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When and why does Bangladesh's inflation differ from India's?

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ABSTRACT

India and Bangladesh share a common historical background, geographical proximity, institutional similarities, and a policy shift towards economic liberalization since the early 1990s. Inflation between these countries, however, often remains remarkably different, and the series of inflation differential between them does not follow any consistent pattern over time, suggesting an intriguing area of investigation. Working over the 1979-2010 period, this study finds support in favor of the Friedman hypothesis of the primacy of money supply in determining inflation in a country after accounting for supply shocks. In an Autoregressive Distributed Lag (ADL) model, this work shows that Bangladesh experienced higher inflation than India whenever Bangladesh's money supply grew faster than India's. The same is true for India as well, suggesting that both central banks must maintain their restrained stance in money supply if they need to lower inflation.

Key words: inflation differential, money-growth differential, monetary phenomenon, ADL model, Bangladesh economy, Indian economy

JEL Codes: E31, P44, E52, E63, N15, O23, O57

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I. INTRODUCTION

While Bangladesh and India, the two fastest growing economies of South Asia, have many economic aspects in common, their inflation series often deviate from each other without setting a common pattern. Hence, the inflation differential, which can be measured by subtracting India's inflation from Bangladesh's, remains an intriguing area of investigation. The monetarist interpretation of inflation, which is also referred to as the Friedman hypothesis, claims that money supply primarily determines the level of inflation in a country (Friedman 1963, 1977). As Friedman (1963) asserts, inflation is always and everywhere a monetary phenomenon. This view, however, is not entirely endorsed particularly in developing economies where other structural and supply-shock related issues are likely to influence inflation (see Sargent and Wallace 1981, Montiel 1989). Moreover, with the advent of globalization, the factors such as the exchange rate, world inflation, and remittances may play an increasingly important role in finding the inflation differential between these nations in South Asia where economic openness is gathering momentum.

This scenario has raised a number of questions such as 1) Can money growth explain the differences in inflation between Bangladesh and India? 2) Can the open-economy factors such as the exchange rate, world inflation, and remittances explain the inflation differential better than the money-growth differential between these nations? 3) Which country's inflation shows a higher level of sensitivity to money growth? 4) What are the policy implications for the central banks as well as the governments of these countries if money-growth differentials can explain inflation differentials between these economies?

Although the amount of research on inflation of these countries is voluminous, a comparative study of inflation between these two emerging neighbors is starkly absent. There is no single work with the reasoning of the inflation differential and devising policy prescriptions for these two emerging markets of South Asia. This study fills that gap by addressing the questions as mentioned above.

We collect annual data from the World Development Indicators (WDI 2012) of the World Bankover the period from 1979 to 2010. To briefly preview the results, our study finds support in favor of the Friedman hypothesis of how money supply primarily determines inflation in a country. The inflation differential between Bangladesh and India appears to be a monetary phenomenon once the country-specific and global supply shocks are accounted for. Our work has two layers: the country level and the differential-variable level that integrates data from both countries. The estimation results, derived through Autoregressive Distributed Lag (ADL) models, are consistent across the layers. This empirical work shows that Bangladesh experienced higher inflation than India whenever Bangladesh's money supply grew faster than India's, and the converse is also true.

The remainder of this work comprises six sections. The next section presents literature review on inflation in these two countries. Section III justifies the selection of variables and describes data issues. Methodology is presented in Section IV. Section V describes period-wise statistics, unit root tests, correlation coefficients, and Granger causality tests. ADL estimations and analyses are presented in Section VI, and Section VII concludes.

II. LITERATURE REVIEW

The main objective of this paper is to find the principal determinants of inflation in Bangladesh and India, and to examine whether these determinants can explain the inflation differential between these two nations. While the literature on inflation has a respectable volume in each country, here we present only selected papers that exclusively focus on inflation determinants in each country.

