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Determinants of Commercial Bank Lending Rates in Bangladesh

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Abstract

This paper focuses on the determination of commercial bank lending rates in Bangladesh using autoregressive distributed lag (ARDL) model. The paper finds that deposit rate (DR) and ratio of non-performing loan (NPL) to total loans have both the short-run and long-run impact on commercial banks' lending rate determination when the sample period FY98-FY19 is considered. The paper also identifies that profitability ratio has long-run impact but per capita employment cost has only short-run impact on lending rate determination in Bangladesh. If the data sample includes FY20 which is a different year as government has set a cap on lending rate on 24 February 2020, the coefficients of determinants of lending rate appear to be different than those of the previous sample. For the sample period which includes FY20 data, only deposit rate is found to have both short and long run impact for determining lending rate. All the other variables seem to have no impact on the lending rate determination when the sample period extends up to FY20.

Keywords:

Lending Rate, Credit, Banks, Bangladesh

JEL Classification:

E43, E51, G21

1. Introduction

Until 1990, the lending rate structure of Bangladesh was administered in a mechanism but both types of interest rates (on deposit and lending) were not changed immediately while changing in inflation. Moreover, the Government attempted to give positive incentives to the depositors by raising deposit rate, while lowering the lending rate for investors' interest at the same time. However, after a reform program in the financial sector initiated in 1990, a new interest rate policy was introduced based on the market-oriented interest rate system. Under the new policy, banks were allowed to fix their interest rates for both deposit and lending within a range set by the Bangladesh Bank (BB) for different sectors excluding agriculture, small-medium entrepreneurs (SMEs) and export sectors. However, the range was removed by allowing the banks to set their own interest rates effective from 19February 1997.

As Bangladesh attempts to become the top three fastest growing economies in the world by next decade, according to 7th Five Year Plan of Bangladesh, the investment must be increased. The GDP of Bangladesh has been growing at an average rate of 6.1% with an average gross domestic investment as percent of GDP of 27.2% during FY11 to FY15. The 7th Five Year Plan stipulates average yearly economic growth of 8.25% in FY20 and the average gross domestic investment as percent of GDP should expand from 28.9% in FY15 to around 34.4% by FY20. (Source: 7th Five Year Plan). But because of COVID-19 pandemic, the GDP grew by

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only 5.24% in the FY20 where average gross domestic investment as percent of GDP was 31.75% (Source: 8th Five Year Plan). Moreover, the data show that the credit growth did not increase that much because of high lending rate in last decade with some exception from FY04 to FY14 (shown in appendix table 1). As a result, economic growth had been lower than its potentials as investors determined not to invest because of high cost of borrowing. Considering this situation, Bangladesh Bank issued a circular dated 24 February 2020 that the lending interest rate cannot be more than 9% for advance or investment except credit card with effective from 1 April 2020.[2] It is important to examine which factors are playing determining roles for lending rate in Bangladesh. Setting the lending rate for the banking sector of Bangladesh depends on cost of fund, demand and competitor's interest rate on deposit. The deposits in different banks are their main source of loanable funds. To attract such deposits, banks need to be generous to the depositors by offering higher deposit rates as well as convenient and quicker service. Consequently, banks might adjust the lending rate to lift it faster instantly if interest rates on government bonds and other financial securities increase. However, banks may not automatically decline their lending rates immediately based on market rates. Hence, it becomes costly for customers to turn to a different lender after developing certain business contacts as asymmetric information exists between banks and their customers.

In Bangladesh, the interest on non-bank savings certificates such as National Saving Directorate (NSD) certificates charge a fixed interest rate of 11.28% (with effect from 23.05.15 onward) on saving. As a result, it is very difficult for banks to attract deposits by a deposit rate more than 6% (It was 5.06% in July FY20 and gradually declined to 4.36% in April FY 21), which seems to be low considering that it only meets the current rate of inflation.[3] The lack of loanable funds at schedule banks will therefore tend to push the lending rate up.

As mentioned above, Bangladesh's scheduled banks have the right to set their lending rates according to their own business interests following BRPD circulars, auctions on government bonds and bills. If interest rates of government bonds and bills increase, the lending rate of commercial banks will also increase. Therefore, if the commercial banks set relatively higher interest rate on lending, there will have possibility of higher risk of non-performing loans (NPL) in banking sector. Moreover, in most cases, these non-performing loans (NPLs) cause dual problem of adverse selection and moral hazard, which arise in the presence of asymmetric information where the borrower has more information than the lender.

Considering the importance of lending rate determination, Rouf and Chowdhury (2015) analyzed the factors that are liable for high lending rate in Bangladesh and found that deposit rate, excess reserve, consumer price index (CPI) and policy rate significantly affect commercial bank lending rate. However, they did not analyze the dynamic impact (short and long run impact) of determinants on lending rate.

This research attempts to find the determinants of commercial bank lending rate in Bangladesh considering the dynamic impact. Therefore, the objective of the study is to find out the magnitude or related factors that affect the interest rate on lending in Bangladesh.

The remaining parts of the paper are furnished in several sections. A brief literature review is discussed in the section 2 followed by model specification in section 3. Section 4 reports the empirical results. Finally, section 5 contains a summary of the findings, conclusion and policy recommendation.

2. A Brief Literature Review

As the main objective of this research is to find out the determinants of lending interest rate in Bangladesh, the literature review section analyzes and integrates information regarding lending rate determination in Bangladesh. Consequently, this section proceeds with focusing on the theoretical perspective of lending rate

[2] BRPD Circular No: 03, Dated: 24 February 2020
[3] Source: Monthly Economic Trend, January 2021, Bangladesh Bank.

determination in sub-section 2.1, followed by empirical evidence from both international and domestic context in sub-section 2.2 and finally discusses the literature gap in sub-section 2.3.

