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Sources of exchange rate fluctuations in Bangladesh

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Abstract

Though exchange rate was stable in the initial stage of floating regime in Bangladesh, sharp depreciations occurred during August 2004 to April 2006 and again in July 2010 to January 2012. As excessive fluctuation of exchange rate can be an obstacle to macroeconomic stability, it is important to know the sources of fluctuations in both the phases. In this context, this paper tries to investigate the probable reasons behind sharp depreciation of Bangladesh Taka (BDT) against US dollar (USD) in these two phases using Structural Vector Autoregression (SVAR) model following Clarida and Gali (1994) and uses data from January 2003 to June 2012. The paper finds that both the demand shocks mainly arising from external sector and the supply shocks are responsible for sharp depreciations of Bangladesh's exchange rate in the two phases of our concern. However, the supply shocks are less effective than demand shocks in exchange rate fluctuations and the money supply shock also has a negligible effect on the depreciation of BDT during the period of this study.

Keywords: Structural VAR, Exchange rate depreciation, Demand shock, Supply Shock, Nominal Shock.

JEL Classification: E3, F41

[1] In order to upgrade research capacity and policy analysis at Bangladesh Bank (BB), Research Department conducts research work on macroeconomic issues as a part of its routine activities. The paper reflects research in progress, and as such comments are most welcome (email: mahfuza.akhther@bb.org.bd). It is anticipated that the paper will eventually be published in learned journals after completion of the due review process. The views expressed in this paper are those of the authors' own and do not necessarily reflect those of Bangladesh Bank. The authors would like to thank Dr. Ahsan H. Mansur, Executive Director, Policy Research Institute (PRI) of Bangladesh, who provided valuable insights and guided the research study.

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Introduction

The sharp depreciation of Bangladesh Taka (BDT) against US dollar (US$) in late 2011 has generated considerable interest in seeking the reasons behind the exchange rate fluctuations in Bangladesh. The early stage of the floating exchange rate regime in Bangladesh was almost stable with low volatility and minimal depreciation of the taka against major trading partners' currencies due to adequate preparatory steps taken by Bangladesh Bank and the low inflationary environment at home and internationally (Rahman and Barua, 2006). From June 2003 to July 2004 the BDT/US$ exchange rate remained fairly stable while during August 2004 to April 2006 it experienced substantial depreciating pressure. After April 2006, the exchange rate remained very stable moving very gently during May 2006 to June 2010. The exchange rates again started to depreciate sharply from July 2010 and it continued up to January 2012. From February 2012, it recorded an appreciating tendency which is still continuing.

It is generally believed that depreciation of the domestic currency improves net exports as well as the external current account balance of the home country. But the benefits depend on the elasticity of export and import demand function of the country. Besides, it increases the country's rate of inflation through pass through effect. Therefore, depreciation is not always a good thing for a country. It may also be harmful for the external sustainability as well as economic growth of a country. So, the paper attempts to find out the logical reasons behind the sharp depreciation of BDT against US dollar as well as its trading partners' currencies. The paper also investigate the inter linkage of foreign exchange market with money market of Bangladesh. Besides, a comparative analysis between the two episodes is also presented for future policy options. In this regard, the paper is divided into five sections. The first section summarizes the literature review. In the second section, the behavior of exchange rate movements is analyzed rigorously. The third section focuses the plausible reasons behind the exchange rate depreciations. The fourth section seeks the long-run relationship among the variables of interest (relative output, relative real exchange rate and relative price) and also tries to find out the possible reasons of exchange rate fluctuations using structural vector auto regression (SVAR) model. The last section provides some concluding remarks with policy suggestions.

I. Literature Review

In literature, several studies attempted to investigate the sources of exchange rate fluctuations for different countries over different time periods. But very few studies are found for Bangladesh. Clarida and Gali (1994) was the pioneer to empirically investigate the sources of real exchange rate fluctuations. They studied exchange rate movements in Germany, Japan, Canada and Britain using the data since the collapse of Breton Woods. They found that nominal shocks explained a substantial part of the variance of the change in the dollar-DM and dollar-yen real exchange rates. They also found reverse results in the case of Canada and Britain. In case of Canada and Britain, demand shocks explain the majority of the variance in real exchange rate fluctuations, while supply shocks explain very little.

Bhundia and Gottschalk (2003) investigates the sources of fluctuations in the rand-U.S. dollar exchange rate in 2001 and 2002 using an empirical exchange rate model which identifies aggregate supply, aggregate demand, and nominal disturbances as possible sources for exchange

rate fluctuations. They found that nominal disturbances explain by far most of the rand depreciation in the final quarter of 2001. They also found that financial market developments are the most likely source of the depreciation.

Wang (2004) reviews the evolution of China's real effective exchange rate between 1980 and 2002, and uses a structural vector auto-regression model to study the relative importance of different types of macroeconomic shocks for fluctuations in the real exchange rate. He showed that real relative demand shocks had been the most important sources of fluctuations in the real exchange rate over the estimation period, while supply shocks had been the main factors accounting for variations in relative output and relative prices. He also showed that supply shocks were at least as important as nominal shocks in contributing to real exchange rate variations in China.

Chen (2004) estimated a structural VAR model using quarterly data of the USA, Canada, Germany, Japan and the UK from 1974:Q3 to 2002:Q4 by following Clarida and Gali (1994). His obtained results indicating that the variance of real exchange rates can be attributed more to monetary shocks when the sample span is extended. He also used VAR model with long-run annual data from 1889 to 1995 and found that that monetary shocks can explain nearly 50% of real exchange rate variance in the long run sample period.

Inoue and Hamori (2009) empirically analyzed the sources of the exchange rate fluctuations in India using monthly data from January 1999 to February 2009 by employing the structural VAR model. The VAR model consists of three variables, i.e., the nominal exchange rate, the real exchange rate, and the relative output of India and a foreign country. The empirical evidence demonstrated that real shocks were the main drivers of the fluctuations in real and nominal exchange rates, indicating that the central bank could not maintain the real exchange rate at its desired level over time.

Rahman and Barua (2006) attempted to analyze the underlying causes and impact of the recent developments in the foreign exchange and money markets of Bangladesh using the data of FY05 and FY06. They observed that depreciation and volatility of exchange rate depends on various components of foreign exchange market. For example, when the gap between the monthly flow of imports and exports widens or the demand for opening import LCs rises, the exchange rate tends to depreciate. On the other hand there is high positive correlation between volatility of exchange rate and that of call money rate.

The above survey indicates that a systematic and comprehensive study on recent sharp exchange rate fluctuations in Bangladesh is necessary for adapting future policy options.

II. Behavior of the exchange rate movements

As mentioned earlier, there were two episodes when there were pressures for exchange rate depreciation during the floating exchange rate regime in Bangladesh. The first episode continued about 21 months from August 2004 to April 2006 and the second episode lasted about 19 months from July 2010 to January 2012. During the first episode BDT depreciated by 15.67 percent against the US dollar and stood at Tk. 70.05 per US$1.0 on April 2006 from Tk. 59.37 per

US$1.0 on August 2004. During the second episode BDT depreciated by 17.80 percent and stood at 84.44 per US$1.0 on January 2012 compared with Tk. 69.41 per US$1.0 on July 2010.

