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DOES DOMESTIC CREDIT OF THE BANKING SECTOR PROMOTE ECONOMIC GROWTH? EVIDENCE FROM BANGLADESH

Mohammad Salim Al Mamun (Corresponding author)
Member of Secretariat – Technical and Research
Islamic Financial Services Board (IFSB)
Sasana Kijang, Bank Negara Malaysia, 2, Jalan Dato' Onn,
50480 Kuala Lumpur, Malaysia
Email: salimalmamun@gmail.com

Muhammad Irwan Ariffin
Assistant Professor
International Islamic University Malaysia (IIUM)
P.O. Box 10, 50728 Kuala Lumpur, Malaysia
Email: irwan@iium.edu.my

Zarinah Hamid
Professor
International Islamic University Malaysia (IIUM)
P.O. Box 10, 50728 Kuala Lumpur, Malaysia
Email: inahumkc@iium.edu.my

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ABSTRACT

The objective of the study is to investigate the relationship between domestic credit and economic growth for Bangladesh economy. The paper attempts to link between financial development and economic growth in answering a question whether the credit channelling through banking system goes to productive activities that bring economic growth in a country. Sample data was taken for the period 1975-2016 for year-wise trend analysis while econometric specification applies autoregressive distributed lag (ARDL) model and uses quarterly data for the period 1980Q1-2016Q2. The Bangladesh economy experienced structural changes initiated at the beginning of the 1990s that are addressed in the specification by dividing the full sample period into two sub-samples (19980Q1-1990Q4 and 1991Q1-2016Q2). Overall, the

paper finds that an increase in real domestic credit impacts positively on real GDP and the impact is found to be statistically highly significant. On the other hand, the results indicate that an increase in real lending rates decreases real GDP. However, this result is not statistically significant. Respective policy-makers need to initiate appropriate market-based policy rates that can impact GDP growth through domestic credit channel since this paper finds that domestic credit effectively enhances GDP growth.

Keywords: Economic growth, domestic credit, financial development.

INTRODUCTION

Although Bangladesh economy grew by low rates during the independence decade at the 1970s, it started to grow steadily during 1980s and entered the period of trade liberalisation including reforms of the financial sector undertaking a number of measures during 1990s. Bangladesh economy noticed a remarkable change in the level of GDP growth rates after the financial reforms started at the beginning of the 1990s. The Bangladesh economy grew at the rate of 5.0 percent on average during the 1990s while they were 4.03 percent during 1980s. The impressive growth rates were achieved during the 2000s and it continued at 6 percent growth on average. The Bangladesh economy has been constantly maintaining the high growth rates during the last ten years as at more than 6.2 percent on average.

The banking system is an important segment of the financial systems in Bangladesh. The central bank of Bangladesh (Bangladesh Bank) as monetary authority monitors the banking sector through closer supervision and surveillance measures. Since investment is a precondition for economic activities in a country like Bangladesh, the Bangladesh Bank time-to-time provides policy guidelines so that all the commercial banks in Bangladesh can play an effective role in enhancing sufficient credit to income generating activities which ultimately promote economic growth. However, there is a question that whether the credit channelling through banking systems goes to productive activities and supports economic growth in a country. This is important to find out the

answer to the question in order to achieve inclusive growth for poverty reduction in a country like Bangladesh. This paper select Bangladesh economy as a case study since Bangladesh's poverty rate fell gradually over the years from 82% in 1972 to 12.9% in 2016 (The World Bank, 2018). There is also an impressive progress in the financial development that the available study shows that financial inclusion as percentage of adult population of Bangladesh increased from 65.33 percent in 2004 to 87.23 percent in 2010 (Islam and Mamun, 2011). Since over the years, the Bangladesh economy experienced sustained growth rates which ultimately helped to reduce the poverty rates, therefore, Bangladesh economy is an appropriate case study to find out the answer to the question that whether the economic growth rates of Bangladesh are significantly supported by the flow of domestic credit. A large segment of people in south Asia or even in emerging economies are still extremely poor and the hitherto excluded population from the formal financial sector in those economies can be benefitted from the increased flow of financial access, for example, in this case, the domestic credit in the respective economies. Therefore, the research is also prevalent in the developing and emerging economies in a manner that access to the financial flows can affect the country's economic growth.

Therefore, this paper attempts to understand whether domestic credit as a proxy variable for financial development affects total gross domestic products (GDP) in Bangladesh. The intuition behind the objective is that if the result shows that domestic credit is one of the important determinants of economic growth in Bangladesh, the Bangladesh Bank as the monetary authority can take appropriate policy measures to enhance credit programmes.

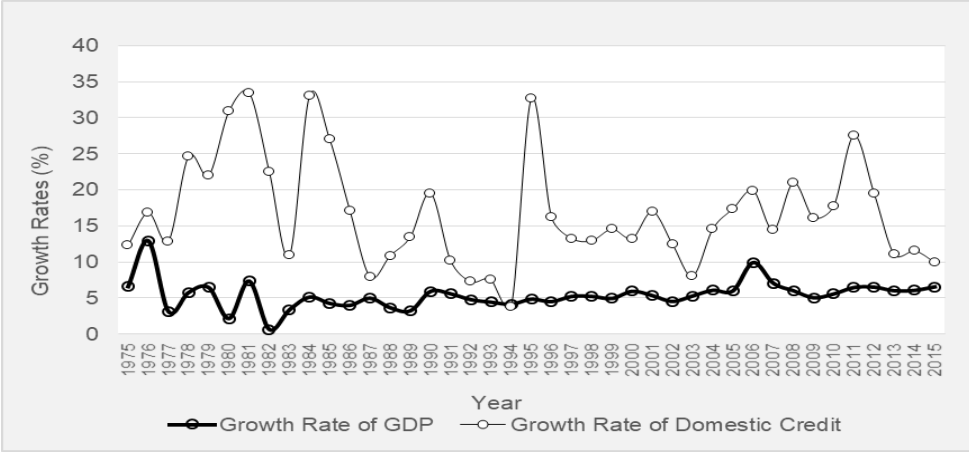
In this paper, the first section discusses introduction, scope, and objective of the paper. Section II provides an introduction to the banking sector of Bangladesh which includes discussion on overall trends on few macroeconomic and monetary policy variables with a view to understanding the long run trend. If there is any fluctuation over the trends, the second section also attempts to address any economic and non-economic factors behind the fluctuation. Section III provides a literature review. Section IV specifies the models for data collection and specification. Section V analyses the data and gives the results. Section VI provides concluding remarks.

