BUFT Journal of Business & Economics (BJBE)
ISSN 2664-9942 (Print)
2024 Volume 5, Pg: 167-175
DOI: https://doi.org/10.58481/BJBE/2411

Assessing the Relationship between Inflation and Policy Interest Rates in the Context of Bangladesh

Dr. Md. Fardous Alom[1*]

ARTICLE INFO

Article History
Received: January 12, 2024
Accepted: March 30, 2024

Keywords:
Inflation, Policy Interest Rate, VECM.

JEL Classification:
E31, E52, E58, C32

ABSTRACT

Purpose: This study attempts to empirically assess the short and long-run relationship between inflation and policy interest rate in the context of Bangladesh.

Methodology: Vector Error Correction Model (VECM) has been utilized using quarterly data over the first quarter of 2010 to second quarter of 2022.

Findings: The empirical findings reveal that the inflation is inversely related to the changes in policy interest rates in the short and long-run indicating that any increase in policy interest rate leads to a decrease in inflation rate and vice versa. This finding is consistent with the conventional monetary policy theory.

Practical Implications: The findings provide insights to the policymakers and practitioners suggesting that the policy rate remains as an effective monetary policy instrument to manage inflation.

Originality/Value: This study adds to the existing limited literature of inverse relationship between inflation and central bank policy rate using most recent data set. The model used in this study has been rarely used in the previous literature.

Limitations: The current study employs quantitative technique of bi-variate VECM which is prudent, however, further study may be conducted using multi-variate VECM.

1. Introduction

The policy interest rate, a monetary policy instrument, is the rate set by a central bank that guides the interest rates in the economy. The policy interest rate plays a crucial role in the economy as it affects borrowing costs, investment decisions, and overall economic activity.

In theory, the policy interest rate is used by central banks to influence inflation and economic growth. The central bank increases the policy interest rate to combat inflation and decrease it to stimulate economic growth. The central bank uses its control over the policy interest rate to influence the demand and supply of money in the economy. An increase in the policy interest rate leads to an increase in borrowing costs, which reduces the demand for loans and investments. Conversely, a decrease in the policy interest rate leads to a decrease in borrowing costs, which stimulates demand for loans and investments. The best way to combat inflation is by controlling money supply by adjusting interest rate (Bernanke & Blinder, 1992).

The effectiveness of the policy interest rate in achieving its goals depends on various factors such as the transmission mechanism of monetary policy, the degree of financial market development,

*Corresponding Author
1. Joint Secretary, Finance Division, Ministry of Finance, Bangladesh Secretariat, Dhaka-1000, Bangladesh, E-mail: fardousalom.official@gmail.com.

and the responsiveness of the economy to changes in interest rates. Additionally, the relationship between the policy interest rate and inflation is not always straightforward, and the effect of changes in the policy interest rate on inflation can be affected by a range of factors such as the structure of the economy, the behavior of consumers and businesses, and global economic conditions.

In the context of Bangladesh, the policy interest rate is set by the Bangladesh Bank, the central bank of the country. The Bangladesh Bank sets the policy interest rate based on the inflation outlook, the level of economic activity, and other macroeconomic indicators. The policy interest rate, also known as the repo rate, is the rate at which commercial banks can borrow money from the central bank. The policy interest rate in Bangladesh is used by Bangladesh Bank as a tool to control inflation and maintain economic stability.

Bangladesh has been experiencing high inflation in recent months due to unprecedented Covid-19 pandemic followed by Russia-Ukraine war. Inflation rates have been hovering around 5-6% annually for last couple of years but recent surge is driven by factors such as rising food prices, higher fuel costs, and currency depreciation. In order tomanage inflation, the Bangladesh Bank has been increasing the policy interest rates since 2010 till first quarter of 2018 followed by a decrease until last quarter of 2021 and then kept increasing.

The Bangladesh Bank's decision to raise interest rates is aimed at reducing demand for goods and services and slowing down price increases. Higher interest rates can discourage borrowing and spending, which can reduce the money supply in the economy and ultimately lead to lower inflation. However, the impact of interest rates on inflation can be complex and delayed.

One of the challenges in implementing monetary policy in Bangladesh is the country's high reliance on imports for goods and services. As a result, changes in exchange rates can offset the effects of interest rate changes on inflation. For example, if the Bangladesh Taka depreciates against the US dollar, the cost of imported goods will increase, which can push up inflation even if interest rates remain high.