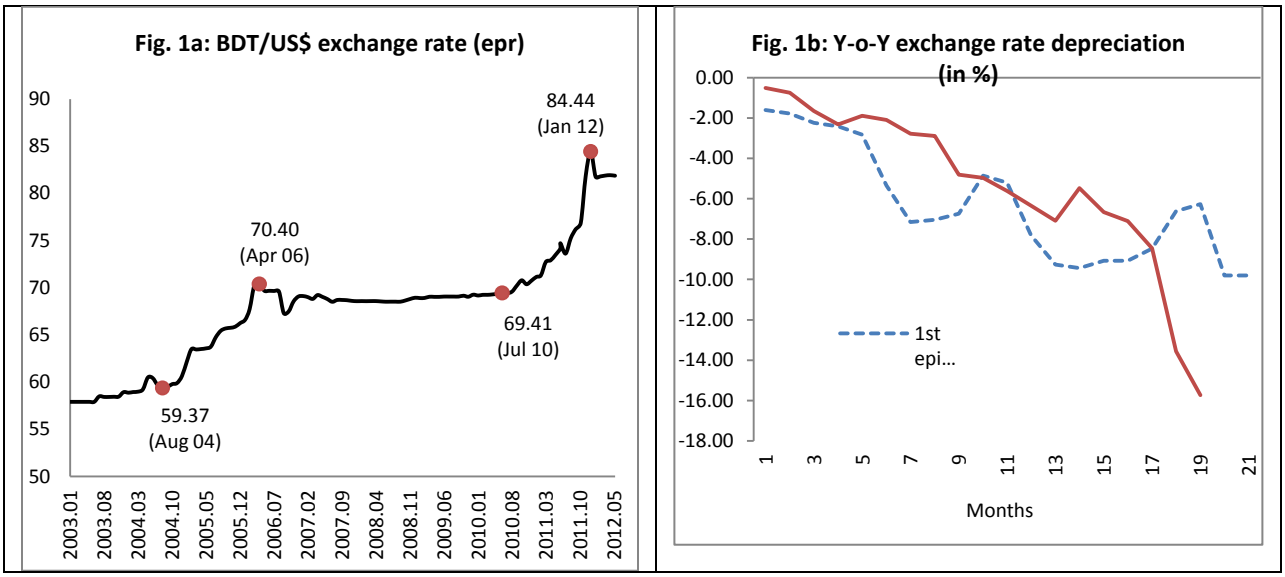
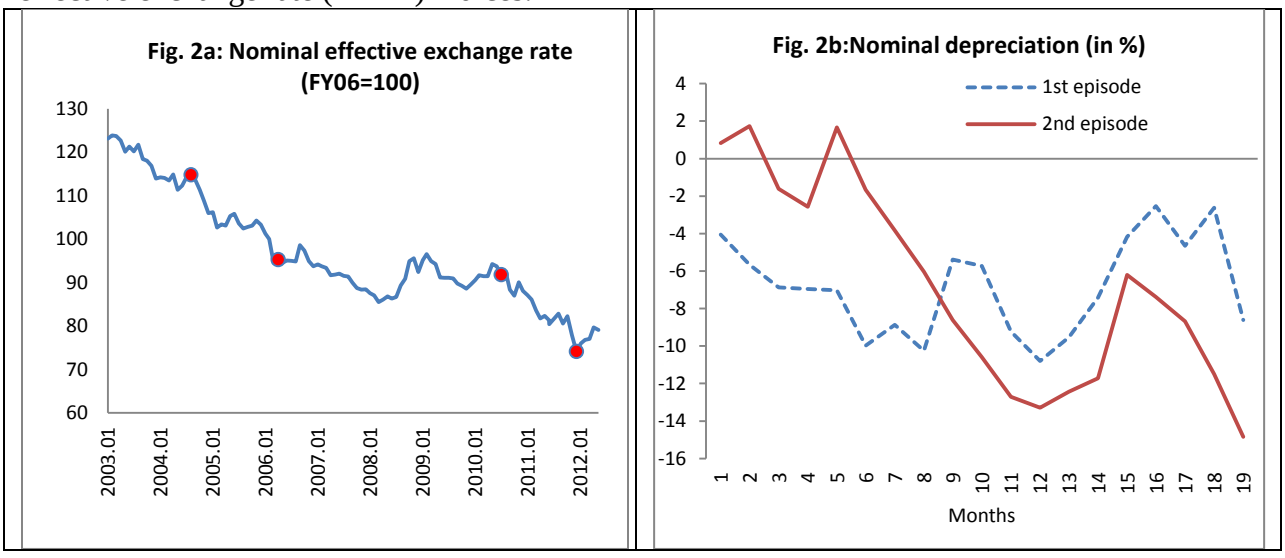
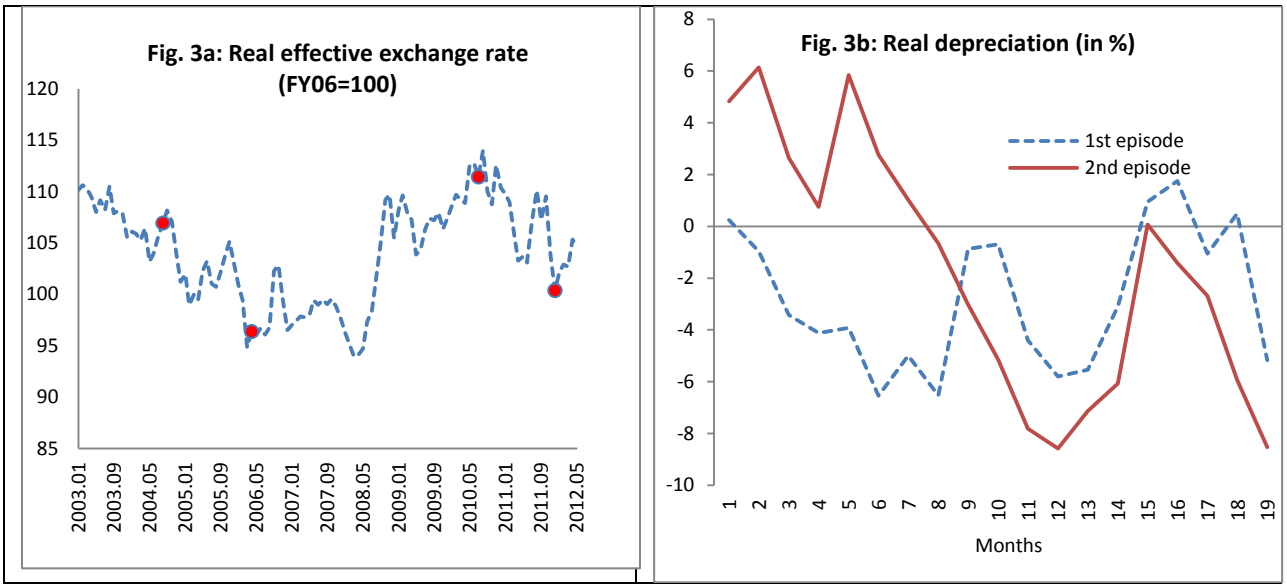


Figure 1a shows the movement of BDT/US$ exchange rate (end period rate, epr) and the figure 1b shows exchange rate depreciation (in percent, %) during the two episodes mentioned above. It is observed that the trend and overall depreciation in 2nd episode was severe than first episode. But the trends of depreciation were increasing for both episodes. Therefore, the correlation between exchange rate movements between two episodes stood at 0.91 (highly correlated).

Although the USA is the second largest trading partner (18 percent of total trade in FY06) and US$ is the intervention currency in foreign exchange transactions of Bangladesh, the multilateral exchange rate , i.e., effective exchange rate is more important for policy decision. The ways to express the effective exchange rates are -nominal effective exchange rate (NEER) and real effective exchange rate (REER) indices.





