



Research article

What bank specific and macroeconomic elements influence non-performing loans in Bangladesh? Evidence from conventional and Islamic banks

Mosharrof Hosen^{1*}, Mohammed Yaw Broni², and Mohammad Nazim Uddin³

¹ Faculty of Business and Finance, Universiti Tunku Abdul Rahman, Perak Campus, 31900 Kampar, Malaysia

² School of Graduate Studies, International Centre for Education in Islamic Finance, 59100 Kuala Lumpur, Malaysia

³ Department of Business Administration, International Islamic University Chittagong, 4314 Kumira, Bangladesh

* **Correspondence:** Email: jonycox74@gmail.com; Tel: +60183865834.

Abstract: Policymakers are usually getting worried due to the continuous increases in non-performing loans, and the situation is expected to worsen in this era of COVID-19 pandemic. It is well established that NPL is one of the key indicators of the success and stability of the banking sector. However, very little attention has been paid regarding this issue in an emerging county like Bangladesh. Therefore, the purpose of this study is to examine and evaluate the factors influencing the non-performing loans (NPLs) of conventional and Islamic banks. We performed the analysis by employing annual panel dataset of top twenty-six conventional banks and four Islamic banks in Bangladesh over the period 2014 to 2018. The Pooled Ordinary Least Square (OLS) approach is employed to investigate the impact of credit growth, loans to deposit ratio, capitalization, inefficiency, size, diversification and economic growth on non-performing loans (NPLs). The empirical results reveal strong evidence that inefficiency has a significantly positive effect on NPLs, whereas loan to deposit ratio has a negative effect on NPLs. The results suggest policymakers need to lessen bank inefficiency with a view of reducing NPL, which ultimately will enrich shareholder's value.

Keywords: non-performing loan (NPL); Islamic bank; conventional bank; panel regression analysis; COVID-19; Bangladesh

JEL Codes: B26, E40, G21, G32

1. Introduction

Non-performing loans (NPLs) has become an alarming issue in the preceding few decades due to its own characteristics. More interestingly, the volumes of bad loans are terrifyingly growing not only in the developing and underdeveloped countries but also in advanced countries as well (Kjosevski & Petkovski, 2017; Saif-Alyousfi et al., 2018). However, Bangladesh has been facing ancient problem along with non-performing loans (NPLs) by way of a foremost hindrance to the expansion of domestic banks because it affects not only the bank's profitability but also liquidity as well. In banking sectors causing chain effects, different from the other industries, meaning the failure of one bank would lead to others. For example, during the financial crisis in 2008, the financial shocks of U.S. were spread to emerging market economies by the universal advancing actions of U.S. banks (Claessens & Horen, 2015).

Definitely, the rise in loan defaults, mortgage foreclosures lengthwise through a synchronized increase in NPLs crossways the country. The worsening of the asset quality of banks, moreover, does not only lead to financially weakening the banking system but also may reduce economic proficiency, damage social well-being, and deterioration of economic bustle (Beltrame et al., 2018). Furthermore, several banking experts have defined NPLs as "financial pollution" because of their antagonistic economic values (Dimitrios et al., 2016; Ozili, 2019). Henceforth, the reduction of NPLs is mandatory to reinstate a good banking system and stand-in complete financial constancy.

Figure 1 shows how fast the non-performing loan is increasing in Bangladesh from 2011 to 2018. The continuous increase in NPLs has been attributed to poor monitoring by the central bank of Bangladesh, especially the commercial banks who have been accused of not following proper rules and regulations. The culture of default loan has spread throughout the banking sector of the country due to lack of proper corporate governance.

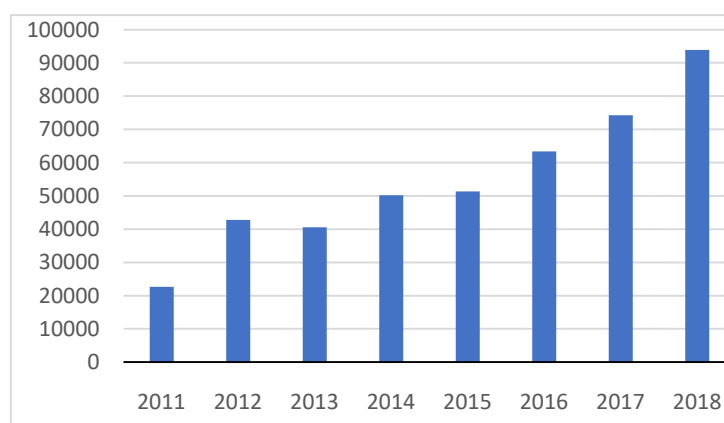


Figure 1. The amount (in crore taka) of non-performing loans in Bangladesh from 2011 to 2018. **Source:** Bangladesh Bank¹.

¹ Retrieved from <https://www.thedailystar.net/business/banking/default-loans-in-bangladesh-banking-sector-soar-26-percent-1707811>.

