Net Interest Margin of bank *I* at time *t*
- $\mathbf{X_{NPLG}}$: Nonperforming Loan Growth rate of bank *I* at time *t*
- $\mathbf{X_{PROVTL}}$: Provision for nonperforming loan to total loan ratio of bank *I* at time *t*
- $\mathbf{X_{LD}}$: Loan to Deposit Ratio of bank *I* at time *t*
- $\mathbf{X_{CRAR}}$ **:** Capital to RWA assets of bank *I* at time *t*
- **€**: Error

2.4. Research Hypothesis

This study examines the effects of bank's profitability due to non-performing loan based on following hypothesis.

- H_0: There is no significant relationship of nonperforming loan ratio with ROA, NIM, growth rate of NPL, provision for NPL to total loan and loan to deposit ratio
- H_1: There is a significant relationship between nonperforming loan ratio and return on asset (ROA)
- H_2: There is a significant relationship between nonperforming loan ratio and net interest margin (NIM)
- H_3: There is a significant relationship between nonperforming loan ratio and growth rate of NPL

- H_4: There is a significant relationship between nonperforming loan ratio and provision for NPL to total loan
- H_5: There is a significant relationship between nonperforming loan ratio and provision for NPL to loan to deposit ratio

H_6: There is a significant relationship between nonperforming loan ratio and Capital to Risk Weighted Assets

3. RESULTS

Theoretical Background

This study concentrates on how nonperforming loan of banks can be influenced by various factors. Six bank specific financial ratios are selected as explanatory variable to conduct this study. Many researchers used most of these five variables in order to identify the effect of NPL on the bank's financial performance. The description of all explanatory and explained variables of this empirical study is given below.

3.1. Explained Variable: Nonperforming Loan to Total Loan Ratio (NPLTL)

As the dependent variable Nonperforming loan to total loan ratio is preferred to accomplish the objective of this research. Islam & Nishiyama, (2015), Saba et al. (2012) and Ekanayake&Azzez(2015) used NPL to total loan ratio as dependent variable to find the degree of relationship of bank's NPL with different bank specific and macro level determinants. Besides, Akter& Roy(2015), Lata(2015) and Rundassa& Batra, (2016) selected NPL to total loan ratio as explanatory variable for identifying its effect on the bank's profitability Measured by Return on Asset (ROA) and Net Profit Margin (NPM).

3.2. Explanatory variables

The six explanatory or independent variables selected for this study are all bank specific financial ratios. The variables are- Return on Asset (ROA), Net Interest Margin (NIM), annual growth rate of nonperforming loan, provision for nonperforming loan to total loan ratio, and loan to deposit ratio.

1. **Return on Asset (ROA)** The explanatory variable Return on Asset (ROA) measures how the total assets of bank are capable of producing net profit. Ekanayake& Azeez(2015) and Lata(2015) used ROA as independent variable and Kingu et al.(2018) used return on asset as dependent variable to identify the influence of NPL on bank profitability.
2. **Net Interest Margin (NIM)** Another measure of the profitability of banks is Net Interest Margin (NIM) which measures how the interest earning assets are capable of generating interest income greater than interest expense. Akter& Roy(2017) employed NIM as independent variable to find the influence of NPL on the strength of banks.
3. **The Growth Rate of Nonperforming Loan**The growth rate of nonperforming loan is adopted in this study with the purpose of detecting to what extent the oscillation of nonperforming loan affects the nonperforming loan to total loan ratio of banks. The percentage of annual growth of NPL is used in the estimated regression model.
4. **The provision for nonperforming loan to total loan ratio** The provision for nonperforming loan is the money that a bank is required to keep as coverage for potential loan loss due to the borrower's inability to preserve the loan obligation and to reduce credit risk exposure. Consequently, the provision for nonperforming loan to total loan ratio is applied as an explanatory variable in the empirical econometric model for conducting the study. The provision for NPL to total loan was adopted by Messai&Juini (2013) as an explanatory variable to identify how classified loans are affected by increasing provision to reduce loss of income by banks.
5. **The Loan to Deposit ratio** The banks' liquidity is commonly presented by the Loan to Deposit ratio. This ratio is composed of dividing total loan of bank by its total deposit. This ratio signifies that to what extent a bank is efficient to utilize its deposit to generate loan. It also indicates how at ease bank can reduce its liquidity risk and lower the nonperforming loan amount. Akter& Roy(2017), Islam & Nishiyama(2015), Kingu et al. (2018), Ekanayake& Azeez, (2015) and Rundassa& Batra(2016) considered total loan to total deposit ratio for identifying its influence on the nonperforming loan of banks.
6. **Capital Adequacy Ratio (CRAR)** Capital Adequacy ratio refers to the banks accessible amount of capital explicated by its risk weighted credit coverage. The capital adequacy ratio is implemented for guarding the depositors and CRAR ensures financial stability of financial institutions. CRAR is calculated by adding the Tier 1 and Tier 2 capital and dividing the summation by risk weighted asset (RWA). Risk weighted asset is comprised of banks' on and off balance sheet credit risk, market risk and operational risk. As per the recommendation of Basel Accord, the banks should keep capital equal to at least 8% of its risk-weighted assets. However, in Bangladesh, the commercial banks ought to hold 10% CRAR according to the regulation of Bangladesh Bank. Vatansever&Hepsen (2013) and Das & Ghosh (2007) opted out the CRAR as explanatory variable to identify its effect on NPL.

