Impact of the Exchange Rate Regime Change on the Value of Bangladesh Currency

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Abstract

Two distinctively different exchange rate regimes have been in place in Bangladesh – a fixed exchange rate regime from January 1972 – May 2003 and a floating exchange rate regime since June 2003. Since the change in regime, the value of Bangladesh currency 'Taka' has fallen by more than 20% against the US Dollar during a period when the US Dollar itself has been losing value. The objective of this paper is to analyze whether the exchange rate regime change in Bangladesh has had any significant impact on the value of its currency i.e. whether the regime change is associated with the loss in the value of Taka. The fact that during the fixed regime, Bangladesh pursued an active exchange rate policy as reflected by the policies of Bangladesh Bank during that period is what makes the question worth asking. In one way, this paper tests the efficiency of Bangladesh Bank in terms of pricing its currency during the fixed regime. In the process, the paper also tries to identify the variables that play important roles in determining the exchange rate of Taka. In order to provide context; the exchange rate system in Bangladesh – its past, its present; the causes of the change in the system and a comparative analysis of the systems have been briefly discussed.

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1. Introduction

International trade is one of the most important aspects of modern economic practices. It helps create personal as well as business relationships - and in doing so improve international relations. It expands the skill base as well as educational and cultural diversity of the people. At the heart of international trade lies the subject matter of exchange rates of currencies.

One of the major issues encompassing the exchange rate literature has been the choice of exchange rate regime. It has been a subject of ongoing debate in international Economics (See Bailliu, Lafrance, and Perrault, 2002). A number of empirical studies have tried to see whether there exists any relationship between economic growth and the choice of exchange rate regime. Some of these studies showed that there doesn't exist any relationship between exchange rate regime and economic growth (See Ghosh et al. 1997, The IMF study, 1997) and some have found evidence linking the two (See Bailliu, Lafrance, and Perrault, 2001, Calvo and Reinhart, 2000, Levy Yeyati and Sturzenegger, 1999, Levy Yeyati and Sturzenegger, 2001). None of these studies, however, seem to be able to suggest a prescription as to what regime is the best in terms of achieving fast sustainable economic growth. A more compelling line of reasoning in this respect would be what Vivek H. Dehejia, a professor in Carleton University, presents. According to him, the choice of the regime and its success depend on individual countries and their own economic considerations and environments (See Dehejia, 2003).

According to Agnieszka Markiewicz, countries experiencing increasing inflation and having higher budget deficits favor flexible regimes; countries having a more developed financial sector are more likely to choose floating regime and countries with stronger governments and higher political stability favor pegs (See Markiewicz, 2006). An IMF working paper suggests that although many studies have attempted to uncover empirical regularities in how countries choose their exchange rate regimes, taken as a whole, the literature is inconclusive (See Juhn and Mauro, 2002).

Whatever the case may be, different countries adopt different exchange rate policies. Bangladesh, the focus of this paper, had a fixed exchange rate system in place since January,

1972, virtually since the birth of the Nation (Bangladesh won its war of Independence on December 16, 1971). After more than 31 years, the Central Bank of Bangladesh (Bangladesh Bank) changed it into a floating exchange rate system in June 2003. Bangladesh has been pursuing a floating exchange rate system since then.

Dr. Mirza Azizul Islam, the current advisor, Ministry of Finance of the Caretaker Government of Bangladesh, presented a paper in January 2003, right before the shift from fixed to floating regime, explaining the overall performance of the fixed regime and the probable implications of the floating regime on Bangladesh economy. He suggested that the experiences of other countries in the region show that floating regime generates greater volatility in exchange rates and this sort of uncertainty is likely to affect adversely the overall trade and investment climate which is already afflicted by many unfavorable elements in Bangladesh (See Islam, 2003). In this paper, I have tried to see whether that claim was plausible i.e. test whether the regime change indeed has created any significant impact on the value of the currency and thereby affected trade and investment adversely. I have referred to Dr. Islam's paper a number of times while presenting the historical overview of the exchange rate system of Bangladesh and its performance during the fixed regime.

Although there has been a lot of work done on what may cause countries to choose a particular exchange rate regime or whether choice of exchange rate regime affects economic growth, I have not found any paper that has directly tried to study the impact of regime change on the value of a particular currency. That of course means that I have not found any paper that has analyzed the impact of the regime change on the exchange rate of Taka either. One might think that if a fixed exchange rate system is in place then it's trivial that changing the system into floating will have a significant impact on the value of the country's currency. The question we are dealing with in this paper is interesting because of the fact that even in the fixed regime, Bangladesh Bank followed an active exchange rate policy. Between 1983 and 2003, there have been as many as 89 adjustments in the value of Taka, 83 of which were devaluations and 6 of which were revaluations (Islam, 2003). So, in one way, testing the statistical significance of the regime change sort of indicates how efficient the Bangladesh Bank was in terms of pricing its currency during the fixed regime.

The paper consists of two parts. In the first part, I present a brief theoretical framework discussing different exchange rate systems - their advantages and disadvantages, a historical overview of the exchange rate system of Bangladesh, the probable reasons for the regime change and a brief discussion of the performance of the two regimes. After that, I move on to the second part i.e. the empirical part of the paper.

Monthly data from January 2001 to February 2007 have been used for the empirical analysis. The models that have been used and the reasons for incorporating each of the explanatory variables in the models are discussed in the beginning of the second part. In order to study the impact of exchange rate regime on the value of Taka, a dummy variable for Exchange rate regime has been used as an explanatory variable and its statistical significance has been tested using a standard t-test. The Hodrick-Prescott (HP) Filter (introduced in 1980 by Hodrick and Prescott but their paper concerning the HP filter was published in Journal of Money, Credit, and Banking in 1997) has been used to detrend the time-series data. The justification for using the HP filter is discussed in the 'Models and Data' section of the paper. The software package STATA has been used to run the regression on the detrended data to get the results.

Running the regression using collected data based on the models, I find that when regime dummy is the only explanatory variable, it has statistically significant impact on the exchange rate of Taka. However, as we incorporate the other explanatory variables, the regime dummy loses its significance and interestingly foreign currency reserve emerges as the only significant variable explaining the exchange rate of Taka under the models that are used. The conclusion of this paper is therefore that regime change has no statistically significant impact on the value of Bangladesh currency once the other variables are incorporated in the regression model.

2. Exchange Rate Systems

Exchange rate systems can be classified according to the degree by which exchange rates are controlled by the government. Exchange rate systems normally fall into one of the following categories:

i. Fixed Exchange Rate
ii. Floating Exchange Rate
iii. Pegged Exchange Rate

i. Fixed Exchange Rate: In a fixed exchange rate system, exchange rates are either held constant or allowed to fluctuate only within very narrow boundaries. If an exchange rate begins to move too much, governments intervene to maintain it within the boundaries. In some situations, a government will devalue its currency while in other situations it will revalue its currency against other currencies.

Advantages: MNCs are able to engage in international trade without worrying about the future exchange rates. It reduces the risk of doing business in that country too.

Disadvantages: The government may manipulate the value of the currency. Also, a fixed exchange rate system may make each country more vulnerable to economic conditions in other countries.

ii. Floating Exchange Rate: Floating rate systems can be further classified into 2 subcategories:

a. Freely floating exchange rate system: Also known as a clean float. In a freely floating exchange rate system, exchange rate values are determined by market forces without intervention by the governments.

Advantages: A major advantage of this system is the insulation of a country from the inflation or unemployment problems in other countries. An additional advantage of this system is that a central bank is not required to constantly maintain ER within specified boundaries.

Disadvantages: A country's economic problems can sometimes be compounded by freely floating ER. Under such a system, MNCs would need to devote substantial resources to measuring and managing exposure to ER fluctuations.

b. *Managed float exchange rate system:* Also known as a dirty float. It is similar to a freely floating system in that exchange rates are allowed to fluctuate on a daily basis and there are no official boundaries. It is similar to a fixed rate system in that governments can and sometimes do intervene to prevent their currencies from a sharp fall.

Advantage: It prevents a crash in the value of the currency, should it happen.