In addition, Bangladeshi policymakers have been touching onward with additional financial sector restructurings with the aim of producing universally extra competitive banks. Nevertheless, before taking any action to solve this frightening problem, NPLs, the mandatory requirement is a more profound understanding of its basic determinants and implications. The existing study scrutinizes together state level banking industry definite factors of NPLs. Thus, this study has hands-on use in the dynamics of lending and asset value in the banking industry.

Moreover, a vital accountability of any banking supervisory authority is to make a concise and well-organized financial system that could be followed by contributing agents (Nastiti & Kasri, 2019). The maiden task of a sound banking system is to transfer funds from savers to borrowers effectively and efficiently, that lead to maintaining financial stability. Another important argument is demonstrated by Ahmad and Hassan (2007) and suggested that Islamic banks in Bangladesh should have an independent banking act that controls, guides and supervises their functions and provide legal support to the parties concerned.

Finally, this is the first paper, to the best of our knowledge, that examines the NPLs issue especially for Bangladesh including Islamic and conventional banks, in a more comprehensive way because here, we have used more variables that directly affect NPLs. Thus, the objective of this study is to investigate the impact of influencing factors on NPLs, and whether there are differences in NPLs of Islamic banks and the conventional banks, by using Islamic bank dummy variable, in Bangladesh.

In addition to the introductory section, this paper is structured as follows: The next section highlights briefly recent relevant literature related to non-performing loans (NPLs). Section 3 outlines the data and research methodology used. Section 4 presents empirical results and discussions based on economic intuition, and finally, section 5 provides concluding remarks and policy implications.

2. Literature review

The preceding literature has mentioned two sets of factors that distress NPLs over the period. The first set is the internal factors that are considered bank-specific variables which can easily be controlled by respective banks' efficient management. The other set is external factors such as macroeconomic circumstances, which cannot be controlled by banks' management directly but the percentage of risk can be reduced by undertaking properly planned action. Empirical suggestions, nevertheless support both sets of factors. The next section will discuss briefly those internal and external influences that distress NPLs.

In Bangladesh, the success of the banking system depends on how efficiently the performance of banks is maintained with a special focus on profitability and liquidity (Ahmad & Hassan, 2007; Hamdi et al., 2019). The foremost challenging issue of the bank is a lending decision because if the banks fail to select the right customer that may affect banks' future performance and profitability. However, a certain part of the loan goes to bad debt. In several cases, bad debt is used as a default, which is important for the banks to try and reduce it. Mollah et al. (2017) argue that the governance structure in Islamic banks plays a crucial role in risk-taking as well as financial performance that is distinct from conventional banks.

The non-performing loan has an inverse relation with gross domestic products (GDP) because the theory represents that lesser NPLs are caused due to an advancement in the real economy. Moreover, Foglia (2008) found that anguish in the banking sector is simultaneously exaggerated by captivating macroeconomic variables as exogenous. In the same vein, it has been advocated by Akter

and Roy (2017) that levels of non-performing loans tend to become higher when banks follow an aggressive lending strategy and charge more interest rate than usual.

Rajha (2016) explores an emerging country's leading bank-specific and macroeconomic factors that could impact non-performing loans (NPLs) by employing a unique annual dataset that covered the period 2008 to 2012. The results pointed out that among bank-specific factors, by plotting panel regression data, the ratio of loans to total assets and the lagged NPLs were the greatest significant factors that affect non-performing loans positively in the Jordanian banking sector, thus, that result is in line with the findings of Sinkey and Greenawalt (1991).

The lending policy of banks might have an important effect that could significantly reduce non-performing loans. Actually, a non-payment loan should not be completely a ridiculous choice because it provides a red signal to the banking system (Lestari, 2018). Relatively a defaulter takes into account probabilistic calculation of numerous costs and benefits of his/her decision. Sluggish banking disapprovingly echoes on banks' investment portfolio strategy and lending policy (Jakubik & Moinescu, 2015).

The instantaneous consequence of the huge volume of non-performing loans in the commercial banking system is not only catastrophic for banks but also slows down the economy as well. The main reasons for occurrence of non-performing loans are the absence of effective supervision and monitoring, weakness of effective leaders, deficiency of debt retrieval approaches and faintness of legal infrastructure (Adhikary, 2006). There are different kinds of discrepancies in respect of contents, scope, and the classification. Consequently, these problems hypothetically enhance uncertainty and disorder in the issues of banks non-performing loans. Therefore, with the line of disorder and uncertainty, Chava and Purnanandam (2011) illustrate similar kind of significantly negative association between non-performing loans and banks performance in the context of the U.S.

Ranjan and Dhal (2003) developed a model in order to investigate the impact on Non-Performing Loans (NPLs) by incorporating three important features of banks, including banks size, macroeconomic shocks, and credit. The results clearly depict that there is a significantly positive relationship between credit policy and NPLs. More importantly, the findings further explained that the proper implementation of rules is ignored due to a higher interest rate. The authors recommended that in order to reduce the non-performing loans the banks must ensure better credit culture, loan maturity, current scenario of business and sound macroeconomic situation. In addition, Fan and Shaffer (2004) reports, a bank's profit efficiency is negatively impacted by non-performing loans, but the relationship is statistically insignificant.