3.3. List of variables in the study and their plausible effects

Table-1 describes Non-Performing Loan to Total Loan represents the indicator of classified loans of private commercial banks.

Table 1: List of variables used in the study and their expected effects on dependent variable.

Variables	Acronym	Description	Expected Effect
Dependent Variable			
Non-Performing Loan to Total Loan	NPLTL	Nonperforming Loan divided by Total Loan	Not Applicable
Independent Variable			
Return on Asset	ROA	Net Profit after Tax divided by Total Asset	-
Net Interest Margin	NIM	Difference of Interest Income and Interest Expense divided by Total Asset (%)	-
Growth of Nonperforming Loan	NPLG	Change in Nonperforming Loan of bank over a one year period (%)	+
Provision for NPL to Total Loan	PROVTL	Provision for nonperforming loan divided by total loan	+
Loan to Deposit Ratio	LD	Total Loans divided by Total Deposits for the same period indicating liquidity of bank	+
Capital to RWA	CRAR	Total equity of bank divided by the Risk Weighted Assets	+

This research is aimed to detect the extent and direction of relationship between the dependent variable and selected independent variables. The profitability of banks is largely affected and dilapidated by Non-Performing Loans (NPL), thus it is estimated that NPL to Total Loan ratio have a negative impact on bank profitability ratios- Return on Asset and Net Interest Margin (Akter& Roy, 2017; Lata, 2015). Moreover, annual growth of Non Performing Loan is adopted as another risk factor of profitability (ROA and NIM) of PCBs (Lata, 2015;Ekanayake& Azeez, 2015).Thus, it is expected that NPL ratio and NPL growth rate share a positive relationship. As the banks tend to keep higher provision due to high probability of capital losses in order to guarantee medium term solvency and plummet reduction of earning risk (Messai&Juini, 2013). Besides, the Provision for NPL to total loan also indicates the percentage of provision is made for NPL amount of banks. Hence, the provision for NPL to total loan ratio is anticipated as to have a positive relationship with NPL ratio. Another independent variable Loan to Deposit ratio (LD) is espoused as the liquidity factor of private commercial banks which induce the interest income of banks resulted in rising of banks' profit (Rengasamy, 2014;Akter& Roy, 2017). Besides, if the bank has high degree of loan to deposit ratio this indicates large expansion of credit, which will eventually emerge problem loans in banks (Rahman et al., 2016). Finally, the explanatory variable Capital Adequacy Ratio (CRAR) is an approach to measure how much risk a bank can tolerate. Capital adequacy ratio is measured by- dividing the sum of Tier 1 and Tier 2 capital of banks by Risk Weighted Asset as per the Basel Accord. The commercial banks of Bangladesh must keep at least 10% of CRAR ratio in order to maintain solvency. As the high capital adequacy ratio indicates high level of riskiness of banks, thus it explicates large amount of nonperforming loans in banks. Therefore, a positive relationship is plausible between NPL and CRAR (Vatansever&Hepsen, 2013).