INTRODUCTION OF BANKING SECTOR OF BANGLADESH

A total of 57[2] scheduled banks are now operating in the banking sector of Bangladesh which comprises four categories of scheduled banks. Out of the four categories, six are state-owned commercial banks (SCBs), two are state-owned development financial institutions (DFIs)[3], nine are foreign commercial banks (FCBs) and 39 are domestic private commercial banks (PCBs). Out of 39 domestic PCBs, eight are full-fledged Islamic banks. The banking sector in Bangladesh holds the large part of the financial systems in Bangladesh. The banking sector alone accounts for about 95% of the whole financial systems in Bangladesh in terms of assets (Ahmed, 2012). Since the banking sector almost reflects the whole financial systems in Bangladesh, the paper uses banking sector variable (domestic credit) as a proxy for the financial development and attempts to find the impacts of this variable on real economy.

Figure 1 shows the development of long-run trends of economic growth (GDP growth rate in constant prices) and growth rate of domestic credit of the banking sector. From a macroeconomic point of view, the growth rates of GDP show a consistent trend from the early 1990s. Before the 1990s, the indicator shows huge fluctuations. Growth rates of domestic credit always fluctuate during the years under consideration. The fluctuation in growth rates of domestic credit is much higher than that of GDP growth rates; however, there is a consistency in fluctuation between the two indicators over the periods except during the first half of 1990s. The economic history of Bangladesh also justifies this fluctuation as the economy reflects responsiveness to trade liberalisation, financial sector reforms, floating exchange rate regimes that all are implemented during the 1990s and thereafter, the economy proceeds on the smooth and sound footing to the development.

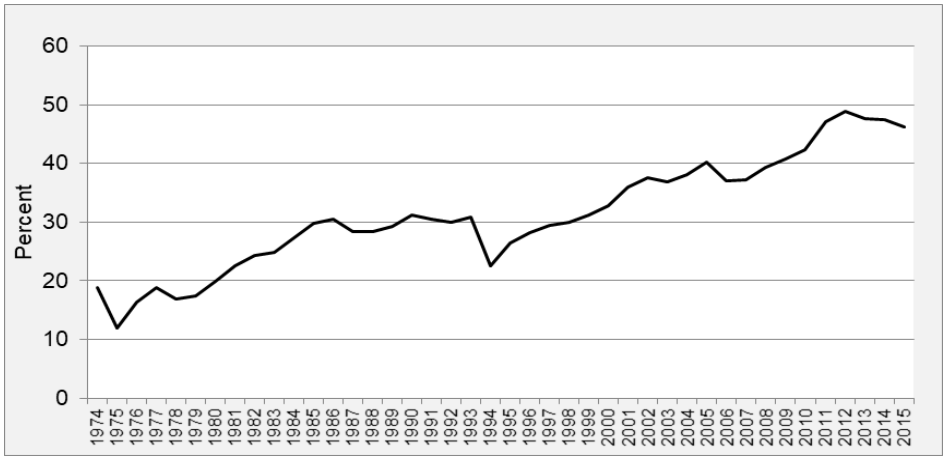
Figure 1: Trends in Growth Rates of GDP and Domestic Credit (constant prices)[4]



Source: Monthly Economic Trends (various issues), Bangladesh Bank, and National Accounts Statistics, Bangladesh Bureau of Statistics

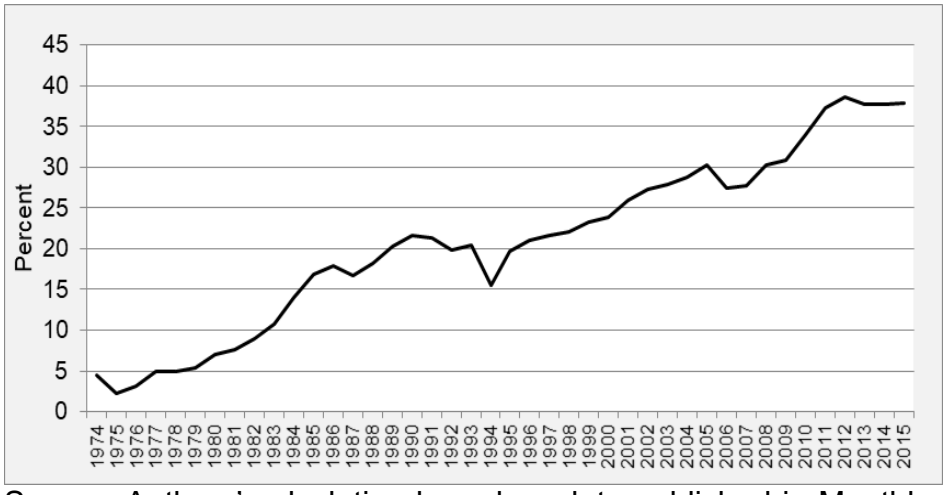
Domestic credit is the aggregate credit provided to both public and private sectors. Since domestic credit is one of the leading indicators of financial development in an economy and it has a direct link to private investment activities, it is worthwhile to observe the trend of domestic credit in private sector. Figure 2 and Figure 3 show the trend of the ratio of domestic credit to nominal GDP and private sector credit to nominal GDP. The ratio of total domestic credit to nominal GDP in 2015 is nearly 2.5 times compared to that of the beginning of 1974, while the ratio of domestic credit to private sector to nominal GDP is more than 8 times compared to that at the beginning of 1974. This reflects the steady growth of financial development and increased activities both in the public and private sector of the country. Domestic credit started to increase substantially after the trade liberalisation in the early 1990s that attracts huge investment in industry and manufacturing activities.

