Estimating the Neutral Interest Rate for Bangladesh

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Abstract

The Neutral Interest Rate (NIR) is the unobservable real interest rate expected to prevail when GDP is growing at its trend rate and inflation is at central bank's target. The NIR provides policy-makers with an indicative benchmark, by telling them whether a given level of the interest rate is higher or lower. Moreover, it indicates of the level of real interest rates where monetary policy is neither contractionary nor expansionary. The concept of NIR has recently received much attention as it yields important information about the stance of monetary policy. Many central banks estimate it for setting the policy rate to preserve price stability. This paper estimates NIR for Bangladesh for the period July 2008-June 2018 applying historical averaging and statistical filtering of time series data (Hodrick-Prescott filter) estimation techniques for different real interest rates such as repo, reverse repo, 30-day Bangladesh Bank bill, 91-day treasury bill, call money, bank deposit, bank lending, 5-year treasury bonds and 10-year treasury bonds. The paper finds that the estimated NIR based on real repo rate for Bangladesh lies in a range of 0.94% to 2.87% for the period under review. Taking the estimated NIR into consideration, the paper found that the monetary policy stance was largely accommodative rather than anti-inflationary. However, NIR is coming down in recent years; therefore lowering the monetary policy rate is very consistent with the economic situation of the time.

1. Introduction

Interest rates are the tool of choice for economists and practitioners when influencing economic activities and the conduct of monetary policy. Low-interest rates are considered to be stimulating economic activities and high rates restraining it. But how do one measure whether the prevailing interest rate is high or low in the absolute sense? To answer this question, it is useful to consider the concept of the 'neutral interest rate' introduced by Wicksell in 1898 and fully integrated into modern macroeconomies by Woodford in 2003. Wicksell argued that it is not a high or low-interest rate in the absolute sense that influencing the demand for productive resources like labour, land, and so indirectly as determining the movement of prices. As a result, what matters is not the absolute level of the current interest rate, but its level relative to the neutral interest rate. Now the question is what is the neutral interest rate? The neutral interest rate (NIR, henceforth) is the real short-term interest rate expected to prevail when GDP is growing at its trend rate (output equaling or converging to its potential), and inflation is at central bank's target. The NIR corresponds to the concept that there exists some unobservable real interest rate, which,

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in the absence of frictions, equilibrates demand and supply conditions of the aggregate economy. In that sense, the NIR is also referred to as the equilibrium interest rate.

The NIR could be informative for policymaker as a:
  i) reference point for interest rates set by central banks;
  ii) basis for long-term fiscal sustainability calculations;
  iii) benchmark for growth estimates; iv) measure for projecting long-term rates in financial markets.

The rate provides a broad indication of the level of real interest rates where monetary policy is neither contractionary nor expansionary. In this sense, a neutral real interest rate can be thought of as a benchmark, where a contractionary real interest rate is sometimes referred to as 'above neutral', and a stimulatory real interest rate is 'below neutral'. The gap between the current real interest rate and the neutral real interest rate can be thought of as a rough measure of the monetary policy stance.

The NIR provides policy-makers with an indicative benchmark, by telling them whether a given level of the interest rate is higher or lower. However, it does not tell the policy-maker the exact level at which to set interest rates. To decide on the appropriate interest rate setting, the policy-maker needs to decide how expansionary or contractionary monetary policy needs to be, and for how long that stance needs to be maintained. These decisions will depend on several factors such as the policy-makers assessment of the

  i) strength and persistence of the inflationary pressure that they are trying to offset. Generally, stronger and more persistent inflationary pressures will lead to higher interest rate settings;
  ii) preferences regarding the trade-offs between deviations of inflation from the target and;
  iii) volatility in other economic variables, such as output or the real exchange rate.

As the NIR is not directly observable, it must, therefore, be derived from real interest rate data, with all the uncertainty that entails. Another difficulty is that the neutral real interest rate varies for the different period of time. It is also changed for a different economic situation. Now, if the neutral interest rate cannot be observed how one can tell whether the market interest rate is above or below the neutral rate? There are many methods (structural model, filtering, and historical average) that are generally employed to estimate the NIR. Many central banks estimate it for setting the policy rate to preserve price stability. To the best of our knowledge, no study was found regarding the estimation of the NIR for Bangladesh. In this backdrop, this paper attempts to estimate the NIR for Bangladesh, probably for the first time, by employing two different methods such as historical average and Hodrick-Prescott (HP) filter methods as these are most popularly used techniques and easy to estimate.

