JnU Journal of Economics Vol. 4, No. 1, December 2022, (Page 134–148) ISSN: 2707-0689

The Nexus Between Money Supply and Economic Growth in Bangladesh: An ARDL Approach

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Abstract

This paper attempts to explore the impact of broad money supply on the growth of the economy of Bangladesh spanning from 1976 to 2019. The study has employed autoregressive distributed lag (ARDL) modelling approach to examine both short-run and long-run link between the variables. The model used in the study is specified by four macroeconomic variables: Per Capita GDP growth rate, broad money supply growth rate, GDP deflator and official exchange rate. Results from the study indicate that though there exists a long-run relationship between the growth of the economy and the supply of money, the impact of the supply of money is statistically not significant on the growth of the economy. Thus, the findings suggest the money market of Bangladesh needs overhauling effectively to stimulate economic growth.

Keywords: Economic growth, money supply, ARDL, cointegration, Bangladesh

1. Introduction

Bangladesh has achieved phenomenal growth in recent years which in part has made her eligible for graduating from a least developed country to a developing one. The growth momentum is temporarily halted by the recent outbreak of Covid-19 pandemic. But the economy has the resilience to bounce back to the trajectory of growth once the effect emanating from the pandemic subdues. There are several policies taken by both the government and the central bank that have played pivotal role in achieving the growth momentum. Among these policies, money supply is supposed to render a major role in accelerating growth of the economy through its

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diverse channel. From the perspective of Bangladesh, the supply of money has a notable effect on GDP growth (Hussain & Haque, 2017).

The link between supply of money and GDP growth is a much-debated topic in research areas but it is gaining increasing attention in contemporary literature. According to macroeconomic theory, when the supply of money increases it decreases interest rate. In loanable fund market, it makes borrowing cheaper which tends to boost investment thereby increasing aggregate demand. This dynamic eventually leads to economic growth. According to some Keynesians "money does not matter", hence immaterial to impact the growth of economy. In contrary, a number of Monetarists argue that "money matters", therefore advocating the use of monetary policy as a tool for influencing economic growth. According to the neutrality of money, as proposed by classical economic theory, the change in money supply only effect the nominal variables rather than the real variables. But modern-day economist suggests that neutrality of money does not hold up entirely. Neutrality of money is considered valid in the long-run but not in the short-run. New Keynesians argue that in the short-run the growth in supply of money may result in increasing real variables like GDP, employment due to price-stickiness and asymmetric information prevailing in the economy (Hussain & Haque, 2017).

The growth pattern of broad money in Bangladesh has always followed an irregular trend (World Development Indicators). This trend is associated with several policy adjustments in the banking arena of Bangladesh, which initiated since 1980s. In 1986, a commission was formed to ascertain the shortcomings in the financial sector and suggest policy recommendations to address those. In the beginning of 1990s, Bangladesh went into a massive reformation program by the Financial Sector Reform Program (FSRP) in collaboration with the World Bank (Bhattacharya & Chowdhury, 2003). Due to those policy reforms, the GDP growth of Bangladesh has also followed an irregular trend hovering around 3 to 5 % until 2010. But after 2010, GDP growth has shown an increasing trend reaching a whopping 8.15 % in 2019 (World Development Indicators). Against this backdrop, the linkage between growth of broad money supply and economic growth deserves an in-depth analysis. This study attempts to investigate the association between broad money growth and economic growth in Bangladesh.

The rest of the paper is organized in different sections. Section 2 of this study involves exploration of relevant studies on the issue while Section 3 entails describing the methodology used to investigate the data. Section 4 delineates the outcomes found from the estimation procedures. Summary of the findings and policy suggestions are represented in Section 5, while Section 6 sums up the study.

2. Literature Review

Although there is a paucity of studies on Bangladesh that examined the relationship between growth of the economy and supply of money, a plethora of literature exists for other countries in this regard. However, the findings of these studies are not in harmony in terms of the influence of supply of money on growth of

the economy. While a host of studies have discovered significant association between supply of money and growth of the economy, a few have discovered very weak link within the underlying variables.

Chude and Chude (2016) examined the impact of supply of money on the growth of the economy of Nigeria. They employed ARDL technique on data spanning from 1987 to 2010 and observed a significant and positive linkage between supply of money (M2) and growth of the economy. Many other studies have come up with similar results. Aslam (2016) analyzed data ranging from 1959 to 2019 of Sri Lanka where he used GDP as dependent variable and money supply, exchange rate, export earnings, import outflow and CPI as independent variables. The result from the study ascertains favorable relationship between supply of money and the growth of the economy of Sri Lanka.