Figure 2: Trend in Domestic Credit as the Ratio of Nominal GDP



Source: Authors' calculation based on data published in Monthly Economic Trends (various issues), Bangladesh Bank, and National Accounts Statistics (various issues), Bangladesh Bureau of Statistics

Figure 3: Trend in Credit to Private Sector as the Ratio of Nominal GDP

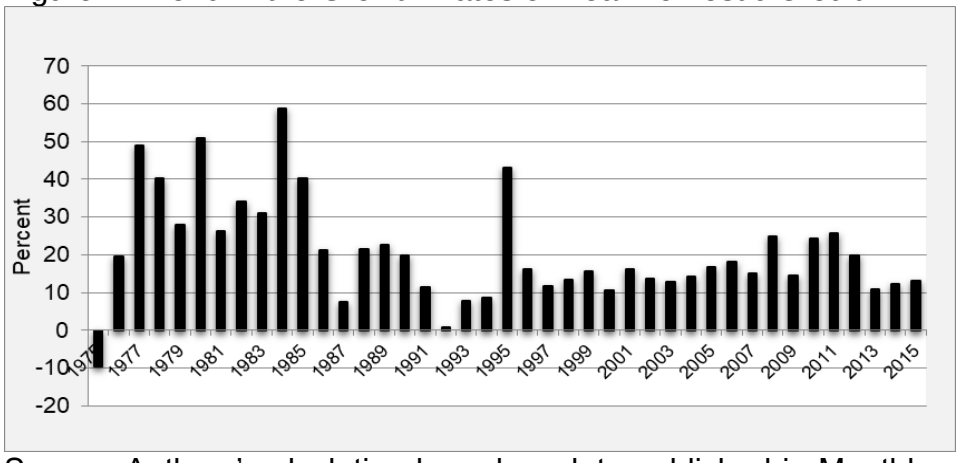


Source: Authors' calculation based on data published in Monthly Economic Trends (various issues), Bangladesh Bank, and National Accounts Statistics (various issues), Bangladesh Bureau of Statistics

However, the growth rates in real terms (Figure 4 and Figure 5) were more stable during and after the 1990s, reflecting discipline in the financial sector after the financial sector reform in the early

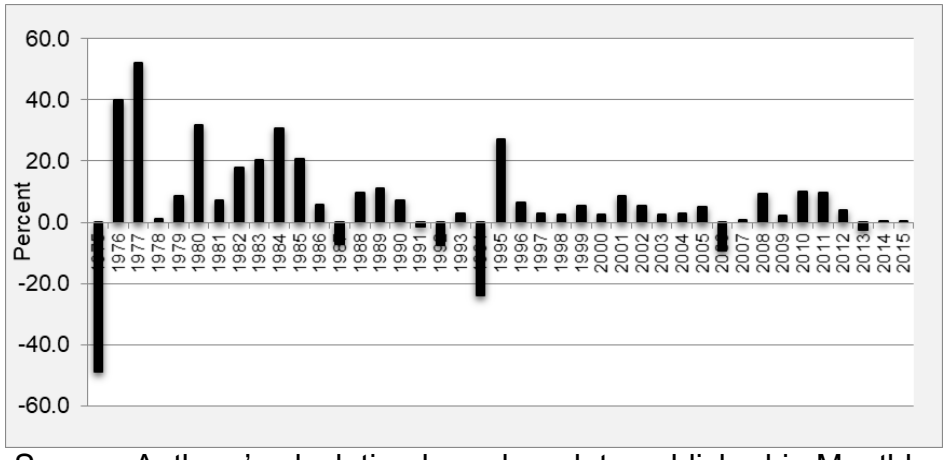
1990s. But the trends show contractions of credit growth in real terms, particularly after the mid of the 1990s. The occurrence of these contractions necessitates the need of understanding policy variables (for example, interest rates) which may affect the credit growth.

Figure 4: Trend in the Growth Rates of Real Domestic Credit



Source: Authors' calculation based on data published in Monthly Economic Trends (various issues), Bangladesh Bank, and National Accounts Statistics (various issues), Bangladesh Bureau of Statistics.

Figure 5: Trend in the Growth Rates of Real Credit to the Private Sector



Source: Authors' calculation based on data published in Monthly Economic Trends (various issues), Bangladesh Bank, and

National Accounts Statistics (various issues), Bangladesh Bureau of Statistics.

LITERATURE REVIEW

The relationship between financial development and economic growth has received much focus after a theoretical foundation on the relationship established by Schumpeter (1911). A number of empirical research support that financial development is a leading determinant of output growth. However, there is still debate on the direction of causality that whether financial development causes economic growth or economic growth causes financial development (Ray, 2013). Mixed or conflicting results on the nature and direction of causality between financial development and economic growth are also evident in some literature. Here, the paper attempts to review the literature on the relationship from different perspectives of nature and direction in order to explore the causality between the financial developments and the economic growth.

Earlier literature such as Schumpeter (1911), Goldsmith (1959), Patrick (1966) and McKinnon (1973) argue that efficient moblisation of financial intermediaries can impact technological innovaton and development which ultimately transfer to higher productivity and economic growth. A more recent paper such as King and Levine (1993) establish their view by empirical analysis using data from 80 countries for the period of 1960-1989 and finds that current and future rates of economic growth are strongly influenced by financial development.

Jayaratne and Strahan (1995), Demirgüç-Kunt and Maksimovic (1998) Rajan and Zingales (1998) suggest that developed financial markets through efficient intermediation and allocation as well as strengthening lending activities can contribute a large and positive impact on inclusive economic development which is reflected in overall GDP growth. Few literature use per capita GDP rather than overall GDP as proxy of economic growth in their empirical analysis and suggest that improvement in financial intermediation has a causal impact on the growth rate of real per capita GDP (Jayaratne

and Strahan, 1995; Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 1998; Thangavelu et al., 2004; Rahman, 2004). However, several authors such as Kugler and Neusser (1998) and Rousseau and Wachtel (1998) find that development in financial intermediation could be an important determinant of economic growth but not an underlying reason of economic growth.

The most common measures employed in the literature as proxy for financial development are total domestic credit, domestic credit to private sector, broad money (M2), total deposit and financial depth index, among others. The quantitative techniques for empirical analysis which include autoregressive distributed lag (ARDL), vector error correction model (VECM), vector auto regression (VAR), structural vector auto regression (SVAR) are applied by most of the recent literature.