2.1 Theory related to interest rate determination

Theoretically the interest rate on lending is broadly determined by five approaches such as (i) Classical theory of interest rate determination or Real theory of interest rate determination (ii) Neo-classical theory of interest rate determination or Loanable fund theory of interest rate determination (iii) Interest rate determination through Keynesian theory of liquidity preference (iv) Neo-Keynesian theory of interest rate determination or Modern theory of interest rate determination (v) Interest rate determination by Fisher's model approach.

Classical theory of interest rate determination or real theory of interest rate determination was introduced by Cassels (1903), A.C Pigou (1936) and then developed by Taussing (2013) and Walras (2014). They all found that real factors such as productivity determine the real interest rate. In this theory, interest rate is determined by the intersection of demand for money and supply of money for investment. Following classical theory, D.H. Robertson (1937) developed the theory of neo-classical regarding interest rate determination based on loanable fund by incorporating both real sectors and monetary sectors. The difference between classical theory and neo-classical theory is that in classical theory only saving (saving indicates goods and services consumed for productive purposes instead of money) is considered for investment whereas in neo-classical theory savings including hoarded wealth, banks credit, disinvestment wealth are considered as loanable fund for investment.

J.M Keynes (1936) determined interest rate through the theory of liquidity preference. According to his theory, interest rate is the point at which demand for money is equal to supply of money in the money market. In this connection, the interest rate can be determined by changes in the money supply by central bank through open market operations either purchasing or selling bonds. Interest rate is also determined by cash reserve ratio which is set by the central bank of a country. On the other hand, the demand for money is the demand for currency that people hold and the reserves maintained by the banks. For example, Gambacarta (2008) pointed out that a rise in the money market rate surges the opportunity cost of other forms of financing such as bonds, National Saving Certificate etc., which makes lending rate more attractive. This form of mechanism increases demand for money and consequently raises lending rate. Therefore, the interest rate is the equilibrium magnitude of demand for and supply of money. Commercial banks balance sheet can be another approach of interest rate determination as commercial banks are operating as oligopolistic market where banks set lending rate considering demand for loans and cost of the fund of that loan. Following Keynes, Hicks (1983) develops a modern theory based on savings and investment form classical theory of interest, demand for money and supply of money from Keynes's liquidity preference in which interest rate is determined jointly from goods market and money market through IS and LM curve where IS curve represents saving and investment in the goods market and LM curves shows equilibrium in the money market for real money balance. Besides these theories, Fisher (1907) postulates a new approach for interest rate determination where interest rate is proportionately changed by expected rate of inflation. However, this change may not necessarily hold in an economy due to a variety of institutional factors observed by Felstein and Eckstein (1970).

2.2 Empirical evidence of determinants of interest rate

Macroeconomic indicators such as economic growth, inflation and interest rate reflect how well a country's financial stability is. According to the Keynesian income identity, investment is one of the key elements of gross domestic product (GDP). But investment is inversely related to interest rate on lending. If a country has unusual lending rate, investment will be interrupted. Therefore, it is important to keep the lending rate in a suitable condition which means not too high or too low. Due to persistent high lending rate, Bangladesh Bank sets 9% lending interest rate cap with effectivefrom1 April 2020 in order to reduce interest rate spread for encouraging the investment activities.

Previous study by Victor and Eze (2013) suggest that lending rate as well as monetary policy measure the performance of banks because they found that lending rate and monetary policy have significantly positive impact on deposit in Nigeria. Lawrence and George (2016) found that interest rate on lending in Ghana is positively affected by nominal exchange rate and monetary policy of central bank but negatively affected by budget deficit, real GDP and inflation. Therefore, commercial banks require more emphasis on credit risk and liquidity ratio because it weakens loan disbursement and makes bank insolvent (Mitku, 2014).

In the context of Thailand, Menkhoff and Suwanaporn (2007) examine the determinants of bank lending in Thailand. They found that the increase in interest rate on deposit to compensate their increased risk and to control the potential loss of non-performing loans (NPL) are liable for high lending rate. Therefore, they suggest that banks require to be cautious in lending. Banks should not charge too low lending rate as the interest from the loan will not cover the cost of fund or too high lending rate that creates an adverse situation for the borrowers.

The performance of loan in the banking sector depends on its size, liability, non-performing loans (NPL) to total loans and inflation (Tomak, 2013). Timsina (2014) has tried to determine commercial bank lending behavior in Nepal. The analyst analyzes data from time series using Ordinary Least Square (OLS) technique where private sector credit is the dependent variable, and deposit, interest rate on deposit, cash reserve requirement ratio (CRR), liquidity ratio, GDP, inflation and exchange rate are the explanatory variables. The author has found that GDP and liquidity ratio of schedule banks have the biggest impact on their lending. Following Timesina, Bhattarai (2015) analyzes and suggests that the lending rate of commercial bank in Nepal is influenced by operating cost of bank, profitability ratio and the risk of bad loan.

Cuberoet al. (2016) express their preliminary thoughts regarding bank lending rate and spread of interest rate of Bangladesh in the IMF country report in January 2016. They explore that inflation, high NPLs, low recovery ratios for bad loans are the main drivers of higher lending rate and increased interest rate spreads in Bangladesh; however, they did not use any statistical tool or time series technique to analyze the data. They applied trend analysis only in order to explain their thoughts in the country report. Hence, there is a room for dynamic quantitative analysis in order to identify the lending rate determinants.