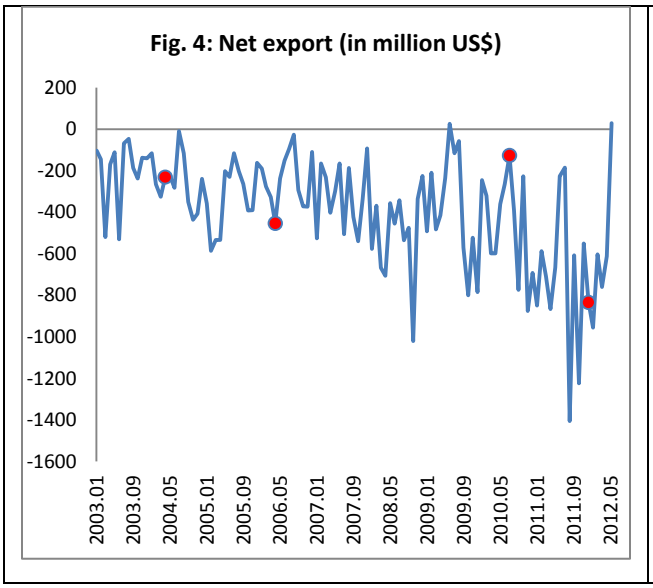
From figure 2a and 2b, it is observed that BDT sharply depreciated in nominal term against its major trading currencies during the first episode. The depreciation would have been more severe in the second episode except for the months of September-October, 2009. From figure 3a and 3b, it is also observed that BDT depreciated in real term in the first episode except for the months of November-December, 2005 and February 2006. It also depreciated severely in the second episode except for the months of July-December, 2010, January 2011 and September 2011.

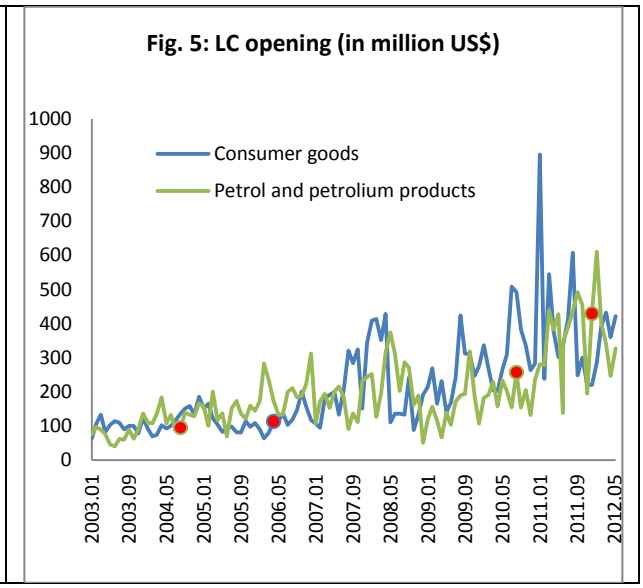
III. Plausible reasons for exchange rate depreciations

Under a floating regime, exchange rate movements depend on the demand and supply of foreign currency which are determined by the foreign exchange rate as well as money market variables. Some important variables are discussed below in order to explain the possible reasons for the sharp depreciation of BDT during the two episodes mentioned above.

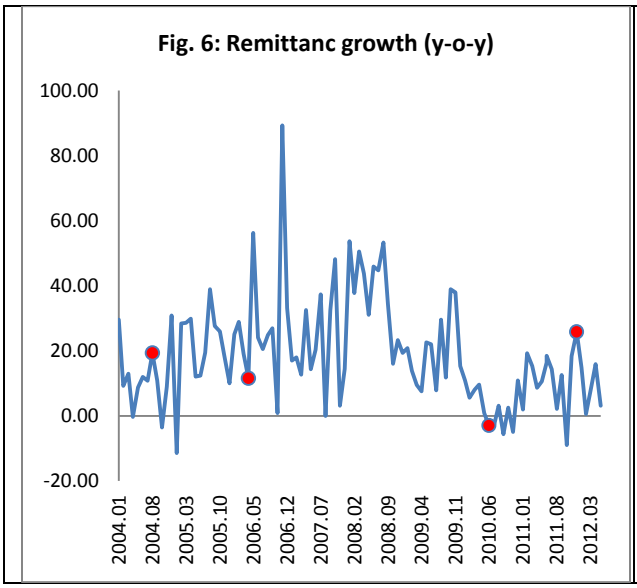
(a) **Movement of net exports**: Net exports in Bangladesh are always negative since its independence due to merchandise trade account imbalance. The size of the external trade account deficit becomes smaller or larger at different time periods. The vulnerability of the net export situation resulted mainly due to inelastic import demand of Bangladesh. About eighty percent of Bangladesh exports are on account of woven garments and knitwear, which in-elastically depend on the import of raw materials. The other important import items namely consumer goods (basically food), machinery and petroleum products are also inelastic in nature. An increase in net exports increases the demand for foreign exchange and trends to put pressures on the BDT exchange rate against partners' currencies. From figure 4, it is observed that net exports of Bangladesh had increased sharply during both the 1st and 2nd episodes. From figure 5, it is apparent that import demands for consumer goods as well as for petrol and petroleum product were responsible for the higher import demand during the two episodes under review. It is observed that during the first episode import demand for petrol and petroleum products was greater than the demand for consumer goods, but during the second episode demand for consumer goods was much higher than its levels in normal

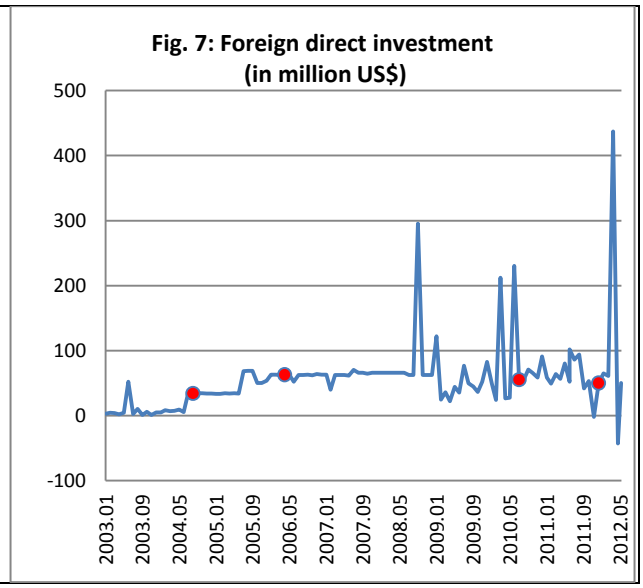
times. Demand for consumer goods increased sharply in value terms mainly due to increased food prices in the world market.





(b) **Inward remittance:** The flows of inward remittances in Bangladesh have contributed significantly to the external current account surplus recorded in recent years. It is also a very important source of foreign exchange from the supply side of the foreign exchange market in Bangladesh and thus can potentially play an important role in exchange rate determination. In this context it is noteworthy that the remittance growth, especially during the second episode, was disappointing (Fig. 6). The average growth of inward remittance during the second episode was 8.29 percent where the historical average of inward remittance was 18.86 percent (during January 2003-June 2012). The slower growth of inward remittances certainly exacerbated the recent exchange rate pressure in Bangladesh during the second episode.





(c) **FDI inflow:** The FDI inflow in Bangladesh has generally been very low compared to most comparator countries in the region. It was even lower during the two episodes under review compared to the inflow in between the two episodes (Fig. 7). The monthly average (y-o-y) FDI inflow during the first and second episodes were US$47.0 million and US$62.2 million respectively whereas it was US$68.8 million during the period in between the two episodes (May 2006 - June 2010).

(d) **Net foreign aid:** Bangladesh is still dependent on international foreign aid for financing its development projects and for the stability of the overall balance of payments. By financing imports associated with development projects and through budget support, foreign aid is also important for the stability of the foreign exchange market of the country. The level of foreign aid, especially during the first episode, was very low compared to the historical average (US$ 93.3 million, during January 2003 - June 2012). The monthly average of net amounts of foreign aid during the first and second episodes were US$69.8 million and US$84.21 million respectively where as it was US$107.1 million during the period in between the two episodes (Fig. 8).