Political instability and the condition before elections have a manipulating influence by the government who literally controls the financial sector because of the need to increase money supply during this period. More importantly, political instability compels the central bank of Bangladesh not to properly investigate all the banking issues more strictly as before, due to strong connections between political leaders and bank officials. This becomes obvious with the lessening of the rules dispensed by the central bank on defaulters (Haneef et al., 2012). However, this is obviously not a relaxed environment to operate in as well since certain measures must be taken to avert the condition from additional worsening and depressing the banking sector (Mhadhbi et al., 2019).

The existence of a frightening volume of NPLs both in the Development Financial Institutions (DFIs) and the Nationalized Commercial Banks (NCBs), together with conservation of insufficient loan loss provisions, weakens the overall credit quality of Bangladesh. Meagre implementation of legislation that could be connected to the reimbursement of non-performing loans, followed by

inadequate debt recovery measures on the part of banks, has also heightened the financial malaise (Adhikary, 2006). Farook et al. (2014) also studied a comparison between conventional banks and Islamic banks in the context of loan loss provisioning behaviour. The findings revealed that Islamic banks consistently recorded lower loan loss provisions than their conventional counterparts.

However, the banks should take sufficient precaution while taking a lending decision based on different threshold level related to NPL ratio. The lending rate would be badly effected when NPL is higher than its normal threshold level (Illes et al., 2019; Sinkey & Greenawalt, 1991). In another study, Karim et al. (2014) found that the capital adequacy through lending and deposit behaviours of conventional and Islamic banks and those capital requirements have a significant impact on the deposit and lending behaviours of the 52 Islamic banks (IBs) and 186 conventional banks (CBs) in the sample.

Saba et al. (2012) explored that the independent variable such as bank size, credit growth, capitalization and loan to deposit ratio have a significant impact on dependent variable which is a non-performing loans, but the coefficient value is not much higher. To maintain reasonable non-performing loans the banks must control and revise their advancement policy by considering aforesaid variables. Similar suggestions were given by Ibrahim and Rizvi (2018).

Most of the regression outcomes evidently show that higher non-performing loan decreases cost efficiency, and lesser cost efficiency raises non-performing loans. This feedback also supports the hypothesis of bad management, which explained that underprivileged management in the banking institutions leads to bad quality loans, and therefore, deteriorates NPLs level (Nkundabanyanga et al., 2017).

Even though the issue of the non-performing loan and its determinants are well discussed in conventional banking literature, it is still unexplored in the context of emerging markets such as Bangladesh. More importantly, it is worth to investigate the issue under study by including Islamic banks as well.

3. Data and methodology

In order to evaluate and measure the factors of NPLs in Bangladesh, we use a set of panel data with 150 observations comprising 4 Islamic banks and 26 conventional banks over the period 2014 to 2018. Panel dataset is the combination of cross-sectional and time-series data, which is more effective for relatively shorter tenure data. In addition, it helps researchers to improve the quantity and quality of data. At first, we intended collecting many observations, but due to unavailability of data for some banks, especially the newly established ones, we were compelled to exclude many observations. By using Bankscope and Bloomberg databases, we collected the required data on the bank-specific and macroeconomic variables. We estimate all variables by using the pooled OLS method in different regression models. The major items of interest are: bank-specific and macroeconomic factors, and used a dummy to check whether there are differences in terms of NPLs of Islamic and conventional banks.

In the banking literature, there are many Non- performing loan ratios that have been used by researchers in measuring non-performing loan. Based on the literature reviewed, we used the following variables:

3.1. *Dependent variable*

3.1.1. NPLs

The loan is considered as non-performing when the borrowers fail to return principal and/or interest within stipulated tenure, which is normally due by three consecutive months or 90 days. Scholars also denote non-performing loan as problematic or bad loans. In this study, the NPL is determined by the ratio of non-performing loans to total loans which is also similarly executed by previous studies (Kjosevski et al., 2019; Mohaddes et al., 2017).

3.2. *Independent variables*

3.2.1. Credit growth

The banks' maiden characteristic is to collect deposit from one party and lend it to other party and through efficiently managing the entire process assist them to generate income. By using a general model of the market for bank loans, Keeton (1999) concluded that higher losses are caused due to a quicker increase of loan. The faster supply of loan by banks leads to a decrease in required interest rate and lessens their minimum obligatory credit standard. Therefore, the lower credit standards increase the probability of loan defaults by debtors. Based on the theory, our expectation of loan evolution would positively distress NPLs. We consider this variable by loans to asset ratio, which is in line with the study of Klein (2013).

3.2.2. Bank capitalization

The consequences of bank capitalization on NPLs are not clear enough because previous studies reported both positive and negative relationship and even some scholars did not find any rapport between them. Dermine and DeCarvalho (2006) explained that bank managers have a moral hazard inducement to involve in perilous lending applies along with poor credit scoring and monitoring of debtors, however, the moral hazard hypothesis represents a reverse association between equity capital and NPLs. On the contrary, Rajan and Dhal (2003) concluded that there is a strong positive affiliation between NPLs and capital because the highly capitalized banks might be more generous in terms of credit policy which is also supported by the concept of "Too Big to Fail". Cut to the bone, we calculate this variable, capitalization, as the ratio of total equity capital to total asset which is also reinforced by the study of Klein (2013), Louizis et al. (2012) and Macit (2012).