The long-run relationship between financial development and economic growth were established by several recent papers (Dhungana, 2014 and Lenka, 2015). Dhungana (2014) applies cointegration and vector error correction model (VECM) and finds the existence of a long-run association between GDP, broad money (M2) and domestic credit to private sectors in respect to Nepalese economy. Lenka (2015) uses Indian time series data covering the period from 1980 to 2011 and applies autoregressive distributed lag (ARDL) bound testing approach to cointegration and error correction model (ECM) for long-run and short-run causality between financial development and economic growth. The author finds that the financial development indicator is one of the long-run determinants of economic growth, but economic growth cannot impact financial development. On the other hand, the autoregressive distributed lag (ARDL) bound testing approach to cointegration was also applied by Kyophilavong et al. (2014) and they find the presence of bi-causality feedback effect that financial development promotes economic growth and vice-versa. The bi-directional causality is also seen in other literature (Karlsson and Månsson, 2015). Calderón and Liu (2003) also find a bi-directional causality by examining the data of 109 developing and industrial countries from 1960 to 1994 using panel VAR techniques employing two measures of financial development, such as the ratio of broad money (M2) to GDP (M2/GDP) and the ratio of private sector credit to GDP

(Credit/GDP).

Domestic credit is channelled to the real sector through a monetary transmission mechanism using different types of interest rates (real call money rate, real 91-day treasury bill rate, real 364-day treasury bill rate). These rates impact the lending and borrowing interest rates of commercial banks. Therefore, fluctuation of lending rates impacts the volume of domestic credit in an economy which implies that lending rate is a determinant factor to influence the amount of domestic credit. Mallick and Agarwal (2007) find the indirect and adverse impact of growth rate if the interest rates increase. The authors use ARDL approach to cointegration for a period of liberalised financial and trade regime during 1993Q1 to 2005Q1 in India to investigate the impact of short run real interest rate on output growth rate. Pattanaik et al. (2013) finds the significant impact of nominal interest rates in their study and find that changes in nominal interest rates to lower the real interest rates can stimulate investment and growth in India.

Adu et al. (2013) also apply ARDL model to investigate the long-run growth effects of financial development in Ghana and find that both total domestic credit to GDP ratio and private sector credit to GDP ratio have a significant impact on output growth. However, the authors do not find a significant relationship if the study considers stock of broad money (M2) as a proxy variable for financial development.

Begum (1998) also investigates the relationship between real interest rates and output in a dynamic model for G-7 countries and finds a positive correlation between output growth spreads and interest rates differentials across countries considering estimated baseline model.

Based on the literature discussed above, this paper attempts to use the indicator, total domestic credit as a proxy of financial development, lending interest as a policy variable and GDP growth rate as a proxy of economic growth in order to investigate the relationship between financial development and economic growth.

In the case of Bangladesh economy, Rahman (2004) examines the

relationship between credit development and economic growth rates and finds that real domestic credit has a long run impact on per capita GDP. Though Rahman (2004) finds a long run relationship between domestic credit and economic growth, he only uses annual data and overlooked the short run parameters over the periods. Moreover, since Rahman (2004) uses the data until 2004, it needs to understand the responsiveness of financial development on the economic growth over the latest available data periods both in short and long run. If the relationship exists in case of Bangladesh economy, it will support the standard economic theory of monetary transmission mechanism where financial development generates investments and investment activities promote economic growth which was initially established by Schumpeter (1911), Goldsmith (1959), Patrick (1966) and McKinnon (1973), among others.

Therefore, the paper considers two important aspects that can complement existing studies in this area. Firstly, the paper attempts to investigate long run as well as short run relationship between domestic credit and economic growth. Secondly, the paper uses quarterly data that also includes latest period available which provide an opportunity to evaluate whether the relationship found by Rahman (2004) still exists for Bangladesh economy.

MODEL SPECIFICATION

The paper uses secondary data collected mainly from different publications of the central bank of Bangladesh (Bangladesh Bank), and Bangladesh Bureau of Statistics (BBS). Broadly, the variables used in the paper are GDP, domestic credit, and lending rate. The paper applies the quarterly data to test its objectives that domestic credit has an impact on GDP growth rate and lending rate is used as a policy variable to influence the GDP growth rates.

Secondary data on domestic credit and lending rates are available on a quarterly basis in different Bangladesh Bank's publication but from the beginning of the 1980s and onwards. However, only annual data is available for the indicator, GDP.

Since quarterly GDP data in Bangladesh is still not available, the paper interpolates the known annual GDP data to quarterly ones for

the purpose of econometric analysis. GDP data is re-estimated here according to the new based year 2006. The paper uses the quadratic-match average method to interpolate the data to a quarterly frequency. Giap et al. (2016) uses the same method to convert the original data within the period. The intuition behind using the quadratic-match average method is that it fits a local quadratic polynomial by taking sets of three adjacent points from the annual data and fitting a quadratic so that the average of the high frequency points matches the low frequency data actually observed.

The variables, GDP, and domestic credit are converted into real terms by deflating them with the consumer price index. The lending rate is also converted into real lending interest rate by deducting it with the inflation rate. Real GDP and real domestic credit are converted into log form for econometric analysis as it can reduce the problem of heteroscedasticity.

The descriptive statistics and pair-wise correlation coefficient matrix of the selected variables are shown in Appendix 1 and Appendix 2 respectively.

Since the selected variables in this paper are quarterly time series data for the long periods (1980Q1-2016Q2), the variables may exhibit trending behaviour or non-stationarity in the mean. A series of the selected variable is considered to be stationary if it has a constant mean, constant variance and a constant auto-covariance for each given period (Brooks, 2008). Therefore, the variables selected for the study need to undergo the tests whether the data is stationary or not. The paper uses Augmented Dickey-Fuller (Dickey and Fuller, 1979; Fuller, 1976) and Phillips-Perron (Phillips and Perron, 1988) tests which assume that null hypothesis (H_0) contains a unit root, while the alternative hypothesis (H_1) means that the series is stationary. The paper also uses Kwiatkowski-Phillips-Schmidt-Shin (KPSS) (Kwiatkowski et el., 1992) where the null hypothesis (H_0) assumes that the observable time series is stationary against the alternative of a unit root. The unit root test results are shown in Appendix 3.