Besides this introduction, this article is structured as follows. Section 2 presents the empirical literature review in the concerned area. Section 3 discusses the movements of the real interest rates in Bangladesh. Section 4 presents the data and methodology used for the study. Section 5 reviews the results and findings of the study. Section 6 evaluates the stance of monetary policy in Bangladesh. Finally, section 7 offers conclusions.

2. The Empirical Literature Review

Naturally, monetary policymakers should have a deep interest in the level of the natural interest rate because it presents a guidepost as to whether the monetary policy is too tight or too loose, just as in Wicksell's (1907) original view. The problem is that the natural rate is fundamentally unobservable. It is a hypothetical construct that cannot be measured directly. Instead, to get a sense of where the natural rate is, economists have employed various empirical methods that attempt to derive the natural rate from actual data.

In the literature, four approaches are commonly used to estimate the NIR.

- The First approach is to extract the natural rate as the long-run trend of a real rate time series (Hamilton et al. (2015));
- the second approach is to use a small scale semi-structural model of the economy and with the help of the Kalman filter jointly extract both short-term shocks and long-term trends (Laubach and Williams (2003; 2016));
- the third approach uses a medium-scale DSGE model where the natural rate is the rate that would prevail if prices and wages were flexible (Barsky et al. (2014), Del Negro et al. (2017), Cúrdia et al. (2015));
- the fourth approach is to use information from financial markets (from the yield curve) to estimate the level of the natural rate of interest.

Laubach & Williams (2003; 2016) use their model on quarterly U.S. data over the period 1961:1 to 2000:4, and jointly estimate the U.S. natural rate of interest, its potential output and trend growth rate. The authors find a substantial variation in the U.S. neutral rate in the period analyzed. For instance, the rate found for the 2000 was of 3%. The list of articles that make a similar estimation shows that the natural rate of interest for advanced economies is on average 2.5% and around 5% for emerging market economies (Table 1). H.K. Behera et.al (2015) apply the Kalman Filter approach on quarterly Indian data over the period 1996:2 to 2015:1, found the neutral interest rate of India for the period Q4of 2014-15 lies between 1.6 percent to 1.8 percent.

Table 1: Neutral Real Interest Rate of different Countries: Survey of Articles

| Author/s	Country	Method	Period	Neutral Rate (%)
ADVANCED ECONOMIES				
Laubach & Williams (2003)	USA	Kalman Filter	2002	3.0
Crespo-Cuaresma et al. (2004)	Euro Area	Cycle-Trend Decomposition	2002	1.5-2.0
Lam & Tkacz (2004)	Canada	DSGE	2002	1.25-2.0
Basdevant et al. (2004)	New Zealand	Kalman Filter	2003	3.12
Garnier & Wilhelmsen (2005)	Euro Area	Kalman Filter	2004	2.0
Clark & Kozicki (2005)	USA	Kalman Filter	2005	2.5
Amato (2005)	USA	Time-Varying Parameter	2004	3.0
	UK		2004	4.0
	Germany		2004	2.75
Mésonnier & Renne (2007)	France	Kalman Filter	2002	1.5
Bernhardsen & Gerdrup (2007)	Norway	Kalman Filter, Taylor Rule	2007	2.5
EMERGING ECONOMIES				
Brzoza-Brezezina (2004)	Poland	SVAR, Kalman Filter	2003	4.0
Humala & Rodríguez (2009)	Peru	Kalman Filter	2008	8.0
Öğünç & Batmaz (2011)	Turkey	Kalman Filter	2006	7.5
Behera, Pattanaik & Kavediya (2015)	India	Kalman Filter	2015	1.6-1.8

Table-1 shows that the highest NIR of 2008 is 8 percent for Peru. The lowest NIR of 2002 is 1.25-2.0 percent for Canada. It also shows that all neutral rates were a positive number.