The number of studies on Bangladesh's inflation, however, is much less than that on India's. Taslim (1982) is one of the pioneering studies on Bangladesh's inflation determinants. He attempts to analyze the inflationary process in Bangladesh in the light of the structuralist-monetarist controversy. To this end, three models of inflation are constructed and tested: a purely structuralist one, a purely monetarist one, and a hybrid model. Taslim finds that the hybrid model performs best, suggesting that at least for Bangladesh, both sets of factors are relevant. He concludes that money growth and exchange rate movements are key determinants of inflation as are structural bottlenecks in Bangladesh.

Working over the 1974Q2-1985Q4 period, Hossain (1989) finds that global commodity prices, real permanent income, real money growth, lagged inflation, and change in the terms of trade between traded and non-traded goods are responsible for explaining inflation in Bangladesh. He also confirms that temporary shocks such as crop failures cause inflation if there is monetary accommodation.Chowdhury et al. (1996) use quarterly data over the 1974-1992 period and investigate the relationship between money, prices, output, and the exchange rate in Bangladesh. They argue that inflationary pressure in Bangladesh is not entirely caused by monetary factors.

Akhtaruzzaman (2005) works over the 1973Q1-2002Q2 period and identifies the variables, which are believed to generate inflation in Bangladesh. He finds that the exchange rate, money supply, and the deposit interest rate have statistically significant roles in explaining the inflationary process of Bangladesh. Rahman (2005) works with quarterly data from 1974 Q1 to 2003 Q4. He finds that real income growth positively affects inflation. The main message of his paper is that the absence of pure monetary neutrality exists in Bangladesh. Covering the period from 1980 to 2008, Mujeri et al. (2009) find the application of the P-star model for measuring inflationary pressure in Bangladesh. They estimate inflation as a function of the output gap along with other factors.

In another paper Hossain (2010) investigates the behavior of broad money demand in Bangladesh using annual data over the period 1973-2008. His empirical results suggest the existence of a causal

relationship between money growth and inflation.Nasir (2011) uses annual data from 1982 to 2005 and incorporates three new measures of institutional rigidities to estimate an inflation model for Bangladesh. He finds that a higher degree of institutional rigidities leads to higher inflation rates in Bangladesh. Evidence in his work also suggests that inflation is unlikely to be a monetary phenomenon in Bangladesh.

Given the varied results of the works on Bangladesh, the main reasoning for its inflation still remains inconclusive, demanding further investigation into this topic. The papers of India's inflation convey the similar message of controversy over the main factors of inflation in the country. The direction of causality between money supply and inflation is another inconclusive area as well.

Rangarajan and Arif (1990) use data over the 1961-1985 period and find that that money supply mainly determines the price level in India and thus its inflation. They ascertain that the price effects of an increase in money supply are stronger than the output effects in the country. Dave and Rami (2008) used data from June 1953 to December 2005 and argue that reverse Granger causality from price to money supply exists as far as the Indian economy is concerned.

Kar and Sinha (2009) report estimates from some heuristic models that allow the data to select important determinants of Indian WPI inflation during 1971-2004. They find that current growth in money supply, income, agricultural output, and imports are the most important determinants of inflation. In their study, however, money supply alone is the most important contributing variable during 1981-2004. GDP growth, as they show, counters the inflation rate quite substantially.

Mishra et al. (2010) work over the period 1950-51 to 2008-09 and find unidirectional causality from price level to money supply and output in the long run. They also find bidirectional causality between money supply and price level in the short run. Their results infer that money is not neutral and inflation is a short-run monetary phenomenon in India. Patra and Ray (2010) work with the Indian data over the period from April 1997 to December 2008. They argue that inflation expectations in India are influenced by movements in food and fuel prices, as well as the output gap, real interest rates, and the exchange rate. As they note, monetary policy in India has traditionally been conducted in a manner that has anchored inflation expectations around a threshold of 5 percent.

Rami (2010) examines the relationship between money, price and output using pair-wise Granger causality tests on annual data of the Indian economy covering a period from 1951 to 2005. The results in Rami's paper strongly support the monetarists view and partially supports the Keynesian view. However, these relationships in his work are sensitive to the lag length selections. Joshi and Acharya (2011) examine the relationship between international prices of primary commodities and domestic inflation in India for the period 1994 to 2007. The empirical results show that cointegration between international and domestic prices have grown stronger in the period since 2000.