The ARDL approach is an appropriate technique of choice for the regression analysis of the objectives of the paper, if the unit root

results for the selected variables of this paper are found to be integrated into different orders. A number of studies introduced the ARDL techniques such as the papers published by Pesaran and Pesaran (1997), Pesaran and Smith (1998) and Pesaran et al. (2001), among others.

Appendix 3 shows that only real domestic credit is stationary (I(0)) with the trend, while real GDP and real lending rates are found to be no-stationary (I(1)) with the trend. The ARDL model has several advantages as compared to using Johansen cointegration model. The advantage of using the ARDL is that it can be applied even if the variables used to provide different integration of order whether they are I(1) and/or I(0). However, the Johansen cointegration techniques require the variables be classified into either I(1) or I(0). Moreover, Table 6 shows that unit root test results are not the same in all the three unit root test methods. In that case, when the unit root properties of the data are not decided, the ARDL model is appropriate for regression analysis. Another advantage that the ARDL model can use with different lags for different variables, while Johansen cointegration model does not allow this variation.

Pesaran and Pesaran (1997) recommend two steps to complete the analysis of the ARDL model. A long run relation needs to be established in the first step. In order to proceed the first step, a prior F-bound test is needed to make a justification for using the ARDL model. Pesaran and Pesaran (1997) provide the ARDL model as follows:

$$\Phi(L,p)y_t = \sum_{k=1}^{K} \gamma_k(L,q_i)x_{kt} + u_t) \quad \text{.....(1)}$$

Where,

$$\Phi(L,p) = 1 - \Phi_1 L - \Phi_2 L^2 - \cdots \ldots\ldots\ldots \Phi_p L^p \quad \text{.....(2)}$$

And

$$\gamma_i(L,q_i) = 1 - \gamma_{k_1} L - \gamma_{k_2} L^2 - \cdots \ldots\ldots\ldots \gamma_{kq} L^{qk} \text{ , } k\text{= 1, 2, 3, …, } K \quad \text{.....(3)}$$

Where L is the lag operator. y_t and x_{it} denote the dependent variable and i explanatory variables, respectively. p is the number of lag for dependent variable and q is the number of lag for independent variables. The well-known Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ) select the optimum number of lags.

Pesaran and Pesaran (1997) provide the long run elasticity as

follows:

$$\hat{\theta}_i = \frac{\hat{\gamma}_{i0} + \hat{\gamma}_{i1} + \cdots + \hat{\gamma}_{iq}}{1 - \hat{\Phi}_1 - \hat{\Phi}_2 - \cdots - \hat{\Phi}_p} \quad \ldots\ldots(4)$$

Where, $\forall i$=1, 2, 3,…., *k*

The long run cointegrating relationship can be written as:

$$y_t - \hat{\theta}_0 - \hat{\theta}_1 x_{1t} - \hat{\theta}_2 x_{2t} - \cdots - \hat{\theta}_k x_{kt} = \mathcal{E}_t \quad \ldots\ldots(5)$$

Where, $\forall t$ =1, 2, 3,…., *n*

Now the error correction ARDL model can be written from equation (1) taking into consideration the lagged level values and the first difference of y_t, x_{12}, x_{2t},…., x_{kt} as follows:

$$\Delta y_t = \Phi(1, \hat{p}) EC x_{t-1} + \sum_{i=1}^{k} \gamma_{i0} \Delta x_{it} - \sum_{j=1}^{\hat{p}-1} \delta^* y_{t-j} - \sum_{i=1}^{k} \sum_{j=1}^{\hat{q}-1} \gamma^*_{ij} \Delta x_{i,t-j} + u_t \quad \ldots\ldots(6)$$

The error correction term is written as below:

$$EC_t = y_t - \sum_{i=1}^{k} \hat{\theta}_i x_{it} \quad \ldots\ldots(7)$$

In equation 6, δ^* and γ^* are the coefficients in order to identify short-run dynamics which are converted to equilibrium with the speed of adjustment, $\Phi(1, \hat{p})$.

ECONOMETRIC ANALYSIS AND DATA RESULTS

The two variables, GDP and domestic credit show unusual trend at the 1970s (Section II). Political issues for a newly independent country and long term impact of 1970 cyclone and 1974 famine affect the way of institutional development of good economic systems. Therefore, the econometric exercises use the data period ranging from the first quarter of 1980 to second quarter of 2016, and the paper refers to the period as full sample period. However, economic and structural changes that happened during the full sample period might affect the proper analysis of econometric results. A comprehensive financial reform and trade liberalisation at

the beginning of the 1990s made structural changes in the whole economic and financial systems in Bangladesh. The economy has been undergoing liberalisation process by establishing export processing zone for export oriented industry, introducing tax holidays, infrastructure rebates during the 1990s and onwards. Since then, interest policy had also been changed by the regulatory authority. The authority allowed the commercial banks to maintain a rate between the ceiling and floor rates. Therefore, the full sample period is again divided into two sub-sample periods for applying the same ARDL method. Therefore, the econometric specification in this thesis for ARDL analysis is tested in three different ways – full sample period (1980Q1-1990Q4), first sub-sample period (1980Q1-1990Q4) and second sub-sample period (1991Q1-2016Q2).

As discussed before that different number of lags for the dependent and explanatory variables can be applied to the ARDL framework. Standard lag selection criterion, such as AIC, SC, and HQ is to be used to determine optimum lag. The simple form of the relationship for the objective of the paper can be written as follows:

$$GDP = f(DCR, RLR) \quad \text{..(8)}$$

Here, GDP is the log level real value of total GDP, DCR is the log level of real value of the total domestic credit, and RLR is the real lending rate.