Disadvantage: Some criticize such a policy as it seeks to protect the home currency at the expense of others.

3. Pegged Exchange Rate: Under such a system, the value of the home currency is pegged to a foreign currency. The pegged currency moves in line with that currency to which it is fixed against other currencies. Some currencies such as the Argentine peso or the Chinese yuan are pegged against a single currency (US dollar) while some others are pegged against a composite of currencies such as the composite of European currencies.

Advantage: If a country conducts most of its trade with another country then pegged system yields benefit to both these countries as it virtually eliminated the exchange rate risk.

Disadvantage: The risk associated with depreciation of that currency to which it is pegged. (Summarized: Madura, 402-407)

3. Historical overview of Exchange Rate System of Bangladesh

Exchange rate regime of Bangladesh can be characterized mostly as a fixed rate system imposed and influenced by the government. Given an existing nominal exchange rate, the corresponding real effective exchange rate was estimated. If the real effective exchange rate (REER) as estimated on the basis of current par value significantly diverged from the desired REER, corrective response was initiated by changing the nominal exchange rate. The exchange rate policy decisions, though notified in all cases by the Bangladesh Bank, were made on behalf of and in close consultation with the Ministry of Finance. Bangladesh Bank did not have the sole authority over determining the exchange rate policy. Up to 24th May 2001, Bangladesh Bank used to announce specified buying and selling rates. From 3rd December 2000 Bangladesh Bank adopted the practice of declaring a 50 poisha (0.50 Taka) band within which buying and selling transactions were to be undertaken; this band was widened to Taka 1.00 from 25th May 2001. Even during the fixed regime, as mentioned earlier, Bangladesh pursued an active exchange rate policy. This activism is reflected in the frequency of nominal exchange rate changes announced by the Central Bank. From 1983 onwards, there have been as many as 89 adjustments in the exchange rate of which 83 were downwards and only six were upward. (Summarized: Islam, 2003)

4. Reasons for Changing the Fixed Rate System to Floating

Some of the reasons the ER system was changed are discussed below:

• Balance of Payments disequilibrium can automatically be restored to equilibrium. When the economy experiences a balance of payments deficit, there is excess demand for the foreign currency and the exchange rate of the local currency depreciates. This may have the effect of automatically restoring equilibrium. In such case, the value of local commodities falls from foreigners' perspective making them more attractive abroad hence increasing export and value of foreign goods increases from domestic perspective making them less attractive locally. Both could lead to an improvement in the balance of payments situation.

• May decrease inflationary pressures and improve international competitiveness. A floating exchange rate can reduce the level of inflation in LDCs like Bangladesh. Allowing the exchange rate to float freely should ensure that exports do not become uncompetitive. The basic idea comes from the Purchasing Power Parity theory. A high rate of inflation tends to make the exports uncompetitive.

• To keep pace with the other markets in South Asia where India (in1998), Pakistan (in 2000) and Sri Lanka (in 2001) have already introduced the floating rate system. (Islam, 2003)

• Donors had also been putting pressure on Bangladesh to go for the floating exchange rate system and reportedly, obtaining foreign assistance from them also depended somewhat on introducing the new floating exchange rate system. Hence, it can be argued that pressure from the IMF and the World Bank was an important factor behind the regime change.

• Involvement of the government would stop under the new system where market forces determine the actual price of taka rather than the finance ministry or the central bank.

5. Current Exchange Rate System of Bangladesh

The Bangladesh Bank (BB) set foreign currency exchange rate band free from any regulation on May 29, 2003. It came into effect, officially from June 1, Saturday, when banks started to fix buying and selling rates of dollar and other currencies according to supply and demand situation under the free-float system. The BB however said that it would keep an eye on the market and

intervene in money market and US dollar selling and purchase transactions whenever needed. The BB also said that it would deal with banks on dollar on a case-to-case basis. Though the official change came on May 29, BB was effectively pursuing the freely floating rates and did allow the banks to determine the rates for the past one year. The observed volatility was not significant during this period, which encouraged the BB to take this long awaited step. The attraction of a floating exchange rate system is, that at least in theory it provides a kind of automatic mechanism for keeping the balance of payments in equilibrium. Besides, progressive devaluation of the Bangladesh currency, arising out of the fixed exchange rate, has been a regular feature during the last three decades. The devaluations and their effects on the economy subjected the governments to regular criticism by those affected by the same. Under the floating rate system, the need for such official devaluation of the currency will cease. However, the finance minister indicated that the new exchange rate system will not be totally devoid of official influence. The Bangladesh Bank is likely to resort to buying and selling of foreign currency from time to time to indirectly play a stabilizing role in exchange rate operations. For example, when the floating exchange rate system was made operational in Pakistan, the same led to a jump in the exchange rate of the Rupee by ten or fifteen per cent on the first day. Thus, Bangladesh had provision for similar safeguards. (Summarized: *The Daily Star*, "Free floats the exchange rate", May 30, 2003, *The New Nation*, "Operating the floating exchange rate", Apr 24, 2003; The Daily Star and The New Nation are two of the leading national English daily newspapers of Bangladesh)

6. Performance during Fixed Rate Regime

Let's take a look at the performance of Bangladesh in terms of certain key objectives that an exchange rate regime is expected to promote and how it fared during the fixed rate regime. According to Dr. Mirza Azizul Islam, the relevant objectives are: (a) the prevention of any major misalignment of exchange rate and, in particular, the prevention of appreciation of the real effective exchange rate which can hurt exports; (b) the promotion of exports and containment of current account deficit; (c) moderation of inflation; and (d) enhancement of remittances.

(a) Misalignment of exchange rate: The prevention of misalignment implies that the actual exchange rate should correspond to the estimate of equilibrium exchange rate. A recent study

undertaken by ADB concluded that the misalignment between the actual and equilibrium exchange rate for the period 1997 to 2001 was small and progressively narrowed since 1998. During 2001, the misalignment was only 2.2 per cent. Also, the exchange rate policy succeeded in preventing appreciation of the real effective exchange rate throughout the 1990s. It can thus be concluded that the fixed exchange rate regime has avoided any major misalignment in the exchange rate.

(b) Exports and current account balance: Bangladesh's achievement in terms of containing current account deficit was not unsatisfactory. It has done consistently better than Sri Lanka, and better than Pakistan in all the recent years except in 2001. The only country with which Bangladesh compares somewhat unfavorably is India, but that should not come as a surprise even to a casual observer in view of India's high savings rate and level of industrialization.

(c) Inflation: The discussion of inflation in the context of exchange rate regime becomes relevant because of two major considerations. First, a change in the exchange rate is almost certain to cause a change in the domestic prices of tradable goods. Second, the prices of non-tradable goods are also likely to be affected because the non-tradable goods often use tradable inputs and the demand switch generated by initial change in the exchange rate may not extract corresponding supply response from the non-tradable sector to leave prices unchanged. Bangladesh did reasonably well in terms of inflation criterion. During the past decade, its inflation rate never reached double-digit level. In every year except 1999, the inflation rate in Bangladesh has been similar to or lower than the South Asian average.

(d) Remittances: Remittances by Bangladeshi workers employed abroad play an important role in moderating the country's trade deficit. The country's performance in respect of remittances in dollar terms has maintained an uninterrupted upward trend. There was only a minor blip in 2001. The performance of Bangladesh in terms of certain key objectives that an exchange rate regime is expected to promote has been quite satisfactory. So it is arguable that the fixed exchange rate regime of Bangladesh had served the country reasonably well. (Summarized: Islam, 2003)

7. Initial Performance after the Regime Change

It was feared by some that the introduction of the freely floating system may immediately adversely affect the value of the taka as it did when this change took place in the neighboring

country. There had been a dip in the value of the weaker currency right after floatation. But this did not happen for the taka, which initially remained strong after the flotation.

