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Forecasting Inflation and Output in Bangladesh: Evidence from a VAR Model

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The intention of this paper is to forecast output, inflation, and the policy rates in Bangladesh for the period from July 2016 to June 2017. The Unrestricted Vector Auto Regression (VAR) techniques are used to forecast inflation, real GDP growth and the policy rates covering data from July 2006 to June 2016. In order to find out the best model to forecast output and inflation, this paper uses the spread between the lending and deposit rates, growth in money supply (M2), private sector credit, the exchange rate, and the world food price index. The empirical results derived from VAR show that in terms of forecast accuracy the models estimated with the spread, the repo and reverse repo rates, and M2 perform better in forecasting inflation, output than the models with other variables. This implies that interest rates and money supply are the two important variables to forecast inflation and output in Bangladesh. Therefore, monetary authority could use the spread between the lending and deposits rates, policy rates, and money supply to ensure effective management of inflation and real GDP growth in Bangladesh.

JEL Codes: C51, C52, C53, E31, E37, C32

Keywords: Forecasting, VAR models, model selection, model evaluation

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I. INTRODUCTION

Like other central banks, one of the main responsibilities of the central bank of Bangladesh is to conduct monetary policy with a view to regulating the issue of currency and keeping of reserves and managing the monetary and credit system of the country. With the primary objective of outlining the formulation and implementation of monetary policy and conveying information in advance relating to monetary and inflationary situation to the stakeholders and the public at large, Bangladesh Bank has been publishing its Monetary Policy Statement (MPS) bi-annually since January 2006 requiring availability of quality forecasting of macroeconomic variables, inflation and output in particular. This ex-ante announcement of the monetary policy stance is intended to affix inflation expectations of the market participants and the general public in the prevailing market based interest rate and exchange rate regime for Taka. In this backdrop, this paper attempts to forecast inflation, output and the policy rates in Bangladesh.

Successful implementation and persuasion of monetary policy largely depends on the efficiency and accuracy of forecasting major macro events like inflation, output and the interest rate. Therefore, decision makers of most of the top-notched central banks in the world use forecasts of economic growth and inflation to make plans and implement policies. This study forecast output (real GDP growth), inflation (CPI) and the repo and reverse repo rates using monthly data from 2006:M7 to 2016:M6.

There are a wide range of forecasting methods used to forecast macro economic variables such as, structural macro-econometric models, Klein interwar model, the Brooking model, the St. Louis macroeconomic model and the Taylor model. These models are based on hundreds of equations and variables. In addition to the estimation difficulties, the problems of identification and endogeneity are commonly associated with these giant structural macroeconomic models.

Sims' (1980) seminal work introduces unrestricted vector auto regression (UVAR) that allows feedback and dynamic interrelationships across all the variables in the system and appears to be highly competitive with the large-scale macro-econometric models in forecasting and policy analysis. The unrestricted VAR model assumes that each and every variable in the system is endogenous and does not impose any a priori restrictions. The VAR model is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system.

Lately, small-scale VARs are now widely used in forecasting (see, for example, Jacobson *et al*., 2001; Robertson and Tallman, 2001; Negro and Schorfheide, 2004; and Favero and Marcellino, 2005; Clark and McCracken (2010). In practice, it has been observed that reasonably good forecasts can be made with simple rules of thumb that are extrapolations of a single data series. Including too many variables makes a model unwieldy while not including enough can increase forecast error. Studies show that (e.g., Clark and McCracken, 2010; Caesar Lack, 2006) forecast from univariate linear time series models are often provide more robust forecast than their multivariate counterparts (Banerjee and Marcellino, 2005) as because multivariate time series models entail a significant increase in complexities with the presence of non-linearity and time-varying parameters to forecast inflation and output and the interest rate. Therefore, the plan of the study is as follows: after introduction in Section I, in Section II a brief review of the literature is described followed by the data analysis and methodology in Section III. In Section IV empirical results are analyzed followed by the conclusions and recommendations in Section V.