The automatic lag selection procedure shows that the selected models are ARDL (2, 0, 1) for 1980Q1-2016Q2, ARDL (4, 2, 4) for 1980Q1-1990Q4, and ARDL (3, 1, 0) for 1991Q1-2016Q2, shown in Appendices 4, 5, 6, respectively. Appendix 4 fixes ARDL (2, 0, 1) based on Akaike Information Criterion (AIC) for the full sample period (1980Q1-2016Q2) which means that GDP and real lending rates have two and one lags respectively and domestic credit does not have any lag. The automatic lag selection procedure for the first sub-sample period (1980Q1-1990Q4) fixes ARDL (4, 2, 4) as optimum estimated based on Schwarz Criterion (SC) which means that GDP, domestic credit and real lending rates have four, two, and four lags respectively (Appendix 5). The optimum lag length refers to ARDL (3, 1, 0) for the second sub-sample period (1991Q1-2016Q2) estimated based on AIC which indicates that GDP and

domestic credit have three and one lags respectively and real lending rates do not have any lag (Appendix 6).

The F-bound test results shown in Table 7 indicate that all the computed F-values for the full sample (1980Q1-20162) and two sub-sample periods (1980Q1-1990Q4 and 1991Q1-2016Q2) are much higher that the respective upper bound of the critical values. These results justify the use of ARDL model for the three sample and sub-sample periods.

Table 7: F-Bounds Test Results
(Null Hypothesis: No levels relationship)

Period	Computed F-Value	Critical Value	
		Lower bound	Upper bound
1980Q1-2016Q2	7.83***	3.88	5.3
1980Q1-1990Q4	10.83***	4.99	5.85
1991Q1-2016Q2	5.15***	2.63	3.35

Notes: *** Significance at 1% level.
** Significance at 5% level.
* Significance at 10% level.

The long run coefficients of the selected variables under investigation for the full sample and sub-sample periods are shown in Table 8. The coefficients of real domestic credit for all sample and sub-sample periods are found to be positive and statistically highly significant. Therefore, in the long run, increase in real domestic credit has a significant positive impact on real GDP. Table 8 also shows that real lending rates are negatively related to the real GDP for all sample and sub-sample periods. In other words, lowering the real lending rates increase real GDP for all sample and sub-sample periods. However, the real lending rate is only found to be statistically significant for the first sub-sample period (1980Q1-1990Q4).

Table 8: Long Run Coefficient Estimating Results
(Dependent variable: Real Gross Domestic Product (GDP))

Period	Real Domestic Credit (DCR)		Real Lending Rate (RLR)	
	Estimated	t-	Estimated	t-

	Coefficient	Statistic	Coefficient	Statistic
1980Q1-2016Q2	1.469***	3.589	-0.017	-0.185
1980Q1-1990Q4	0.194***	4.710	-0.010***	-8.842
1991Q1-2016Q2	0.629***	8.801	-0.008	-0.794

Notes: *** Significance at 1% level.
** Significance at 5% level.
* Significance at 10% level.

Table 9 shows conditional error correction cointegration estimates in the short run for the full sample and sub-sample periods. The results in the table indicate that growth rate of GDP at the previous quarter ((D(GDP(-1)) has the positive and statistically significant impact of 1% level on growth rates of GDP at a current quarter (D(GDP)) for the three sample and sub-sample periods. The coefficient of the growth rate of real domestic credit is only found to be positive and statistically significant at 1% level for the second sub-sample period (1991Q1-2016Q2). Rahman (2004) also finds shock to financial development (credit/GDP ratio in that case) has positive impacts on investment and per capita GDP for Bangladesh economy. Uddin and Chakraborty (2009) apply cointegration and Granger causality tests and find long run relationship between domestic credit and real income growth in Bangladesh. The results found in this paper are also consistent with some other papers for other economies. For example, Perera and Paudel (2009) and Adu et al., (2013) find a positive and significant impact of domestic credit on output growth for Sri Lanka and Ghana, respectively. Change of real lending rate (D(RLR)) is also found to be statistically significant for the full sample period; however, the coefficient is positive. Rahman (2004) also does not find expected negative relationship for the long run response of financial development with respect to real lending rates changes. Mallick and Agarwal (2007) apply ARDL approach and find that interest rate has no impact on economic growth for Indian economy.

Table 9 also indicates that the coefficients of the cointegration equations for all sample and sub-sample periods are negative with high t-values. The error correction term indicates the speed of

adjustment to restore equilibrium level in a dynamic model.

Table 9: Short Run Error Correction Elasticity Estimates (Dependent variable: D(GDP))

	1980Q1-2016Q2		1980Q1-1990Q4		1991Q1-2016Q2	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
D(GDP(-1))	0.248***	7.945	0.498***	4.162	0.233**	2.470
D(GDP(-2))	-	-	0.185	1.264	0.111***	2.887
D(GDP(-3))	-	-	0.672***	3.558323	-	-
D(DCR)	-	-	-0.161***	-2.831	0.055**	2.015
D(DCR(-1))	-	-	-0.135**	-2.423	-	-
D(RLR)	0.001**	2.210	-0.000	-0.183	-	-
D(RLR(-1))	-	-	0.006***	5.830	-	-
D(RLR(-2))	-	-	0.003***	5.236	-	-
D(RLR(-3))	-	-	0.001***	3.290	-	-
CointEq(-1)	-0.003***	-4.885	-0.794***	-7.140	-0.030***	-4.616

Notes: 1980Q1-2016Q2: $\bar{R}^2$ = 0.363, AIC = -7.618, SC = -7.490, HQ = -7.566.

1980Q1-1990Q4: $\bar{R}^2$ = 0.877, AIC = -8.166, SC = -7.537, HQ = -8.593.

1980Q1-1990Q4: $\bar{R}^2$ = 0.800, AIC = -8.761, SC = -8.577, HQ = -8.687

*** Significance at 1% level.

** Significance at 5% level.

* Significance at 10% level.

Appendix 7 plots CUSUM and CUSUMQ statistics against the critical bound of 5% significance. The plot indicates that CUSUM test statistics for all sample and sub-sample periods are fitted between the red lines at 5% level. However, the CUSUMQ test statistics are not fitted between the red lines at 5% for the full

sample period (1980Q1-2016Q2) but they are fitted for first sample period (1980Q1-1990Q4) at 5% level and for second sample period (1990Q1-2016Q2) for second sample period.