Contrary to a lot of speculation about a possible drastic fall in the value of taka it actually fared well initially. It also contradicted the historical experience of the other Asian countries. We can see it by looking at the following exchange rates between taka and the USD. Exchange rate of BDT against USD on May 22, 2003 (a week before the regime change): Tk 57.80/ USD (The Daily Star, May 23, 2003) Exchange rate of BDT against USD on August 18, 2003 (about one and a half month after the regime change): Tk 57.82/ USD (The Daily Star, August 19, 2003)

It's obvious here that taka had not depreciated much against the USD in the early days after the regime change. It actually gained initially and then remained steady as dollar showed signs of weakening against the Euro. Other economic indicators also did not hint any significant deviations after the introduction of the freely floating system. For example, the flow of remittances maintained its upward trend as it did during the fixed rate regime. Also, offering of dollar denominated bonds increased the reserve of dollars. The rate of inflation was 5.98% in March 2003, which is higher than 4.58% in the fiscal year of 2000-2001. The current account deficit was 15,809 Crore BDT ($ 2.72 billion). GDP growth was approximately 5.5% in 2003 – 2004 (Data source: Official Website of Bangladesh Bureau of Statistics: http://www.bbs.gov.bd/) Thus, we can conclude that immediately after the exchange rate system regime change, performance had been reasonable compared to the performance during the fixed rate regime. In comparison, the BDT had fared more or less the same in the competitive environment.

However, since then, value of taka has fallen drastically against dollar. In February 2007, BDT against USD was Tk 69.00/USD. Many have attributed this fall in taka value to the floating exchange rate regime. We are going to test whether the impact of the exchange rate regime on exchange rate of Taka is significant in the following empirical segment of the paper.

Some of the other note-worthy factors that may influence the change in exchange rate of Taka are changes in net exports or trade deficits, changes in foreign currency reserves, changes in real interest rate and change in the rate of inflation. In the next part of the paper, significance of these factors on value of Bangladesh currency has been analyzed thoroughly.

8. Models and Data

The core objective of the quantitative analysis, as mentioned earlier, is to identify if there exists any significant impact of exchange rate regime on the value of Bangladesh currency. Effects of four other important variables namely foreign exchange reserve, trade deficit, real interest rate and inflation on exchange rate of Bangladesh currency have also been tested.

Variables Used and Reasons for Using Them:

Seven regression models have been used. For all the variables other than the regime dummy, real interest rate and inflation rate, I have taken the logarithms of the observations for the regression analysis. In addition to this practice being quite standard in the literature in terms of dealing with Macro variables, the reason is to eliminate the difference in units of accounts of the different variables in the models. So, the coefficients of the explanatory variables (other than the regime dummy) in the regressions in this paper represent elasticity. I have not taken logarithms of real interest rate and inflation rate since they are in percentage format and therefore their coefficients would indicate elasticity anyway.

In all the models, the dependent variable is log exchange rate of taka per US dollar. This is obvious since our objective is to identify the impact of different variables on the exchange rate of Bangladesh currency.

In the first model, the only explanatory variable used is an exchange rate regime dummy. I run the regression of the log exchange rate on the regime dummy. Theoretically, during a floating regime, the Central Bank doesn't have any control over the exchange rate and exchange rate of a currency fluctuates based on demand and supply of the currency. Since the Central Bank cannot influence the exchange rate, it tends to fluctuate more compared to a fixed regime. Value of taka has fallen drastically in recent times. Many attribute this depreciation in Bangladesh currency value to the change of the exchange rate system from fixed to floating. That's why a regime dummy variable taking value 1 if the regime is floating and 0 if fixed has been used as the explanatory variable.

In the second model, I run the regression of the detrended log exchange rate on the regime dummy to see whether the significance of the effect changes when using detrended data. From the second model onward, in all the regressions, only detrended data have been used.

The 3rd model has the regime dummy and log foreign exchange reserve or Dollar reserve as the explanatory variables. Dollar reserve can be thought of as a catch-all variable that may explain the exchange rate of the Bangladesh currency. All the inflows and outflows of foreign currency take place through the Bangladesh Bank and result in an increase or decrease of foreign exchange reserves. Whenever a good is exported from or a product is imported into Bangladesh or remittances are sent by Bangladeshis working abroad, foreign exchange reserve is affected. Therefore, it may be the single most important variable explaining the exchange rate of Taka.

Dollar reserve acts as a safeguard against the rapid fall of Bangladesh currency as well. Many believe that if Bangladesh currency value falls rapidly, as is happening now, releasing dollar from the reserve would resist the fall by reducing dollar value by increasing its supply. Dollar reserve has always been viewed as a significant indicator of the state of Bangladesh economy. A high dollar reserve always gives a good signal to everyone including the international community. Many believe that in order to impress foreign investors and international organizations like the IMF and World Bank, the central bank is not releasing the dollar from the reserve that is needed to control the fall in the value of taka. Hence the comparatively high dollar reserve is artificial in a sense, which may be a reason for the falling value of Bangladesh currency.

The 4th model incorporates log of trade deficit as a third explanatory variable in addition to the regime dummy and foreign exchange reserve. The economic basis is as trade deficit rises i.e. net export falls, demand for dollar increases since dollar is the means of exchange for purchasing imports in Bangladesh and it naturally creates upward pressure on price of dollar or downward pressure on the exchange rate of taka. In recent times, lots of capital goods imports have taken place in Bangladesh. Exports have not increased to the same extent. Net commodity exports have always been falling. Trade deficit rose from US $327.60 million in January 2001 to US $616.90 million in December 2006. This continuous increase in trade deficit i.e. fall in net export may have significant impact on the exchange rate of Bangladesh currency.

In the 5th model, real interest rate has been added as the fourth explanatory variable. Theoretically, as the domestic real interest rate rises (falls), foreign financial investors become more (less) willing to buy the domestic financial securities and hence foreign currency inflow increases (decreases) creating upward pressure on the exchange rate of the local currency. At the

same time, as local real interest rate rises (falls), domestic investors may also want to invest less (more) in foreign financial markets and thus local currency outflow may decrease (increase) increasing the local currency value.

In the 6th model, inflation rate (point to point) differential (inflation rate in Bangladesh minus inflation rate in USA) has been used as the fifth and final explanatory variable. Theoretically, a rise (fall) in the inflation rate differential results in less (more) exports since foreigners find local goods more expensive (cheaper) and more (less) imports as the locals find foreign goods cheaper (more expensive) and create downward (upward) pressure on local currency value. It can also affect the exchange rate by affecting the real interest rate. A rise in inflation rate would lead to a fall in real interest rate and vice versa and thus influence the exchange rate.

The 7th and final model, in addition to the explanatory variables used in the 6th model, incorporates four interaction terms, which are simply new variables created by multiplying the last four explanatory variables of interest (used in the 6th model) with the regime dummy. Just adding the exchange rate dummy enables the intercept to shift, while still forcing the slope on all variables to be the same across both regimes. Addition of the interaction terms makes the model more flexible and helps us answer the question regarding how the partial effects of the regressors change with the regime change.

Regression Models:

1. $lner = \alpha + \beta_1 f + \varepsilon$
2. $flner = \alpha + \beta_1 f + \varepsilon$
3. $flner = \alpha + \beta_1 f + \beta_2 flnres + \varepsilon$
4. $flner = \alpha + \beta_1 f + \beta_2 flnres + \beta_3 flnmx + \varepsilon$
5. $flner = \alpha + \beta_1 f + \beta_2 flnres + \beta_3 flnmx + \beta_4 fr + \varepsilon$
6. $flner = \alpha + \beta_1 f + \beta_2 flnres + \beta_3 flnmx + \beta_4 fr + \beta_5 finfdif + \varepsilon$
7. $flner = \alpha + \beta_1 f + \beta_2 flnres + \beta_3 flnmx + \beta_4 fr + \beta_5 finfdif + \beta_6 fflnres + \beta_7 fflnmx + \beta_8 ffr + \beta_9 ffinfdif + \varepsilon$