II. Literature Review

Literature on forecasting macro variables are few in Bangladesh. Rahman and Younus (2007) used three alternative forecasting models, namely, Box-Jenkin's Auto-regressive Integrated Moving Average (ARIMA) model, unrestricted VAR model, and Hsiao's Final Prediction Error (FPE) criteria to forecast some of the the key macroeconomic variables such as, output, inflation, the exchange rate, money and credit growth in Bangladesh based on quarterly data during 1990:01 to 2006:04. They found FPE criteria as relatively better technique followed by ARIMA and unrestricted VAR in forecasting. Akhtaruzzaman (2005) employed co-integration and Vector Error Correction Modeling (VECM) technique using quarterly

data from 1973:01 to 2002:05. He found that the rate of depreciation of exchange rate, money supply growth and the deposit rate, each has significant impact in inflationary process of Bangladesh. Mortaza (2006) investigated the sources of inflation in Bangladesh during FY1990-FY2006 using quarterly data under the unrestricted VAR system and found that money supply and the exchange rates have a positive influence on inflation. He also identified negative relationship between the deposit rate and inflation.

Bokil and Axel (2005) used three empirical approaches to forecast inflation for Pakistan based on monthly data during 1998 to 2004. A leading indicator model (LIM), a univariate ARIMA model, and an unrestricted VAR model are used in their study. Two variants of a leading indicator model performed well in ex-post inflation forecasting in Pakistan. The univariate approach also resulted in a reasonably acceptable forecasting model, though the ARIMA's forecasting accuracy was much less than the LIMs. The model-based VAR approach yielded the least satisfactory forecasting model in their study on Pakistan.

Tao Sun (2004) using monthly data during May 1995 to October 2003 developed an approach for forecasting core inflation in Thailand combining a short-term model with an equilibrium correction model. The seasonally adjusted monthly percent changes in Thailand's consumer price index after removing its raw food and energy components was used as the dependent variable. A group of potential explanatory variables available at monthly frequency had been selected for the estimation. These include commodity and asset prices, indicators of cost pressures in product or labor market (such as industry selling price indexes, wages, unit labor costs, and import prices), and measures of pressure on the demand side (such as the money supply and other financial indicators). This paper implemented an empirical statistical model to identify short-run factors that may be useful in forecasting Thailand's core inflation—with clear implications for the conduct of monetary policy in the inflation-targeting regime. Second, the paper also made use of an equilibrium-correction term to catch the long-run effect of the main economic determinants of Thailand's consumer price index. Combining the short and the long-run analysis, Tao (2004) obtained a forecasting model with out-of-sample predictive accuracy regarding core inflation—10, 24, and 55 months ahead. The results suggest that several indicators available at a monthly frequency contain information that helps forecasting core inflation in Thailand. The findings of the paper indicate that the combination of the general-to-specific approach, principal component analysis, and equilibrium correction modeling is a promising way to forecast Thailand's core inflation.

Ramakrishnan and Vamvakidis (2002) estimated a multivariate model for Indonesia to identify the leading indicators having predictive power on future inflation using quarterly data from 1980 to 2000. Using Granger Causality tests their study identified that the exchange rate, foreign inflation and monetary growth have significant predictive power for inflation in Indonesia.

Hafer and Hein (1998) compared the relative efficiency of the widely used interest rate based forecasting model and univariate time series model using monthly data from the United States, Belgium, Canada, England, France and Germany for the sample period from 1967 to 1986. Their results indicate that time series forecast of inflation model produces equal or lower forecast errors and have unbiased predictions than the interest rate based forecasts. They also found that the best inflation forecast is the one that combined information in both the time-series and interest-rate models.

Gavin and Kliesen (2008), using Stock and Watson's (2005 and 1999) Dynamic Factor Models (DFM) forecasted inflation and output with three alternative processes: a benchmark autoregressive model; a random walk; and a constant that presumes a fixed rate of growth of prices and output over the forecast horizon 3, 12 and 24 months with the monthly data from January 1978 to December 1996. Gavin and Kevin (2006) compared forecasts of four price indexes—the CPI, the CPI excluding food and energy, the Personal Consumption Expenditure (PCE) chain price index and the PCE measure excluding food and energy. They find that the accuracy of the forecasts is sensitive to time horizon and the type of model used in forecasting.

Callen and Chang (1999) forecast inflationary trends in India by estimating two models that describe the inflationary process in India – one is based on a monetary approach and the other on output gap model. Besides, they use a series of vector auto-regressions models (VARs) to identify the indicators that contain predictive information about future inflation in India. Quarterly data of Wholesale Price Index (WPI) is used as measure of inflation. A set of explanatory variables have been used for sample period from 1982:Q2 to 1998:Q2 to asses which variables contain significant information about future inflationary

process in India. Callen and Chang (1999) found that two monetary aggregates (M1 and M3) contain best information about future inflation. The output gap model does not perform well on Indian data. They also find that in case of manufacturing sector prices, import prices, the exchange rate, stock prices, and the prices of primary products also provide useful information about future price developments.