In a recent paper, Jim Hamilton et al. (2015) use moving averages of the actual real rate of interest over a relatively long period of time as a proxy for the natural rate of interest. The measure is very useful to understand low-frequency changes in the actual real rate of interest. L. Thomas A. and M. Christian (2015) argued that the average of the real interest rate can be used as a proxy of neutral rate where the determinants of the neutral rate are constant over time.

3. Movement of Real Interest Rates in Bangladesh

The NIR must be extracted from the observed real interest rate data. Towards estimating the NIR the focus should be on the behavior of the real interest rate, defined as the nominal short-term rate minus inflation. From chart-1 it is evident that real interest rates of instruments such as repo, 91-day treasury bill, 30-day Bangladesh Bank bill and call money have declined mostly from July 2006 to June 2011 with some volatility. During July 2006 to December 2011, particularly after the global crisis, the average real interest rates of 91-day treasury bill, repo and call money were -2.29 percent, -0.80 percent, and -0.09 percent respectively, reflecting the easy monetary policy stance and accommodative fiscal stimulus. From January 2012 these rates started to move upward. The average real interest rates of repo, 91-day treasury bill and call money were 0.81 percent, 0.12 percent and 0.35 percent respectively during January 2012 and June 2018.

Chart -2 shows the real bank deposit rate was also negative from July 06 to December 2011 with some fluctuation. During the period, the average real interest rate on bank deposit was -1.46 percent. From January 2012 the real bank deposit rate started to become positive, the average rate was 0.56 percent between January 2012 and June 2018. On the other hand, the bank lending rate was positive throughout the whole period of July 2006 to June 2018. It appears that the real rates were negative when inflationary pressure was high and the real rates became positive when inflationary pressure moderated.

Chart 1: Movement of Real Interest Rates

Chart 2: Real bank Interest Rates (In Percent)
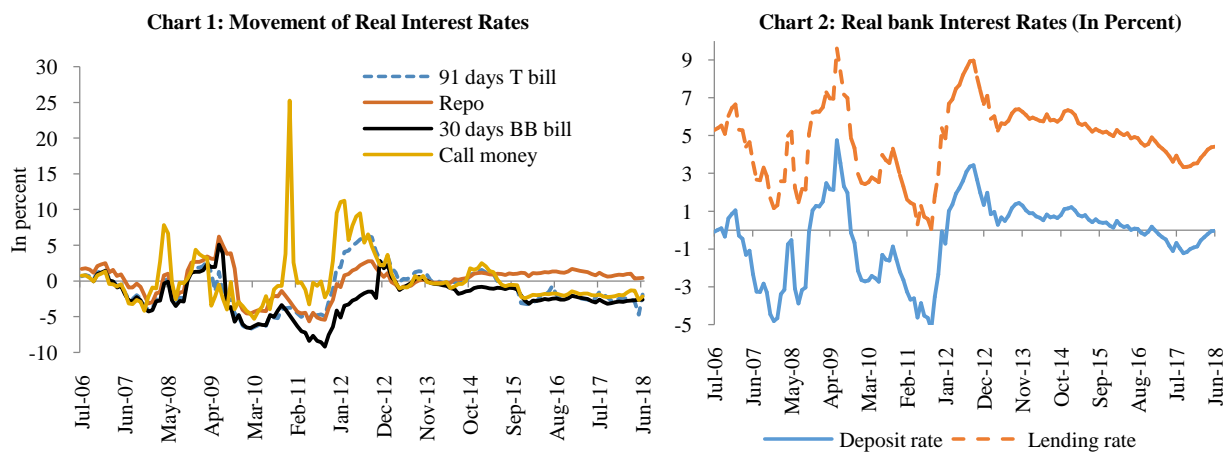
4. Data and Methodology

To estimate the NIR for Bangladesh, the paper considers real interest rates of different instruments (repo, reverse repo, 30-day Bangladesh Bank bill, 91-day treasury bill, call money, bank deposit, bank lending, 5-year treasury bonds and 10-year treasury bonds) for the period of July 2006 to June 2018. The NIR is associated with the real interest rate. All NIR is a real interest rate but all real interest rates are not neutral. The interest rates that are prevailing in the banking systems are in nominal terms. So, the paper at first converts the observed nominal interest rates of different instruments to real interest rates by subtracting the inflation (point-to-point) from the respective nominal interest rates. There is no straightforward technique to estimate the NIR. Different methods such as structural model, filtering and historical average are generally employed to estimate the NIR. This paper estimates the NIR by applying historical average and filtering methods.