2.3 Establishing the bridge on the literature gaps in Bangladesh

According to contemporary empirical literature, the lending rate depends on a variety of factors. Younus et.al. (2020) tried to identify the factors and determinants of lending rate behavior in Bangladesh by using Ordinary Least Square (OLS) method spanning quarterly data from 2010 to 2018. They found that deposit rate is the only determining factor of lending rate for all kinds of banks (SCBs, PCBs, SPBs and FCBs) in Bangladesh. National savings certificate (NSC) rate (both 3-year and 5-year) does not have impact on lending rate for all kinds of banks except State Owned Commercial Banks (SCBs). Moreover, they found that Non-performing Loan (NPL) has impact only in SCBs but the sign of the coefficient is negative whereas private sector credit has no impact on lending rate in Bangladesh. This work was the first attempt of lending rate determination in Bangladesh. The authors critically analyze the data to find out the determinants of lending rate; however, they did not analyze any dynamic impact of the determinants for short-run, medium run or long-run.

Rouf and Chowdhury (2015) attempted to examine the factors that influence commercial banks' lending rates in Bangladesh using Ordinary Least Square (OLS) technique based on the time series data spanning 1994-2014 and found that Consumer Price Index (CPI), excess reserve, and deposit rate effect significantly on commercial banks' lending rate. However, they did not find non-performing loan (NPL) as statistically significant, although it is one of the most important factors forcing banks to fix high interest rates on lending.

Moreover, they did not use cointegration technique to analyze or identify whether there exists any long-run equilibrium relationship among the selected variables.

Rahman et. al. (2019) identify whether banks follows single digit interest rate by scrutinizing the factors of lending rate and deposit rate in Bangladesh. Authors found that loans related to consumer's credit, constructions, transportation and trade with green and SME finances have more than 9 percent interest rate while weighted average deposit rate is less than 6 percent for the whole banking sectors. In addition, they found that cost of the fund, deposit rate offered by others banks, market rate, demand and supply of loanable funds, regulatory compliances, assets-liabilities mismatch and NPLs significantly influence lending rate. This is the first paper which analyzes the single digit interest rate in the perspective of Bangladesh; however, it is limited only static analysis instead of dynamic analysis. As there was no significant study on determining dynamic factors (short-run or long-run) of commercial bank lending rate in Bangladesh, this research tries to overcome the limitations of the earlier studies and hence find determinants of commercial bank lending rate and its implication for the economy of Bangladesh.

3. Sources of data and Methodology

3.1 Variable selection and Sources of data: Data on lending rate (LR), deposit rate (DR), per capita employment cost (PCEC), profitability ratio (PFR), ratio of net non-performing loan to total loans (NPL) of commercial banks, national saving interest (INSI) rates were collected from various publications of Bangladesh Bank (central bank of Bangladesh). Data on the ratio of money supply to GDP (MSGDP) were collected from World Development Indicators (WDI) of World Bank spanning fiscal year 1997-1998 to 2019-2020.

3.2 Model Specification: This research employed the time series regression method for empirical analysis of the lending rate on other regressors that are identified in the literature review.

The model can be specified implicitly as follows:

$$LR_t = f(DR_t, PCEC_t, PFR_t, NPL_t, INSI_t, MSGDP_t, Z_t)$$

where LR_t= lending rate at year *t*, DR_t= deposit rate at year *t*, $PCEC_t$= per capita employment cost at year *t*, PFR_t= profitability ratio of commercial bank at year *t*, NPL_t=ratio of net non-performing loan to total loans at year *t*, $INSI_t$= national saving interest at year *t*, $MSGDP_t$ = ratio of money supply to GDP at year *t*, and Z_t= variables which are not included in the model at that time *t*.

Following Rouf and Chowdhury (2015), this paper developed the lending rate model for Bangladesh explicitlyas:

$$LR_t = \alpha_0 + \beta_1 DR_t + \beta_2 PCEC_t + \beta_3 PFR_t + \beta_4 NPL_t + \beta_5 INSI_t + \beta_6 MSGDP_t + Z_t$$

Before analysis of the data, the variables were tested by the Augmented Dickey Fuller (ADF) test to ensure whether the variables have unit root or not.

3.3.1 Testing the Unit Root: According to Engle and Granger (1987), most of the time series in macroeconomic variables are non-stationary at levels. Therefore, in order to seek for proper methodology to establish the economic relationship among the macroeconomic variables, checking stationarity of the variables is required for time series data. Otherwise, the results of the regression will be spurious (nonsense). A variable is said to be stationary if its ADF values larger than the critical values.

Then, cointegration test was used to identify whether long run equilibrium relationship exists among the selected variables or not.

3.3.2 Testing the Cointegration: In cointegration test, null hypothesis is a series that are not cointegrated whereas alternative hypothesis is a series of cointegration among the selected variables. If the linear combination of selected time series variables is integrated of order 1 i.e., I (1), then the variables will be stationary as well as cointegrated at first difference. This implies that, in the short run, time series variables may fluctuate from one another; however, they will proceed to gather in the long run. In order to examine whether the long run equilibrium relationship exists among the selected variables or not, the Johansen System Cointegration Test for multivariate is used.