4. DISCUSSION

4.1. The Relationship between Bank Profitability and Its Determinants

Correlation is a statistical tool to measure the extent and strength of relationship between dependent and explanatory variables used in the research. Correlation points to the degree and direction of association among the variables. If the values in correlation are higher, there is a strong association and if smaller, it indicates a weak association among the variables. The signs of coefficient indicate the direction of relationship between dependent and explanatory variables. If the sign of coefficient is positive, there is a positive relationship and if the sign is negative, there is a negative relationship among the variables. The correlation matrix of this study is given below:

The correlation matrix table depicts the association between explained and explanatory variables. The infiltration of NPLTL ratio has a negative effect on the profitability of PCBs –ROA and NIM (Lata, 2015). Furthermore, growth of nonperforming loan ratio and provision for NPL to total loan share positive relationship with nonperforming loan ratio as this signifies the increased portion of nonperforming loans will lead to more provisions for classified loans annually that decline the profitability of banks (Ekanayake& Azeez, 2015; Lata, 2015). Moreover, the loan to deposit ratio signifies liquidity position of PCBs by comparing their total loans to disburse and total deposits collected over the same period, thus it holds a positive relationship with nonperforming loan ratio (NPLTL) because increase in the credit will lead to high problem loan in the commercial banks (Akter& Roy, 2017). The capital to risk

Table 2 Correlation Matrix

	NPLTL	ROA	NIM	NPLG	PROVTL	LD	CARAR
NPLTL	1						
ROA	-0.10062	1					
NIM	-0.127269	0.198541	1				
NPLG	0.187912	-0.23207	-0.06118	1			
PROVTL	0.677631	-0.02069	0.321095	-0.06578	1		
LD	0.211098	0.230708	0.167974	-0.08228	0.263811	1	
CARAR	0.235215	-0.01633	0.248675	-0.13635	0.138532	-0.13176	1

Table 3 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
NPLTL	75	2.08	7.99	4.5537	1.35542	0.628	0.277	0.049	0.548
ROA	75	0.19	1.84	1.0043	0.36289	-0.084	0.277	-0.475	0.548
NIM	75	1.10	6.17	3.0103	1.25119	0.561	0.277	-0.636	0.548
NPLG	75	-59.00	388.00	38.3968	63.26397	2.818	0.277	12.268	0.548
PROVTL	75	0.00	0.05	0.0210	0.01027	0.708	0.277	1.345	0.548
LD	75	0.71	1.12	0.8654	0.08284	0.710	0.277	0.696	0.548
CRAR	75	0.09	0.15	0.1185	0.01353	0.509	0.277	-0.005	0.548
Valid N (listwise)	75								

Author's Own Calculation

Table 4: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.755[a]	0.570	0.532	0.92700	1.966

Author's own calculation

a. Predictors: (Constant), CRAR, ROA, PROVTL, NPLG, LD, NIM

b. Dependent Variable: NPLTL

Table 5: ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	77.515	6	12.919	**15.034	0.000[a]
	Residual	58.435	68	0.859		
	Total	135.950	74			

Author's Own Calculation

a. Predictors: (Constant), CRAR, ROA, PROVTL, NPLG, LD, NIM

b. Dependent Variable: NPLTL, 5% Level of Significance**

weighted asset ratio CRAR bears a positive connection with the NPL ratio due to the risk identification of banks. As the banks have to hold capital of the amount equal to 10% of RWA, the increase CRAR reflects the high-risk exposure. Hence, the higher level of CRAR explains the greater amount of NPL reflecting increasing risk of commercial banks (Vatansever & Hepsen, 2013).

4.2. Descriptive Statistics

Descriptive statistics is a summary statistic that explains the quantitative features of the gathered sample data under the selected variables of a statistical research. Here, a descriptive statistic is designed for one explained variable- nonperforming loan to total loan ratio and five explanatory variables- ROA, NIM, growth rate of NPL, provision for NPL to total loan, loan to deposit ratio and Capital to risk weighted asset ratio (CRAR).