In order to estimate the NIR for all the relevant real interest rates (91-day treasury bill, repo, reverse repo, 30-days Bangladesh Bank bill, call money rate and bank deposit rate, bank lending rate, 5-year and 10-year treasury bonds), the paper divide the whole sample period into two sub-sample such as:

i) July 2006 to December 2011 and

ii) January 2012 to June 2018

based on negative and positive mean as shown in Chart-7. It is seen from chart-7. The mean of the different real interest rates (inflation-adjusted) are quite different and diverse across the different sample period. For example, during July 2006-December 2011, mean of the real repo and deposit interest rates are negative while they are positive from January 2012 to June 2018.

The estimated NIRs for different countries are shown in Table-1. The most notable finding from the survey of articles is that the estimates of the natural interest rates never turn negative. So the estimated neutral interest rate should be any positive number. Moreover, the report of the expert committee to review and strengthen the monetary policy framework for India has recommended adoption of a simple policy rule defined in terms of a real policy rate which should be positive, on average, when inflation exceeds the inflation target, and the Monetary Policy Committee (MPC) should decide the magnitude by which it may be positive. This finding is qualitatively in line with the findings of Laubach and Williams (2003), who also find a positive natural interest rate.
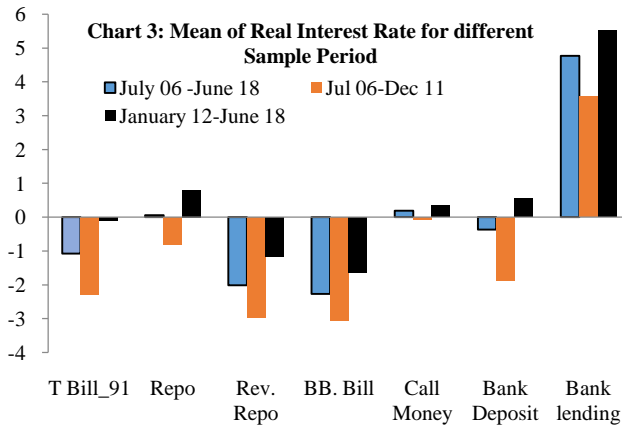
Chart-3 shows that the average real interest rates of all the variables (except lending rate) were negative within July 2006 and December 2011. On the other hand, it is found that during January 2012 to June 2018 the average real interest rates of repo, call money, deposit and lending rates were positive. Thus, the paper considers the positive variables i.e. repo, call money, deposit and lending rates for the period from January 2012 to June 2018 to estimate the NIR for Bangladesh. For estimating the NIR using the historical average method, the average of the positive real interest rates of repo, call money rate, bank deposit, bank lending rates over a business cycle have been considered. The average would, therefore, give us an estimate of the NIR for respective instruments.

Another simple method often applied for assessing the changing level of the neutral rate is the use of univariate filters for extracting the trend from the real interest rate. In this paper, Hodrik-Prescott (HP) filter is applied to different real interest rates.

5. Results and Findings

5.1 Historical Averaging Method:

To estimate the NIR by the historical average method the paper first compute the cycle-specific mean of the real interest rates of repo, Call money, bank deposits and Lending rate. The chart 4-7 show that the cycle mean for repo varies from 0.94 percent to 2.87, for call money rate the cycle mean varies from 1.75 percent to 2.36 percent, for bank deposits the cycle mean varies from 0.90 percent to 1.86 percent and for lending it varies from 4.79 percent to 5.51 percent.