In time series analysis, cointegrating regression model only pay attention to the long-run equilibrium relations, and does not consider any short-run dynamics explicitly. However, time series modeling is not only for short run dynamics but also for long run equilibrium relationship simultaneously. Therefore, in order to test the presence of cointegration and to estimate the long-term and short-run coefficients jointly, the method of bounds testing procedure first introduced by Pesaran and Shin (1999) and later developed by Pesaran, Shin, and Smith (2001) are carried out. This bound testing approach has two main advantages while comparing with other cointegration techniques. First, the underlying regressors do not necessarily require only I (0) or only I (1) or mutually (1) by the bounds test. Second, the bounds test might be applicable even in a very small sample size. The statistic regarding this technique is Wald-statistic or F-statistic, which is a similar kind of generalized regression by Dickey-Fuller. This statistic is generally applied for testing the lag level of variables significantly. If the calculated value of F-statistic falls outside the range of critical bounds, then null hypothesis of no cointegration i.e., there is no relation among the selected variables in the long run is rejected. Next, if the relationship in the long run is found, a two-step procedure will be carried out in the next stage in order to estimate the model. This recent cointegration technique, autoregressive distributed lag (ARDL) model, is initiated by Pesaran et al. (2001). In the initial step, the lag length of the ARDL model is determined by using an appropriate lag selection criterion and in the next step, the selected model is estimated by the technique of ordinary least squares (OLS).

Following Halicioglu (2004), the general ARDL considering short-run and long-run jointly takes the form as

$$\Delta LR_t = \mu + \sum_{i=1}^{n} \alpha_i \Delta LR_{t-i} + \sum_{i=0}^{n} \beta_i \Delta DR_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta PCEC_{t-i} + \sum_{i=0}^{n} \delta_i \Delta PFR_{t-i} + \sum_{i=0}^{n} \theta_i \Delta NPL_{t-i} + \sum_{i=0}^{n} \vartheta_i \Delta INSI_{t-i} + \sum_{i=0}^{n} \pi_i \Delta MSGDP_{t-i} + \alpha LR_{t-1} + \beta DR_{t-1} + \Upsilon PCEC_{t-1} + \delta PFR_{t-1} + \theta NPL_{t-1} + \vartheta INSI_{t-1} + \pi MSGDP_{t-1} + \varepsilon_t$$

Where μ and ε_t are assumed to be drift component and white noise error process respectively.

However, the reliability of the results based on ARDL model should be tested by diagnostic tests and stability tests.

3.4 Testing the Reliability and Sensitivity of the model:

3.4.1 Diagnostic tests: Lagrange multiplier (LM) test is used for serial correlation of residuals, which is also known as the Breusch-Godfrey (BG) test. The advantage of BG test over Durbin-Watson (DW) test is that it allows not only non-stochastic regressor such as lag values of the regressand but also higher-order autoregressive schemes, for instance AR (1), AR (2) etc. Moreover, moving averages of white noise error terms for higher order can also be tested by BG test. The null and alternative hypotheses of the test are as follows:

H_0: No serial correlation versus H_1: There exits serial correlation

Ramsey's regression specification error (RESET) test is used for measuring misspecification of the functional form. The null and alternative hypotheses related to Ramsey's RESET are given below:

H_0: Model is not mis-specified against H_1: Model is mis-specified

The advantage of using the Ramsey's RESET test is that it is easy to apply and there is no need to specify alternative model.

In time series regression, it is better to test autoregressive conditional heteroscedasticity (ARCH) effect before accepting Durbin-Watson d statistic value for testing heteroscedasticity. The ARCH test is used to check whether the model pass the diagnostic test or not. Therefore, the null and alternative hypotheses are as follows:

H_0: Homoscedasticity whereas H_1: Heteroscedasticity

3.4.2 Stability tests: In long time series data, it is common to have one or multiple structural breaks. In this connection, the consistency of short-term and long-term coefficients is tested using the cumulative sum (CUSUM) and the cumulative sum (CUSUM) square tests, which were suggested by Brown et al. (1975). Lending rate (LR) as dependent variable is presented in the plot of CUSUM test statistic that falls between the critical bounds at 5% significance level, which confirms that the estimated parameters are reliable over the period 1998-2020.

4. Empirical Results

4.1 Testing the Unit Root: The descriptive statistics of the selected variables carried out at the very beginning helped observe the sample property. Moreover, correlation analysis was conducted to investigate whether any co-movement among the selected variables exist or not. In the second step, test of stationarity was carried out applying the ADF test, which shows that among the selected variables, deposit rate (DR), ratio of net non-performing loan (NPL) to total loans are stationary at level i.e., I (0), and lending rate (LR), per capita employment cost (PCEC), profitability ratio (PFR), national saving interest (INSI) and ratio of money supply to GDP (MSGDP) are stationary at first order difference i.e., I (1). Therefore, if we regress lending rate (LR) on other variables by using Ordinary Least Squares (OLS), then the estimated coefficients of LR at level will be spurious. Consequently, it is better to test the cointegration before estimating the coefficients.

4.2 Testing the Cointegration: Since the null hypothesis that means time series is non-stationary, which was rejected on the basis of ADF test, consequently the time series data of selected variables are integrated of order 1 i.e., I(1). This means that there exists a long run linear relationship among the variables. Therefore, to establish whether the long run equilibrium relationship exists among the selected variables or not, the Johansen System Cointegration Test for multivariate is carried out, which shows both Trace test and the test of maximum Eigen value with 5 cointegrating equations at 5% level of significance. Therefore, the Johansen System Cointegration Test for multivariate indicates same result with trace test and test for maximum Eigen values because both tests which indicate 5 cointegration relations. However, the Johansen cointegration test for cointegration does not provide which variables have the long-run relationship. Hence, it is desired to run ARDL following the methodology in sub-section 3.3.2. However, it is imperative to select lag through lag selection criteria before analyzing ARDL.