CONCLUSION

Overall, it can be concluded that an increase in real domestic credit increases real GDP which is proved to be statistically significant. On the other hand, an increase in real lending rates decreases real GDP but the result is not found to be statistically significant. Over from the two sub sample period (1980Q1-1990Q4 and 1991Q1-2016Q2), it can be concluded that long run coefficients of real domestic credit and real lending rate are stable with short run dynamics in a cointegrated equation. The results confirm the stability of the coefficients if the specification of sample period considers a structural break in the financial sector at the beginning of the 1990s. On the other hand, the real lending rate is not found to be an effective policy variable so that it cannot affect the domestic credit and economic growth. Further research is needed to find out appropriate policy rates in a manner that shock of the policy rate can significantly impact the economic growth of Bangladesh.

The policy implication for this study is that since the increase in domestic credit is found to have a significant impact on the economic growth, the policy-makers should use this variable to strengthen investment as well as economic activities. Secondly, administered interest policy before the 1990s and, thereafter, introducing of maintaining the interest rates within a range may somehow disrupt market forces for economic activities. This could be the reason behind the non-sensitivity of the interest rate as most econometric exercises with regards to interest rate in this paper find the insignificant impact of real interest rates on economic development.

ENDNOTES

[1] Mohammad Salim Al Mamun is currently working as Member of Secretariat in Islamic Financial Services Board (IFSB), Malaysia. Dr. Muhammad Irwan Ariffin and Dr. Zarinah Hamid are Assistant Professor and Professor, respectively, of International Islamic

University Malaysia (IIUM). Any views expressed in this paper are authors' own and do not necessarily reflect that of the IFSB or IIUM.

[2] Source: Annual Report 2016-2017, Bangladesh Bank.

[3] The banks that have special objectives, for examples, development in agriculture or industry sectors, are called DFIs.

[4] The financial year of Bangladesh starts in July and ends in June. To simplify the analysis, the ending financial year is used as the point of reference. For example, the financial year July 2000 – June 2001 is written as 2001 in this paper.

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Appendix 1

Descriptive Statistics of Selected Variables (Quarterly Data)

	Mean	Median	Maximum	Minimum	Std.
GDP	5.36	5.36	5.78	4.98	0.22
GDP_AG	4.72	4.70	4.95	4.50	0.12
GDP_IND	4.68	4.69	5.26	4.19	0.31
GDP_SER	5.09	5.10	5.49	4.70	0.22
DCR	0.86	0.87	0.93	0.74	0.05
DCR_AG	0.79	0.81	0.83	0.60	0.06
DCR_IND	0.90	0.92	0.96	0.77	0.05
DCR_SER	0.83	0.83	0.92	0.69	0.06
LR	13.07	13.42	15.12	10.16	1.27
INF	0.02	0.01	0.11	-0.05	0.02
M2	5.64	5.66	7.37	4.09	0.79
TO	6.07	5.90	12.76	1.55	2.97
ER	47.14	43.10	81.90	7.90	20.58

Note: All variables except lending rate, inflation and exchange rates are converted into log.

Appendix 2

Pairwise Correlation of the Selected Variables

	GDP	DCR	RLR
GDP	1		
DCR	0.95	1	
RLR	-0.13	-0.04	1

Appendix 3

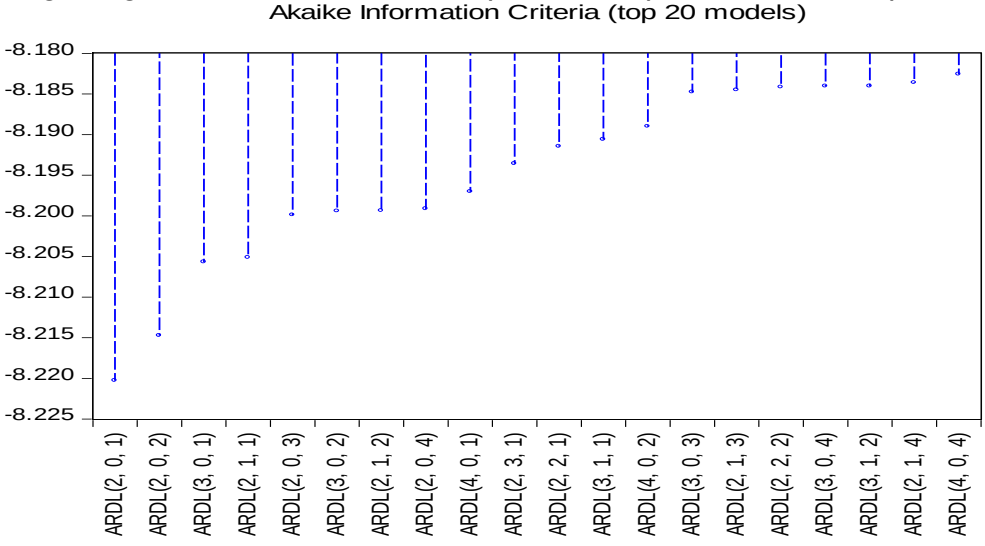
Unit Root Test Results for the Selected Variables

Variables (Log of real values	With trend			Decision (With trend)	Without trend			Decision (Without trend)
	ADF	PP	KPSS		ADF	PP	KPSS	
GDP	I(1)***	I(0)*	I(1)***	I(1)	I(1)***	I(1)***	I(1)***	I(1)
Domestic credit (DCR)	I(0)**	I(0)**	I(1)***	I(0)	I(1)***	I(1)***	I(1)***	I(1)
Real lending rate (RLR)[1]	I(1)***	I(0)***	I(1)***	I(1)	I(0)**	I(0)***	I(0)*	I(0)

Notes: *** Significant at 1% level.
** Significant at 5% level.
* Significant at 10% level.
[1] The variables are not converted into log.