In view of identifying the most important sources of inflation in emerging countries, Loungani and Swagel (2001) examined the experience of 53 developing countries form 1964 to1998 using a six variable vector autoregressions (VARs) approach. Their findings suggest that either money growth or exchange rate movements accounts for two thirds of the variance of inflation at both short and long horizons. The authors also show that inflation expectation plays an important role in inflation determination in emerging economies.

Clark and McCracken (2010) provides an enquiry of real-time forecast performance with different measures of output (GDP growth), inflation (GDP deflator & CPI), and short-term interest rate (3 month Treasury bill rates & federal funds rate) using quarterly US data from 1970:Q1 to 2005:Q4. The authors considered a wide range of VAR forecast approaches and comparing the forecast performances concluded that "a practical forecaster should put considerable weight on univariate forecasts and pay close attention to trends or low frequency movements in inflation and interest rates".

III. Model Variables, Data Analysis and Methodology:

To select the best model to explain inflation, output and the policy rate the following variables are used. Inflation is considered as point to point Consumer Price Index (CPI); money supply (Broad Money-M2); deposit rate (average deposit rate of all scheduled banks), lending rate (average lending rate of all scheduled banks); interest rate spread (difference between lending and deposit rate); Real Gross Domestic Product (RGDP) at constant prices; World Food Price Index (WFPI); nominal exchange rate (end Period); private sector credit; repo rate; reverse repo rate and yield spread (spread between the 91-day treasury bill yield and 10-year government bond yield). Data on CPI and RGDP have been collected from Bangladesh Bureau of Statistics (BBS), data on WFPI has been collected from FAO Food Price Index published by Food and Agricultural Organisation (FAO) of the United Nations. All the data on other variables have been collected from Monthly Economic Trends published by Statistics Department, Bangladesh Bank.

The variables used in the analysis are,

ΔCPI= year on year percentage change in point to point Consumer Price Index

ΔRGDP= year on year growth rate of Real Gross Domestic Product i.e. Gross Domestic Product at constant prices

ΔM2= year on year growth rate of Broad Money

Deposit Rate (D) = average Deposit Rate of all scheduled banks

Lending Rate (L) = average Lending Rate of all scheduled banks

Interest Rate Spread (Spread) = difference between the lending and deposit rates

ΔExchange Rate (ΔER) = year on year percentage change in nominal end period exchange rate

ΔPSC= year on year percentage change in private sector credit

ΔWFPI= year on year percentage change in FAO Food Price Index published by Food and Agricultural Organization

Repo Rate (R) = the rate at which commercial banks borrow money from Bangladesh Bank.

Reverse Repo (RR) =the rate at which commercial banks lend money to Bangladesh Bank.

Call Money Rate (C) = the weighted average rate of call money market

Yield Spread (YS) = the difference between yield of 10 Year BGTB and 91 Day T-Bill

The forecasting models require all variables to be identified properly so that all the residuals are white noise. A series of unit root tests, such as Augmented Dickey-Fuller (DF, 1981), Phillips-Perron (PP,

1988) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992) are used to determine the order of integration (d) for each series. In order to decide the autoregressive parameters (p) and moving average parameters (q), autocorrelation and partial autocorrelation functions are used. The lag lengths of the unrestricted VARs are decided based on Schwarz Information Criterion (SIC) criteria that are sufficient to make all residuals white noise.

Applying Augmented Dickey Fuller (ADF) and Phillips Perron (PP) unit root test to the first differences of the variables, we found that unit root hypothesis can be rejected in case of almost all the time series with a constant. To perform VAR analysis, Sims (1980) and Sims, Stock, and Watson (1990) argued against differencing the variables since the goal of a VAR analysis is to determine the interrelationships among the variables, not to estimate the parameters. So, we used the level variables in our analysis. RGDP is generated annually in Bangladesh. Linear Interpolation is used in this case. The interpolated value is calculated as:

$$IV = (1 - \lambda)V_{i-1} + V_{i+1} \tag{1}$$

where, IV=Interpolated value, V_{i-1}= previous missing value, V_{i+1}= next non-missing value and λ= relative position of the missing value divided by the total number of missing values in a series.

To investigate the best indicator to forecast inflation, output and the policy rates among various indicators Unrestricted rolling VAR is used. Monthly data from 2006:07 to 2016.6 is used for the analysis. Data sources are International Financial Statistics (IFS) published by International Monetary Fund (IMF), Major Economic Indicator (MEI) published by Monetary Policy Department, Bangladesh Bank, Monthly Economic Trends published by Statistics Department, Bangladesh Bank.