Table 3 Estimation results of ARDL controlling MSGDP, FY 1997-98 to 2018-19

	Dependent Variable: Lending rate (LR)				
Regressor	*Model 1*	*Model 2*	*Model 3*	*Model 4*	*Model 5*
DR Long-run	1.32*				
	(0.00)				
Short-run	1.00*				
	(0.00)				
PCEC		49.32			
		(0.71)			
		8.35			
		(0.37)			
PFR			11.80***		
			(0.08)		
			-4.48		
			(0.59)		
NPL				0.21***	
				(0.08)	
				-0.10**	
				(0.03)	
INSI					1.42
					(0.68)
					0.56
					(0.30)

Source: Author's own calculation
Where *, ** and *** denote at 1%, 5% and 10% level of significance respectively.

The estimation results shown in Table 3 are obtained from ARDL using Lending rate (LR) as response and other variables as stimulus after controlling the ratio of money supply to GDP. The first row indicates the different models while using different exogenous and the rest of the rows show the coefficients in the long-run and short-run with respective p-values in the brackets.

The coefficient $\hat{\beta}$ =1.32 in the second column of Table 3 indicates positive relationship between lending rate and deposit rate in the long-run which is expected. Moreover, there exists short-run positive relation between lending rate and deposit rate as $\widehat{\beta_0}$ =1.00, which indicates that if deposit rate increases by 1 percent in the short-run, the lending rate will be increased by 1.00 percent at 1% level of significance.

In the third column of Table 3, the coefficient $\hat{\Upsilon}$ = 49.32 shows expected positive relation between lending rate and per capita employment cost in the long-run after controlling the ratio of money supply to GDP. As there exits long-run equilibrium relationship between lending rate and per capita employment cost, the short-run relationship has been observed and found the coefficient $\hat{\Upsilon}_0$ = 8.35 which is insignificant.

In the fourth column of Table3, the long-run profitability ratio of schedule banks is $\widehat{\delta}$= 11.8 which shows that if profitability ratio increases by 1 percent, then lending rate will be increased by 11.8 percent and it is significant at 10% level of significance. However, profitability ratio of schedule banks in the short-run is insignificant as p-values are exceeded compared to the level of significance. It might happen due to competitiveness of the commercial banks while setting lending rate in the short-run.

The coefficient of ratio of non-performing loan to total loans in the fifth column of Table 3 is estimated from Model 4. The coefficient $\hat{\theta}$ = 0.21 shows the positive relation between lending rate and ratio of non-performing loan to total loans in the long-run. Therefore, if the ratio of non-performing loan to total loans increases by 1 percent, the lending rate will rise by 0.21 percent in the long-run at 10% level of significance. However, in the short-run, the estimated coefficient $\widehat{\theta_0}$ = -0.10 which shows unexpected negative relation between lending rate and ratio of non-performing loan to total loans. The reason behind this negative relation

is that sometimes banks reschedule the non-performing loans after taking down payment and hence decrease the interest rate on lending in the short-run. Consequently, if the ratio of non-performing loan to total loans increases by 1 percent, the lending rate decreases by 0.10 percent in the short at 1% level of significance due to reschedule. When banks fail to recover the bad loans in the long-run, the lending rate is increased by the banks.

The coefficient of national saving interest is insignificant both in the long-run and long-run. As Government impose 10% income tax (dated 2 July 2019) on National Savings Certificate (NSD) under Income Tax Ordinance, 1984 Section 52D, hence saving interest is insignificant on lending rate determination.

Now, ARDL model is estimated (presented in appendix in table 4 and table 5) considering all covariate and presented below:

Table 4. The result of Cointegration Test using ARDL,FY 1997-98 to 2018-19

Panel I: Bounds Testing to Cointegration		
Estimated Model	$f(LR_t/DR_t, PCEC_t, PFR_t, NPL_t, INSI_t)$	
Optimal Lag Length	(1, 1, 1,10, 0, 0)	
F-statistics	**4.30****	
Critical Values (T=21)		
	Lower Bounds I(0)	Upper Bounds I(1)
1 percent level	4.134	5.761
5 percent level	2.91	4.193
10 percent level	2.407	3.517
Panel II: Diagnostic tests	Statistics	P-value
R^2	0.981054	-
Adjusted R^2	0.9655	-
F-statistics	63.2876*	0.0000
Breusch –Godfrey LM test	1.3572	0.3054
ARCH test	0.4837	0.4957
Ramsey RESET	0.1805	0.6799
CUSUM	Stable	-
$CUSUM_{sq}$	Stable	-

Source: Author's own calculations

where *,** and *** indicate significance levels at 1%, 5% and 10% respectively.

Table 5. Long run Results and Their Robustness, FY 1997-98 to 2018-19

	Dependent Variable LR	
Independent Variable	**ARDL coefficient**	**P-value**
Constant	1.2718	0.4134
DR	1.1971*	0.0000
PCEC	-1.0524	0.1471
PFR	4.8963	0.1539
NPL	0.0614**	0.0108
INSI	0.0910	0.2610

Source: Author's own calculations.

Note: * and ** indicate the significance at 1% and 5% levels.

In panel II of table 4, the LM statistics satisfy no serial correlation of accepting H_0 at 1% level of significance as p-value>level of significance.

Following the methodology, the ARCH test and Ramsey RESET test explain that there is no heteroscedasticity and misspecification in the selected model.

In table 4, the parameter consistency based on CUSUM and CUSUMsq plot show that they are stable at 5% level of significance under the critical bound, which is shown in appendix in graph 1.

The estimation results, shown in Table 5, indicate that the coefficient of deposit rate (DR) is statistically significant at 1% level of significance with expected sign as the probability value is 0.0000. Moreover, the coefficient of ratio of net non-performing loan (NPL) to total loans is statistically significant at 5% level of significance with expected sign as the probability value is 0.0108.