Chart 3: Mean of Real Interest Rate for different Sample Period
July 06 -June 18 | Jul 06-Dec 11 | January 12-June 18

Sourse: Estimate of the authors.
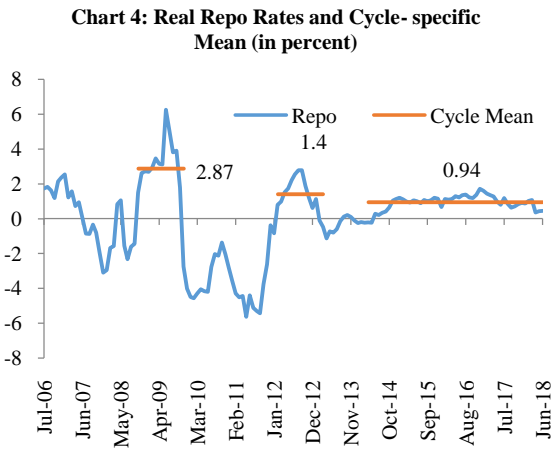
Table 2: Estimated Neutral Interest Rate (%)

Name of Variable	Historical Average	HP Filter
Repo	0.94-2.87	0.76
Call Money	1.75-2.36	-2.13
Bank Deposit	0.90-1.86	-0.59
Bank Lending	4.79-5.51	3.77

Source: Estimate of the authors.

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Chart 4: Real Repo Rates and Cycle- specific Mean (in percent)

Chart 5: Real Call Money Rates and Cycle - specific Mean (in percent)

Chart 6: Real Deposit Rates and Cycle -specific Mean (in percent)

Chart 7 : Real Lending Rates and cycle-specific mean (in percent)
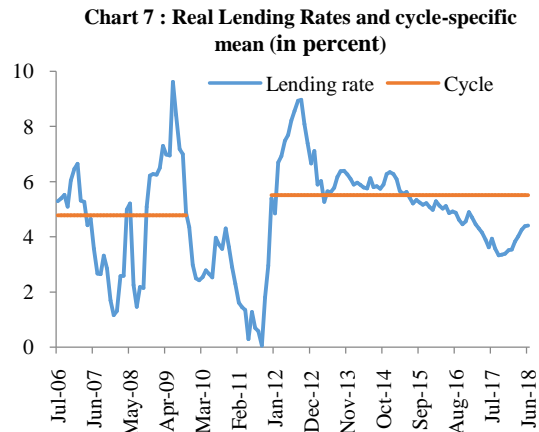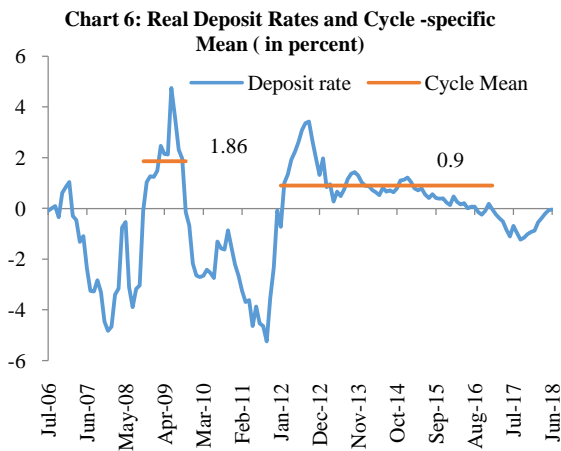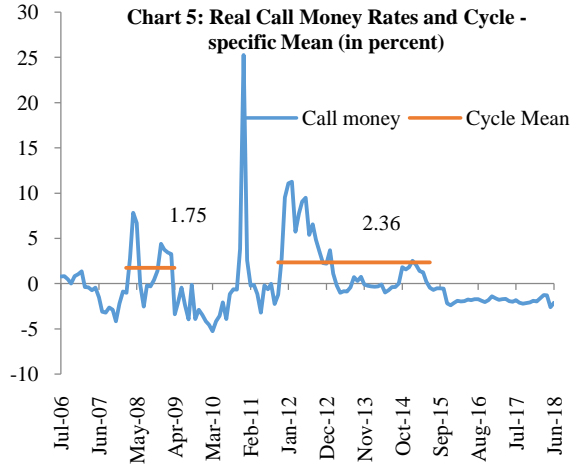