Although a number of papers have examined the determinants of inflation separately at the country level, none of the papers focused on the reasons of the inflation differential between these economies. Moreover, the direction of causality between money and inflation still remains inclusive in both nations, warranting further examination in this regard.

III. SELECTION OF VARIABLES AND DATA ISSUES

Based on literature and theory, we create a list of variables, which are most likely to be determinants of inflation in South Asia. Given the frequency of data and the sample size, it would be pragmatic for us to remain as parsimonious as possible in selecting the possible determinants of inflation. Apart from the variables of money growth, inflation, and their differentials, we further include remittance growth, the output gap, the exchange rate, and world inflation.

Both Bangladesh and India have been experiencing impressive remittance inflows for the last two decades. Both countries fall in the group top-10 remittance recipient countries of the world. In 2010, India topped the list with an amount of 55 billion U.S. dollars. Bangladesh earned 11 billion dollars of remittances and occupied the seventh position in that list, after China, Mexico, Philippines, France, and Germany (WB 2011). Despite a high amount for India, remittances covered only 3.13 percent of its GDP in 2010. The corresponding figure for Bangladesh was 11 percent of its GDP in the same year (WDI 2012). Remittances are often assumed to be inflationary, justifying the inclusion of this variable (see Caceres and Saca 2006, Lopez et al. 2007).

A positive output gap can also be inflationary in South Asia as per the notion of the Phillips curve (see Paul 2009, Singh et al. 2011). If the output gap is above the long-run trend, workers tend to raise their wage, and wage-push inflation is likely to follow. The Lucas supply curve is essentially the same as the expectations-augmented Phillips curve with core inflation replaced by expected inflation. Both state that if we neglect disturbances to supply, output is above normal only to the extent that inflation is greater than expected (see Romer 2006:278). Simply, a positive output gap is expected to have a positive association with inflation, suggesting the inclusion of the output gap in this estimation.

In the last 32 years of our sample, South Asian countries experienced more devaluation against the US dollar than appreciation of their currencies. Devaluation in the exchange rate is likely to increase the prices of imported goods, creating a pressure on a country's inflation. A currency revaluation will trigger opposite results on inflation (see Aigbokhan 1991, Honohan and Lane 2003, Imimole and Enoma 2011). However, these effects are contingent on a number of factors such as 1) how an exchange rate is maintained in a country 2) how much proportion of GDP the imported goods occupy, and 3) how the government controls prices. For both Bangladesh and India, these factors may dampen the theoretical effect of the exchange-rate movements on inflation.

Despite the progress of liberalization in these countries, price control is still prevalent for many imported goods, and particularly, for fuel. In essence, the exchange rate in these countries experience managed float instead of their proclaimed free float. Given this reality, the effects of the exchange-rate movements on inflation may not be as visible as expected. The CPI-based world inflation is likely to affect domestic inflation in these two countries. Again, the possibility may be distorted due to price control, which is gradually being phased out with the progress of liberalization in these countries.

While this work includes both Bangladesh and India, the data availability for Bangladesh works as the limiting factor in this study. The data on inflation based on the Consumer Price Index (CPI) begin in 1987 in Bangladesh, leaving only 24 observations and thus making our estimations non-robust. Hence, we take inflation based on the Gross Domestic Product (GDP) deflator that begins since Bangladesh's independence in 1971. Now the series of money growth becomes the next constraint, which does not begin until 1975. We, however, need to begin in 1979 to avoid some serious outliers in inflation evident until 1978. Bangladesh's inflation in 1978, for example, was 26%, which can be treated as an outlier from the hindsight. Outliers always distort the estimations and provide spurious coefficients. The post-independence years of Bangladesh, a totally war-ravaged country, experienced huge fluctuations and serious outliers in all macro variables including inflation. That is why most time-series studies on Bangladesh begin in the late 1970s or early 1980s (see Hussain and Naeem 2009, Mamun and Nath 2005, Paul 2011). Similarly, our study begins in 1979 as well.