Another challenge is the impact of supply shocks on inflation. Bangladesh is vulnerable to natural disasters such as floods and cyclones, which can disrupt the supply of goods and services and push up prices. In such situations, the Bangladesh Bank may need to adjust its monetary policy to support economic growth while keeping inflation under control.

The above discussion highlights the need to better understand the relationship between inflation and policy interest rate, as this can have significant implications for investors, policymakers and practioners. A better understanding of this relationship can help investors make more informed decisions about their investments, and can also inform monetary policy decisions aimed at achieving price stability and promoting economic growth. Therefore, it is essential to investigate this relationship in order to provide more accurate predictions and reliable guidance to investors and policymakers.

The relationship between inflation and policy interest rates in Bangladesh is complex and requires careful management by the Bangladesh Bank. While higher interest rates can help to reduce inflation, their impact can be offset by other factors such as exchange rate movements and internal or external supply shocks. The Bangladesh Bank monitors these factors closely and adjust its policies accordingly to maintain price stability and support sustainable economic growth.

The objective of the current study is to empirically identify whether the policy interest mechanism enables to control inflation in Bangladesh or not. Specifically, this study aims to assess the relationship between inflation and policy interest rates in Bangladesh in general and in particular to identify whether the movement of inflation is inversely related to the movement of policy interest rate or not both in the short and long-run.

The rest of the paper is structured as follows. The next section reviews the previous relevant studies while section 3 reports data and their properties. Section 4 illustrates modelling framework; section 5 discusses empirical findings and section 6 concludes the study with policy implications.

2. Literature Review

The relationship between inflation and policy interest rates has been a subject of intense study in the field of economics. Strand literature on the relationship between inflation and policy interest rates are available. In line with the objective of current study, the main purpose of this literature review is to examine the empirical evidence on the relationship between inflation and policy interest rates, with a focus on studies conducted in the context of Bangladesh. Before proceeding to the studies available in the context of Bangladesh we briefly review some studies conducted in different countries of the world in order to reveal the pattern of the relationship between these two variables.

There is a widely studied and well-established inverse relationship between inflation and policy interest rates. This relationship is based on the idea that changes in policy interest rates can affect inflation by influencing borrowing, investment, and spending decisions, which in turn can impact the level of economic activity and the prices of goods and services in the economy.

Numerous empirical studies have examined the relationship between policy interest rates and inflation across various countries and time periods. A study by Taylor (1993) found evidence of a strong negative relationship between interest rates and inflation in the United States over the period 1954-1992. Similarly, in a study Roberts (2004) argued that changes in the monetary policy can explain the changes in inflation-unemployment relationship.

Other studies have examined the relationship between inflation and interest rates in specific countries. For example, a study by Bhardwaj & Kateja (2018) found that changes in the policy interest rate had a short-run impact on inflation in India over the period 1995-2015. In another study, Ahiabor (2013) revealed evidence of a strong negative relationship between inflation and policy rates in Ghana over the period 1985-2009.

The mechanism by which changes in policy interest rates affect inflation can vary depending on the specific economic conditions in a given country or region. For example, in a study of the euro area, Van Els et al. (2001) revealed that raises in the policy interest rate had a slow and lagged declining impact on inflation.

Numerous studies have investigated the relationship between inflation and policy interest rates in the context of Bangladesh. In a study conducted by Hossain & Islam (2013) showed the relationship between interest rates and inflation in Bangladesh over the period 1990-2010. The study revealed that money supply and one year lagged interest rate positively and significantly affect inflation.

Similarly, in a study by Uddin et al. (2019) investigated the impact of monetary policy on inflation in Bangladesh. The results indicated that money supply has a significant impact on inflation, with a positive relationship between the two variables. The study thereby showed that money supply regulated by policy rates influences inflation in Bangladesh.

Another study by Hossain and Ibon (2020) examined the impact of monetary policy on inflation in Bangladesh using a structural VAR model. The results indicated that policy interest rates have a significant impact on inflation, with a positive relationship between the two variables. The study also found that exchange rates have a significant impact on inflation in Bangladesh.

In another study Abdullah et al. (2012) used a time series econometric approach to analyze the impact of monetary policy on inflation in Bangladesh over the period 2000-2012. The study found that policy interest rates have a significant positive impact on inflation. The study also found that other variables, such as money supply, exchange rates, and international oil prices, also influence inflation in Bangladesh.