In equation form the VAR model can be written as,

$$Y_t = \alpha_0 + \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \ldots\ldots\ldots + \mu_t \tag{2}$$

Where,

$$Y = \begin{bmatrix} \Delta CPI \\ \Delta RGDP \\ R \end{bmatrix} \qquad X = \begin{bmatrix} \Delta CPI \\ \Delta RGDP \\ \Delta M2 \\ D \\ L \\ S \\ \Delta PSC \\ \Delta ER \\ \Delta WFPI \\ R \\ RR \\ C \\ YS \end{bmatrix}$$

The equations of the VAR model for ΔCPI are:

$$\Delta CPI_t = \beta_0 + \beta_1 \Delta CPI_{t-1} + \beta_2 \Delta CPI_{t-2} + \cdots\cdots\cdots + \mu_{1,t} \tag{3}$$
$$\Delta CPI_t = \beta_3 + \beta_4 \Delta RGDP_{t-1} + \beta_5 \Delta RGDP_{t-2} + \cdots\cdots\cdots + \mu_{2,t} \tag{4}$$
$$\Delta CPI_t = \beta_6 + \beta_7 \Delta M2_{t-1} + \beta_8 \Delta M2_{t-2} + \cdots\cdots\cdots + \mu_{3,t} \tag{5}$$
$$\Delta CPI_t = \beta_9 + \beta_{10} D_{t-1} + \beta_{11} D_{t-2} + \cdots\cdots\cdots + \mu_{4,t} \tag{6}$$
$$\Delta CPI_t = \beta_{12} + \beta_{13} L_{t-1} + \beta_{14} L_{t-2} + \cdots\cdots\cdots + \mu_{5,t} \tag{7}$$
$$\Delta CPI_t = \beta_{15} + \beta_{16} S_{t-1} + \beta_{17} S_{t-2} + \cdots\cdots\cdots + \mu_{6,t} \tag{8}$$
$$\Delta CPI_t = \beta_{18} + \beta_{19} \Delta PSC_{t-1} + \beta_{20} \Delta PSC_{t-2} + \cdots\cdots\cdots + \mu_{7,t} \tag{9}$$
$$\Delta CPI_t = \beta_{21} + \beta_{22} \Delta ER_{t-1} + \beta_{23} \Delta ER_{t-2} + \cdots\cdots\cdots + \mu_{8,t} \tag{10}$$
$$\Delta CPI_t = \beta_{24} + \beta_{25} \Delta WFPI_{t-1} + \beta_{26} \Delta WFPI_{t-2} + \cdots\cdots\cdots + \mu_{9,t} \tag{11}$$

$$\Delta CPI_t = \beta_{27} + \beta_{28}R_{t-1} + \beta_{29}R_{t-2} + \cdots\cdots\cdots + \mu_{10,t} \quad (12)$$

$$\Delta CPI_t = \beta_{30} + \beta_{31}RR_{t-1} + \beta_{32}RR_{t-2} + \cdots\cdots\cdots + \mu_{11,t} \quad (13)$$

$$\Delta CPI_t = \beta_{33} + \beta_{34}C_{t-1} + \beta_{35}C_{t-2} + \cdots\cdots\cdots + \mu_{12,t} \quad (14)$$

$$\Delta CPI_t = \beta_{36} + \beta_{37}YS_{t-1} + \beta_{38}YS_{t-2} + \cdots\cdots\cdots + \mu_{13,t} \quad (15)$$

The equations of the VAR models for ΔRGDP, the repo and reverse repo rates are similar to the above equations having ΔRGDP, the repo rate and reverse repo rates as dependent variable instead of ΔCPI respectively. To evaluate the forecast performances the estimation and forecasting periods is shown in Table 1.

Table 1: Evaluation and Forecasting Period

Evaluation Period	Estimation Period	Forecasting Period
1	2006:07 to 2015:06	2015:07 to 2016:06
2	2006:07 to 2015:07	2015:08 to 2016:07
3	2006:07 to 2015:08	2015:09 to 2016:08
	----	----
12	2006:07 to 2016:05	2016:06 to 2017:05
(Final evaluation Period) 2006:07 to 2016:06		2016:07 to 2017:06 (Final forecast)

note: There are 12 evaluation periods each time shifting the period forward by 1 month; final estimation period is 2006:07 to 2016:05 and final forecast period is 2016:07 to 2017:06.