Where,

er = Exchange Rate (US Dollar per Taka)

lner = Log Exchange Rate

flner = Detrended Log Exchange Rate (Filtered Log Exchange Rate)

f = Exchange Rate Regime Dummy (f=1 if Floating, f=0 if Fixed)

res = Foreign Exchange Reserve (Million US$)

flnres = Detrended Log Foreign Exchange Reserve (Filtered Log Foreign Exchange Reserve)

mx = Trade Deficit (Million US$)

flnmx = Detrended Log Trade Deficit (Filtered Log Trade Deficit)

r = Real Interest Rate

fr = Detrended Interest Rate (Filtered Interest Rate)

infdif = Inflation rate differential (Inflation rate in Bangladesh – Inflation rate in USA)

finfdif = Detrended Inflation Rate Differential between Bangladesh and USA (Filtered Inflation Rate Differential between Bangladesh and USA)

fflnres = (f * flnres), fflnmx = (f * flnmx), ffr = (f * fr), and ffinfdif = (f * finfdif)

The Data:

Collecting data was a big challenge. It is relatively lot more difficult to get data for Bangladesh compared to USA or Canada since data are not recorded with the same vigor in Bangladesh as they are in the developed world. Monthly data from January 2001 – February 2007 (a total of 74 observations, first 29 during the fixed regime and the rest during the floating regime) have been used for all the variables in this paper. Data for exchange rate, foreign exchange reserve & real interest rate of Bangladesh and the U.S. inflation rate have been collected from the website of the World Bank (http://web.worldbank.org/). Data for export, import and inflation rate of Bangladesh have been collected from Monthly Summery Sheet, Export Promotion Bureau, Bangladesh (January 2001 – February 2007) Monthly Statistical Bulletin, Bangladesh Bureau of Statistics (BBS), Ministry of Planning (January 2001 – February 2007) and Economic Trends Quarterly Journal of The Statistics Dept. of Bangladesh Bank (January 2001 – May 2007) respectively*.

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As mentioned earlier, for all the variables other than the regime dummy, real interest rate and inflation rate, the logarithms of the observations have been taken for the regression analysis. The Hodrick-Prescott (HP) Filter has been employed to detrend the time-series data. A large applied econometrics literature achieves trend and cycle decompositions by applying identifying assumptions on the innovations to the trend and cycle components of aggregate output (See Crucini, 2006, Beveridge and Nelson, 1981, Cochrane 1994, Crucini and Shintani, 2006, Stock and Watson, 2005, Kydland and Prescott 1982, 1988, 1990, Hansen 1985, Prescott 1986, Christiano and Eichenbaum, 1988 and Bachus, Kehoe and Kydland, 1992).

According to David Aadland, assistant professor in the Department of Economics, Utah State University, the HP filter, has arguably become the "industry standard" for detrending data in empirical macroeconomics (See Aadland, 2002). For discussions of the properties of the HP filter see King and Rebelo 1989, and Kydland and Prescott, 1990.

After applying the HP filter, the trend component has been isolated. The trend component has then been deducted from the observation value and regression has been run on the cycle component.

The data used for the analysis are summarized below using tables and graphs:

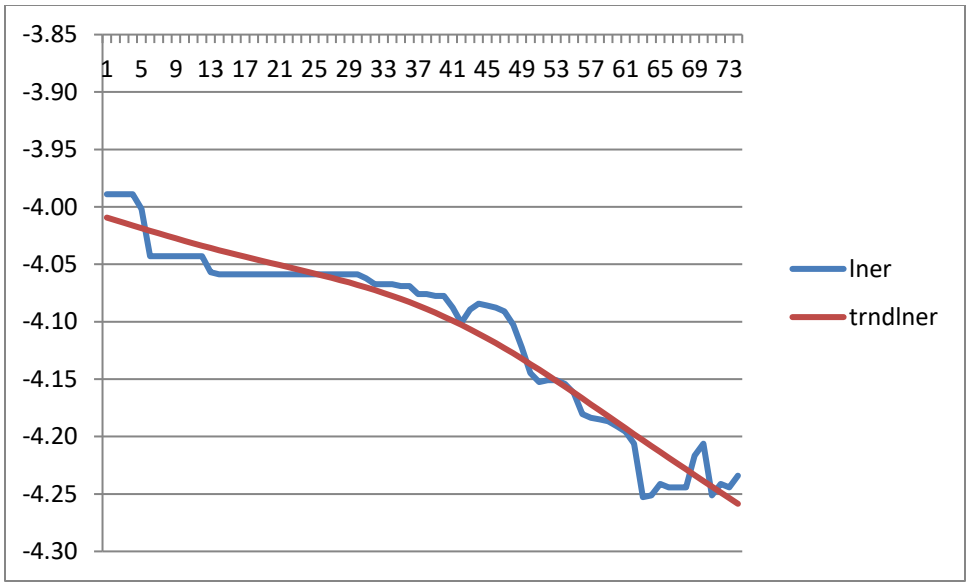
Data Summary:

First five of the 74 observations are presented in the following table:

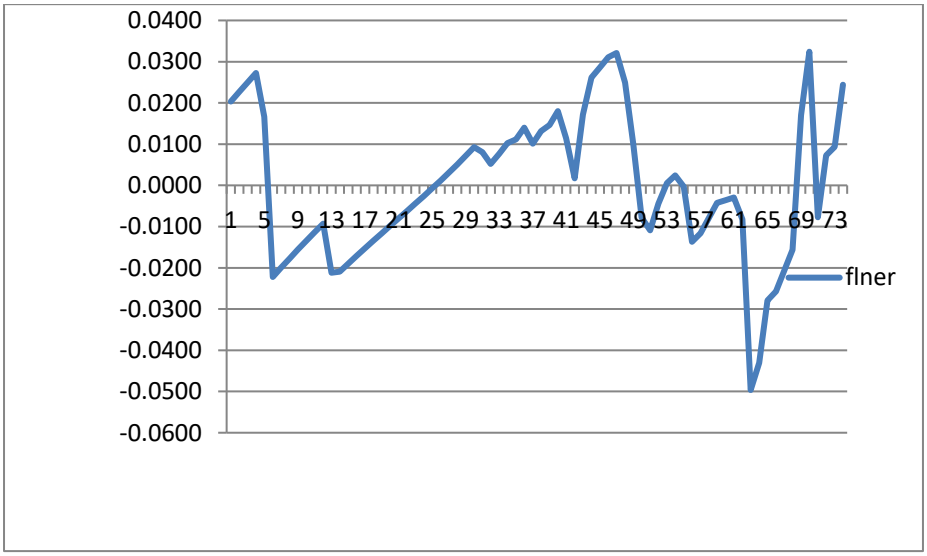
period	lner	trndlner	flner	lnmx	trndlnmx	flnmx	lnres	trndlnres	flnres	r	trndr	fr	f	infdif	trndinfdif	finfdif
Jan-01	-3.9890	-3.37	-0.62	5.79	4.76	1.03	7.27	6.10	1.17	6.35	7.59	-1.24	0	-2.96	-1.72	-1.24
Feb-01	-3.9890	-3.22	-0.77	5.03	4.55	0.49	7.33	5.82	1.51	7.00	7.38	-0.38	0	-2.03	-1.53	-0.50
Mar-01	-3.9890	-3.07	-0.92	5.92	4.33	1.59	7.20	5.55	1.65	7.02	7.18	-0.16	0	-1.45	-1.35	-0.11
Apr-01	-3.9890	-2.92	-1.07	5.57	4.12	1.45	7.21	5.27	1.94	6.89	6.97	-0.08	0	-1.67	-1.16	-0.51
May-01	-4.0019	-2.77	-1.24	5.93	3.91	2.02	7.04	5.00	2.04	6.47	6.77	-0.30	0	-2.09	-0.97	-1.12

Summary statistics of the raw data:

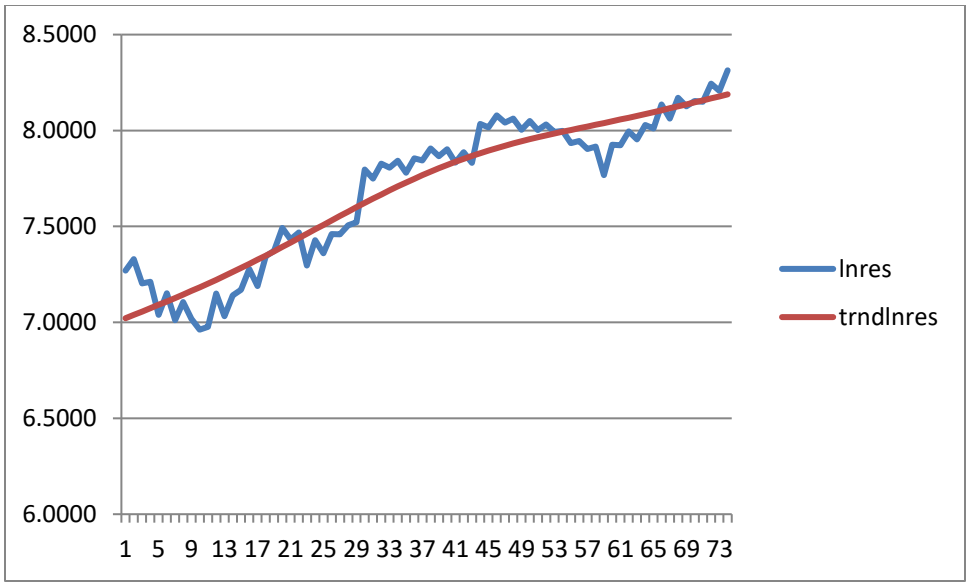
Variable	Obs	Mean	Std. Dev.	Min	Max
er	74	.0165	.0012	.0142	.0185
res	74	2347.7220	816.3229	1055.6	4079.9
mx	74	362.0553	142.2521	57.1675	671.848
r	74	2.4933	2.6868	-2.3878	7.2583
infdif	74	2.4314	1.9556	-2.9571	5.9860



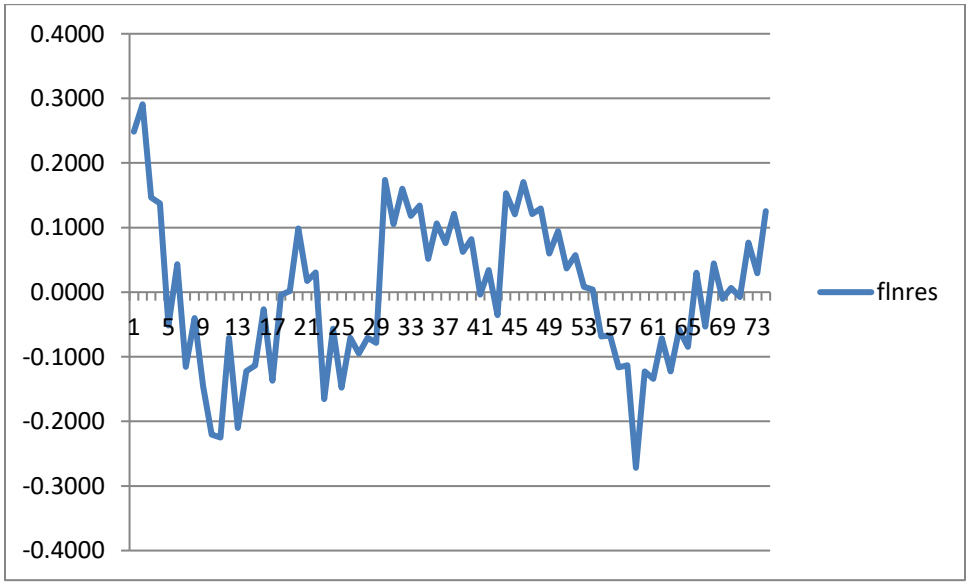
Graph 1.1: Log Exchange Rate (lner) and Trend Log Exchange Rate (trndlner)



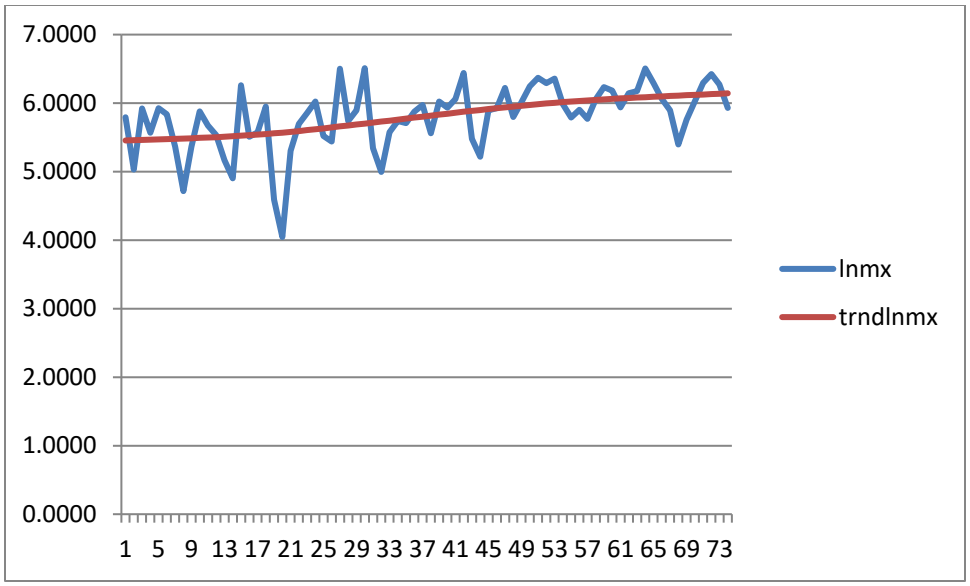
Graph 1.2: Detrended (Filtered) Log Exchange Rate (flner)



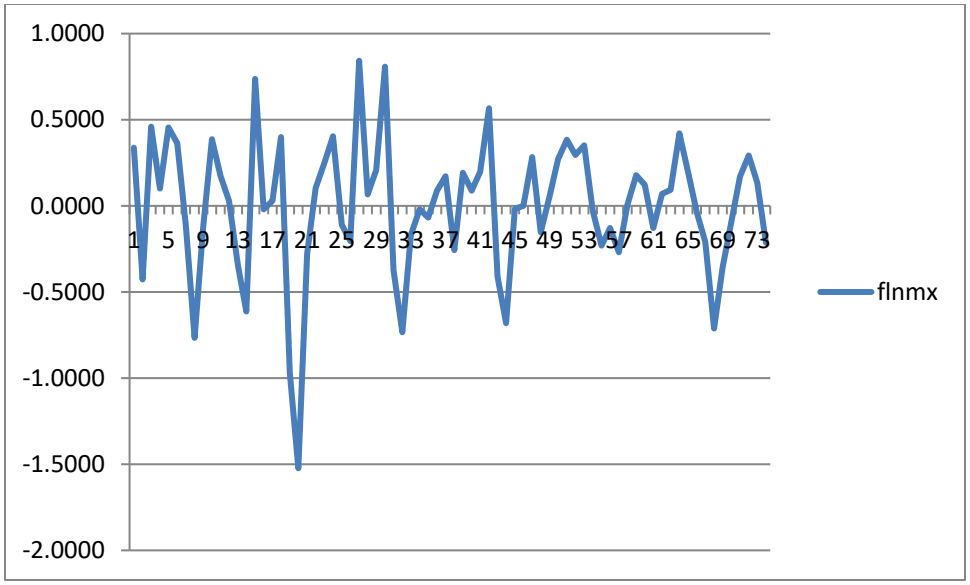
Graph 2.1: Log Foreign Exchange Reserve (lnres) and Trend Log Foreign Exchange Reserve (trndlnres)