3.2.3. Economic growth

When the economic growth tends to be higher, it will help households pay their credit because at that time people have money. Therefore, the defaulted loan becomes lower when economic growth is rising meaning theoretically they have a negative relationship (Abid et al., 2014; Makri et al., 2014). Therefore, we denoted economic growth by calculating real GDP divided by the total population to obtain GDP per capita.

3.2.4. Bank diversification

Banks' income can be divided into two forms; interest-based and non-interest based. At the very beginning stage of banking history, banks were only earning from investment securities and numerous sorts of loan contracts. Nowadays, however, there are several ways banks earn profit such as asset management, insurance underwriting, investment banking, derivatives, trading, fees, commission paying service etc. Therefore, diversification control is not easy in Bangladesh due to economic heterogeneity across the country. However, Louizis et al. (2012) state that there should exist an inverse relationship between diversification and NPLs because more diversification would lead to the banks providing better loan quality as well as decrease credit peril. We calculate diversification as the share of non-interest income to total income for separate municipal.

3.2.5. Loan to deposit (LTD) ratio

LTD mainly represents the relationship between banks total loans and their deposit. The LTD ratio is calculated as a percentage form, and the banks are free to provide loans to clients without borrowing from any other outside sources rather than internal deposits when LTD ratio is less than one. If the ratio is more than one, it means the banks loaned from other sources to secure the customers demand because current deposits are not enough to provide loan to clients. Most of the scholars use LTD ratio to determine banks' liquidity. Banks should keep sufficient liquidity to enable them to face unfortunate situations or crisis. An increasing loan to deposits ratio reveals a risk preference and is expected to lead to higher NPLs.

3.2.6. Inefficiency

Inefficiency refers to the ratio of operating expenses which occurred in order to generate income. The concept of cost efficiency effect is not clearly stated and still debatable in the finance literature. Prior scholars demonstrated inefficiency through "Skimping Hypothesis" which explains that when banks provide lower amount to monitor lending jeopardies will be added cost-efficient. Therefore, in future the amount of NPLs will rise; thus, that will represent an inverse relationship with NPLs and efficiency. On the other hand, the greater number of cost inefficiency might lead to rising NPLs in respect of "Bad Management Hypothesis" by way of bank managers not able to do efficient loan scoring, and monitoring of borrowers would lead to provide meagre quality loans and raise expenditure. However, operating efficiency is calculated by non-interest expenses divided by total assets which are in line with Kumar et al., (2018), Lee et al. (2019), Louizis et al, (2012), and Podpiera and Weill, (2008).

3.2.7. Size

The bank size is measured by the number of branches or total market share of any specific bank. In the large size banking industry, banks have a greater opportunity to raise their leverage and provide more credit to the lesser class debtors. In that way, the chance of default loans would be higher. On the contrary, some empirical studies found a negative relationships between NPLs and bank size because comparatively big market share banks have more opportunity to diversify loans (Hu et al., 2004; Salas & Saurina, 2002). Therefore, large size banks can get benefit from lower

market discipline by regulators as well as the assumption that the government will shield them in the event of any catastrophes (Kumar et al., 2018). However, based on previous studies we expect NPLs to have a positive relationship with bank size.

3.3. Proposed research models

This study adopts regression equation from Abduh et al. (2017), and Pooled Ordinary Least Square (OLS), to examine the bank-specific and macroeconomic factors of a non-performing loans in Bangladesh. Pooled OLS method is simply, OLS estimations applied on a panel data. Hence, this method is appropriate in the context of this study because the number of banks (N) is greater than year (t). In OLS estimations, the main goal is to obtain the Best Linear Unbiased Estimates (BLUE) (Broni et al., 2019). As a result, assumptions of Normality of the error term, the existence of Homoscedasticity, estimation model well specified, and the absence of outliers are made. Estimated coefficients are deemed to be efficient when these assumptions hold. Consequently, diagnostic tests have been performed for evaluating these assumptions. There is one dependent variable–NPL, and in total, we used eight independent variables including dummy. We used the dummy variable to compare the behaviour of NPLs of Islamic and conventional banks. In that case, we divided the model into four so that we can check for robustness. Moreover, we used an Islamic bank as a dummy variable and IB*CPLZ interactive dummy variable that would help us to determine which banks are more capitalized. The models are demonstrated below:

Model 1. General model

This is the normal regression model to determine the impact of bank-specific characteristics on NPL.

$$NPL_{it} = \alpha_0 + \beta_1 CG_{it} + \beta_2 CPLZ_{it} + \beta_3 INEF_{it} + \beta_4 SIZE_{it} + \varepsilon_{it} \dots \dots \dots (1)$$