We collect data on inflation, money growth, remittances, GDP, and the exchange rate for both countries from the WDI (2012).Bangladesh uses broad money (M2) as a key operational target as discussed in the Monetary Policy Statement of Bangladesh Bank (MPS 2012, see also GOB 2012). In Indian literature and studies by the Reserve Bank of India (RBI) in particular, both M2 and M3 are used for money supply. As an RBI study by Ramachandran et al. (2010) asserts, two official measures of monetary aggregates, M2 and M3, are used to understand their role in inflation. We use M2due to its operational use in both countries, and calculate money growth from this variable for both countries in a consistent manner.

GDP has been used to calculate the output gap for each country. First, we take log of the variable, and second, the output gap is derived by de-trending GDP with the Hodrick-Prescott filter. The exchange rate can be defined in two ways. It is the value of one unit domestic currency in terms of the US dollars in our exercise. The variable of global inflation based on the CPI has been collected from the WDI as well. Although it does not matter which way we measure the differential variables, we derive both inflation and money-growth differentials by subtracting India's variable from the respective variable of Bangladesh.

IV. METHODOLOGY

Since the objective of the paper is to examine the determinants of the inflation differential between Bangladesh and India, we need to confirm zero degree of integration for each variable. Otherwise, the variables cannot be used for correlation, causality, and OLS estimations if they characterize different degrees of integration. Thus, first we need to make sure that the series are free of unit roots, i.e. the series are stationary to make all results valid and all estimates consistent (see Enders 2010:318).

Usually the Augmented Dickey-Fuller (ADF) test is widely used in this regard (Dickey and Fuller 1979, 1981). Phillips and Perron (1988) proposed a modification of the Dickey-Fuller (DF) test and have developed a comprehensive theory of unit roots. The Phillips-Perron (PP) test has introduced a t-statistic on the unit-root coefficient in a DF regression, corrected for autocorrelation and heteroskedasticity. Formally, the power of a test is equal to the probability of rejecting a false null hypothesis.

Monte Carlo simulations show that the power of the various DF tests can be very low (Enders 2010:234). Maddala and Kim (1998:107) comment that the DF test does not have serious size distortions, but it is less powerful than the PP test. Choi and Chung (1995) assert that for low frequency data like mine the PP test appears to be more powerful than the ADF test. Accordingly, we adopt the PP methodology to test unit roots in the variables.

Once stationarity in all variables is confirmed, we will run a comprehensive correlation test with money growth and inflation including different lags of plausible length appropriate for annual data as per the following specifications:

$$\rho = [mg_{t-i}, \pi_t] \text{ and } \rho = [mg_t, \pi_{t-j}], \ i = 0,1,2. \ j = 1,2. \quad (1)$$

$$\rho = [mgd_{t-i}, \pi d_t] \text{ and } \rho = [mgd_t, \pi d_{t-j}], \ i = 0,1,2. \ j = 1,2. \quad (2)$$

where ρ stands for correlation, *mg* denotes money growth, π represents inflation, and *t* is time in year. The similar tests will be conducted with money-growth and inflation differentials as shown in Equation (2), where *mgd* is money-growth differential and πd stands for inflation differential. The significance of each correlation coefficient will be tested as well. If any relationship is found, the direction by which one variable affects another will be tested by Granger causality tests with plausible length of lags:

$$\pi_t = c + \theta_j \sum_{j=1}^{q} mg_{t-j} + \varepsilon_t, \ q = 1, \ 1...2, \ 1.....3. \quad (3)$$

$$mg_t = c + \beta_i \sum_{i=1}^{p} \pi_{t-i} + \varepsilon_t, \ p = 1, \ 1...2, \ 1.....3. \quad (4)$$

where *c* stands for constant, and ε denotes the error term in the estimation. All notations are as before. θ and β are the coefficients of money growth and inflation, respectively. The similar estimation is run for

both differential variables. The *F*-statistics at different lags will be tested to understand the direction of causality.