Table 1 shows that at 1st period, for each forecasting variable (inflation, output and the policy rates) models are estimated with data up to 2015:06. Then from the estimated VAR models dynamic forecasts for ΔCPI, ΔRGDP, the repo rate and reverse repo rates are calculated from 2015:07 to 2016:06. Then compared with actual values of ΔCPI, ΔRGDP, the repo and reverse repo rates forecast errors are stored for each month and for each variable. This process is repeated 12 times, each time shifting estimation period and forecasting period forward by 1 month until models are estimated with data up to 2016:06. Subsequently, the Root Mean Squared Error (RMSE) of the inflation, output and the policy rates forecast for a horizon of 12 months is calculated for all models. Then among the average RMSE, the models with lower average RMSE are selected to forecast inflation, output and the policy rates. Schwarz Information Criterion (SIC) is used for selecting optimal lag length of the VAR models.

IV. Empirical Analysis:

The time series forecasting system provides a variety of tools for identifying potential forecasting models and for choosing the best fitting model. As a standard practice, in making the forecasting outcomes comparable among the various techniques, means square error (MSE) as well as root means square error (RMSE) are used as model selection criteria to identify the best performing model in forecasting. Table 2, 3, 4 and 5 depict all average RMSEs of all forecasting models.

Inflation

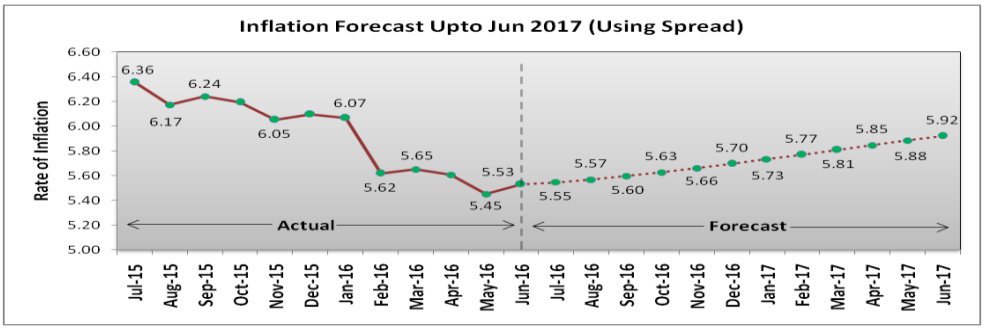
From Table 2, we can see that, in forecasting inflation, models with the spread, the repo rate, and ΔM2 are showing the lower average RMSE among the others. Using data from 2006:07 to 2016:06 from the estimated VAR models with the spread, M2, and the repo rate the forecasted inflation from 2016:07 to 2017:06 is shown Figure 1, Figure 2 and Figure 3 respectively.

Table 2: Average RMSE for Inflation forecast

Variable	Average RMSE	Variable	Average RMSE
Spread	0.5364	**ΔWFPI**	1.0311
Repo Rate	0.6901	**ΔCPI**	1.3606
Reverse Repo Rate	0.7560	**ΔPSC**	1.3671
ΔM2	0.7741	**ΔRGDP**	1.3994
Call Money Rate	0.8548	**Deposit Rate**	1.8323
Yield Spread	0.9794	**Lending Rate**	2.0802
ΔExchange rate	0.9884		

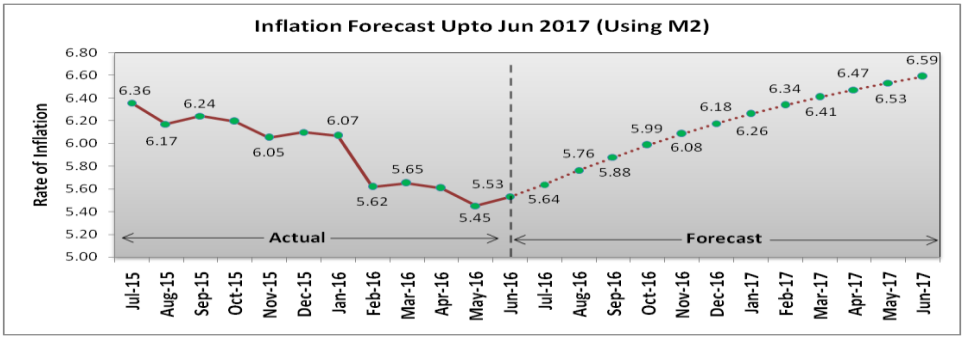
Source: Authors' calculation

Figure 1: Inflation Actual (2015:07 to 2016:06) and Forecast (2016:07 to 2017:06) Based on Model with the Spread