Hussain and Haque (2017) showed that the long-run neutrality of money does not hold for Bangladesh. They tried to determine the relationship between supply of money and growth of per capita GDP utilizing a data set ranging from 1972 to 2014. By the help of Vector Error Correction Model (VECM), they ascertained that supply of money has a significant short-run and long-run influence on the growth of the economy and suggested the central bank that follows "the Taylor rule" to allow for a steady rate of money growth keeping with growth of the economy.

Dingela and Khobai (2017) also recommended the central bank to apply "the Taylor rule" as their investigation revealed a statistically significant and positive result between supply of money (M3) and per capita GDP. Their study involved using ARDL-bound test procedure to cointegration and error correction model to assess the dynamic effect of money supply on economic growth using data for 37 years. Chaitip et. al. (2015) strived to assess the link between supply of money and growth of the economy in some selected AEC countries. Using yearly data of 19 years, they found a long-run association between supply of money and growth of the economy with demand deposit (DD) having an unfavorable impact on economic growth.

Muhammad et. al. (2009) investigated annual data from 1977 to 2007 of Pakistan to assess the association among supply of money, price level, government expenditure and growth of the economy. Although the results of the study assert that government expenditure and price level are negatively related to the growth of GDP, in the long-run, money supply (M2) is found to have a positive effect on the growth of the economy.

Marshal (2016) empirically analyzed the nexus between supply of money (M2) and growth of the economy by relying on cointegration and VAR model. The outcomes of the paper postulate that supply of money has short-run as well as long-run equilibrium relationship with economic growth. The study also asserts a unidirectional relationship on causality, running from money supply to real GDP. Tabi and Ondao (2010) tried to find out the relationship between the growth of the economy, inflation and money in circulation by the use of VAR model. Their

analysis involved using data spanning from 1960 to 2007 and found that growth in supply of money increases growth of the economy, which in turn gives rise to inflation.

Boon and Zubaidi (1999) used Johansen's multivariate cointegration analysis, VECM, variance decomposition, granger causality and impulse response function to examine the causal relationship among money, price level and real GDP in the context of Malaysia. The findings of the study aver that money is non-neutral in the short-run, which is in line with Keynesian and Monetarist paradigm. It also found that among various definitions of monetary stocks, M3 has the strongest causal effect on real output thus being the most suitable intermediate target of monetary policy for sustaining high rate of economic growth for Malaysia.

There are also quite a few numbers of literature that found Money supply to be a weak predictor of economic growth. Hussain and Zafar (2018) in their paper titled "The interrelationship between money supply, inflation, public expenditure and economic growth" tried to understand the effect of supply of money, price level and public expenditure on the growth of the economy. Although they postulated a strong long-run association among inflation, public expenditure and economic growth, there was no such relation in the case of money supply.

Saidi et. al. (2019) also found a similar result in terms of money supply. Using ARDL technique on information ranging from 1994 to 2017, they tried to scrutinize the effect of internet and supply of money on the growth of the economy of Indonesia. Their study revealed that no long-run relationship exists among these parameters although having a short-run relationship. Kizito (2013) assessed the influence of money market on Nigeria's economic growth spanning from 1980 to 2012 by employing OLS, Johansen's Cointegration Test and VECM. They found very weak relationship between the monetary system and real output of the country.

As the effect of supply of money on the growth of the economy across different countries is still inconclusive, it is imperative to reach a definitive conclusion. Furthermore, to the best of our knowledge, there is very little amount of literature in the context of Bangladesh and that too with data period up to 2014, so there is a need to improve on existing literature incorporating recent data. This study aims to fill this vacuum in research.