Although we intend to see the influence of the money-growth differential on the inflation differential between the two countries, first we need to start with each of the countries separately. We will examine the role of money growth in affecting inflation, first in Bangladesh and next in India. Accordingly, we will estimate inflation in both Bangladesh and India by including a number of regressors such as remittance growth, the output gap, the exchange rate, and world inflation in addition to money growth.

Since the actual data generating process is unknown, we keep experimenting on different specifications. When the specification uses the lagged dependent variable in the RHS where other exogenous variables appear in the contemporaneous and lagged fashion, this type of specification is called ADL model (Enders 2010:286, Stock and Watson 2011:537):

$$\pi_t = c + \beta_i \sum_{i=1}^{p} \pi_{t-i} + \theta_j \sum_{j=0}^{q} mg_{t-j} + X_t + D_1 + \varepsilon_t \qquad (5)$$

where *X* denotes a bunch of variables such as remittance growth, the output gap, the exchange rate, and world inflation.D_1 represents any country level dummy or dummies. Other notations are the same as before. If this ADL model estimated at the country level gives significantθ, the monetary interpretation of inflation will get its ground, and we will run the model with differential variables as below:

$$\pi d_t = c + \beta_i \sum_{i=1}^{p} \pi d_{t-i} + \theta_j \sum_{j=0}^{q} mgd_{t-j} + \Delta X_t + D_1 + \varepsilon_t \qquad (6)$$

where Δ signifies the first difference operator, and other notations are the same as defined before. The RHS variables under *X* may be either in the differential form or in the country-specific original form based on whichever becomes significant in the estimation.

A fundamental idea in the Box-Jenkins approach is the principle of parsimony (Box and Jenkins 1976). It suggests using other selection criteria as more appropriate measures of the overall fit of the model. To that end, the Autocorrelation Function (ACF) and Partial ACF (PACF) derived from the correlogram and some experimentation will be engaged to derive an optimal specification of the model of inflation differential. Simply, the goal will be to select a stationary and parsimonious model that has a good fit.

After every estimation, we will look for the R-squared value. Incorporating additional regressors will necessarily increase fit along with the R-squared value at the cost of reducing degrees of freedom. Hence, the adjusted R-squared value that takes degrees of freedom into account will also be checked. While both the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) are mostly used for model selection, we will rely on the SBC since it selects a more parsimonious model than the

AIC (Enders 2010:120). The objective of a parsimonious model is to minimize the values of the SBC. We need to be parsimonious given the sample size of our low frequency data. Nelson (1991) refers to Hannan (1980) and argues that the SBC provides consistent-order estimation in linear autoregressive models.

The final stage of diagnostic checking ensures that the residuals from the estimated model mimic a white-noise process. The absence of serial correlation, heteroskedasticity, non-normal errors in residuals, and specification errors will be required at this stage. Serial correlation will be tested with the Q-statistics of the ACF and PACF derived from the correlogram of residuals at conventional lag lengths (Ljung and Box 1978). We will check the Q-statistics at the lag lengths of 1, 4, and 8, which appear to be sufficient for annual data. The Q-statistics from the correlogram of squared residuals will be checked for the remaining ARCH errors, whose presence will require estimating the model in an ARCH or GARCH specification.

The check for non-normality in residuals will be conducted with the Jarque-Bera (J-B) statistic. The Ramsey Regression Equation Specification Error Test (RESET) will be deployed to ascertain that the estimation does not have an inappropriate specification. Once the absence of serial correlation, heteroskedasticity, non-normal errors in residuals, and specification errors are confirmed, the estimation with a good fit will be accepted as a model of the inflation differential between Bangladesh and India. Box and Jenkins argue that a parsimonious model produces good forecasts. Hence, the final test of our parsimonious model will be judged by its forecasting power.

PERIOD-WISE STATISTICS, CORRELATION, AND CAUSALITY TESTS

Panels A and B of Figure 1 show the inflation differential and money-growth differential, respectively. Panel C of the same figure shows how these differentials largely move together, suggesting that the inflation differential is likely to be a monetary phenomenon. We present a period-wise analysis between money growth and inflation for both countries in Table 1. A 2-year special window for the initial years of 1979 and 1980 is made to allow other 5-year and 10-year windows begin in 1981. The table presents not only the figures of money growth and inflation for both countries, but also their differentials. A primary inspection of the table will help portray a positive association between money growth and inflation, reiterating a direct relationship obvious in Panel C of Figure 1.