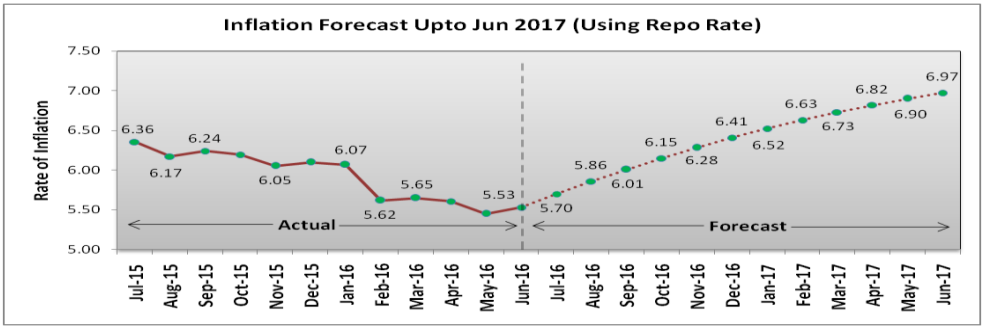
Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation

Figure 2: Inflation Actual (2015:07 to 2016:06) and Forecast (2016:07 to 2017:06) Using Model with ΔM2



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation

Figure 3: Inflation Actual (2015:07 to 2016:06) and Forecast (2016:07 to 2017:06) using Model with the Repo Rate



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation

Output

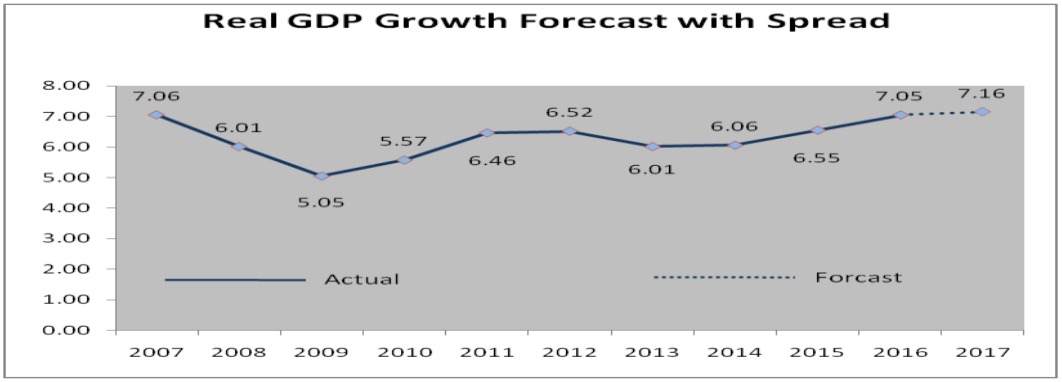
The average RMSEs in ΔRGDP forecast for all horizons are in Table 3. From the Table 3 we can see that, similar to inflation forecast, models with the spread and ΔM2 are showing the lower average RMSE. ΔRGDP forecasts for 2017 from estimated VAR models (2006:07 to 2016:06) with the spread and ΔM2 are shown in Figure 4 and Figure 5 respectively.

Table 3: Average RMSE for RGDP growth forecast

Variable	Average RMSE	Variable	Average RMSE
Spread	0.0963	**Reverse Repo Rate**	0.1333
ΔM2	0.0967	**ΔCPI**	0.1438
Deposit rate	0.1005	**Call Money Rate**	0.1497
Lending Rate	0.1035	**ΔExchange Rate**	0.1531
ΔPSC	0.1216	**Yield Spread**	0.1553
Repo Rate	0.1286	**ΔRGDP**	0.1748
ΔWFPI	0.1313		

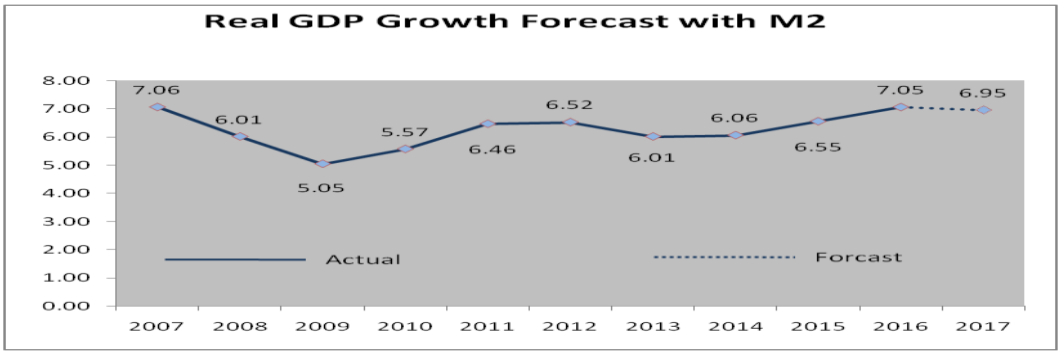
Source: Authors' calculation

Figure 4: ΔRGDP Actual (2007 to 2016) and forecasted ΔRGDP (2017) using Model with the Spread