3. Methodology

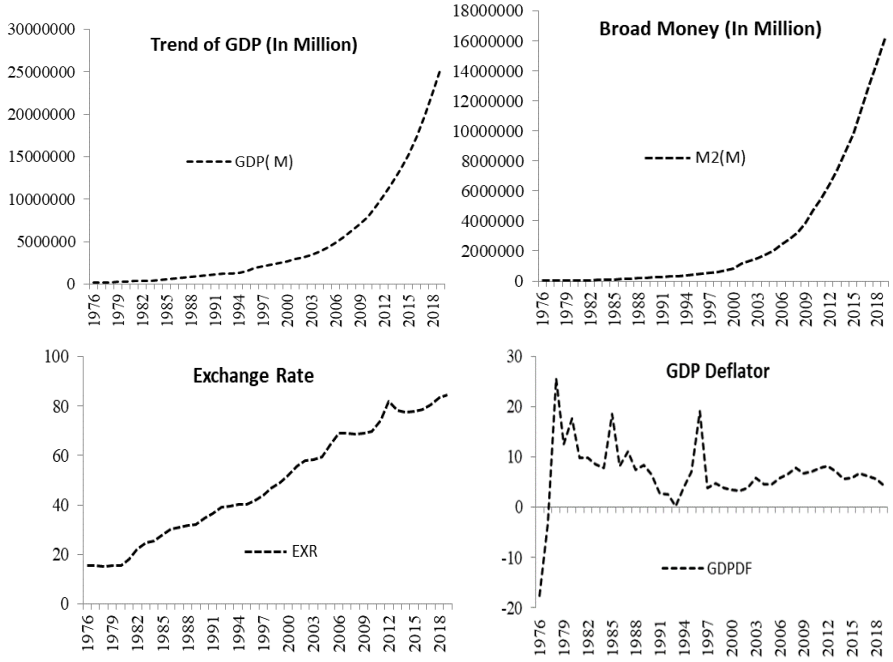
3.1 Data

The annual data for the study is taken from World Bank's World Development Indicators (WDI) database. The data of WDI are stored in a way that secondary users can easily handle and make required transformation in their convenient way, which induced the collection of data from WDI. Data were obtained for the year from 1976 to 2019 on GDP Per Capita Growth Rate, Broad Money Supply (M2) Growth Rate, Official Exchange Rate, and GDP Deflator. As the data of 1971-1975 exhibits peculiarity, researchers cast doubt on the data. Therefore, the initial period's data are excluded in this paper. All the estimations are conducted using EViews.

3.2 Trends of the Data

The time series plot of GDP, Broad Money, Exchange Rate and GDP Deflator are shown in figure 1. All the variables demonstrate an upward trend apart from GDP deflator. The graphs indicate the possibility of existence of long-run relationships among the variables. However, rigorous time series tools have been used to check for the existence of cointegration among the variables.

Figure 1: Time series representation of the selected variables



3.3 Estimation Technique

In order to find the relationship between GDP growth and Money supply (M2) the following relationship was specified.

$GDPG = f(M2G, GDPDF, EXR)$

Where, $GDPG$ = Per Capita Gross Domestic Product Growth Rate

$M2G$ = Broad Money Growth Rate

$GDPDF$= GDP Deflator; EXR = Official Exchange Rate (Taka per Dollar basis)

The partial derivatives of $GDPG$ with expected signs are shown below

$\partial_1 = \frac{dGDPG}{dM2G} > 0$ or < 0, $\partial_2 = \frac{dGDPG}{dGDPDF} > 0$, $\partial_3 = \frac{dGDPG}{dEXR} > 0$

Where, ∂_1= Partial derivative of $GDPG$ with respect to $M2G$

∂_2= Partial derivative of $GDPG$ with respect to $GDPDF$

∂_3= Partial derivative of $GDPG$ with respect to EXR. The model is specified as follows:

$$GDPG_t = c_o + \theta_1 M2G_t + \theta_2 GDPDF_t + \theta_3 EXR_t + \varepsilon_t \quad (1)$$

To establish the long-run relationship among these variables, we relied on the ARDL-bound test approach to cointegration. ARDL model has certain advantages over other estimation techniques. Whereas Johansen test employs a system of equations, ARDL approach uses just a single reduced form of equation to examine the cointegration of the variables. An added benefit of using ARDL model is that it is robust in small sample (Odhiambo, 2009; Pesaran et. al., 2001; Solarin & Shahbaz, 2013). Another advantage is that the variables under study don't necessarily need to be integrated of the same order for using ARDL approach to cointegration. For example, some variable are allowed to be integrated of order zero I(0), whereas other variables can be integrated of order one I(1) or all the variables can be either I(0) or I(1) (Olhan, 2015). The ARDL approach can take into account endogenous problems and deliver unbiased long-run estimates with valid t statistics (Harris & Sollis, 2003; Narayan, 2005). In addition to choosing the optimal lag length itself, ADRL model allows for differences in the optimal lag length in the variables which enhances the fitness of the model (Nkoro & Uko, 2016). Finally, ARDL model does not count on the properties of unit root dataset (Dingela & Khobai, 2017). For these advantages, this study implements the ARDL bound approach to cointegration.