The empirical evidence from the literature review suggests that there is a positive relationship between inflation and policy interest rates in Bangladesh. This implies that an increase in policy interest rates leads to an increase in inflation, and vice versa. However, few studies revealed inverse

relationship between policy rate and inflation. Islam & Uddin (2011) found that the deviation of inflation can be corrected by the changes of policy rates. Similarly, Chowdhury et al. (1995) revealed that an increase in policy interest rates reduced inflation in the short-run.

However, other studies have found a more complex relationship between policy interest rates and inflation in Bangladesh. For example, Afrin (2017) expored that the impact of policy interest rates on inflation was influenced by factors such as exchange rates, and lending rates. She argued that the effectiveness of monetary policy in controlling inflation depends on the stability of the external shocks.

Furthermore, some studies have suggested that the impact of policy interest rates on inflation may be asymmetrical in Bangladesh. For example, Nguyen et al. (2012) found that inflation converts to its long-run threshhold faster when it is above and below than the exogeneously determined threshhold while the short-run impact is negligble.

Overall, the existing literature shows no consensus regarding the relationship betweeninflation and policy rates. The relationship between inflation and policy interest rate has been a topic of much debate and speculation in the field of economics. While conventional economic theory suggests that increasing policy interest rates should lead to lower inflation, the empirical evidence on this relationship has been mixed. Therefore, there is a need for further investigation into the nature and direction of the relationship between policy interest rate and inflation. The literature suggests that the relationship between inflation and policy interest rates in Bangladesh is complex and influenced by various external factors. While higher policy interest rates can help to reduce inflation, their impact may be asymmetric and dependent on the stability of external factors such as exchange rates and supply shocks. The optimal level of policy interest rates for controlling inflation in Bangladesh is still a matter of debate, and further research is needed to determine the most effective policies for maintaining price stability and supporting economic growth. During the Covid-19 pandemic followed by Russia-Ukraine war triggered the inflation scenario which lacks study. Thus, the current study aims to examine the relationship of inflation and policy interest rate including data covering the period of Covid-19 pandemic and Russia-Ukraine war.

This study will be distinct from existing literature in several aspects. The present study aims to contribute to the existing literature in multiple ways. Firstly, it extends the time period of analysis beyond 2018 to include data up to 2022, which is relatively recent compared to previous studies. Secondly, it employs quarterly data instead of annual data, which enables more precise and accurate estimation. Thirdly, this study focuses on the theory of the inverse relationship between inflation and policy interest rate in the context of Bangladesh, adding to the limited literature available in this area. Finally, to achieve this objective, an error correction model is employed, which is a rare approach used in previous studies in the context of Bangladesh, allowing for identification of short and long-run relationships between inflation and policy interest rate.

3. Data and their Properties

This study utilizes quarterly timeseries data of policy interest rate (repo rate denoted as Rr) and consumer price index (CPI) from 2010Q1 to 2022Q2, making a total 50 observations, collected from International Financial Statistics (IFS) of IMF. CPI is converted to the rate of inflation by using the following formula:

$$In = \left(\frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \right) X\, 100 \qquad (1)$$

Where Inf refers to the rate of inflation, CPI refers to consumer price index and subscript t refers to current period while t-1 refers to previous period.

Figure1 is the graphical representation of Inf and repo rate over the period 2010Q1 to 2022Q2. Visually, we can see that these two series share a similar pattern over the long period where reasonable ups and downs are visible without any irregularities. Table 1 depicts summary statistics of the dataset. The mean values over the sample period for Inf is 1.62 and repo Rr is 6.36. The standard deviation for Inf shows considerable volatility while the Rr demonstrates low volatility. Normality tests represented by skewness, kurtosis and JB statistics reveal that the series are relatively normally distributed. Table 1 also shows that the stationarity tests results conducted by augmented Dickey-Fuller (ADF) test. The result indicates that the series are non-stationary at level because the null hypotheses of nonstationarity cannot be rejected at any acceptable level of significance and those are stationary at first differences as the null hypotheses are rejected at 1 percent level of significance. We use Akaike Information Criteria (AIC) to select the lag length and the optimal lag length is found to be 4.