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation

Figure 5: ΔRGDP Actual (2007 to 2016) and forecasted ΔRGDP (2017) using Model with ΔM2



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation

Policy Rate:

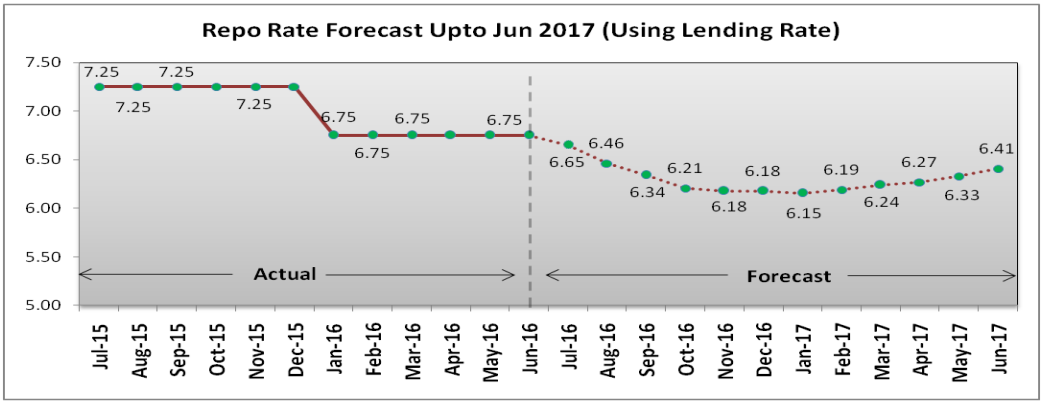
The average RMSEs in the repo rate forecast for all horizons are in Table 4. In case of the repo rate forecasting, model with the lending rate is showing the lowest average RMSE. Using estimated VAR model (2006:07 to 2015:12) with the lending rate, the forecasted repo rate is illustrated in Figure 6.

Table 4: Average RMSE for Repo forecast

Variable	Average RMSE	Variable	Average RMSE
Lending Rate	0.1449	**ΔM2**	0.2671
Repo Rate	0.1513	ΔPSC	0.3266
ΔRGDP	0.1545	**Yield Spread**	0.3633
Spread	0.1664	**Reverse Repo Rate**	0.3800
ΔExchange Rate	0.2090	**Call Money Rate**	0.4669
Deposit rate	0.2338	**ΔWFPI**	0.5217
ΔCPI	0.2652		

Source: Authors' Calculation

Figure 6: Repo Rate Actual (2015:07 to 2016:06) and forecasted Repo Rate (2016:07 to 2017:06) using Model with the Lending Rate



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation.

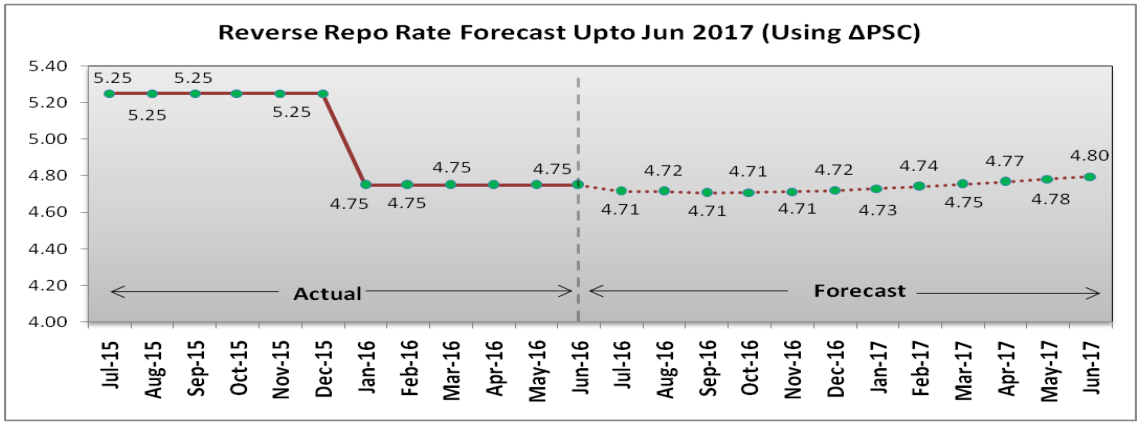
The average RMSEs in the reverse repo rate forecast for all horizons are in Table 5.In case of the reverse repo rate forecasting, models with ΔPSC and the spread are showing the lower average RMSE. Using estimated VAR model (2006:07 to 2015:12) with ΔPSC and the spread, the forecasted repo rates are illustrated in Figure 7 and 8 respectively.