The result shows that there exists a positive relationship between the lending rate (LR) and deposit rate (DR) in the banking sector. This means if DR increases, it leads to an increase in lending rate. If deposit rate (DR) is increased by 1 percent, then in the long run the lending rate (LR) is increased by 1.1971 percent at 1% level of significance under ceteris paribus. As LR is the yardstick of loan transaction, therefore, commercial banks depend on DR (the less, the better) in order to accelerate loan disbursement or investment, which improves the overall macroeconomic situation of the country.

The most important key factor for determining lending rate is the non-performing loan or bad loan. This variable is included in the analysis because the concept of collecting data on that variable comes in 1990s. Considering the situation, which is worsening continuously, government has taken initiatives to collect the data. In the long-term, if the net non-performing loan (NPL) to total loans is increased by 1 unit, the lending rate (LR) is increased by 0.0614 percentage points. Therefore, it causes the high lending rate in the banking sector.

Since there exists long-run equilibrium relationship among the selected variables, it is necessary to analyze the short-run relationship. In this connection, error correction mechanism (ECM) was carried out to tie the short-run behavior of variables to its long-run.

Table 6. Short run Results, spanning Fiscal Year 1997-1998 to 2018-2019

Panel I	Dependent Variable LR		
Variable	**Coefficient**	**T-Statistics**	**P-value**
Constant	-1.4080	-6.8199	0.0000
Δ DR_t	1.0721*	14.8183	0.0000
Δ $PCECR_t$	-10.3491	-5.4519	0.0002
Δ PFR_t	1.5102	0.8740	0.4008
R^2	0.9400	-	-
Adjust R^2	0.9294	-	-
D.W stat	1.9869	-	-
Panel II: **Test**		χ^2**-statistics**	**P-value**
χ^2 Serial		4.8662	0.0878
χ^2 ARCH		0.5233	0.4694
χ^2 Hetero		16.7663	0.1150
χ^2 Reset		0.3758	0.5398

Source: Author's own calculations.

Note:χ^2 Serial is the Breusch-Godfrey-Pagan LM test statistic for testing no serial correlation, χ^2 ARCH is used to test "no autoregressive conditional heteroscedasticity" by the Engle's test statistic, χ^2 Hetero test statistic is used for testing the heteroscedasticity and χ^2 Reset is the Ramsey's test statistic for testing misspecification of the functional form. Also, *, ** and ***indicate the significant levels at 1%, 5% and 10% respectively.

In Table 6, $\widehat{\beta_0}$ = 1.0721 shows that 1 percent increase in deposit rate in the short-run at period t leads to an increase 1.0721 percent in lending rate in the short-run at period t under ceteris paribus and this increment is statistically significant at 1% level of significance.

The short-run coefficient of per capita employment cost is significant but unexpectedly negative due to shock such as technology import, training to improve shills of employee etc. However, it is insignificant in the long-run.

The adjusted R^2 is quite high in the short run model as shown in Column 2 of Table 6. However, the dominance of return on asset, excess reserve ratio, Cash Reserve Requirements (CRR), lack of user-friendly environment for investment, political instability and other factors which are non-economic may play considerable role for adjusted R^2.

Considering the data from fiscal year 1997-98 to 2019-20, we get the results as follows:

Table 7. The result of Cointegration Test using ARDL, FY 1997-98 to 2019-20

Panel I: Bounds Testing to Cointegration		
Estimated Model	$f(LR_t/DR_t, PCEC_t, PFR_t, NPL_t, INSI_t)$	
Optimal Lag Length	(1, 0, 0,0, 0,0)	
F-statistics	**12.24****	
Critical Values (T=22)		
	Lower Bounds I(0)	Upper Bounds I(1)
1 percent level	3.9	5.419
5 percent level	2.804	4.013
10 percent level	2.331	3.417
Panel II: Diagnostic tests	Statistics	P-value
R^2	0.9569	-
Adjusted R^2	0.9398	-
F-statistics	55.5947*	0.0000
Breusch –Godfrey LM test	0.8704	0.5387
ARCH test	0.2114	0.6508
Ramsey RESET	0.3673	0.5542
CUSUM	Stable	-
$CUSUM_{sq}$	Stable	-

Source: Author's own calculations

where *,** and *** indicate significance levels at 1%, 5% and 10% respectively.

Table 8. Long run Results and Their Robustness, FY 1997-98 to 2019-20

	Dependent Variable LR	
Independent Variable	**ARDL coefficient**	**P-value**
Constant	2.007	0.5902
DR	1.3035	0.0000
PCEC	-3.0747	0.0982
PFR	1.6600	0.8128
NPL	0.0265	0.5587
INSI	0.1014	0.6156

Source: Author's own calculations.

Note: * and ** indicate the significance at 1% and 5% levels.

Table 9. Short run Results, spanning Fiscal Year 1997-1998 to 2019-2020

Panel I	Dependent Variable LR		
Variable	Coefficient	T-Statistics	P-value
Constant	1.6222	0.5220	0.6093
DR_t	1.0534*	4.6717	0.0003
$PCECR_t$	-2.4848	-1.8073	0.1090
PFR_t	1.3415	0.2458	0.8092
NPL_t	0.0214	0.6078	0.5524
$INSI_t$	0.0819	0.5583	0.6050
R^2	0.8346	-	-
Adjust R^2	0.8346	-	-

Panel II: **Test**	χ^2**-statistics**	**P-value**
χ^2 Serial	1.2212	0.5430
χ^2 ARCH	0.2312	0.6307
χ^2 Hetero	5.6813	0.4598
χ^2 Reset	0.5697	0.4504

Source: Author's own calculations.