One caveat is that we cannot apply ARDL bound test approach to cointegration if any of the variable is integrated of order two I(2). Therefore, checking for stationarity of the underlying variables is very important. In that line, we need to check the unit root test of the variables. The procedure for testing stationarity is described below.

3.3.1 Unit root test

A time series variable is stationary if it is mean reverting meaning that its mean and variance are constant over time and the covariance between two time periods does not depend on the actual time but on the gap between two time periods. The stationarity of time series data can be checked by applying Augmented Dickey Fuller (ADF), Phillips-Perron or the KPSS test. In our study, we can allow the variables either to be stationary at level form I (0) or stationary after first differencing I (I). For this purpose, we used the ADF test procedure to test the stationarity property. ADF test has three specifications:

$$\Delta y_t = a_1 y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + \varepsilon_t \quad (2)$$

$$\Delta y_t = a_0 + a_1 y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + \varepsilon_t \quad (3)$$

$$\Delta y_t = a_0 + a_1 y_{t-1} + a_2 t + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + \varepsilon_t \quad (4)$$

Where ε_t is white noise error term. To ensure that there is no correlation among the errors, extra lagged terms are included in the model. The hypotheses for the ADF test are:

H_0: y_t is nonstationary or y_t has a unit root

H_1: y_t is stationary or y_t has no unit root.

To take decision, we compare the ADF test statistics with the critical value from Fuller's table. If the calculated test statistics is greater than the critical value, we reject the null hypothesis that the variable is nonstationary and vice-versa. We can have enough evidence that the underlying variable is I (0). If the variable is proved not to be I (0) then ADF test is performed after first differencing. If the series is found to be stationary after first differencing, we refer the variable to be I (1).

The next step in selecting the ARDL model involves finding the appropriate lag length. Determining the lag number is based on the Akaike Information Criteria (AIC) developed by Akaike.

3.3.2 ARDL Method

To test the cointegration relationship among the variables, the following ARDL model is estimated

$$\Delta GDPG_t = c_o + \delta_1 GDPG_{t-1} + \delta_2 M2G_{t-1} + \delta_3 GDPDF_{t-1} + \delta_4 EXR_{t-1} + \sum_{i=1}^{p} \theta_1 \Delta GDPG_{t-i} + \sum_{j=1}^{q1} \theta_2 \Delta M2G_{t-j} + \sum_{k=1}^{q2} \theta_3 \Delta GDPDF_{t-k} + \sum_{l=1}^{q3} \theta_4 \Delta EXR_{t-l} + \varepsilon_t \quad (5)$$

Where δ_i, c_o, ε_t represents long-run coefficients, intercept and white noise error term. The first step in performing ARDL bound testing involves estimation of this equation by Ordinary Least Square to test the long-run relationship among the variables by employing F-test for joint significance of the coefficients of the lagged level variables, that is:

H_0: δ_1=δ_2=δ_3=δ_4=0

H_1:$\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$.

Rejecting or not rejecting the null hypothesis is subject to the comparison between F-statistics and critical value. There are two asymptotic critical values that are generated by Pesaran et al. (2001). where one is known as upper critical value and other one as lower critical value. The Upper critical value assumes the regressors are I(0) whereas lower critical value assumes them to be I(1). If the Calculated F-statistics is above the upper critical value, we reject the null hypothesis that there is no long-run relationship. On the other hand, if the calculated F-statistics is lower than the lower critical value, we cannot reject the null hypothesis. Lastly, if the F-statistics fall within the lower critical value and upper critical value, we cannot judge. If the bound test establishes a long-run relationship, the Conditional ARDL long-run model for GDP can be specified as

$$GDPG_t = c_0 + \sum_{i=1}^{p} \delta_1 GDPG_{t-i} + \sum_{j=1}^{q1} \delta_2 M2G_{t-j} + \sum_{k=1}^{q2} \delta_3 GDPDF_{t-k} + \sum_{l=1}^{q3} \delta_4 EXR_{t-l} + \varepsilon_t \quad (6)$$

In the last step for cointegration, the short-run dynamic parameters are obtained by estimating an error correction model associated with long-run estimates. The error correction model can be estimated as

$$\Delta GDPG_t = c_0 + \sum_{i=1}^{p} \theta_1 \Delta GDPG_{t-i} + \sum_{j=1}^{q1} \theta_2 \Delta M2G_{t-j} + \sum_{k=1}^{q2} \theta_3 \Delta GDPDF_{t-k} + \sum_{l=1}^{q3} \theta_4 \Delta EXR_{t-l} + \alpha ECM_{t-1} + \varepsilon_t \quad (7)$$

Finally, to check the robustness of the results from ARDL model, FMOLS, DOSL and CCR methods are used.