As is observed from the descriptive statistics table presented above, the mean value of nonperforming loan ratio (NPLTL) of private commercial banks in Bangladesh is 4.5537% with the minimum value of 2.08% and maximum value of 7.99%. The average Return of Assets of PCBs and mean Net Interest Margin are 1.0043% and 3.0103% respectively along with lower standard deviations of 0.36%

Table 6 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t-test	Significance	Initial Hypothesis
		B	Std. Error	Beta			
1	(Constant)	-1.284	1.649		-0.779	0.439	
	ROA	-0.072	0.321	-0.019	-0.225	0.823	Not Accepted
	NIM	-0.159	0.096	-0.147	***-1.656	***0.102	Accepted
	NPLG	0.006	0.002	0.259	**3.131	**0.003	Accepted
	PROVTL	89.840	11.575	0.680	**7.762	*0.000	Accepted
	LD	1.833	1.420	0.112	1.291	0.201	Not Accepted
	CRAR	22.776	8.508	0.227	**2.677	**0.009	Accepted

Author's Own Calculation
a. Dependent Variable: NPLTL
1% level of significance*
5% level of significance**
10% level of significance***

for ROA and 1.25% for NPM. The provision for NPL to total loan ratio and loan to deposit ratio have mean value of 0.021 and 0.8284 correspondingly.

As growth of NPL oscillates on annual basis with extreme values, the NPLG holds a mean value around 38.40% with a minimum negative growth of 59% and an utmost positive growth of 388%. Apparently, this uncertainty of NPLG experiences high values of skewness and kurtosis, 2.818 and 12.268 respectively, which are greater than +1.96, indicating the absence of normality in the dataset. The capital to RWA ratio of PCBs hold a mean value of 0.1185 along with a minimum value of .09 and maximum value of .15, which reflects that banks approximately properly maintain the required capital adequacy ratio explained by their risk weighted assets. The skewnes and kurtosis values of variables provide evidence of normality of data. All the variables except nonperforming loan growth rate are between -1.96 to +1.96, which expounds that all the data under variables NPL ratio, ROA, NIM, provision for NPL to total loan, loan to deposit ratio and Capital to risk weighted asset ratio (CRAR) are perfectly normal.

4.3. Result of Regression Analysis

Regression analysis is a set of statistical process for recognizing the extent of relationship among the explained and explanatory variables. As the econometric model of this study suggests, theReturn on Asset (ROA), Net Interest Margin (NIM), Growth rate of NPL (NPLG), Provision for classified loans to total loan ratio (PROVTL), Loan to deposit ratio (LD) and Capital to Risk Weighted Asset ratio (CRAR) are selected as the explanatory variables to identify their influence on the profitability of privately owned commercial banks in Bangladesh. The Nonperforming loan to total loan ratio (NPLTL) is selected as dependent variable for this study.

$$\hat{Y}_{i\,(NPLTL)} = \alpha + \beta_1 X_{ROA} + \beta_2 X_{NIM} + \beta_3 X_{NPLG} + \beta_4 X_{PROVTL} + \beta_5 X_{LD} + \beta_6 X_{CRAR} + Є$$

a) Model Summary

The model summary portrays that **R** is the correlation between dependent and independent variables. The correlation can be positive or negative. The value R= 0.755 indicates that there is a high degree of positive relationship between Nonperforming loan to total loan ratio (NPLTL) and the six explanatory variables (ROA, NIM, growth rate of NPL, provision for classified loans to total loan ratio, loan to deposit ratio and CRAR).

R square is called coefficient of determination that measures the proximity or closeness of data integrated to the regression line. It is the percentage of dependent variable that can be explained by the linear regression model. With the six explanatory variables the R square is 0.570, which explains 57% of the Nonperforming loan to total loan ratio (NPLTL) with theReturn on Asset (ROA), Net Interest Margin (NIM), Growth rate of NPL (NPLG), Provision for classified loans to total loan ratio (PROVTL), Loan to deposit ratio (LD) and Capital to Risk Weighted Asset ratio (CRAR) as explanatory variables.

Adjusted R square calculates the goodness of fit adjusted for the number of explanatory variables in regression model. R square becomes larger when another explanatory variable is added in regression model and adjusted R square become smaller albeit to the new variable is not statistically significant. Therefore, the value of adjusted R square is less than unadjusted R square. The adjusted R square in this multiple regression model is 0.532. It estimates the regression model is 53.20% good to compare with different number of explanatory variables.

Standard error of estimate represents the total amount of error in dependent variable i.e. NPLTL that cannot be explained by the linear effect of ROA, NIM, growth rate of NPL, provision for nonperforming loans to total loan ratio,

loan to deposit ratio and CRAR in the estimated regression model. The standard error of this regression equation is 0.92700.