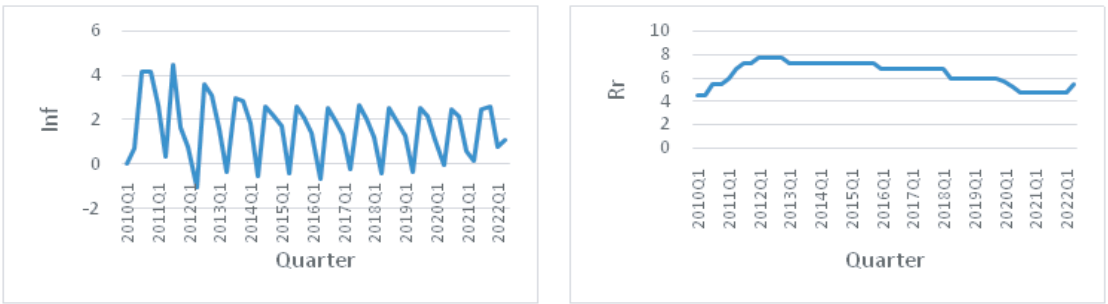

Figure 1.

Quarterly Inflation and Repo Rate Over 2010Q1-2022Q2.

Source: Authors Developed

Table 1.

Summary Statistics

Stats	**Inf**	**Rr**
Mean	1.62	6.36
Median	1.87	6.75
Maximum	4.5	7.75
Minimum	-1.05	4.5
Std. Dev.	1.36	1.01
Skewness	-0.08	-0.48
Kurtosis	2.37	1.94
Jarque-Bera	0.88	4.24
Prob.	(0.64)	(0.11)
ADF (level)	-1.17	0.13
(Prob.)	(0.21)	(0.78)
ADF (fdiff)	-3.78	-4.75
(Prob.)	(000)	(000)

Source: Author's calculation by using econometric software

4. Modelling Framework

As discussed in the previous section the data series are non-stationary thus we check the integrating relationship between the series by using Johansen approach (Johansen, 1988). If the series are integrated of order (1) we will proceed with Vector Error Correction Model (VECM) developed by Engle and Granger (1987). VECM is a type of time series model that is used when analyzing the

relationship between two or more non-stationary variables that are cointegrated. In other words, a VECM is used when there is a long-run relationship between the variables, but short-run deviations from this relationship may occur. A VECM is particularly useful when analyzing economic and financial time series data, where it is often the case that multiple variables are influenced by a common underlying trend or long-run equilibrium. For example, the prices of goods and services in an economy may be influenced by several factors, such as changes in interest rates, exchange rates, or money supply. A VECM can help identify the causal relationships between these variables and determine how they affect each other in the long run.

A VECM involves estimating a system of equations that model the short-run dynamics and long-run equilibrium relationships between the variables. The equations are estimated simultaneously using maximum likelihood, and the resulting model can be used to forecast future values of the variables and analyze the impacts of various shocks or policy changes. For the purpose of achieving the objective of this paper following VECM is estimated:

$$\Delta Inf_t = \alpha_0 + \beta_1 \Delta R\gamma_t - \pi \hat{u}_{t-1} + e_t \quad (2)$$

Where β_1 is the impact multiplier, the short-run effect, that measures the immediate impact of a change in Rr_t will have on Inf_t, the π is the feedback effect, or the adjustment effect, and shows how much the disequilibrium is being corrected, while $\hat{u}_{t-1}$ refers to error correction term. This actually measures the extent to which any disequilibrium in the previous period affects any adjustment in Inf_t. $\hat{u}_{t-1} = Inf_{t-1} - \hat{b}_1 - \hat{b}_2 Rr_{t-1}$ where $\hat{b}_2$ is the measure of long-run response which is estimated by $\Delta Inf_t = a_1 + a_2 \Delta Rr_t + \Delta u_t$. The VECM model is estimated using maximum likelihood method.

5. Empirical Findings and Discussion

5.1 Cointegration Test Results

Table 2 shows the results of the Johansen cointegration test, which is used to determine whether there is a long-term relationship between Inf and Rr. The test is based on the idea that if there is a cointegrating relationship, the variables will move together in the long run, even if there are short-term fluctuations that cause them to deviate from each other. From the Trace and Max-eigen value test statistic it is clear that at 5 percent level of significance Inf and Rr are cointegrated and the order of integration is 1, I(1).

Table 2.
Results of Cointegration Test

Test type	Hypothesized rank	Test statistic	Critical values (5%)	P-values
Trace	$r \leq 0$	24.99	15.49	0.00
Trace	$r \leq 1$	2.35	3.84	0.12
Max-eigen value	$r \leq 0$	22.64	14.36	0.00
Max-eigen value	$r \leq 1$	2.35	3.84	0.12
Normalized cointegrating coefficients				
Inf	1.000			
Rr	-0.078			
(s.e)	(0.62)			
Adjustment coefficients				
Inf	-1.05			
(s.e)	(0.32)			
Rr	0.28			
(s.e)	(0.14)			

Source: Authors Calculation

The normalized cointegrating coefficients represent the long-term relationship between the two variables. In Table 2 we see that the coefficient is negative for Rr, which means that an increase in the repo rate leads to a decrease in the inflation in the long run.