Model 2. The model with additional variables

In addition to the existing model, we added three more variables including macroeconomic variable namely, diversification, loan to deposit ratio, and economic growth to check the robustness of the model.

$$NPL_{it} = \alpha_0 + \beta_1 CG_{it} + \beta_2 CPLZ_{it} + \beta_3 INEF_{it} + \beta_4 SIZE_{it} + \beta_5 DVRS_{it} + \beta_6 LTD_{it} + \beta_7 GRTH_{it} + \varepsilon_{it} \dots \dots \dots (2)$$

Model 3. Dummy variables

With the existing model, we added one additional dummy variable; the Islamic bank to see the impact on the NPL. D1 = 1 for an Islamic bank, and D1 = 0 if Otherwise.

$$NPL_{it} = \alpha_0 + \beta_1 CG_{it} + \beta_2 CPLZ_{it} + \beta_3 INEF_{it} + \beta_4 SIZE_{it} + \beta_5 DVRS_{it} + \beta_6 LTD_{it} + \beta_7 GRTH_{it} + \beta_8 IB_{it} + \varepsilon_{it} \dots \dots \dots (3)$$

Model 4. Interactive dummy variable

With the existing model, we included one additional interactive dummy variable; the Islamic bank and capitalization to see the impact on NPL

$$NPL_{it} = \alpha_0 + \beta_1 CG_{it} + \beta_2 CPLZ_{it} + \beta_3 INEF_{it} + \beta_4 SIZE_{it} + \beta_5 DVRS_{it} + \beta_6 LTD_{it} + \beta_7 GRTH_{it} + \beta_8 IB_{it} + \beta_9 IB * CPLZ_{it} + \varepsilon_{it} \dots \dots \dots (4)$$

where NPL, CG, CPLZ, INEF, SIZE, DVRS, LTD, GRTH, IB and IB*CPLZ represent Non-performing loan, Capital growth ratio, Capitalization ratio, Inefficiency ratio, Bank size, Diversification ratio, Loan to deposit ratio, Economic growth, Islamic bank dummy, and interactive dummy respectively.

4. Empirical results

The descriptive statistics is presented in Table 1. The findings show variables with high standard deviation to include diversification, capital growth, inefficiency, and loan to deposit, meaning that these variables are highly volatile across the sample. Intuitively, this means that these variables or qualities fluctuate significantly in Bangladesh during the studied tenure. However, the findings clearly illustrate that most of the variables' standard deviations are close to zero.

The descriptive statistics also suggest, the existence of the problem of kurtosis for variables LTD and CPLZ with values of kurtosis higher than 3. This means the variables have a fat-tailed distribution which may affect hypothesis testing. Ultimately, this affects the efficiency of studied variables, but most variables in this study show kurtosis of acceptable threshold levels.

Table 1. Descriptive statistics.

Variables	N	Mean	S.D.	Min	Max	Skewness	Kurtosis
NPL	150	5.232	2.085	2.085	11.37	1.081	2.331
DVRS	150	32.630	11.300	17.180	69.74	0.687	1.951
CG	150	14.420	10.880	-8.653	33.27	-0.102	2.549
CPLZ	150	9.162	2.209	4.208	16.37	0.957	5.679
INEF	150	44.950	10.330	23.490	65.23	-0.305	2.743
LTD	150	75.970	9.200	53.310	88.80	-0.898	3.065
GRTH	150	0.920	2.010	-2.410	4.95	-0.087	2.530
SIZE	150	2.670	1.591	1.288	7.57	1.190	1.044

Note: NPL (non-performing loans), DVRS (bank diversification), CG (credit growth), CPLZ (capitalization), INEF (inefficiency), LTD (loan to deposit), GRTH (economic growth), SIZE (bank size), N (number of observations), S.D. (standard deviation), Min (minimum), Max (maximum), var (variance).

Finally, the descriptive statistics suggest that most of the variables do not exhibit the problem of skewness. That means skewness is not a problematic issue in this study. This subsequently means most of the variables, do strictly follow the normal distribution, which ultimately has a positive effect on hypothesis testing and the efficiency of variables.

The main issue of biased independent variable hypothesis testing is the high correlation between constructs. Correlation matrix demonstrates the relationships among the independent variables. The results indicate that there is a negative rapport between capital growth and NPL. The banks will experience lowering NPL when the rational amount of capital growth has been increased. Likewise, another significantly negative relationship is shown between bank capitalization and NPL. It is clear that a highly capitalized bank would follow more strict rules and regulations that could help to steady decomposing NPL. A positive affiliation is established between inefficiency and NPL, which means the number of problematic loans would proliferate when banks' risk management system is not well functioned. A seminal positive relationship is found between bank size and diversification towards

NPL because higher market share tends to fail in properly monitoring NPL. In addition, the macroeconomic variable shows negative affiliation with NPL. It exhibits that, when a country's economic condition is better, stakeholders will become keener to pay back bank loans. From Table 2, we can see that correlation between the variables are lower than 0.80, which means there is no multicollinearity problem in our current dataset. In addition, the results of mean VIF is 5.86, which also indicates that variables are free from multicollinearity.