Note:χ^2Serial is the Breusch-Godfrey-Pagan LM test statistic for testing no serial correlation, χ^2 ARCH is used to test "no autoregressive conditional heteroscedasticity" by the Engle's test statistic, χ^2 Hetero test statistic is used for testing the heteroscedasticity and χ^2 Reset is the Ramsey's test statistic for testing misspecification of the functional form. Also, *, ** and ***indicate the significant levels at 1%, 5% and 10% respectively.

From Table 8 and Table 9, we found that all the coefficients except deposit rate have no impact after inclusion of FY20 data. It might happen as lending rate was administered by Banking Regulation and Policy Department of Bangladesh Bank through issuing a circular regarding interest rate on lending dated 24 February 2020. In this circular, the lending rate was set not more than 9% for all loans and advances except credit card with effective from 1 April, 2020. This capping on the lending rate may affect its determinants.

5. Conclusion

Interest rate on lending is one of the important tools of a modern banking system, which greatly impacts economy. The higher the rate of interest on loans the lower will be the investment and thereby it will negatively impact the economic growth. This study attempts to investigate the possible factors that are liable for persistent high lending rate in Bangladesh. The annual data of the variables – deposit rate, per capita employment cost of schedule banks, profitability ratio of commercial banks, ratio of non-performing loan to total loans, national saving interest, ratio of money supply to GDP were used as explanatory variables, following theoretical evidence of lending rate determinants from different countries. Several time series econometric techniques such Augmented Dickey Fuller test for testing unit root, Johansen Cointegration test for long-run equilibrium relation, Auto Regressive Distributed Lag (ARDL) model for estimating coefficients were employed. This research found that deposit rate and ratio of non-performing loan to total loans have impact on lending rate determination in Bangladesh both in the short-run and long-run after controlling the ratio of money supply to GDP and considering data from fiscal year 1997-98 to 2018-19. For instance, if deposit rate increases by 1 percentage then the lending rate will be increased by 1.32 percentage point in the long-run which is statistically significant at 1% level of significance. If the net ratio of non-performing loan to total loans increases by 1 percent, the lending rate will rise by 0.21 percentage point in the long-run at 10% level of significance. Moreover, profitability ratio has long-run impact on lending rate determination in Bangladesh. Furthermore, the paper found that deposit rate in both the long-run and short-run has an impact on

lending rate whereas ratio of non-performing loan to total loans has only the long-run affect behind lending rate in the banking sector. Therefore, deposit rate, profitability ratio, and net non-performing loan to total loans are the determinants of commercial banks' lending rate in Bangladesh. These findings will help not only the Central Bank of Bangladesh and commercial banks but also the policy makers as well as government to take bank lending rate policy after fine-tuning its determinants. Moreover, based on the above findings, the following recommendations should be taken regarding lending rate so that lending rate becomes conducive to investment and continuous economic growth in Bangladesh.

Policy recommendations:

- Since higher profitability ratio is one of the factors that are liable for high lending rate. Therefore, the management should think how to reduce profitability for the welfare of the society. After controlling the ratio of money supply to GDP, in the long-run, if management decreases profitability ratio by 1 percent, the lending rate will be decreased by 11.8 percent which is statistically significant at 10% level of significance.

- It is imperative to strengthen bank governance for improving asset quality because high stock of non-performing loan is a concern in the banking sector. The high ratio of net non-performing loans to total loans reflects financial inefficiency, which should be improved through strengthen the financial intermediaries. As the net ratio of non-performing loan to total loans increase by 1 percentage point the lending rate will rise by 0.0614 percentage point in the long-run. Hence, a stable and capable financial institution is required for higher investment. In this connection, Credit Information Bureau (CIB) should be improved to help banks for better assessment of borrower creditworthiness. Volume of investment should be increased in the quality of lending. Moreover, it is essential to give power to the bank for taking legal action for NPL or bad loan collections, foreclosures without injecting stay order for loan default from the Supreme Court.

- Total volume of saving should be increased by increasing saving rate in order to boost up investment rate.

- In the analysis, deposit rate of the banks is found to have impact on lending rate considering both data samples (FY98 to FY19 and FY98 to FY20). The reason behind the impact is that there is no cap on deposit rate in both samples, while analyzing data. However, after the cap on lending rate introduced by the government on 24 February 2020 with effect from 1 April 2020, all the variables except deposit rate have found no impact on lending rate, seemingly capping on lending has impact on the market channel. Therefore, why the variables have no impact on lending rate while capping of lending interest rate can be an issue of further research.

Appendix

Table 1

Fiscal Year	Total Credit	Credit Growth (%)	Excess Reserve	Lending Rate
2003-2004	119889.6	-	-	-
2004-2005	140409.3	17.12	373.06	10.93
2005-2006	162842.7	15.98	387.33	12.06
2006-2007	189391.1	16.30	563.42	12.78
2007-2008	235732.9	24.47	56.43	12.29
2008-2009	275025.1	16.67	9027.46	11.87
2009-2010	334654.8	21.68	4726.46	11.23
2010-2011	422475.7	26.24	4051.76	12.37
2011-2012	507085	20.03	2831.48	13.88
2012-2013	583077.7	14.99	2035.41	13.61
2013-2014	670166.3	14.94	501.56	13.06

Source: Monthly Economic Trends (Time series data since 1972),
Statistics Department, Central Bank of Bangladesh.