The Durbin- Watson Statistic test is a statistical approach to detect the existence of autocorrelation in residuals of a regression analysis. This test identifies the autocorrelation with a value ranging from 0 to 4. If the value ranges from 1.5 to 2.5, then there is no severe autocorrelation. In this estimated regression model the Durbin- Watson test is approximately 1.966 which is approximate to 2. This indicates that there is no autocorrelation among the explanatory variables in this multiple regression model.

b) Analysis of Variance (ANOVA)

Analysis of Variance (ANOVA) is a statistical method to compare a diverse range of dataset. It presents various sums of square in estimated regression model in following ways:

- **Total Sum of Square (TSS):** TSS is the total squared deviation of actual values of dependent variable from their sample mean. The total sum of square in this regression model is 135.950.
- **Explained Sum of Square (ESS):** ESS measures the extent of variation explained in observed data in the regression model. The ESS in this estimated regression model is 77.515.
- **Residual Sum of Square (RSS):** RSS identifies the variation that cannot be explained in the values of dependent variables. The Residual Sum of Square (RSS) in this regression model is 58.435.

Therefore, the equation illustrating various sums of squares with their approximate value is:

$$\mathbf{TSS = ESS + RSS}$$

$$135.950 = 77.515 + 58.435$$

This equation dictates the value of TSS is constant regardless in case of one or two independent variables as it does not depend on explained variable. Only Explained Sum of Square increases and Residual Sum of Square decreases when a new independent variable is added (i.e. loan to deposit ratio). The increase in ESS denotes that estimated regression model provides a better fit for the observed dataset.

Inserting new explanatory variable leads to reduction of prediction error. Thus, it decreases the RSS because RSS=TSS-ESS, when ESS becomes greater and RSS becomes smaller.

The **F-test** measures significance of general relationship between the explained variable- Nonperforming loan to total loan (NPLTL) and explanatory variables- Return on Asset (ROA), Net Interest Margin (NIM), Growth rate of NPL (NPLG), Provision for nonperforming loans to total loan ratio (PROVTL), Loan to deposit ratio (LD) and Capital to Risk Weighted Asset ratio (CRAR). In order to test the significance of relationship between dependent and independent variables of this estimated regression model, the following hypothesis can be established:

- **H_0:** There is no significant relationship between Nonperforming loan ratio to total loan (NPLTL) and independent variables
- **H_1:** There is a significant relationship between Nonperforming loan ratio to total loan (NPLTL) and independent variables

If the null hypothesis (H_0) is rejected, there is sufficient evidence that six parameters are not equal to zero and the dependent variable Nonperforming loan ratio to total loan (NPLTL) shares a significant relationship with all five independent variables.

From the ANOVA table it can be perceived that the F value of estimated regression model is 15.034. At a 0.05 level of significance, and 6 degree of freedom in numerator and 6 degree of freedom in denominator, the tabulated value of F-test is $F_{.05}$= 4.28. So, it can be apparent that the calculated F-value 15.034 is much greater than the tabulated value 4.28. Therefore, the null hypothesis H_0 is rejected and it deduce that there is a significant relationship between NPLTL and explanatory variables.

P value examines the null hypothesis (H_0), whether the coefficient in estimated regression model is equal to zero. A low P value denotes that there is little evidence that the alternative hypothesis H_1 cannot be accepted. A P value less than 5% level of significance is regarded as low P value.

The P value in this estimated regression model is approximately 0.00. The evaluated P value is greatly less than actual P value of 0.05 at 5% significance level. This also put valid evidence to reject the null hypothesis H_0.

c) Analysis of Coefficient

Multiple regression analysis dictates the effect of two or more independent variables on the dependent variable. The coefficient value of each explanatory variable in a multiple regression model can express how each explanatory variable individually affect the dependent variable. The values of coefficient of this regression equation and the coefficient table are given below:

$$\boldsymbol{\alpha = -1.284,\ \beta_1 = -.072,\ \beta_2 = -.159,\ \beta_3 = .006,\ \beta_4 = 89.840,\ \beta_5 = 1.833,\ \beta_6 = 22.776}$$