The last part of Table 2 shows the adjustment coefficients, which represent the short-term relationship between the two variables. The first row shows the coefficients for the Inf variable, while the second row shows the coefficients for the Rr variable. The coefficients are negative for Inf, meaning that the adjustment to the long-run equilibrium is faster for Inf than for Rr.

Overall, the results of the Johansen cointegration test suggest that there is a long-run relationship between the inflation rate and the repo rate, with one cointegrating equation explaining the relationship.

5.2 VECM Results

The estimated VECM output can be written in equations as follows where the values in parentheses are standard error:

$$\Delta Inf_t = \underset{(0.09)}{-0.079} - \underset{(0.22)}{0.59}\Delta Inf_{t-1} - \underset{(0.15)}{0.68}\Delta Inf_{t-2} - \underset{(0.09)}{0.77}\Delta Inf_{t-3} - \underset{(0.29)}{0.49}\Delta \hat{u}_{t-1}$$

$$\underset{(0.42)}{-0.021}\Delta Rr_{t-1} - \underset{(0.39)}{0.38}\Delta Rr_{t-2} - \underset{(0.34)}{0.36}\Delta Rr_{t-3} + e_{1t} \quad (3)$$

$$\hat{u}_{t-1} = \underset{(0.10)}{1.00} Inf_{t-1} - 0.16 Rr_{t-1} - 0.51 \quad (4)$$

$$\bar{R}^2 = 0.91$$

where ΔInf and ΔRr are the first differences of inflation and repo rate, respectively, $\Delta\hat{u}$ is the first difference of the cointegrating equation. Equation 3 shows that the coefficient of the cointegrating equation or the error correction term is statistically significant at 5 percent level of significance with appropriate negative sign, which indicates the presence of a long-run relationship between the two variables. The coefficient -0.49 indicates that any deviation from long-run equilibrium in the previous quarter gets corrected at a speed of 49 percent. The coefficient of the lagged inflation variable is negative and significant, which indicates that inflation adjusts to deviations from the long-run relationship. The coefficient of the lagged repo rate having negative signs indicate that inflation is inversely related to the movement of inflation. The intensity of the relation gets stronger over time. The coefficient of Rr for the immediate past quarter is -0.02 indicates that if the repo rate is increased by 1 percent, inflation decreases by 0.02 percent only while the coefficients for Rr_{t-2} and Rr_{t-3} indicate that the increase of repo rate by 1 percent reduces inflation by 0.38 and 0.36 percent respectively ceteris paribus. Lagged effect is visible in terms of effectiveness of policy rate. The R-squared and adjusted R-squared values are high, which indicates that the model fits the data well. The F-statistic is significant, confirming the significance of the variables used in the model. The values of the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) suggest that the model is the best fit among the other possible models.

5.3 Granger Causality Test

In order to test the causal relationship between inflation and repo rate Granger causality test is performed and the results are shown in Table 3.

Table 3.
Result of Granger Causality Test

Null hypothesis	F statistic (prob)
Rr does not Granger cause Inf	4.12
	(0.01)
Inf does not Granger cause Rr	1.06
	(0.37)

Source: Authors Calculated.

Based on the results of the Granger causality tests, the null hypothesis that the Rr does not Granger cause the Inf is rejected at 5 percent level of significance. This is indicated by the F-statistic of 4.12045 and the associated p-value of 0.01. This suggests that there is evidence of a causal relationship between Rr and Inf, where changes in Rr can cause changes in Inf.

On the other hand, the null hypothesis that Inf does not Granger cause Rr is not rejected at a significance level of 5 percent. This is indicated by the F-statistic of 1.06078 and the associated p-value of 0.37. Therefore, there is not enough evidence to suggest a causal relationship from Inf to Rr. The results suggest that Rr is a causal factor for changes in Inf, but Inf may not be a causal factor for changes in Rr indicating a unidirectional causal relationship from Rr to Inf.