Table 2. Correlation matrix.

Variables	NPL	CG	CPLZ	INEF	SIZE	DVRS	LTD	GRTH
NPL	1.00							
CG	-0.15	1.00						
CPLZ	-0.14	-0.39	1.00					
INEF	0.51	0.40	-0.44	1.00				
SIZE	0.44	-0.10	-0.22	0.16	1.00			
DVRS	0.18	0.00	0.04	0.08	0.04	1.00		
LTD	-0.60	0.17	-0.06	-0.07	-0.38	-0.32	1.00	
GRTH	-0.08	-0.38	0.23	0.18	-0.41	0.21	-0.06	1.00

Note: NPL (non-performing loans), DVRS (bank diversification), CG (credit growth), CPLZ (capitalization), INEF (inefficiency), LTD (loan to deposit), GRTH (economic growth), SIZE (bank size).

Table 3 shows Pool OLS estimations findings which suggest that as we added more variables, the model's explanatory power grows as well, demonstrated by the increasing adjusted R-squared, F-test, and AIC which is lower, an indication of lower information missing from the true model. Our first model suggests that credit growth has a significant and negative relationship with NPL. Intuitively, this can be explained by the fact that a positive credit growth implies a more prudent bank, which would have a tighter credit screening and risk management process, which could contribute to lesser NPL. In addition, similar results are revealed from model 2, model 3, and model 4, but they are not statistically significant. This could happen when banks are very aggressive to boost up their lending policy regardless of the quality of credit. The findings also amplified that banks' sound capitalization strategy would assist them in reducing non-performing loans, even though the results are not statistically significant.

According to the results, inefficiency in a bank shows a significant, consistent and positive relationship with NPL. Our model suggests that 1% increase in bank inefficiency would lead to an increase of between 1.07% and 1.27% in NPL. This is explained by the fact that increased inefficiency of banks would lead to lower resources available for monitoring and credit screening, which could contribute to higher NPL.

Table 3. Empirical results of four models.

Variables	Model(1) NPL	Model(2) NPL	Model(3) NPL	Model(4) NPL
CG	-0.065** (0.031)	-0.048 (0.029)	-0.048 (0.029)	-0.039 (0.025)
CPLZ	0.072 (0.158)	-0.020 (0.140)	-0.020 (0.144)	-0.157 (0.130)
INEF	0.127*** (0.033)	0.107*** (0.031)	0.107*** (0.032)	0.108*** (0.027)
SIZE	0.419** (0.196)	0.178 (0.181)	0.180 (0.197)	0.122 (0.167)
DVRS		-0.009 (0.024)	-0.009 (0.025)	-0.028 (0.022)
LTD		-0.109*** (0.032)	-0.109*** (0.038)	-0.132*** (0.033)
GRTH		0.238 (0.379)	-0.489 (0.721)	-0.526 (0.481)
IB			-0.024 (0.776)	-7.291*** (2.453)
IB*CPLZ				0.885*** (0.288)
Constant	-1.305 (2.529)	9.128** (3.610)	8.012** (4.219)	12.591*** (3.658)
Observations	150	150	150	150
R-squared	0.409	0.569	0.681	0.772
Adj R-squared	0.398	0.567	0.668	0.702
F-stat	6.03	6.78	5.68	8.10
AIC	116.37	111.02	113.12	107.32

Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

With the significant effects of inefficiency, the findings also depict that 1% increase in banks market share which is represented by SIZE, the growth of non-performing loans tend to rise by 1.22% to 4.19% within our four models, but statistically not significant. This is in line with the findings of Saba et al. (2012) where they mentioned that, when banks spread their business, the monitoring systems could not be implemented strongly as before. Subsequently, diversifications show a negative relationship with NPLs, which means when banks diversify their loans towards many clients, the possibility of loan loss will be reduced even though the models failed to prove significant evidence.

The estimations also show a negative relationship between NPL and loan-to-deposit ratio, which can be explained by the fact that the LTD can be increased by decreasing deposits. A bank with high LTD could be financing their loans using their own capital, meaning that a low LTD bank could be more prudent (because the bank is using their own money to give out loans), and a more prudent bank leads to a lower NPL. The results also show that economic growth does not have a significant impact on non-performing loans, which is also supported by Kumar et al. (2018). The findings of economic

growth indicate that when a country's economic condition is good, the bank's clients have a positive mentality to pay back loans. For a 1% increase in economic growth, the possibility of default loans reduced by 4.89% to 5.26% but unfortunately the result is not statistically significant.

Finally, the results demonstrate how Islamic Banking contributes negatively towards NPL. The estimations suggest that an Islamic bank would have a 7.29% lower NPL compared to conventional banks. Even though the models failed to provide statistical evidence, still the findings are in line with Islamic principles. Islamic banks provide loans based on profit-loss sharing (PLS) principles where both parties are equally responsible for loan loss. However, when we interact the Islamic Banking dummy variable with capitalization, the result is a positive relationship but statistically insignificant. This implies that if an Islamic bank has a large capitalization, it could contribute to higher NPL. The findings have important implications for policymaking: The Bangladeshi government should provide more attention towards Islamic banks because they would reinforce the economy by successfully maintaining NPL and capitalization strategy compared to their conventional counterparts.