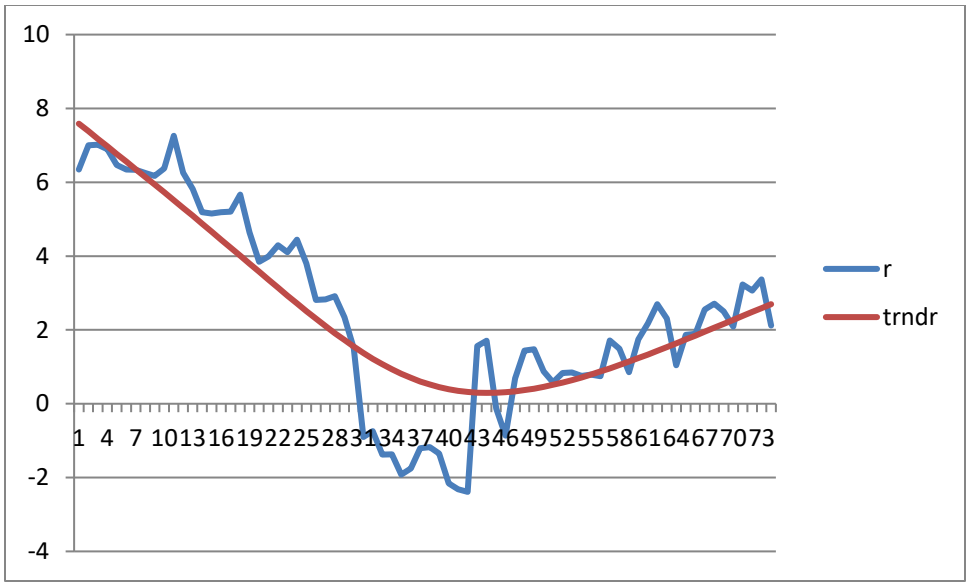
Graph 2.2: Detrended (Filtered) of Log Foreign Exchange Reserve (trndlnres)



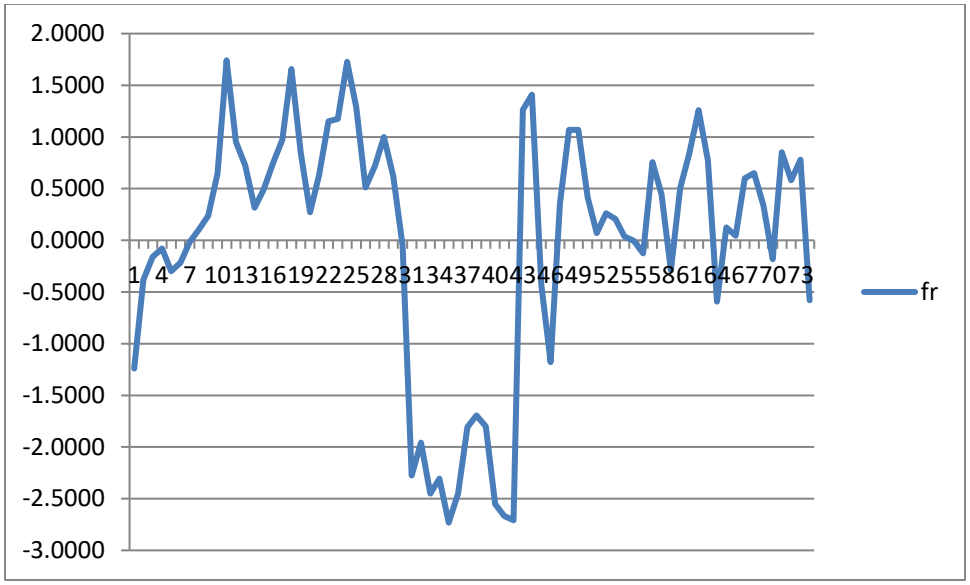
Graph 3.1: Log Trade Deficit (lnmx) and Trend Log Trade Deficit (trndlnms)



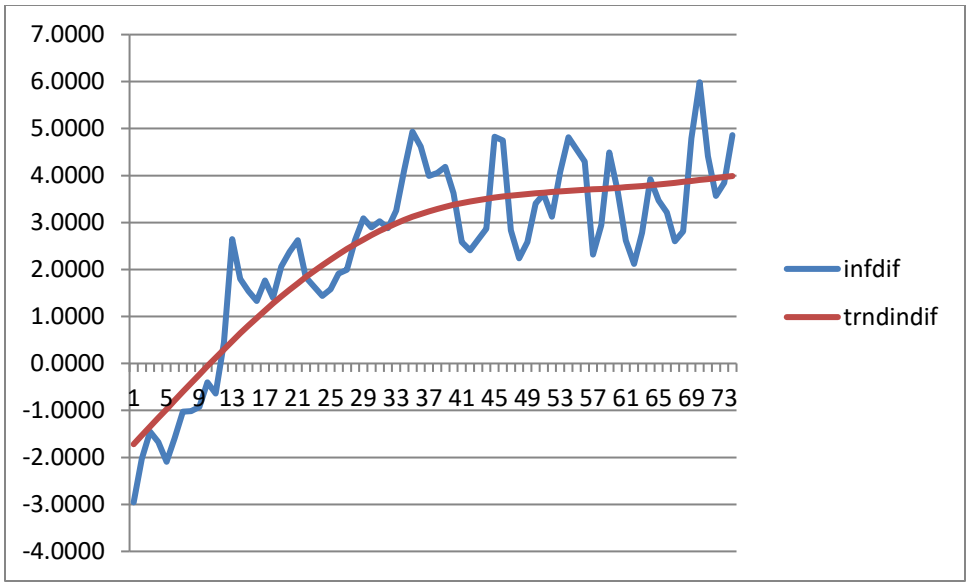
Graph 3.2: Detrended (Filtered) Log Trade Deficit (flnmx)



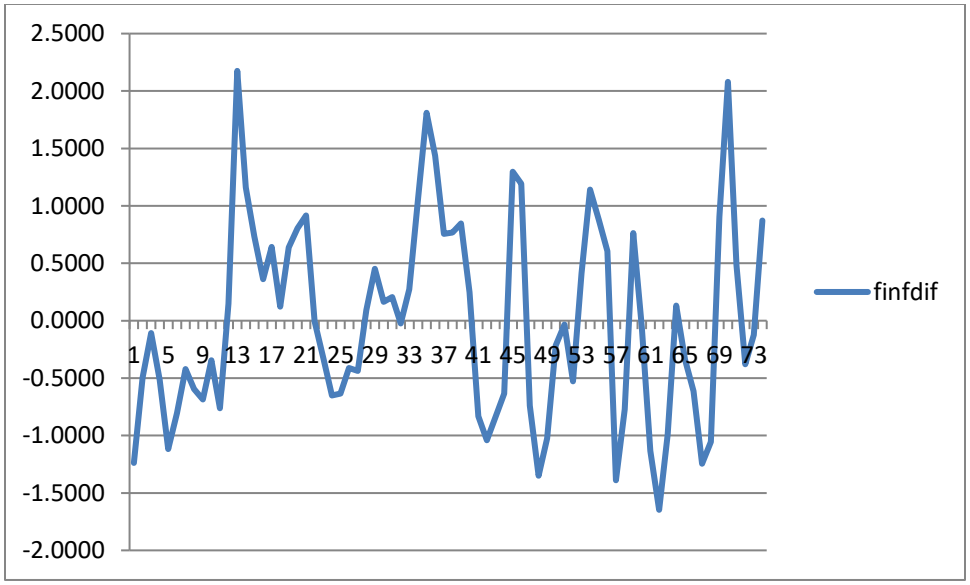
Graph 4.1: Market Interest Rate (r) and Trend Market Interest Rate (trndr)



Graph 4.2: Detrended (Filtered) Market Interest Rate (fr)



Graph 5.1: Inflation Differential (infdif) and Trend Inflation Rate (trndinfdif)



Graph 5.2: Detrended (Filtered) Inflation Rate Differential (finfdif)

9. Results

As mentioned earlier, the software package STATA has been used to run the regressions. Please refer to the STATA log page in the Appendix to see the detailed results.

In the first model, unfiltered log exchange rate has been regressed on the regime dummy. The coefficient of the regime dummy is -0.1061 with a p-value of 0 (significant at 99% confidence level) meaning the conditional mean of exchange rate of Taka has been 10.61% percent lower during the floating regime compared to the conditional mean of exchange rate of Taka in this model. The R-squared of the model is 0.4732. Based on this model, it seems that the regime change is significant in explaining the fall in value of Taka.