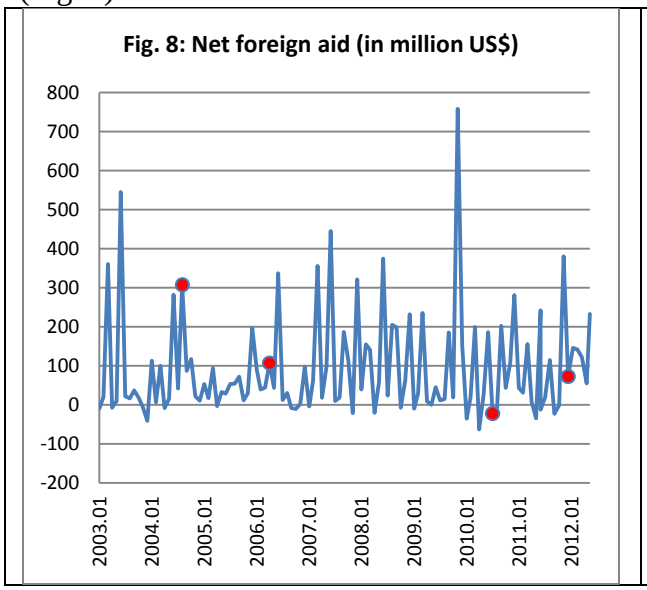


Fig. 8: Net foreign aid (in million US$)

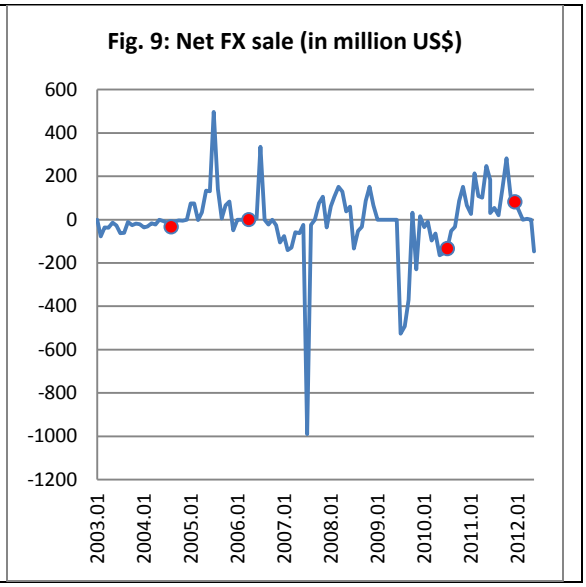
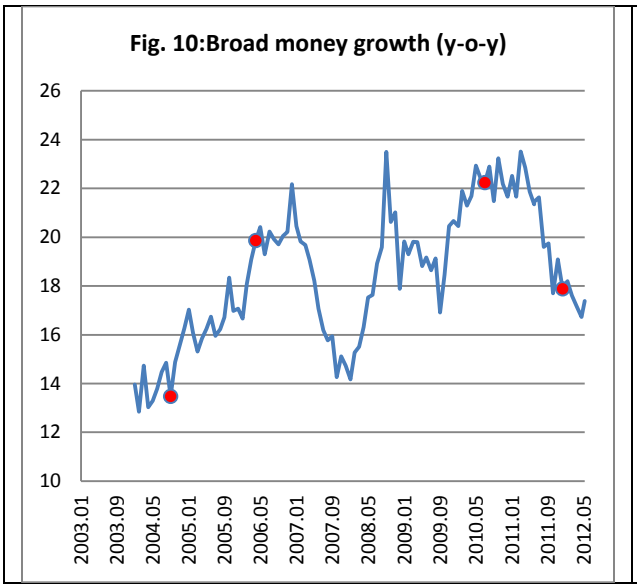
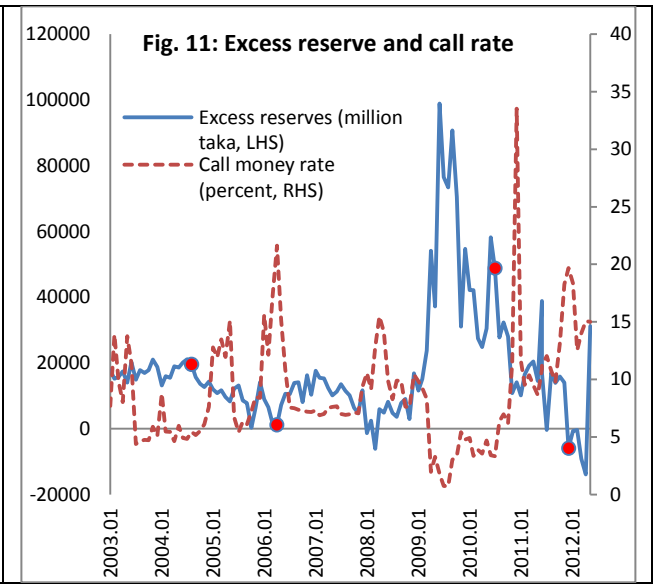


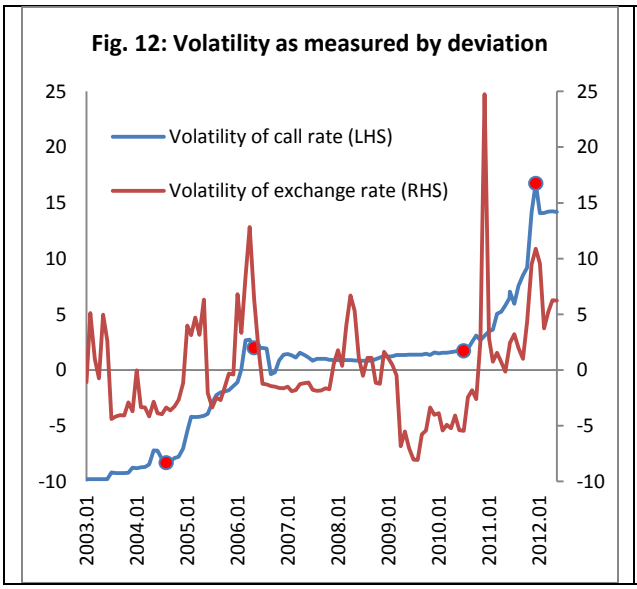
Fig. 9: Net FX sale (in million US$)

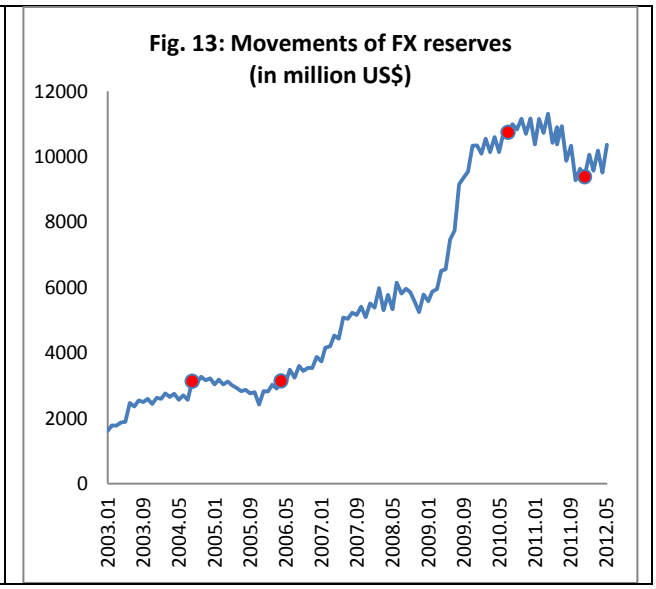
(e) **FX intervention:** Although the floating exchange rate regime has been prevailing, Bangladesh Bank has to intervene sometimes indirectly through selling and buying of foreign currency in the market to mitigate the undesirable fluctuations in the exchange rate. In this context, the amounts of net sales during the first and second episodes were US$1135.9 million and US$1680.5 million, respectively. Market interventions works to smooth out fluctuations due to temporary or short-term liquidity problems and it never works when the exchange market is fundamentally in disequilibrium. Since the interventions were made when the exchange market was subjected to some fundamental shifts on the supply and demand side both working toward larger excess demand for foreign exchange Bangladesh Bank interventions were not sufficient to stabilize the market (Fig. 9).