5. Conclusions and policy implications

Most scholars agree that the banking sector has a significant impact on economic growth, and this financial segment is drastically influenced by bad loans. The literature review outlines that previous studies paid more attention to either bank-specific factors or macroeconomic factors as having effect on NPLs in the context of Bangladesh. However, numerous previous studies ignored the importance of Islamic banks' principles that could help to reduce NPL. So, this is the first attempt, to the best of our knowledge, in investigating the bank-specific and macroeconomic determinants of non-performing loans in Bangladesh by including both Islamic and conventional banks. We employed pooled ordinary least square approach to generate statistical results that could help the policymaker to resolve NPLs problems. The findings from the pooled OLS estimations show that inefficiency has a positive effect on NPLs, whereas loan to deposit ratio has a negative effect on NPLs. Both results are at 1% level of significance. By using Islamic bank dummy, we found that Islamic banks have lower NPLs than conventional banks. However, an insignificant positive relationship is found between capitalization, economic growth and bank size towards NPL. On the other hand, capital growth and diversification demonstrate a negative relationship with NPL, which is not statistically significant.

Our paper suggests that Bangladeshi banks should encourage policies to reduce inefficiencies. This is because the estimations show a consistent positive relationship between bank inefficiency and NPL for all models, meaning that inefficiency clearly and undoubtedly contributes to NPLs. The regulatory authorities of the Bangladeshi banking system should concentrate much of their efforts towards achieving higher managerial performance in banks. Subsequently, the authorities should reinforce the monitoring systems that would help to reduce credit risk through proper execution of rules and regulations. The model also suggests that banks should increase their loan to deposit ratio by reducing the number of loans generated from deposits. Instead, banks should use their own capital to provide loans. This is because the loan to deposit ratio has a consistently negative impact on NPL, meaning that a higher loan to deposit ratio would contribute to lower NPL. The Islamic banking model in Bangladesh also tends to reduce NPL; therefore, more banks in Bangladesh should follow the Islamic banking model. This paper is not out of limitations, even though the findings have significant effects on the Bangladeshi banking sector. One of the significant drawbacks of this

research is data unavailability that deprived us to select a greater number of banks. Future research work could extend this study by adding more variables with a longer period data, and consider making cross-country comparison.

Acknowledgement

We are sincerely grateful to the editors of *Green Finance* and three anonymous reviewers for their time and learned comments which enhanced the quality of the paper immensely. The usual disclaimer applies.

Conflict of interest

All authors declare no conflicts of interest in this paper.

References

- Abduh M, Omar MA, Mesic E (2017) Profitability determinants of Islamic and conventional banks in Malaysia: a panel regression approach. *Terengganu Int Financ Econ J* 3: 1–7.
- Abid L, Ouertani MN, Zouari-Ghorbel S (2014) Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Econ Financ* 13: 58–68.
- Adhikary BK (2006) Nonperforming loans in the banking sector of Bangladesh: realities and challenges. *Bangladesh Inst Bank Manage* 4: 75–95.
- Ahmad AUF, Hassan MK (2007) Regulation and performance of Islamic banking in Bangladesh. *Thunderbird Int Bus Rev* 49: 251–277.
- Akter R, Roy JK (2017) The impacts of non-performing loan on profitability: An empirical study on banking sector of Dhaka stock exchange. *Int J Econ Financ* 9: 126–132.
- Beltrame F, Previtali D, Sclip A (2018) Systematic risk and banks leverage: The role of asset quality. *Financ Res Lett* 27: 113–117.
- Broni MY, Hosen M, Masih A (2019) Does a country's external debt level affect its Islamic banking sector development? Evidence from Malaysia based on quantile regression and markov regime switching. *Quant Financ Econ* 3: 366–389.
- Chava S, Purnanandam A (2011) The effect of banking crisis on bank-dependent borrowers. *J Financ Econ* 99: 116–135.
- Claessens S, Van Horen N (2015) The impact of the global financial crisis on banking globalization. *IMF Econ Rev* 63: 868–918.
- Dermine J, De Carvalho CN (2006) Bank loan losses-given-default: A case study. *J Bank Financ* 30: 1219–1243.
- Dimitrios A, Helen L, Mike T (2016) Determinants of non-performing loans: Evidence from Euro-area countries. *Financ Res Lett* 18: 116–119.
- Fan L, Shaffer S (2004) Efficiency versus risk in large domestic US banks. *Managerial Financ* 30: 1–19.
- Farook S, Hassan MK, Clinch G (2014) Islamic bank incentives and discretionary loan loss provisions. *Pacific-Basin Financ J* 28: 152–174.