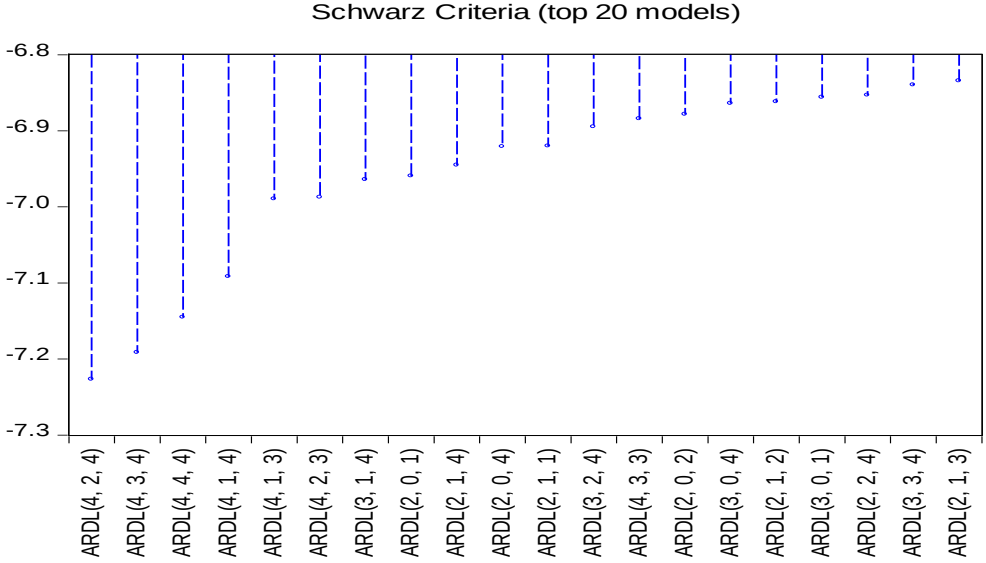
Appendix 4

Lag Length Selection for Full Sample Period (1980Q1-2016Q2)



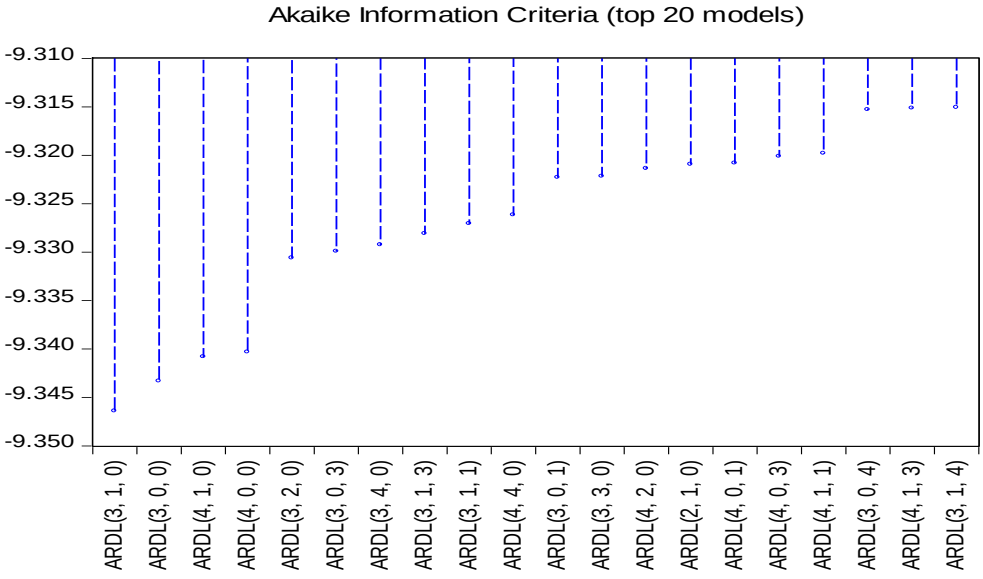
Appendix 5

Lag Length Selection for First Sample Period (1980Q1-1990Q4)



Appendix 6

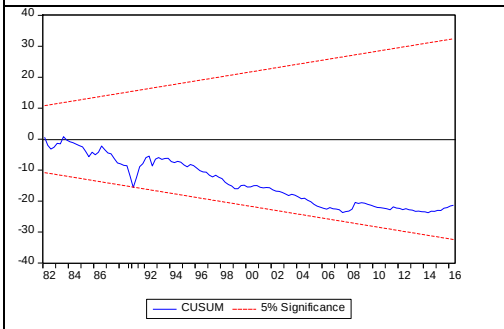
Lag Length Selection for Second Sample Period (1991Q1-2016Q2)

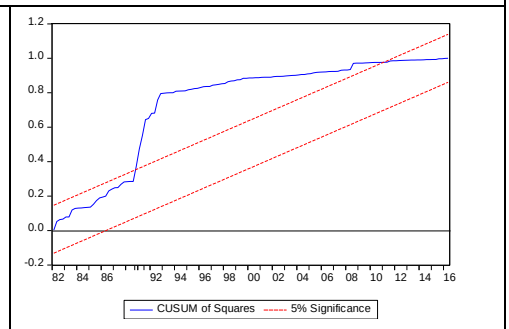


Appendix 7

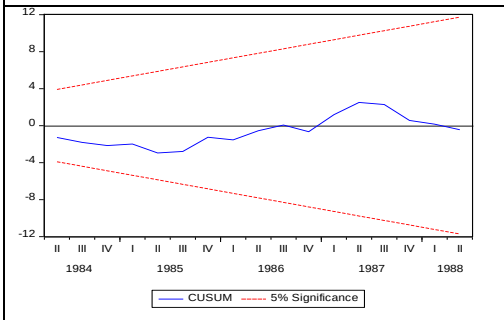
Plot of CUSUM and CUSUMQ of Recursive Residuals for Coefficient Stability Tests

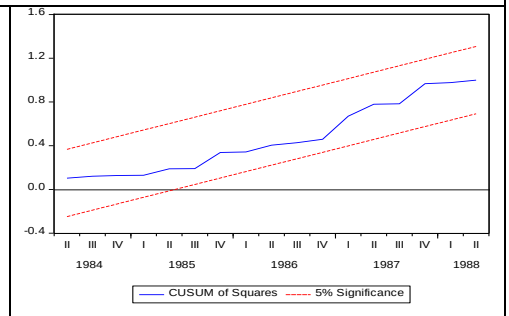
1980Q1-2016Q2





1980Q1-1990Q4





1991Q1-2016Q2