(f) **Liquidity movement:** Theoretically, exchange rate depreciation is positively related with the expansion of money supply (liquidity). From figure 10, it is observed that the growth of broad money during first episode was increasing. For the second episode it may appear that liquidity was decelerating when the exchange market pressure emerged. However, a closer look at the monetary/liquidity situation would indicate that in the period immediately preceding the start of the episode for a significant period during the second episode, liquidity expansion remained at the very high level of about 22 percent. Therefore, the impact of nominal shock behind the sharp depreciation can be supported for both the episodes. This observation is also supported by the movement of excess reserve and call money rate. From figure 11, it is observed that the movements of the excess reserves were decline during the both episodes and the call money rates were comparatively high. It may also be observed that (Fig. 12) the correlations between volatility of call rate and that of exchange rate (0.63 for first episode and 0.37 for second episode) were not strong.





(g) **Foreign exchange reserves:** Due to both domestic and external factors discussed above the level of foreign exchange reserves was decreasing during both episode, in part because of market interventions. Bangladesh Bank's inability to stabilize the exchange rate despite sizable market interventions and the consequent loss of reserves led to a sharp exchange rate depreciation pressure in during the two episodes in Bangladesh.

IV. Model based analysis of exchange rate fluctuations

Theoretical background

Following the pioneering work of Blanchard and Quah (1989), there has been a growing body of literature in which long-run relationships from theory are used to identify structural shocks in an open economy setting. Clarida and Gali (1994) construct a three variable - relative output, relative prices, and the real exchange rate - structural VAR and identify three types of macroeconomic shocks: supply, real demand, and nominal shocks. The contribution of each type of shock to the variability of each variable is then assessed.

Clarida and Gali (1994) derive a stochastic version of the Obstfeld (1985) open economy macro model where output is supply determined over the long run. Their representation illustrates how the Mundell-Fleming-Dornbusch model can provide theoretical foundations for the restrictions used in their analysis to identify three separate types of "fundamental" shocks in the economy. The key assumptions of the model include (i) prices and output adjustments are sticky and (ii) foreign and domestic goods are imperfect substitutes in consumption. Shocks in the model can be categorized into: (i) real aggregate supply (AS) shocks, which includes all labor market factors, such as changes in the relative productivity of home to foreign countries, that shift the aggregate supply curve; (ii) aggregate demand or real good market (IS) shocks, encompassing exogenous changes to real relative domestic absorption due to shifts in consumption, investment, government expenditure and home/foreign goods tastes; and (iii) nominal or money market (LM) shocks, reflecting shifts in both relative money supplies, such as monetary policy shocks and relative money demands, such as velocity shifts, and effects of financial liberalization.

A positive supply shock, such as a higher productivity growth in the home country, raises the aggregate supply of domestic goods and the rate of return to capital and, in a traditional Mundell-Fleming model in which capital is mobile, leads to capital inflows and an appreciation of the exchange rate on impact (Obstfeld, 1994). Over the long run, domestic output increases to its higher potential level, domestic price declines, and the real exchange rate depreciates in order to generate trade surpluses to pay down the accumulated stock of net foreign liabilities. A positive demand shock increases demand for home goods, pushes up prices of home products and leads to an appreciation of the real exchange rate and an increase in output in the short run. Over time, output returns to the long-run trend, but the price level remains higher and the real exchange rate remains above its trend. A positive nominal shock lowers home interest rates. In the short run, both the nominal and real exchange rates depreciate, the relative price rises, and the domestic output increases. Over time, output and the real exchange rate return to their long-run trends. The long-run relationships described here are used in this paper as restrictions to identify the fundamental shocks in the model.

Data and Variables

Three variables - relative output (y), relative prices (p) and the real exchange rate (q) - have been included in this study. Monthly data on these variables have been collected for the period from January 2003 to June 2012. All variables are expressed in natural logarithms. The variables are relative to the weighted average of same variables in eight largest trading partner countries because both domestic and external macroeconomic conditions may affect the real exchange rate. Due to unavailability of quarterly or monthly data on GDP in Bangladesh, in this paper the index of industrial production (IIP) is used as a proxy of output variable. Hence, the log of relative real output is measured as the log of IIP of Bangladesh minus the log of trade weighted IIP of trading partner countries; the relative price level (CPI) has been measured similarly. Data on these variables related to Bangladesh have been collected from various publications of Bangladesh Bank and Bangladesh Bureau of Statistics (BBS). On the other hand, data related to trading partner countries have been collected from the CD-ROM of International Financial Statistics (IFS).

Model

The empirical model contains a three-variable structural VAR (Δy, Δq, Δp) and its identification restriction. The observed variations of economic variables are governed by three mutually orthogonal disturbances: supply shocks, demand shocks and monetary shocks. Formally, we want to transform the reduced form VAR to the structural model:

$$x_t = C(L)\varepsilon_t \tag{1}$$

where

$$x_t = \begin{pmatrix} \Delta y_t \\ \Delta q_t \\ \Delta p_t \end{pmatrix}, \qquad C(L) = \begin{pmatrix} C_{11}(L) & C_{12}(L) & C_{13}(L) \\ C_{21}(L) & C_{22}(L) & C_{23}(L) \\ C_{31}(L) & C_{32}(L) & C_{33}(L) \end{pmatrix}, \qquad \varepsilon_t = \begin{pmatrix} \varepsilon_t{}^s \\ \varepsilon_t{}^d \\ \varepsilon_t{}^m \end{pmatrix} \tag{2}$$

In equation (2), $C_{ij}(L)$ is the polynomial of lag operator L, and $\varepsilon_t{}^s$, $\varepsilon_t{}^d$ and $\varepsilon_t{}^m$ are sequences of supply, demand and monetary shocks respectively. The orthogonality assumption implies $E\varepsilon_t\varepsilon_t' = I$. Furthermore, following Clarida and Gali (1994), the restriction that neither monetary shocks $\varepsilon_t{}^m$ nor demand shocks $\varepsilon_t{}^d$ influence relative output levels in the long run requires that

$$C_{12}(1) = C_{13}(1) = 0 \tag{3}$$

Similarly, the restriction that monetary shocks $\varepsilon_t{}^m$ do not influence the real exchange rate in the long run implies that

$$C_{23}(1) = 0 \tag{4}$$

Estimation Procedure

First, the reduced form VAR will be estimated by ordinary least square regression (OLS). Second, from the estimated reduced form VAR and long-run restriction denoted in equations (3) and (4), three orthogonal shocks can be disentangled, yielding the estimated coefficients $\{C_{ij}: i,j = 1,2,3\}$ in equation (2). Finally, the paper will employ impulse response and variance decompositions, which help us to investigate the direction and the sources of real exchange rate fluctuations.

Estimation Results

This section examines the time-series properties of the variables in the analysis. As we see in Figure 14, three variables included in this study are most likely to have unit roots. Regression of non-stationary variables may leads to a spurious result. Formal stationary tests are conducted and the results from the Augmented Dickey Fuller unit root tests are reported in Table 1. The null hypothesis of a unit root cannot be rejected for the levels of all three variables at conventional level of significance, while the first differences are confirmed to be stationary at 1 percent level of significance.