As a result, the multiple regression equation is:

$$\hat{\mathbf{Y}}_{\mathbf{i\ (NPLTL)}} = -1.284 - .072X_{ROA} - .159X_{NIM} + .006X_{NPLG} + 89.840X_{PROVTL} + 1.833X_{LD} + 22.776X_{CRAR}$$

The multiple regression equation denotes that Nonperforming loan to total loan ratio (NPLTL) is the dependent variable. The bank specific financial ratios- Return on Asset (ROA), Net Interest Margin (NIM), Growth rate of NPL (NPLG), Provision for classified loans to total loan ratio (PROVTL), Loan to deposit ratio (LD) and Capital to Risk Weighted Asset ratio (CRAR) are selected as independent variables to identify their influence on bank profitability measure- Nonperforming loan to total loan ratio.

The value $\boldsymbol{\alpha = -1.284}$ states that, if the coefficients are zero, it indicates that Nonperforming loan to total loan ratio

of PCBs will be-1.284, regardless the value of explanatory variables.

The slope coefficient β_1= **-0.019** indicates that due to existing positive relationship between return on asset and nonperforming loan ratio while other independent variables remaining the same, if the ROA increases by 1%, the nonperforming loan ratio will reduce by 0.019%.

The slope coefficient β_2 = **-0.147** designates that if the net interest margin increases by 1%, the nonperforming loan ratio will plummet by 0.147% due to a negative relationship between nonperforming loan and net profit margin while other explanatory variables are constant.

Theslope coefficient β_3 = **0.259** points that due to prevailing positive relationship between nonperforming loan and nonperforming loan growth rate if the NPL growth rate, ceteris paribus, increases by 1%, the nonperforming loan ratio will expand by 0.347%.

The slopecoefficient β_4 = **0.680** specifies that if the Provision for nonperforming loan to total loan ratio, while other independent variables remain unchanged, increases by 1%, the nonperforming loan ratio will swell 0.680% due to existing positive relationship between the nonperforming loan ratio and provision for nonperforming loan to total loan ratio.

Theslope coefficient β_5 = **0.112** identifies that if the loan to deposit ratio, ceteris paribus, increases by 1%, the nonperforming loan ratio will boost by 0.112% due to existing positive relationship between nonperforming loan ratio and loan to deposit ratio.

The slopecoefficient β_6 = **0.227** stipulates that if the Capital to Risk Weighted Asset ratio, increases by 1%, the nonperforming loan ratio will rise by 0.227% due to existing positive relationship between nonperforming loan ratio and Capital to Risk Weighted Asset ratio, while other independent variables remain unaffected.

D) T-Test to Identify the Relationship between Dependent and Independent Variables

The T-test is used to detect the association of individual explanatory variable with explained variable. In this statistical model, a T test is performed to scrutinize the significance of relationship of each independent variable-explanatory variables- Return on Asset (ROA), Net Interest Margin (NIM), Growth rate of NPL (NPLG), Provision for nonperforming loans to total loan ratio (PROVTL), Loan to deposit ratio (LD)and Capital to Risk Weighted Asset ratio (CRAR) with dependent variable Nonperforming loan to total loan ratio (NPLTL). At a 5% level of significance and 6 degree of freedom the table value of T distribution for a two-tail test is $T_{.05\text{-}.10} = 1.943$.

The realized t value of Return on Asset and Net Interest Marginare -0.019 and -1.656 respectively. Both valuesare less than the tabulated t value 1.943 at 5% level of significance. As a result, the ROA and NIM share insignificant negative association with Nonperforming loan to total loan ratio (NPLTL). Thus, the alternative hypothesis H_1 and H_2 is not acceptedat 5% significant level.However, at the 10% level of significance of 6 degrees of freedom, the derived t value of Net Interest Margin is -1.656, which is greater than the tabulated t value is 1.440. Hence, the alternative hypothesis H_2 is accepted at 10% significance level.

The estimated t value of growth rate of nonperforming loan,provision for nonperforming loan to total loan ratio and Capital to RWA ratio (CRAR) are 3.131, 7.762 and 2.677 separately, which are greater than the tabulated t value 1.943. Thus, at 5% level of significance, the growth rate of nonperforming loan (NPLG), provision for nonperforming loan to total loan ratio (PROVTL) and Capital adequacy ratio (CRAR) have a significant positive relationship with Nonperforming loan to total loan ratio (NPLTL). Therefore, the alternative hypothesis H_3, H_4 and H_6 are accepted.