5.2 HP method:

Hodrik-Prescott (HP) filtering method applied on real interest rates of different instruments (repo, call money, deposit and lending) are presented in Table-2 and chart 8-11. All of the rates show a similar pattern. NIR for Repo, was -1.32 percent in January 2012 and 0.76 percent in June 2018. Call money neutral rate was -1.74 percent in January 2012 and -2.13 percent in June 2018. Bank deposit neutral rate was -0.48 percent in January 2012 and -0.59 percent in June 2018. Bank Lending neutral rate was 4.78 percent in January 2012 and 3.77 percent in June 2018.
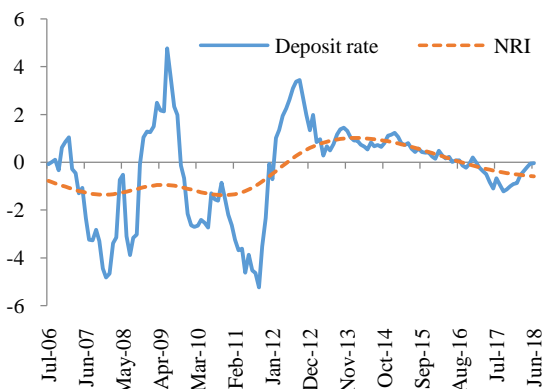
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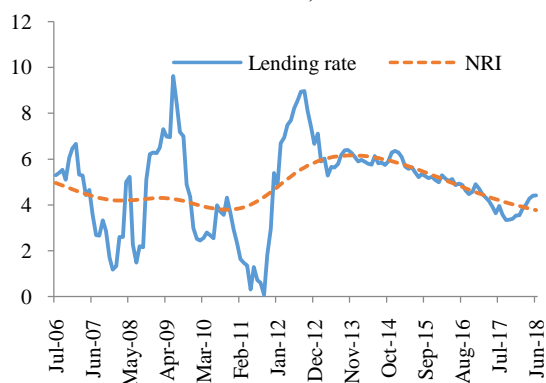**Chart 8:Actual and Neutral Repo Rates (in percent)**
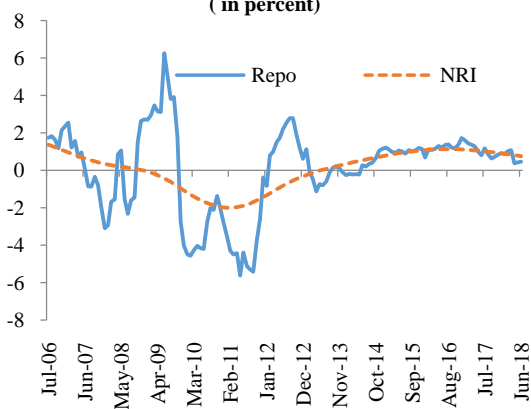
Chart 9 : Actual and Neutral Call Money Rates (in percent)
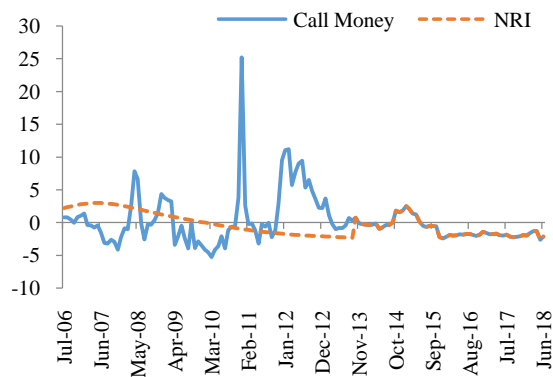
Chart 10 : Actual and Neutral Deposit Rates (In Percent)

Chart 11: Actual and Neutral Lending Rates (In Percent)

6. Evaluating the Stance of Monetary Policy in Bangladesh

Each of the variables, (repo, call money, deposit, and lending) is associated with different neutral interest rate. Among these, the choice of interest rate to evaluate the stance of monetary policy depends upon which interest rate is used as a policy rate. There are cross country differences in what is used as the policy interest rates. Bangladesh Bank considers repo as the policy interest rates. So, the study focuses on the neutral repo interest rate and its divergence from the real repo rate to evaluate the stance of monetary policy.