Fig. 14: Movements of variables

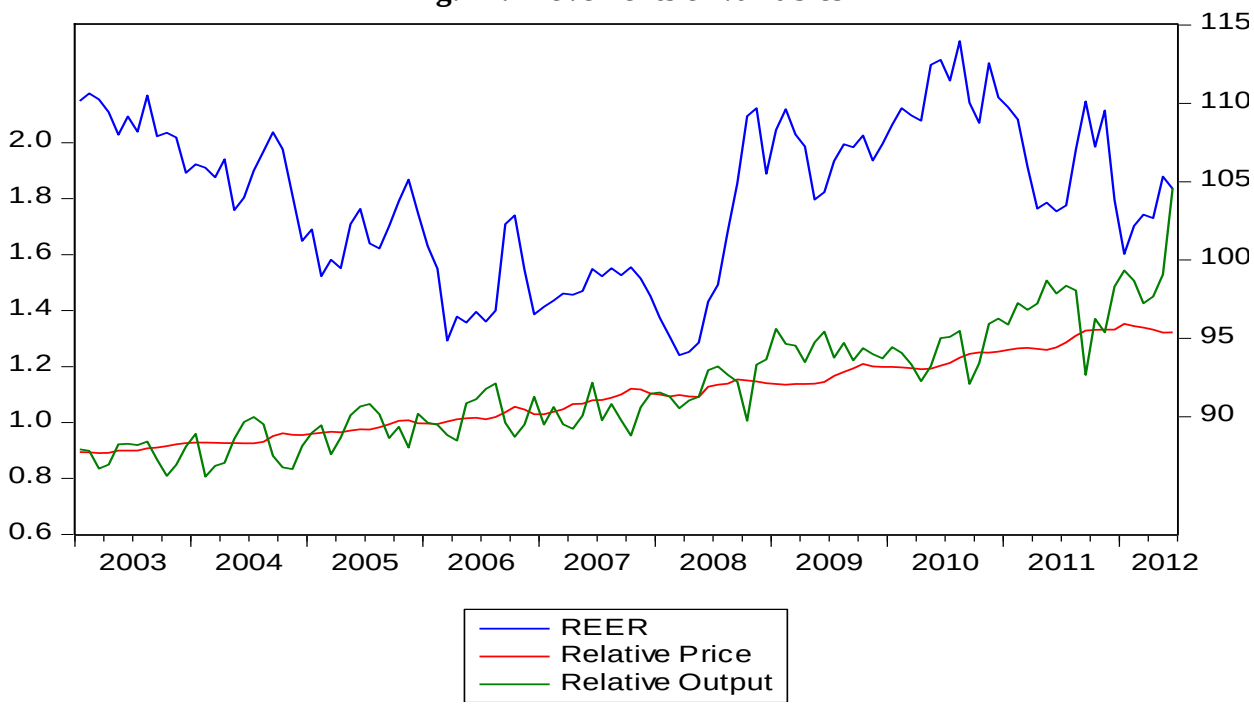


Table 1: Augmented Dickey-Fuller Test for Stationarity

Variables	In Level	In first difference
	t-statistic	t-statistic
Relative output	0.41	-10.16*
REER	-2.34	-9.81*
Relative Price level	1.70	-7.70*

Note: * test statistic significant at 1 percent level of significance.

Using the Akaike Information Criterion (AIC), we find that the Vector Auto Regressive (VAR) model is the most appropriate for the system. In order to examine the sources of fluctuation, computed impulse response functions (IRFs) and variance decompositions (VDCs) of these three variables have been used. Since the nominal exchange rate is of central interest to us, below we also present the impulse response analysis for this variable[2].

Figure 15 displays the impulse response functions of relative output, real exchange rate, relative price level and nominal exchange rate to one standard deviation structural shocks. Since the variables were entered in first differences in the VAR, the resulting impulse responses were cumulated in order to obtain the impulse responses of level of each of the variable to the structural shocks in the model. These impulse response functions are in line with the theoretical priors discussed above. Figure 15 shows that a positive supply shock leads to an increase in output; however, it declines to a lesser rise over the long run. The increase in relative output in

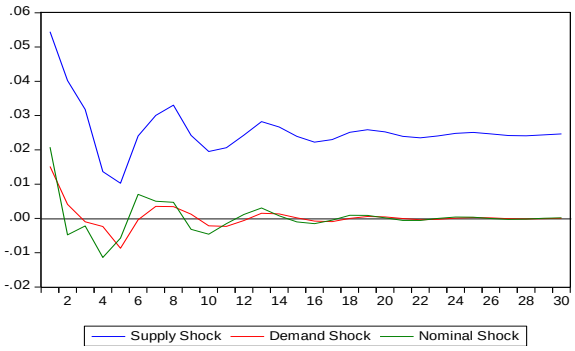
[2] Even though this variable does not enter our empirical model directly, it can be constructed from the relative price variable and the real exchange rate variable.

Bangladesh is accompanied by a relative decline in the price level in Bangladesh. Since it is a key characteristic of a supply disturbance to drive output and prices in opposite directions, the responses shown in the figure are consistent with the predictions of our theoretical model. The real exchange rate initially appreciates slightly in response to the supply disturbance, but then a pronounced and persistent depreciation sets in, which is the long-run response predicted by Clarida and Gali's model. To quantify the impulse response of nominal exchange rate we deduct the response of relative price from the response of real exchange rate. The figure shows that in response to supply shock, nominal exchange rate appreciates slightly in the long run and the response seems to be very weak.

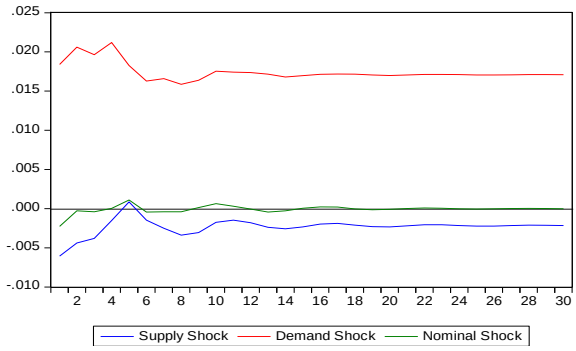
In the case of real demand shock, there is an increase in output, an increase in the price level, and an appreciation of the real exchange rate. Both responses are predicted by our theoretical model. The nominal exchange rate also appreciates. In the long run, the output response is restricted to zero. The price and the exchange rate responses, on the other hand, turn out to be very persistent. In the case of nominal shock, the output response lasts for a few months and is accompanied by a depreciation of the nominal and real exchange rate. In the long-run, both the output and the real exchange rate responses are restricted to zero. But the nominal disturbance is followed by a persistent increase in the price level, and, consequently, in the nominal exchange rate. It is noteworthy that the nominal exchange rate overshoots its long-run level considerably, which is consistent with the predictions of the familiar Dornbusch (1976) model.