The gauged t value of Loan to Deposit ratio (LD) is 1.291, which is less than the tabulated t value 1.943. Therefore, at 5% level of significance, the NIM has an insignificant negative relationship with Nonperforming loan to total loan ratio (NPLTL). Therefore, the alternative hypothesis H_5 is not accepted.

5. FINDINGS AND RECOMMENDATIONS

As the solemn hurdle of the economy of Bangladesh is the recurrent and crucial uprising of classified loan every year, this difficulty is threatening the banking and financial sector of Bangladesh more grievously. The purpose of these studies is to detect the factors acting as the signpost of nonperforming loan of private commercial banks in Bangladesh. Through the quantitative measure, the determinants that explain the variability of nonperforming loan are annual growth rate of nonperforming loan (NPLG), provision for loan loss of banks to total loan (PROVTL), capital to risk weighted asset (CRAR) at the 0.5% level of significance or 95% confidence interval. This explicate that the growing nonperforming loan in commercial banks acts as a catalyst for the magnanimous amount risk with the additional rise of on and off-balance sheet assets, that commercial banks have to endure. Hence, the more nonperforming loan, the more risk, the more provision in consequence of the less profitability. Furthermore, at 90% confidence interval and 10% significance level, the net profit margin (NIM) of commercial banks has a negative relationship with nonperforming loan. While, this study found an insignificant negative relationship exists in nonperforming loan with return on asset (ROA). This can elucidate that the profitability of a financial institution or commercial bank can corrode due to the presence of immense amount of classified loans. Again, nonperforming loan possesses an insignificant positive relationship with Loan to deposit ratio. It indicates that the liquidity measure of a bank causes low variability of the nonperforming loan. Moreover, the estimated regression model provides a 53.2% of good fit. Therefore, the bank specific financial ratios-profitability indicators ROA and NIM, performance of NPL measuring nonperforming loan growth and provision for

NPL to total loan ratio, liquidity tool for banks-loan to deposit ratio and the capital adequacy ratio have a significant effect on the NPL of PCBs in Bangladesh.

It can be suggested that the banks should adopt an appropriate regular reform measures for the reduction and recovery of nonperforming loan as per the regulatory policies of Bangladesh Bank. Besides, the board of directors of commercial banks should conduct proper monitoring of the risk management by reviewing all issues of banks' credit management. In addition, the banks require a feasible lending and risk management committee for ensuring effective loan and credit risk mitigation activities through prudential and constant control, monitoring and reviewing. Momentously, the banks should not jeopardize the loan portfolio by investing funds in the risky investment sectors and carefully scrutinize the borrower specific factors as well as ensure proper documentation including accurate measure of the inquiry of collaterals. Lastly, employing healthier corporate governance activities, better information on credit for curtailing the new nonperforming loans accompanied by improved capital markets facilitating the mechanism and sufficient liquidity necessary for writing off bad loans.

6. CONCLUSION

This study has been focused to accomplish the specific objective. From the empirical analysis it is found that swelling of nonperforming loan is the main reason to dwindle profitability of banks in Bangladesh. Due to the increase of nonperforming loan, the provision for loan loss of banks also shoots, which eventually reduce the earnings of banks. Moreover, the increasing tolerable risk of a bank acts as the signpost of rising level of nonperforming loan. Nevertheless the banking sector of Bangladesh suffering from plunged profitability; it is enduring high risk and largernonperforming loans because of the malevolence tendency of loan misappropriation. Though nonperforming loan problem is acute to the banks, this cannot be fully alleviated at all from the economy of Bangladesh. Henceforth, in order to curb the nonperforming loan in the economy of Bangladesh, the government, regulatory authorities, the financial institutions as well as the deficit spending unit of the country require taking proper actions unanimously. Appropriate financial and non-financial contribution from the government ensuring a satisfactory business environment, comprehensive formulation and potent implementation of regulatory policies by Bangladesh Bank, competent lending authority and credit risk management of commercial banks and financial institutions along with identification and investment in profitable sectors of Bangladesh are essential for thwarting the upsurge of nonperforming loan issue in the economy of Bangladesh.

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