Chart 12: Interest Rate Gap of Real Repo (Percentage Point)

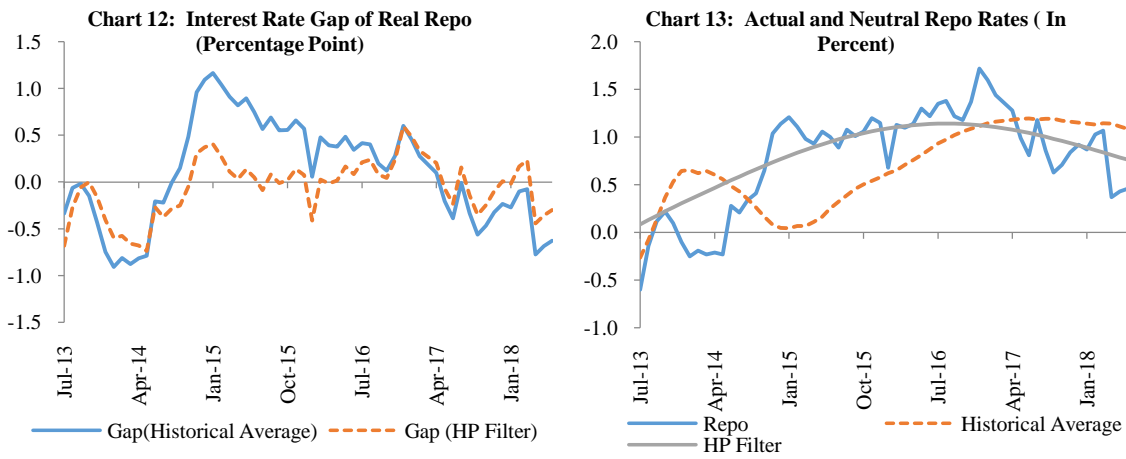**Chart 13: Actual and Neutral Repo Rates (In Percent)**

Chart-12 shows the interest rate gaps i.e., 24 months moving average real repo rate minus NIR estimated applying two alternative approaches, yield largely similar results. The interest rate gap narrowed, particularly for the last few years, displaying the preciseness of the two measures. Chart-13 presents the neutral repo rate estimated adopting two different statistical techniques against the 24 months moving average real repo rate to get an idea about the stance of monetary policy. Chart-13 shows that even the average real repo rate has some fluctuations; it is fairly consistent with the estimated NIR for repo and broadly following the movements of it. NIR for repo was increasing through FY15-16 because of the high demand for investment and average real repo rate track the neutral rate. The NIR was slowing down after FY17 because of the moderate demand for investment as a contagion effect of the global slowdown.

Moreover, both the estimates of NIR concur that the real repo rate has been below its natural counterpart for an extended period suggesting the accommodative stance of monetary policy pursued by Bangladesh Bank for the last five years. Especially, in the recent time (from the start of FY18) real repo rate came down below the NIR. This finding suggests that monetary policy has not been tight enough and the policy stance has remained accommodative in the recent period. With an accommodative policy stance, the most favourable information for the policymakers is that the monetary policy has the scope to higher repo rate to rein any inflationary pressures in the near future.

7. Conclusion

The estimated results show that the monetary policy stance has remained accommodative, as the repo neutral rate remained below the average real repo rate for most of the period under review. Particularly in the recent period, the accommodative monetary policy stance of Bangladesh Bank is evident interest rate gap between neutral repo rate and the average real repo rate turn into negative. The low level of interest rates experienced in recent times is largely attributable to a reduction in the neutral rate of interest, which reflects cautious behavior on the part of households and firms. The monetary policy stance is very close to the neutral rate in the recent times which suggests that the monetary policy adopted by Bangladesh Bank has largely accommodated the decline in the neutral rate in order to mitigate the adverse effects of the

financial crisis. The neutral rate of interest is falling in recent periods, so, lowering of the repo can be considered as consistent with the current economic situation. Looking ahead, the study expects the temporary headwinds on investment to abate, as the neutral rate to return closer to historical levels.

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