In the second model, however, as soon as we detrend the log exchange rate and regress that on the regime dummy, the scenario changes. The R-squared falls from 0.4732 to 0.0443 and the coefficient of the regime dummy becomes 0.0075 with a p-value of 0.072 (significant at 90% confidence level). That means, this model suggests that the conditional mean of exchange rate of Taka has been 0.75% percent higher during the floating regime compared to the conditional mean of exchange rate of Taka during the fixed regime. So, this model predicts that without the trend effect, the regime change has in fact had positive influence on the Bangladeshi currency value.

In the third model, the detrended log foreign exchange reserve (flnres) is added as the second explanatory variable. The R-squared jumps up to 0.3763 implying that it's a good addition. The regime dummy loses its significance with a p-value of 0.655. The coefficient of log foreign exchange reserve is 0.0905 with a p-value of 0 (significant at 99% confidence level) meaning exchange rate of taka increases by 0.0905% in response to a 1% rise in foreign exchange reserve. This makes perfect sense. A rise in foreign exchange reserve means an increase in Dollar inflow, which should certainly increase the value of Taka.

The fourth model incorporates detrended log trade deficit as the third explanatory variable. The regime dummy remains insignificant with a p-value of 0.683. Foreign exchange reserve remains significant at 99% confidence level with a p-value of 0. The coefficient of log foreign exchange reserve in this model is 0.0920. The coefficient of trade deficit however is insignificant with a p-

value of 0.378. This is not totally unpredictable since the foreign exchange reserve captures the effect of change in trade deficit.

Detrended real interest rate is added as the fourth explanatory variable in the fifth model. The regime dummy remains insignificant with a p-value of 0.773. Foreign exchange reserve remains significant at 99% confidence level with a p-value of 0. Its coefficient in this model is 0.0897. Trade deficit remains insignificant with a p-value of 0.395. Real interest rate is also insignificant with a p-value of 0.733. This can be explained by the lack of participation of foreigners in Bangladeshi financial markets and the lack of participation of Bangladeshis in foreign financial markets. Financial markets in Bangladesh have not yet developed enough to interest foreign investors and very few Bangladeshi investors invest in international financial markets. Thus the channel through which real interest rate affects exchange rate is inactive in the case of Bangladesh making the effect of change in real interest rate statistically insignificant in determining the exchange rate of Taka.

In the sixth model, detrended inflation rate differential is added as the fifth explanatory variable. The regime dummy, trade deficit and real interest rate remain insignificant with p-values of 0.701, 0.283 and 0.900 respectively. Inflation differential is also insignificant with a p-value of 0.196. This is understandable since inflation affects exchange rate by influencing trade balance; insignificant in our case due to foreign exchange reserve capturing its effects; and by affecting real interest rate, which is insignificant as well due to the lack of participation of the foreigners in Bangladeshi financial market and the lack of participation of the Bangladeshis in foreign financial markets. Foreign exchange reserve remains the only statistically significant explanatory variable at 99% confidence level with a p-value of 0. Coefficient of log foreign exchange reserve in this model is 0.0922 meaning a 1% rise in foreign exchange reserve is associated with a 0.0922% rise in the exchange rate of Taka.

In the seventh and final model, four interaction terms have been used. These interaction terms are new variables created by multiplying the regime dummy with the last four explanatory variables of interest used in the sixth model. I have included these terms to see how the partial effects of the regressors have changed with the regime change. Even after including the interaction terms, not surprisingly; the regime dummy, trade deficit, real interest rate and

inflation differential are insignificant with p-values of 0.538, 0.181, 0.986 and 0.332 respectively. Foreign exchange reserve remains significant at 99% confidence level with p-value of 0.006. Coefficient of log foreign exchange reserve in this final model is 0.0713 meaning a 1% rise in foreign exchange reserve is associated with a 0.0713% rise in the exchange rate of Taka. All the interaction terms other than the one with the inflation rate differential turn out to be statistically insignificant as well. The interaction term of the log inflation rate differential with the regime dummy is significant at 95% confidence level with p-value of 0.036 and a coefficient of 0.0097. This simply means that inflation differential's effect on exchange rate of Taka is significantly different in the floating regime compared to the fixed regime.

Note that for all the models, Breusch-Pagan/Cook-Weisberg test for heteroskedasticity has been performed to see whether any heteroskedasticity of variance is present. The test results are provided in the Appendix (please refer to the STATA log page in the Appendix). The null hypothesis of a constant variance cannot be rejected in any of the models (other than model 1 since unfiltered data were used for this model). Since we are trying to show that model 1 is incorrect anyway, and the other models have constant variance, transformation of the regression models seems unnecessary. Since the data for all the models except model 1 were detrended, this result was expected.

Finally, for the last five models, Ramsey RESET test using powers of the fitted values of the dependent variable has been performed to check whether the models have any omitted variables. For the first two models, performing this test is not possible since the only independent variable is the regime dummy – an indicator variable. The test results are provided in the Appendix (please refer to the STATA log page in the Appendix). We cannot reject the null hypothesis that the "model has no omitted variables" in any of the models even at 90% confidence level other than the 6^{th} model, where the null hypothesis can be rejected at 90% confidence level but cannot be rejected at 95% confidence level. This result is also predictable since the catch-all variable foreign exchange reserve is present in the last five models that have been tested.

These results mean that if we try to explain the variations in exchange rate of Taka without detrending the dependent variable and only by the regime change, then it would seem that the move from the fixed to the floating regime has had a significant negative impact on the value of

Taka. However, as soon as we take out the trend effect, and regress the de-trended exchange rate on the regime dummy, the effect becomes reverse. And as we introduce foreign exchange reserve, the catch-all variable in the regression model, the significance of the regime change disappears. Trade deficit, real interest rate and inflation rate differential also don't seem to hold any statistical significance in explaining the exchange rate of Taka and foreign exchange reserve remains significant in all the models.

The regression results are summarized in the table below:

Models	**Goodness of Fit**		**Constant**	**Coefficients**					
	R-squared	**Adj R-squared**		**f**	**flnres**	**fflnmx**	**fr**	**finfdif**	**ffinfdif**
Model 1	0.4732	0.4659	-4.0434*** (-392.98)	-0.1061*** (-8.04)	-	-	-	-	-
Model 2	0.0443	0.0310	-0.0045* (-1.42)	0.0075* (1.83)	-	-	-	-	-
Model 3	0.3763	0.3587	-0.0009^ (-0.35)	0.0016^ (0.45)	0.0905*** (6.15)	-	-	-	-
Model 4	0.3832	0.3568	-0.0009^ (-0.32)	0.0014^ (0.41)	0.0920*** (6.20)	0.0037^ (0.89)	-	-	-
Model 5	0.3843	0.3486	-0.0007^ (-0.23)	0.0011 ^ (0.29)	0.0897*** (5.49)	0.0036^ (0.86)	-0.0006^ (-0.34)	-	-
Model 6	0.3993	0.3551	-0.0009^ (-0.31)	0.0014^ (0.39)	0.0922*** (5.63)	0.0046^ (1.08)	0.0002^ (0.13)	0.0027^ (1.30)	-
Model 7	0.4891	0.4173	-0.0018 ^ (-0.53)	0.0025^ (0.62)	0.0713*** (2.86)	0.0075^ (1.35)	-0.0001^ (0.986)	-0.0037^ (0.332)	0.0097** (2.14)

Legend: * Significant at 90% confidence level
** Significant at 95% confidence level
*** Significant at 99% confidence level
^ Statistically insignificant
t-statistics are shown in brackets
This table does not include the other 3 interaction terms since they are insignificant

10. Conclusion

The objective of this paper was to find out whether the falling value of Taka over the past few years can be explained by the change of the exchange rate regime from a fixed system to floating system. I started with a discussion regarding what work has been done in the area. A brief discussion about the types of exchange rate systems, their advantages and disadvantages were provided next followed by a historical overview of the exchange rate system of Bangladesh. Then reasons for changing fixed exchange rate system to floating system were discussed. A brief discussion about Bangladesh's current exchange rate system was presented next followed by a discussion about the performance of taka during the fixed exchange rate regime. Then initial performance of taka after the regime change was discussed followed by the quantitative analysis. In the quantitative analysis part, monthly data covering a period from January 2001 to February 2007 collected from the Website of the World Bank, publications of Bangladesh Bank, Export Promotion Bureau and Bangladesh Bureau of Statistics have been regressed using the software package STATA to come to the conclusion that regime change has no statistically significant impact on the value of Bangladesh currency once foreign exchange reserve is incorporated in the regression model.