4. Empirical Result

4.1 Sample Statistics

The descriptive statistics outline that the mean of GDP growth, money supply growth, GDP deflator and exchange rate are 3.142, 17.510, 6.744, and 48.671 respectively. A better measure of central tendency might be the median, shown in Table 1, as it shows the middle value of the entire data series irrespective of being sensitive to outlier values. The standard deviation which shows how dispersed the data are around the mean is highest for exchange rate (22.65) and lowest for GDP growth rate (2.06) meaning that GDP growth data are less scattered around its mean value. The skewness is positive for both Exchange rate and money supply growth, whereas it is negative for both GDP deflator and GDP growth. Skewness being a measure of symmetry around mean suggests that exchange rate and money supply growth have a long right tail and a long left tail for GDP deflator and GDP growth. The value of kurtosis depicts both GDP deflator and money supply growth have more peakedness in their distribution compared to normal distribution. Finally, the probabilities from Jarque-Bera conclude both exchange rate and GDP growth are normally distributed whereas exchange rate and money supply growth have non-normal distribution.

Table 1: Simple statistics

	GDPG	M2G	GDPDF	EXRT
Mean	3.142772	17.51004	6.744820	48.67110
Median	3.100395	15.71180	6.501998	45.39888
Maximum	7.031584	42.99762	25.61889	84.45352
Minimum	-1.852565	9.742787	-17.63042	15.01612
Std. Dev.	2.063673	7.241851	6.292325	22.64942
Skewness	-0.204522	2.062618	-0.399823	0.054830
Kurtosis	2.481282	7.318479	8.362732	1.672483
Jarque-Bera	0.800040	65.38919	53.89693	3.252932
Probability	0.670307	0.000000	0.000000	0.196623
Sum	138.2820	770.4417	296.7721	2141.528
Sum Sq. Dev.	183.1261	2255.109	1702.514	22058.85
Observations	44	44	44	44

Source: Based on World Development Indicators (WDI) database

4.2 ADF Test Result

As majority of the time series data have unit root and if any of the variables is I(2), we cannot apply ARDL model, so it is imperative to determine the order of integration of each variable. To that end, ADF test is applied on each variable. From Table 2, we can observe that, in case of GDP growth, we fail to reject the null

hypothesis of non-stationary at all significance level. But after first differencing, the test statistics become significant at 10%, 5% and 1% levels. This means, GDP growth data is I (1). For all the other variables including broad money growth, GDP deflator and exchange rate, the test statistic was found to be significant at 10%, 5% levels in the level form with money supply growth being significant at 1% level too. So relying on this outcome, we have enough evidence to consider all these variables to be I (0). As, there is a mixture of I(0) and I (1) variables in our data, we are allowed to carry out an ARDL bound test to cointegration to seek for the existence of long-run relationship in the variables.

Table 2: Unit root test for stationarity

Variable	ADF Test (Level)	ADF test (First Difference)	Decision
GDPG	-3.1192	-11.3023*	I (1)
M2G	5.0612*	-7.2388*	I (0)
GDPDF	-3.6294**	-8.0834*	I (0)
EXRT	-3.6479**	-5.7036*	I (0)

Source: Author's estimation

*Note: *, **, *** indicates 1%, 5%, 10% significance level, respectively*

4.3 Lag Selection Criteria

The appropriate amount of lag for the model was chosen relying on Vector Autoregressive Lag Length Selection criteria which is selected on the basis of minimum values generated by each of the criteria. All the criteria except LR suggested the maximum appropriate lag order to be four. As AIC and FPE are considered more robust in case of small sample size, we have proceeded with 4 lags to estimate our model (Liew, 2004).