Table 5: Average RMSE for Reverse Repo Rate forecast

Variable	Average RMSE	Variable	Average RMSE
ΔPSC	0.1466	**ΔM2**	0.3006
Spread	0.1495	**Call Money Rate**	0.3243
ΔCPI	0.1538	**Repo Rate**	0.3413
ΔWFPI	0.1729	**Reverse Repo Rate**	0.3771
Deposit rate	0.2145	**Yield Spread**	0.4655
Lending Rate	0.2552	**ΔRGDP**	0.5319
ΔExchange Rate	0.2861		

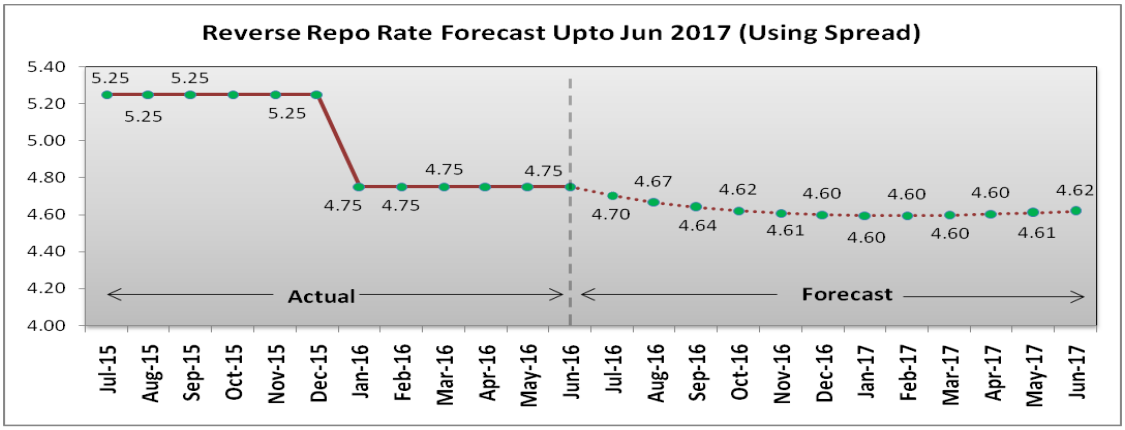
Source: Authors' Calculation

Figure 7: Reverse Repo Rate Actual (2015:07 to 2016:06) and forecasted Reverse Repo Rate (2016:07 to 2017:06) using Model with ΔPSC



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation.

Figure 9: Reverse Repo Rate Actual (2015:07 to 2016:06) and forecasted Reverse Repo Rate (2016:07 to 2017:06) using Model with Spread



Source: Actual values from Monthly Economic Trends (July 2006 to June 2016), Bangladesh Bank and forecasted values from authors' calculation.

V. Conclusion

Bangladesh Bank conducts monetary policy using broad money as an intermediate target. Since 2002-03 Bangladesh Bank also uses interest rates as indirect monetary policy tools. In this regards, it is necessary to know which of the many potential indicators provide the most reliable and timely information on future developments in the target variable(s) such as inflation and GDP growth. This paper assesses which indicators provide the most useful information about future inflationary trends, output and the interest rate. Unrestricted VAR techniques are used to estimate various models. The empirical results show that in terms of forecast accuracy the models estimated with the spread, the repo and reverse repo rates, and M2 perform better in forecasting inflation. Similarly in case of output forecast, models estimated with the spread and M2 performs better. In case of the repo rate forecasting, model estimated with the lending rate shows better accuracy. Models estimated with private sector credit and the spread show better accuracy than other variables for the reverse repo rate forecasting. Therefore, the policy implications of this study would be we need to keep an eye on the spread between the lending and the deposits rates, policy rates, and monetary aggregates (M2) to manage inflation, increase output and conduct changes in the policy rates.

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