- Foglia A (2008) Stress testing credit risk: a survey of authorities' approaches. *Bank Italy Occas Pap*.
- Hamdi B, Abdouli M, Ferhi A, et al. (2019) The stability of Islamic and conventional banks in the MENA region countries during the 2007–2012 financial crisis. *J Knowl Econ* 10: 365–379.
- Haneef S, Riaz T, Ramzan M, et al. (2012) Impact of risk management on non-performing loans and profitability of banking sector of Pakistan. *Int J Bus Social Sci* 3: 307–315.
- HU JL, Li Y, CHIU YH (2004) Ownership and nonperforming loans: Evidence from Taiwan's banks. *Dev Econ* 42: 405–420.
- Ibrahim MH, Rizvi SAR (2018) Bank lending, deposits and risk-taking in times of crisis: A panel analysis of Islamic and conventional banks. *Emerging Markets Rev* 35: 31–47.
- Illes A, Lombardi MJ, Mizen P (2019) The divergence of bank lending rates from policy rates after the financial crisis: The role of bank funding costs. *J Int Money Financ* 93: 117–141.
- Jakubik P, Moinescu B (2015) Assessing optimal credit growth for an emerging banking system. *Econ Syst* 39: 577–591.
- Karim MA, Hassan MK, Hassan T, et al. (2014) Capital adequacy and lending and deposit behaviors of conventional and Islamic banks. *Pacific-Basin Financ J* 28: 58–75.
- Keeton WR (1999) Does faster loan growth lead to higher loan losses? *Econ Rev Fed Reserve Bank Kansas City* 84: 57–76.
- Kjosevski J, Petkovski M (2017) Non-performing loans in Baltic States: determinants and macroeconomic effects. *Baltic J Econ* 17: 25–44.
- Kjosevski J, Petkovski M, Naumovska E (2019) Bank-specific and macroeconomic determinants of non-performing loans in the Republic of Macedonia: Comparative analysis of enterprise and household NPLs. *Econ Res* 32: 1185–1203.
- Klein N (2013) Non-performing loans in CESEE: Determinants and impact on macroeconomic performance. *Int Monetary Fund Working Pap*, 13–72.
- Kumar RR, Stauvermann PJ, Patel A, et al. (2018) Determinants of non-performing loans in banking sector in small developing island states. *Accounting Res J* 31: 192–213.
- Lee YY, Yahya MHDH, Habibullah MS, et al. (2019) Non-performing loans in European Union: country governance dimensions. *J Financ Econ Policy* 12: 209–226.
- Lestari D (2018) Corporate Governance, Capital Reserve, Non-Performing Loan, and Bank Risk Taking. *Int J Econ Financ Issues* 8: 25–32.
- Louzis DP, Vouldis AT, Metaxas VL (2012) Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *J Bank Financ* 36: 1012–1027.
- Macit F (2012) Bank specific and macroeconomic determinants of profitability: Evidence from participation banks in Turkey. *Econ Bull* 32: 586–595.
- Makri V, Tsagkanos A, Bellas A (2014) Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus* 61: 193–206.
- Mhadhbi K, Terzi C, Bouchrika A (2019) Banking sector development and economic growth in developing countries: a bootstrap panel Granger causality analysis. *Empirical Econ*, 1–20.
- Mohaddes K, Raissi M, Weber A (2017) Can Italy grow out of its NPL overhang? A panel threshold analysis. *Econ Lett* 159: 185–189.
- Mollah S, Hassan MK, Al Farooque O, et al. (2017) The governance, risk-taking, and performance of Islamic banks. *J Financ Services Res* 51: 195–219.

- Nastiti ND, Kasri RA (2019) The role of banking regulation in the development of Islamic banking financing in Indonesia. *Int J Islamic Middle East Financ Manage* 12: 643–662.
- Nkundabanyanga SK, Akankunda B, Nalukenge I, et al. (2017) The impact of financial management practices and competitive advantage on the loan performance of MFIs. *Int J Social Econ* 44: 114–131.
- Ozili PK (2019) Non-performing loans and financial development: new evidence. *J Risk Financ* 20: 59–81.
- Podpiera J, Weill L (2008) Bad luck or bad management? Emerging banking market experience. *J Financ Stability* 4: 135–148.
- Rajha KS (2016) Determinants of non-performing loans: Evidence from the Jordanian banking sector. *J Financ Bank Manage* 4: 125–136.
- Rajan R, Dhal SC (2003) Non-performing loans and terms of credit of public sector banks in India: An empirical assessment. *Reserve Bank India Occas Pap* 24: 81–121.
- Saba I, Kouser R, Azeem M (2012) Determinants of Non Performing Loans: Case of US Banking Sector. *Rom Econ J* 44: 125–136.
- Saif-Alyousfi AY, Saha A, Md-Rus R (2018) Impact of oil and gas price shocks on the non-performing loans of banks in an oil and gas-rich economy. *Int J Bank Marketing* 36: 529–556.
- Salas V, Saurina J (2002) Credit risk in two institutional regimes: Spanish commercial and savings banks. *J Financ Services Res* 22: 203–224.
- Sinkey JF, Greenawalt MB (1991) Loan-loss experience and risk-taking behavior at large commercial banks. *J Financ Services Res* 5: 43–59.



AIMS Press

© 2020 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>)