Table 3: Lag order selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-55.36983	NA	1.230540	3.044607	3.215228	3.105824
1	-54.10749	2.201008	1.214940	3.031153	3.244430	3.107675
2	-53.40666	1.186023	1.235012	3.046495	3.302428	3.138322
3	-49.24535	6.828810*	1.051724	2.884377	3.182965	2.991508
4	-47.41277	2.913338	1.009755*	2.841680*	3.182924*	2.964116*
5	-47.19528	0.334598	1.053794	2.881809	3.265708	3.019549

Source: Author's estimation

4.4 ARDL bound test to cointegration

The result from ARDL bound test to cointegration among GDP growth, money supply growth, GDP deflator and exchange rate are shown in Table 4. ARDL bound test was performed on the basis of equation (5). The calculated F statistic is 4.79 and it is larger than the upper bound critical value and lower bound critical value at 5% significance level, meaning that the null hypothesis of no cointegration relationship can be rejected with substantial evidence. This result implies that GDP growth

variable is cointegrated with money supply growth, exchange rate and GDP deflator. To be more specific, we can conclude from our result that a long-run equilibrium relationship lies among the variables of interest for the relevant period of this study.

Table 4: Bound F test for cointegration

F-statistic=4.785644		
Level of Significance	I(0)	I(1)
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Author's estimation

Having found the presence of both long-run and short-run association among the variables, we tried to make estimation of the coefficients of ARDL long-run model and that of the short-run model, which is simply the ECM model. Estimates from the long-run and short-run model of the ARDL (4, 0, 0, 1) are presented in Table 5 and Table 6.

4.5 Long-Run Result

The long-run estimate of the model presented in Table 5, demonstrate that money supply growth and economic growth is negatively related. This result is in line with empirical works of (Ihsan & Anjum, 2013; Kizito, 2013; Inam, 2014). However, the result is insignificant at 5% significance level. As for GDP deflator, the positive result of the coefficient suggests a rise in price level leads to a rise in per capita GDP growth rate. The result was also found to be insignificant at 5% level of significance. The only statistically significant variable is the exchange rate which was found to be significant at 10%, 5%, and 1% level of significance. The value of the coefficient suggests a unit rise in the rate of exchange which is basically currency depreciation (as the data was taken on Taka per Dollar basis) bringing forth a rise in per capita GDP growth rate. It is consistent with economic theory that asserts currency depreciation and promotes export by making local goods and services cheaper to the foreigners and thereby enhances economic growth.

Table 5: Long-run results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2G	-0.031521	0.026863	-1.173406	0.2496
GDPDF	0.017167	0.052856	0.324781	0.7475
EXRT	0.088576	0.009466	9.357524	0.0000

Source: Author's estimation

4.6 Short-Run Result

The important part of the short-run model is the Error Correction Term. It measures the amount of disequilibrium of the previous period that is being adjusted in the present period. In other words, it measures the speed of convergence toward the equilibrium if there exists any disequilibrium in the short -run. The coefficient of

error correction term is expected to be negative with value lying within 0 to -1. Any positive value of this term will imply divergence from the equilibrium. The coefficient of ECT in our model is -.8495 which is statistically significant at 1% level. The value implies that any departure from the long-run equilibrium due to a shock is adjusted by 84.95% each year.

Table 6: Short-run results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.172139	0.266034	-4.405969	0.0001
D(GDPG(-1))	-0.313471	0.157371	-1.991920	0.0553
D(GDPG(-2))	-0.071740	0.149103	-0.481141	0.6338
D(GDPG(-3))	0.314164	0.110725	2.837344	0.0080
D(EXRT)	0.290312	0.072650	3.996013	0.0004
CointEq(-1)*	-0.849532	0.185405	-4.582039	0.0001
Adjusted R-squared	0.765311			
S.E. of regression	0.834261			
Durbin-Watson stat	1.836530			

Source: Author's estimation

4.7 Robustness Check

For checking the robustness of the ARDL model, we have employed FMOLS, DOLS and CCR. The results from these three methods are represented in Table 7. The results show that in all the three models, money supply growth has statistically insignificant impact on economic growth. The coefficients of GDP deflator suggest that price level has a positive impact on economic growth. Likewise, the results from ARDL long-run model, are statistically insignificant in all the three methods as well. Again, exchange rate is the only significant variable which has a positive impact on economic growth. Therefore, the findings from all the three methods validates the long-run results of ARDL model.