To sum up, the empirical investigations suggest that there is a long-run inverse uni-directional causal relationship between the repo rate and inflation, and that the short-run dynamics of the model are significant and well-specified. The findings of this study is consistent with (Taylor, 1993; Bhardwaj & Kateja, 2018; Ahiabor, 2013; Roberts, 2004; Islam & Uddin, 2011).

Diagnostic analysis reveals that at 5 percent level of significance residuals are normally distributed with no remaining serial correlation and heteroscedasticity.

6. Conclusion

This study empirically investigates the relationship between inflation and the policy rate set by Bangladesh Bank, specifically the repo rate, using a vector error correction model (VECM). The study finds that there is a short and long-run inverse relationship between inflation and the repo rate, indicating that the repo rate has a significant impact on inflation in Bangladesh. The study reveals that there is a unidirectional causal relationship from the repo rate to inflation. This suggests that the repo rate Granger causes inflation, and not vice versa. This finding is consistent with the monetary theory of inflation control, which states that inflation can be managed by manipulating the policy rate. However, the study also notes that the reduction rate of inflation with the increase of the policy rate for the immediate period is relatively low. This could be due to lagged effect of transmission mechanism and other variables such as exchange rates, and international oil prices, which also influence inflation in Bangladesh. The empirical findings of this study suggest that the inflation management policy in Bangladesh, through the manipulation of the policy rate by the Bangladesh Bank, is in line with monetary theory. However, policymakers should also consider the influence of other variables such as exchange rate, oil price and supply shock on inflation in the short-run.

References

Abdullah, M., Parvez, K., & Tooheen, R. (2012). Impacts of Monetary Policy on Inflation in Bangladesh. *Global Disclosure of Economics and Business, 1,* 103-119. https://doi.org/10.18034/gdeb.v1i2.198

Afrin, S. (2017). Monetary policy transmission in Bangladesh: Exploring the lending channel. *Journal of Asian Economics, 49,* 60-80.

Ahiabor, G. (2013). The effects of monetary policy on inflation in Ghana. *Developing Country Studies, 3*(12), 82-89.

Bernanke, B. S., & Blinder, A. S. (1992). The Federal Funds Rate and the Channels of Monetary Transmission. *The American Economic Review, 82*(4), 901-921. http://www.jstor.org/stable/2117350

Bhardwaj, S., & Kateja, A. (2018). The trinity of interest rate, exchange rate, and inflation: The casefor inflation targeting in India. *International Journal of Social Science and Economic Research, 3*(1), 181-189.

Chowdhury, A. R., Dao, M. Q., & Wahid, A. N. M. (1995). Monetary policy, output and inflation in Bangladesh: A dynamic analysis. *Applied Economics Letters, 2*(3), 51-55.

Engle, R. F., & Granger, C. W. J. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica, 55*(2), 251-276. https://doi.org/10.2307/1913236

Hossain, M., & Ibon, M. (2020). Assessing the effectiveness of monetary policy in Bangladesh. In *Bangladesh's macroeconomic policy* (135-162). https://doi.org/10.1007/978-981-15-1244-5_5

Hossain, T., & Islam, N. (2013). An economic analysis of the determinants of inflation in Bangladesh. T*he International Journal of Social Sciences, 11*(1), 29-36.

Islam, M. S., & Uddin, M. T. (2011). Inflation targeting as the monetary policy framework: Bangladesh perspective. Economia. *Seria Management, 14*(1), 106-119.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control, 12*(2), 231-254. https://doi.org/https://doi.org/10.1016/0165-1889(88)90041-3

Nguyen, C. V, Islam, A. M., & Ali, M. M. (2012). Bangladeshi monetary policy transmission mechanism: asymmetric responses, inflation, and policy time lags. *Savings and Development, 36*(1), 91-107.

Roberts, J. M. (2004). Monetary policy and inflation dynamics. *Available at SSRN 633222, Staff WP*, 1-46.

Taylor, J. B. (1993). Discretion versus policy rules in practice. *Carnegie-Rochester Conference Series on Public Policy, 39*, 195-214. https://doi.org/10.1016/0167-2231(93)90009-L

Uddin, M. N., Uddin, M. J., & Ahmmed, M. (2019). Money and Inflation Nexus in Bangladesh. *Asian Economic and Financial Review, 9*(6), 702-711.

Van Els, P., Locarno, A., Morgan, J. B., & Villetelle, J.-P. (2001). Monetary policy transmission in the euro area: What do aggregate and national structural models tell us? *Available at SSRN 356300, WP. 94,* 1-76.