Table 2

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LR)
Selected Model: ARDL(1, 1, 1, 1, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 02/04/21 Time: 13:57
Sample: 1998 2019
Included observations: 21

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.790615	2.212213	0.809422	0.4354
LR(-1)*	-1.407974	0.274324	-5.132529	0.0003
DR(-1)	1.685512	0.358113	4.706643	0.0006
PCEC(-1)	-1.481715	0.988047	-1.499639	0.1619
PFR(-1)	6.893852	4.436396	1.553931	0.1485
NPL**	0.086481	0.031891	2.711800	0.0202
INSI**	0.128161	0.105464	1.215216	0.2497
D(DR)	1.072074	0.170743	6.278870	0.0001
D(PCEC)	-10.34911	4.654539	-2.223444	0.0481
D(PFR)	1.510203	3.889326	0.388294	0.7052

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DR	1.197118	0.082720	14.47194	0.0000
PCEC	-1.052373	0.674689	-1.559791	0.1471
PFR	4.896291	3.197499	1.531288	0.1539
NPL	0.061422	0.020067	3.060847	0.0108
INSI	0.091025	0.076824	1.184847	0.2610
C	1.271767	1.496215	0.849989	0.4134

EC = LR - (1.1971*DR -1.0524*PCEC + 4.8963*PFR + 0.0614*NPL + 0.0910 *INSI + 1.2718)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.299308	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
			Finite Sample:	
Actual Sample Size	21		n=35	
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419
			Finite Sample: n=30	
		10%	2.407	3.517
		5%	2.91	4.193
		1%	4.134	5.761

Table 3

ARDL Error Correction Regression
Dependent Variable: D(LR)
Selected Model: ARDL(1, 1, 1, 1, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 02/04/21 Time: 14:31
Sample: 1998 2019
Included observations: 21

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DR)	1.072074	0.072348	14.81834	0.0000
D(PCEC)	-10.34911	1.898272	-5.451856	0.0002
D(PFR)	1.510203	1.727829	0.874047	0.4008
CointEq(-1)*	-1.407974	0.206452	-6.819875	0.0000

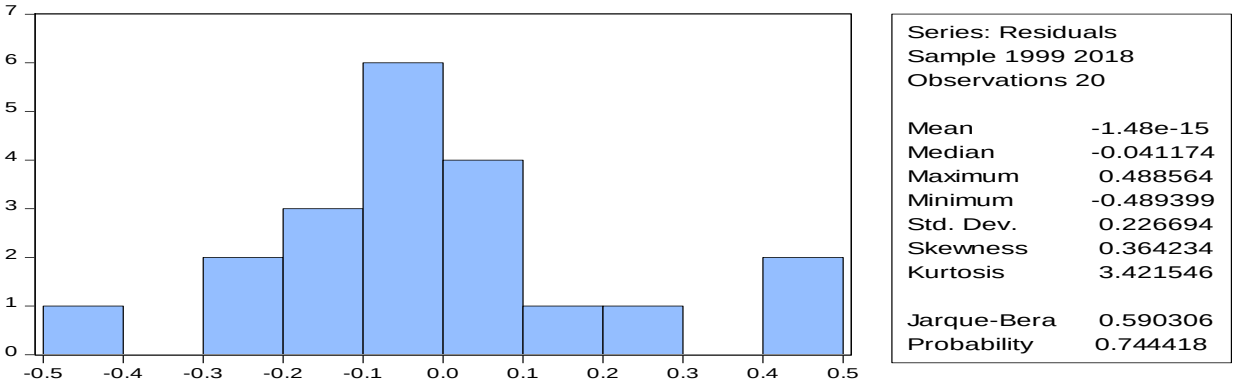
R-squared	0.940026	Mean dependent var	-0.211429
Adjusted R-squared	0.929443	S.D. dependent var	0.816506
S.E. of regression	0.216885	Akaike info criterion	-0.049253
Sum squared resid	0.799667	Schwarz criterion	0.149703
Log likelihood	4.517161	Hannan-Quinn criter.	-0.006075
Durbin-Watson stat	1.986901		

* p-value incompatible with t-Bounds distribution.

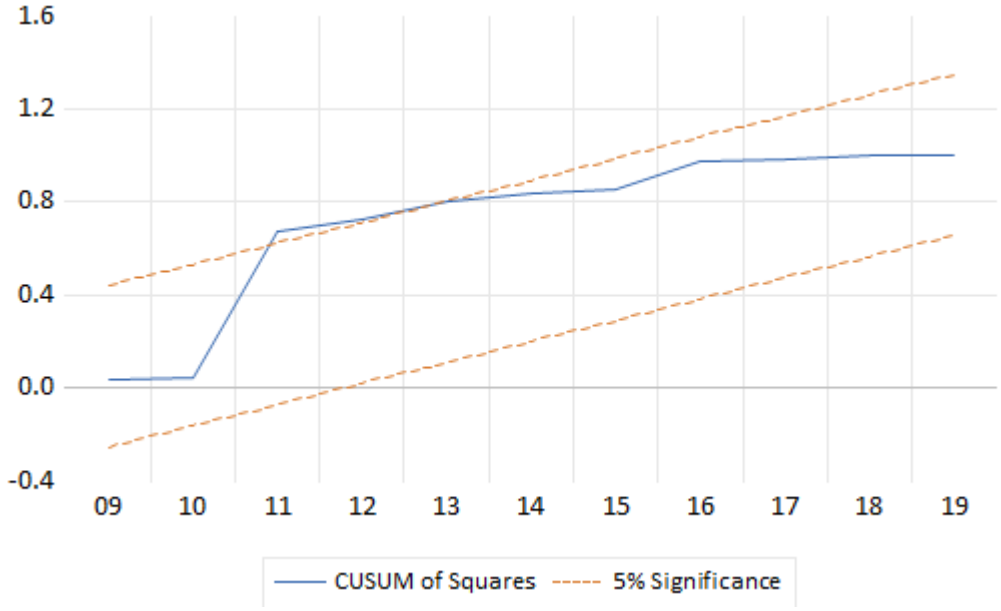
F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.299308	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Chart 1



Graph 1



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