Fig. 15: Accumulated Impulse Response Function

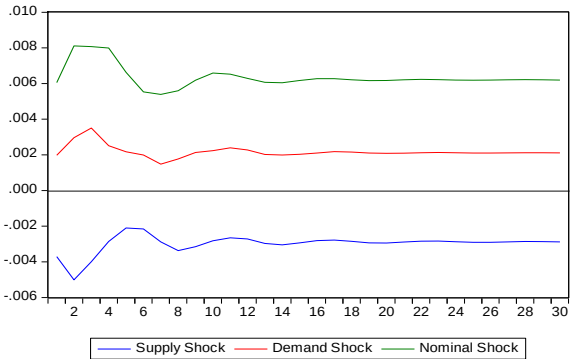
Impulse response of relative output



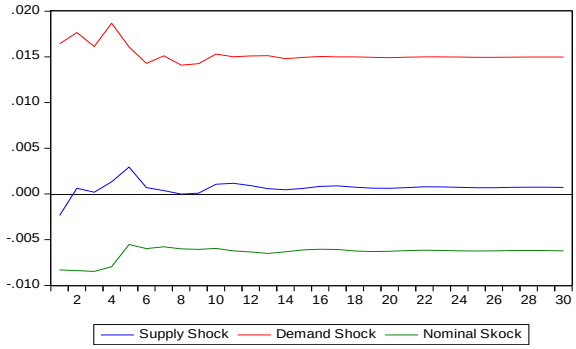
Impulse response of real exchange rate



Impulse response of relative price



Impulse response of nominal exchange rate



While impulse responses are useful in assessing the signs and magnitudes of responses to specific shocks, the forecast error variance decomposition analysis provides an important insight into the relative importance of each shock at different forecast horizons to the structural disturbances in our model. Since this paper focuses on the nominal exchange rate, we report here the variance decomposition only for the nominal exchange rate, which has been produced from the variance decomposition of real exchange rate and relative price. Table 2 presents the share of the forecast error variance of nominal exchange rate at different forecast horizon that can be attributed to each type of shocks in the model.

Table 2 shows that the main cause of the unexpected changes in the nominal exchange rate is demand shock. Demand shock accounts for almost half of the short-run variability in the nominal exchange rate. At the one-year horizon, nominal disturbances still account for about 60 percent of the variance decomposition, but at the two-year horizon this share has declined to about one-third. It decreases slightly to 46.56 percent at six month forecast horizon and it remained persistent for longer forecast horizon. While nominal shocks are the second largest source of the variability in nominal exchange rate which accounts for one-third of the unexpected fluctuations of the nominal exchange rate and it remains persistent in the longer forecast horizon. Initially supply shocks account for only 17.53 percent of the variability in nominal exchange rate. It increases to 20.44 percent at eight month forecast horizon and remains persistent thereafter.

Table 2: Forecast Error Variance Decomposition of Nominal Exchange Rate

Forecast horizon	Supply shock	Demand shock	Nominal shock
1	17.52	48.10	34.38
2	17.68	47.79	34.53
3	18.27	47.92	33.81
4	19.35	47.99	32.66
5	19.73	47.33	32.94
6	19.94	46.56	33.49
7	20.27	46.60	33.13
8	20.44	46.57	32.99
9	20.38	46.60	33.03
10	20.55	46.42	33.03
11	20.56	46.42	33.02
12	20.56	46.40	33.04

In this paper our main objective is to identify the sources of volatility of nominal exchange rate with special attention to two episodes (Episode 1: August 2004 - April 2006 and Episode 2: July 2010 - January 2012) of high depreciation pressure on nominal exchange rate in Bangladesh. This purpose may be better served by historical decomposition of the nominal exchange rate. Using the estimated VAR, a historical decomposition can be derived to examine whether or not the supply, demand, and nominal shocks that have been identified can plausibly explain the time path followed by the nominal exchange rate of Bangladesh during the two episodes mentioned earlier.

Figure 16: Historical Decomposition of Nominal Exchange Rate During the Two Episodes

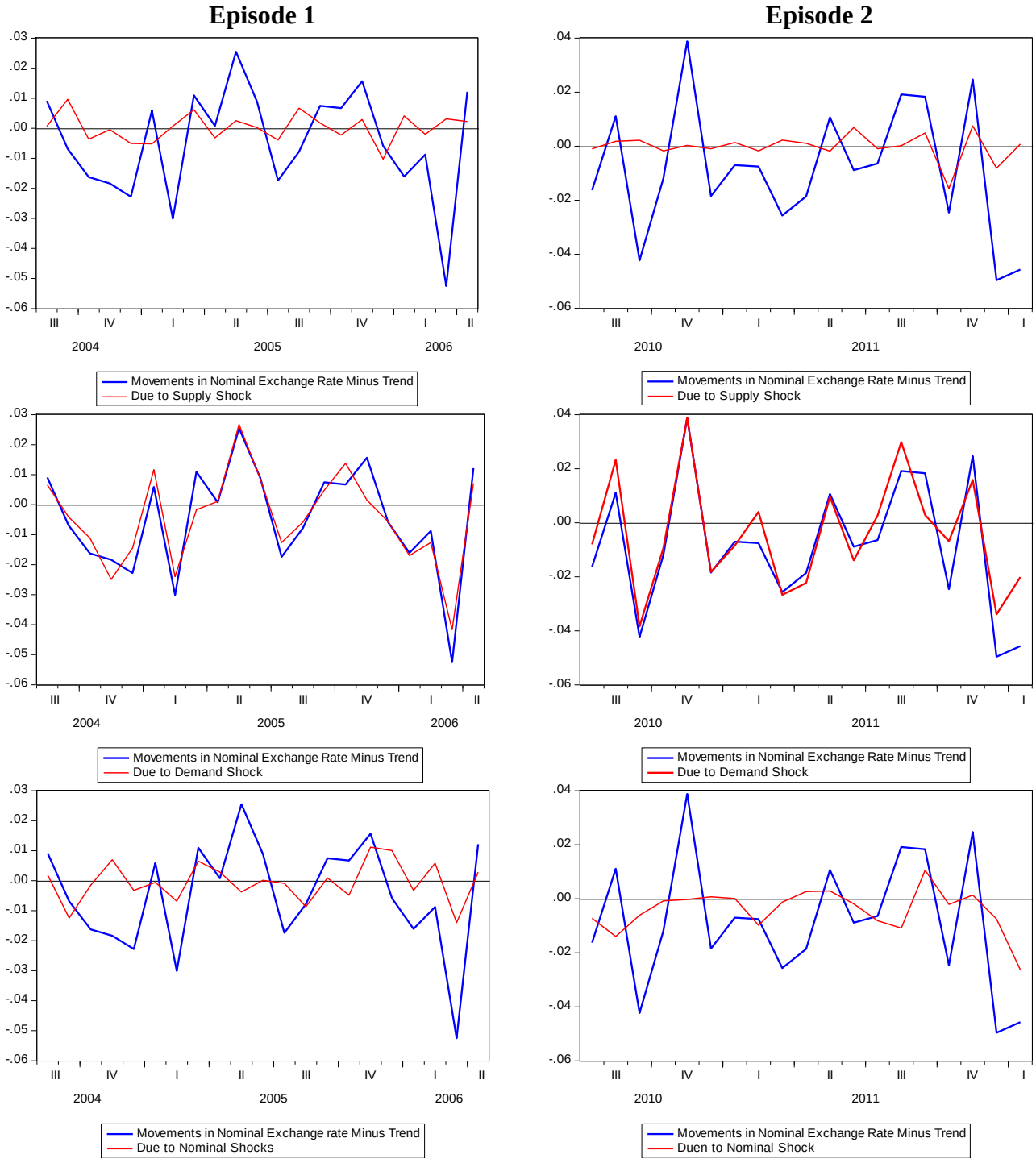
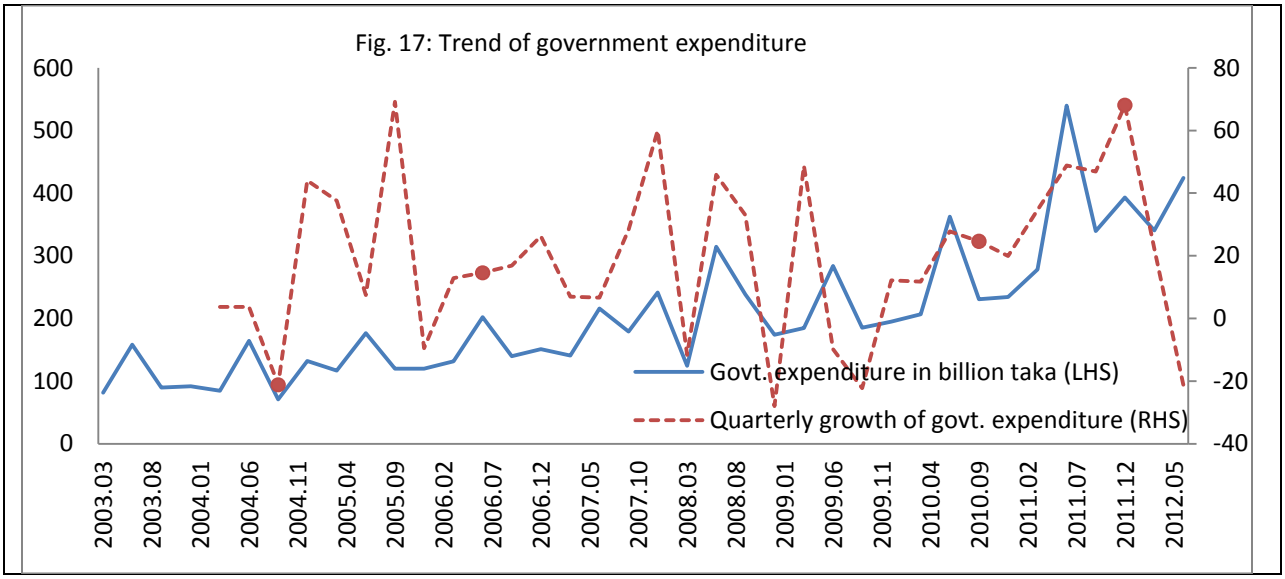
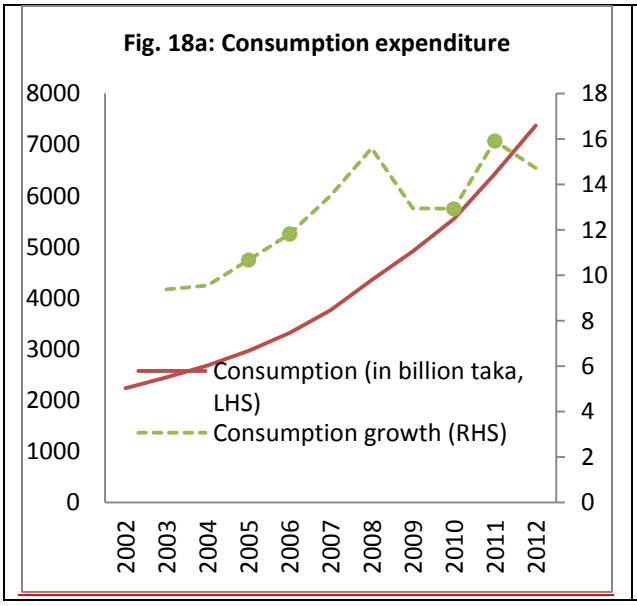