Table 7: Result of robustness analysis

Variables	FMOLS	DOLS	CCR
M2G	-0.076591 (0.5938)	-0.037675 (0. 2506)	-0.039547 (0.3729)
GDPDF	0.032968 (0.4320)	0.074062 (0.2953)	0.069109 (0.2404)
EXRT	0.138807 (0.0000)	0.095988 (0.0001)	0.097091 (0.0000)

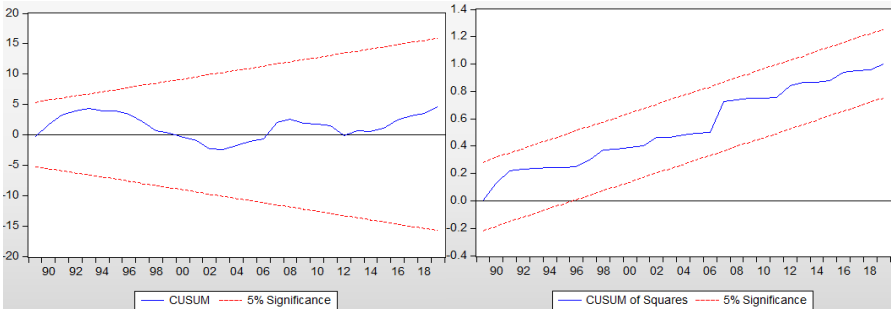
Source: Author's estimation

Note: Values in the parentheses denote probability values

4.8 Diagnostic Test

To check for the stability of the long-run parameters, both CUSUM and CUSUMSQ are used. The results are depicted in figure 2. In both cases, we failed to reject the null hypothesis as the plots of the tests show there is no root lying outside the 5 % level of significance. Therefore, we can claim that our ARDL model passes the test of model stability.

Figure 2: CUSUM and CUSUMSQ



The result for the residual diagnostic test are illustrated in the Table 8. The most commonly used test to examine the existence of serial correlation in the error terms is LM test and the p value for LM test confirms there is no serial correlation existing in the model.

Table 8: Short-run diagnostic test

Diagnostic Test	F-statistics	p-value
Serial Correlation LM test	1.2423	0.3167
Heteroskedasticity test	1.7421	0.1278
Normality	0.1560	0.9249

To check for the heteroscedasticity in the residuals, BPG test was used. Again, as the null hypothesis of no heteroscedasticity cannot be rejected, it can be inferred that our model is free of heteroscedasticity. Lastly, the high p value of Jarque-Bera test verifies that the error terms are distributed normally

5. Findings and Policy Option

This study finds the existence of a long-run relationship between economic growth and money supply. But the relationship is inverse and statistically insignificant. The long-run coefficient for money supply growth implies that, keeping other variables constant, a 1% increase in money supply will decrease per capita GDP growth by 0.03% on average. The finding matches the works of Ihsan and Anjum (2013), Kizito (2013), Inam (2014). The underlying reason for such relationship might be that the money market in Bangladesh is still in its nascent stage. Money supply exhilarates growth by lowering the rate of interest which increases investment and thus economic growth. Financial institutions operating in the money market render a pivotal task by delivering the saving of lenders to the hand of investors. As a matter of fact, the moral hazard and adverse selection problem are prevalent in the financial sector which hamstrings the swift operation of these financial intermediations by financial institutions. Apart from these issues, there is also a need for a more investment-friendly environment to attract foreign investment. Against this backdrop, some policy recommendations can be as follows.

a) The continuation of reform in the banking sector that started in the 1980s is imperative to deliver the savings of lenders into the safe hand of investors. This will build more confidence among investors to borrow from the banks and use those in productive initiatives.

b) The government should take prudent macroeconomic policies both fiscal and monetary policies to make money market more competitive to international standards in collaboration with the Central Bank.

6. Conclusion

This study has attempted to examine the dynamic impact of money supply (M2) on the economic growth proxied by per capita GDP growth in Bangladesh. This paper has applied Autoregressive Distributed Lag Model (ARDL) modelling approach on a time-series data ranging from 1976 to 2019 to capture both the long-run and short-run dynamics. Official exchange rate and GDP deflator were also used as control variables to measure the relationship between money supply and GDP per capita growth. The results from the study revealed that there exists a long-run relationship between money supply (M2) and economic growth in Bangladesh. The relationship was found to be negative but statistically insignificant indicating the urgency of overhauling the money market in Bangladesh. The study also reveals that the money market in Bangladesh is still in a fledgling state to generate economic growth of the country. To make the association between money market and real sector of the economy more resolute, some policies were also recommended in the study.

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