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APPENDIX

```
. use finaldata
. tsset obs, monthly
. time variable:  obs, 1960m2 to 1966m3
. reg lner f

      Source |       SS       df       MS              Number of obs = 74
-------------+------------------------------           F(1, 72) = 64.67
       Model |   .19854974     1   .19854974           Prob > F = 0.0000
    Residual |  .221045829    72  .003070081           R-squared =  0.4732
-------------+------------------------------           Adj R-squared =  0.4659
       Total |  .419595568    73  .005747884           Root MSE =  .05541

------------------------------------------------------------------------------
        lner |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           f |   -.1061073   .0131943    -8.04   0.000    -.1324096   -.079805
       _cons |  -4.043448   .0102891  -392.98   0.000    -4.063959   -4.022937
------------------------------------------------------------------------------

. hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lner
         chi2(1) = 14.94
         Prob > chi2 = 0.0001
```

```
. reg flner f

      Source |       SS           df       MS              Number of obs = 74
-------------+------------------------------              F(1, 72)  =  3.34
       Model |  .000982896         1  .000982896           Prob > F  =  0.0720
    Residual |  .021218622        72  .000294703           R-squared =  0.0443
-------------+------------------------------              Adj R-squared = 0.0310
       Total |  .022201518        73   .00030413           Root MSE  =  .01717

------------------------------------------------------------------------------
       flner |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           f |   .0074656   .0040879     1.83   0.072    -.0006835    .0156147
       _cons |  -.0045345   .0031878    -1.42   0.159    -.0108893    .0018203
------------------------------------------------------------------------------

. hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of flner
         chi2(1) = 1.50
         Prob > chi2  = 0.2200

. reg flner f flnres

      Source |       SS           df       MS              Number of obs = 74
-------------+------------------------------              F(2, 71)  =  21.42
       Model |  .008353956         2  .004176978           Prob > F  =  0.0000
    Residual |  .013847562        71  .000195036           R-squared =  0.3763
-------------+------------------------------              Adj R-squared =  0.3587
       Total |  .022201518        73   .00030413           Root MSE  =  .01397
```

```
------------------------------------------------------------------------------
      flner |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          f |   .0015529   .0034619     0.45   0.655    -.0053498    .0084557
     flnres |   .0905049   .0147219     6.15   0.000     .0611502    .1198596
      _cons |  -.0009389   .0026585    -0.35   0.725    -.0062398    .0043619
------------------------------------------------------------------------------
```

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of flner

chi2(1) = 0.55

Prob > chi2 = 0.4564

. ovtest

Ramsey RESET test using powers of the fitted values of flner

Ho: model has no omitted variables

F(3, 68) = 2.00

Prob > F = 0.1215

. reg flner f flnres flnmx

```
      Source |       SS           df       MS              Number of obs = 74
-------------+----------------------------------           F (3, 70) = 14.50
       Model |  .008508257     3   .002836086              Prob > F  = 0.0000
    Residual |  .013693261    70  .000195618              R-squared = 0.3832
-------------+----------------------------------           Adj R-squared = 0.3568
       Total |   .022201518    73   .00030413              Root MSE  =  .01399
------------------------------------------------------------------------------
```

flner	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
f	.0014242	.0034701	0.41	0.683	-.0054966	.008345
flnres	.0920113	.0148411	6.20	0.000	.0624117	.121611
flnmx	.0036739	.0041367	0.89	0.378	-.0045764	.0119243
_cons	-.0008607	.0026639	-0.32	0.748	-.0061736	.0044523

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of flner

chi2(1) = 0.39

Prob > chi2 = 0.5347

. ovtest

Ramsey RESET test using powers of the fitted values of flner

Ho: model has no omitted variables

F(3, 67) = 2.03

Prob > F = 0.1183

reg flner f flnres flnmx fr

Source	SS	df	MS	Number of obs = 74
Model	.008531423	4	.002132856	F (4, 69) = 10.77
Residual	.013670095	69	.000198117	Prob > F = 0.0000
Total	.022201518	73	.00030413	R-squared = 0.3843
				Adj R-squared = 0.3486
				Root MSE = .01408

```
------------------------------------------------------------------------------
      flner |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          f |   .0010561   .0036543     0.29   0.773    -.0062342    .0083463
     flnres |   .0897292   .0163589     5.49   0.000     .0570941    .1223643
      flnmx |   .0035712   .0041738     0.86   0.395    -.0047554    .0118978
         fr |  -.0005665   .0016565    -0.34   0.733    -.0038712    .0027383
      _cons |  -.0006368   .0027596    -0.23   0.818    -.0061421    .0048685
------------------------------------------------------------------------------
```

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of flner

chi2(1) = 0.42

Prob > chi2 = 0.5158

. ovtest

Ramsey RESET test using powers of the fitted values of flner

Ho: model has no omitted variables

F (3, 66) = 2.03

Prob > F = 0.1188

. reg flner f flnres flnmx fr finfdif

```
      Source |       SS       df       MS              Number of obs = 74
-------------+------------------------------           F(5, 68)      = 9.04
       Model |  .008865129     5  .001773026           Prob > F      = 0.0000
    Residual |  .013336389    68  .000196123           R-squared     = 0.3993
-------------+------------------------------           Adj R-squared = 0.3551
       Total |  .022201518    73  .00030413            Root MSE      = .014
```

```
------------------------------------------------------------------------------
      flner |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
          f |   .0014076   .0036459     0.39   0.701    -.0058677    .0086828
     flnres |   .0921964   .0163859     5.63   0.000     .0594989     .124894
      flnmx |   .0045714    .004223     1.08   0.283    -.0038554    .0129982
         fr |   .0002211   .0017553     0.13   0.900    -.0032815    .0037238
    finfdif |   .0026647   .0020428     1.30   0.196    -.0014117     .006741
      _cons |  -.0008506   .0027506    -0.31   0.758    -.0063393    .0046382
------------------------------------------------------------------------------
```

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of flner

chi2(1) = 0.80

Prob > chi2 = 0.3713

. ovtest

Ramsey RESET test using powers of the fitted values of flner

Ho: model has no omitted variables

F (3, 65) = 2.68

Prob > F = 0.0542

. reg flner f flnres flnmx fr finfdif fflnres fflnmx ffr ffinfdif

```
      Source |       SS           df       MS                 Number of obs = 74
-------------+----------------------------------------        F (9, 64) = 6.81
       Model | .010859065         9  .001206563               Prob > F = 0.0000
    Residual | .011342453        64  .000177226               R-squared = 0.4891
-------------+----------------------------------------        Adj R-squared = 0.4173
       Total | .022201518        73  .00030413                Root MSE = 0.01331
------------------------------------------------------------------------------
```

flner	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
f	.0024527	.0039567	0.62	0.538	-.0054517	.0103571
flnres	.0712547	.0248934	2.86	0.006	.0215244	.120985
flnmx	.0075369	.0055786	1.35	0.181	-.0036076	.0186814
fr	-.0000815	.0046551	-0.02	0.986	-.0093811	.009218
finfdif	-.0037406	.0038299	-0.98	0.332	-.0113917	.0039105
fflnres	.0298084	.0331788	0.90	0.372	-.0364739	.0960907
fflnmx	-.015039	.008525	-1.76	0.082	-.0320698	.0019917
ffr	.0013921	.0050157	0.28	0.782	-.008628	.0114122
ffinfdif	.0097338	.0045525	2.14	0.036	.0006391	.0188285
_cons	-.0017908	.0033504	-0.53	0.595	-.0084839	.0049024

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of flner

chi2(1) = 1.16

Prob > chi2 = 0.2812

. ovtest

Ramsey RESET test using powers of the fitted values of flner

Ho: model has no omitted variables

F (3, 61) = 0.99

Prob > F = 0.4017

. clear

. exit