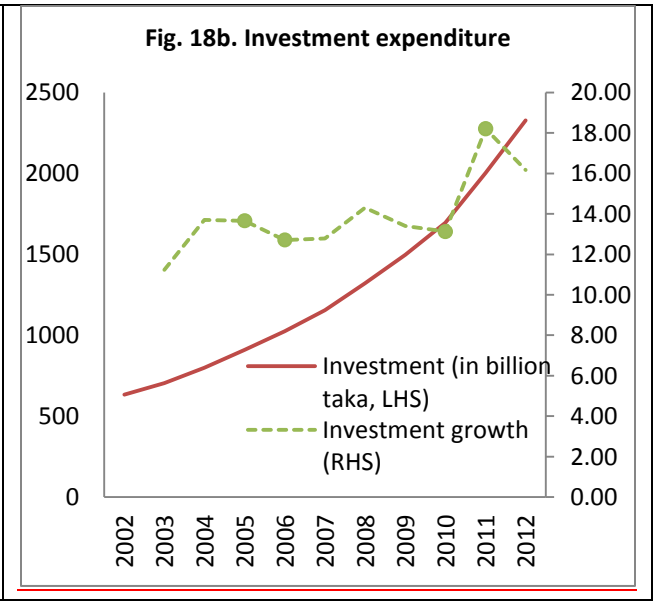
Figure 16 plots the unconditional forecast error for the nominal exchange rate and shows the decomposition of this forecast error into the components that can be attributed to supply, real demand, and nominal shocks. The blue line in each graph of two panels (for two episodes) is the total forecast error, which depicts the difference between the actual (log level of the) nominal

exchange rate and the level that would have been forecast from the VAR. In other words, the blue line reflects the cumulative impact of the three types of structural shocks on the nominal exchange rate. The red line in each panel plots the contribution of each type of shocks to the total forecast error, or the forecast error that would have resulted if only one particular source of shocks had hit the variable. As shown in the figure, unexpected movements in the nominal exchange rate have been driven mainly by demand shocks.

Government expenditure which is a component of aggregate demand expands very largely during both episodes (Figure 17). The average quarterly growth of government expenditure stood at 19.37 percent and 40.51 percent during the 1st and 2nd episode respectively, whereas the average growth between two episodes was 15.79 percent. The growth of other components of aggregate demand except net exports (exports minus imports) also increases largely during the two episodes compared to pre-episodes periods (Figure 18a and Figure 18b).







The growths of consumption during 1st and 2nd episodes were 11.24 percent and 15.31 percent respectively, whereas the growths were 9.47 percent and 13.74 percent during pre-episodes respectively. The growths of investment during 1st and 2nd episodes were 13.19 percent and 17.19 percent respectively, while the growths were 12.47 percent and 13.41 percent during pre-episodes respectively. As a result, the nominal GDP growths during 1st and 2nd episodes were 11.74 percent and 14.78 percent respectively, whereas the growths were 10.40 percent and 13.69 percent during pre-episodes respectively.

V. Concluding remarks

In order to find out the recent exchange rate fluctuations in Bangladesh, this paper has discussed all relevant variables of foreign exchange market and money market using graphical as well as econometric technique. This paper also tries to find out the reasons behind the exchange rate fluctuations on historical as well as episode basis. It is observed that demand shocks especially created from external sector are responsible for sharp depreciation of BDT exchange rate during the two episodes. As per econometric analysis supply shocks are also important (but less than demand shock) for exchange rate fluctuation. The nominal shock, i.e., the money supply shock is ignored in the overall analysis.

References

Bhundia, A. & Gottschalk, J. (2003). Sources of Nominal Exchange Rate Fluctuations in South Africa. *IMF Working paper No. WP/03/252*.

Blanchard, O. & Quah, D. (1989). The Dynamic Effects of Aggregate Supply and Demand Disturbances. *American Economic Review,* 79(4): 655–673.

Chen, S. (2004). Real Exchange Rate Fluctuations and Monetary Shocks: A Revisit. *International Journal of Finance and Economics,* 9:25-32.

Clarida, R. & Gali, J. (1994). Sources of Real Exchange Rate Fluctuations: How Important are Nominal Shocks? *NBER Working paper no. 4658.*

Dornbusch, R. (1976). Expectations and Exchange rate dynamics. *Journal of Political Economy,* 84:1161–76.

Inoue, T. & Hamori, S. (2009). What Explains Real and Nominal Exchange Rate Fluctuations? Evidence from SVAR analysis for India. Discussion paper no. 216, Institute of Developing Economics, Japan.

Obstfeld, M. & Rogoff, K. (1995). Exchange Rate Dynamics Redux. *Journal of Political Economy*, 102: 624–660.

Rahman, M. H. & Barua, S. (2006). Recent experiences in the foreign exchange and money markets, *Policy Note Series: PN 0703*, Policy Anlysis Unit (PAU), Bangladesh Bank.

Wang, T. (2004). China: Sources of Real Exchange Rate Fluctuations. *IMF Working Paper No. WP/04/18.*