High money growth has been associated with high inflation in both countries. When Figure 2 plots the period-wise differentials as calculated in the third and sixth columns of Table 1, the monetary phenomenon of inflation becomes much convincing. Positive money-growth differentials, which implies that Bangladesh's money growth was higher than India's, have always been associated with positive inflation differentials, which also confirms higher inflation in Bangladesh than in India in the corresponding period. The reverse is true for negative money-growth differentials. The same pattern

becomes effective from India's angle as well. There is no single exception to this pattern in any 5-year or 10-year sub periods, suggesting a robust association between money growth and inflation in both Bangladesh and India.

Econometric estimations are required to examine the accurate pattern of this relationship and to unveil the direction of effect. Before we run the tests of correlation and causality, we want to make sure that the variables of money growth, inflation, and their differentials are stationary series, so the estimated coefficients can be ascertained as consistent and valid. Table 2 serves this purpose.

Table 2 presents the Phillips-Perron stationarity tests with inflation, money growth, and other inflation-related variables as discussed. The first segment of the table tests Bangladesh's variables, while the second and third segments test Indian and global variables, respectively. The last segment includes inflation and money-growth differentials. All the variables are tested under three different models, although each variable falls under a particular model as shown by the bold statistic. The last column of the table shows that all the variables are integrated of degree zero, and thus stationary. A time series is stationary if its probability distribution does not change over time (Stock and Watson 2011:536). These series, being stationary, are now appropriate for correlation and causality tests, and finally OLS estimations if needed.

Panel A of Table 3 presents a set of correlation tests with Bangladeshi, Indian, and differential variables as per the Equations (1) and (2). While correlation coefficients under India are not significant, those under Bangladesh and the differential column are strongly significant as long as the contemporaneous and lagged effects of money growth on inflation are concerned. Inflation never influences money growth, but money growth does in a lagged fashion, as expected. These results are by and large consistent with those in Panel B of the same table, where the Granger causality tests are presented as per Equations (3) and (4).

Money growth causes inflation in a lagged fashion in Bangladesh. The F-statistics are significant at the 5 percent level. The same is true for India though at the 10 percent level, but the reverse is never true. The influence of money growth on inflation, however, appears to be much stronger in Bangladesh than in India. The differential variables establish the same unidirectional causality, paving our way for OLS estimations where money growth can be placed in the RHS to estimate inflation.

V. ADL ESTIMATIONS AND ANALYSES

Before moving to the estimation of inflation differential, we examine the role of the inflation-related variables, and money growth in particular in each country separately, as shown in Table 4.The role of money growth in controlling inflation is consistently evident in correlation, causality tests, and finally in OLS estimations with individual county cases. Regression 1 under Bangladesh in Table 4, which is estimated as per Equation (5), includes all variables as discussed in the stationarity tests. Only lagged

money growth and contemporaneous remittance growth become significant at the 10 percent level at this stage. After some experimentation we find Regression 2 as a better fit than Regression 1. Both the SBC and adjusted R-squared value show an improvement with Regression 2.

Both money growth and inflation with one lag are strongly significant at the 1 percent level to affect Bangladesh's inflation. Although the effect of remittance growth on inflation is significant at the 5 percent level, the coefficient is low, 0.04, compared with 0.27 for lagged money growth for instance. World inflation is expectedly significant in affecting Bangladesh's inflation. All the diagnostic tests confirm that this estimation is free of serial correlation, heteroskedasticity, non-normality in residuals, and specification errors.

The first estimation with Indian inflation, as shown in Regression 3 of the same table, does not show significance for any variable other than the exchange rate, while the coefficient is as low as 0.05. After checking the goodness of fit for the regression, we notice that the fitted line fails in tracking actual inflation in the early years of the 1990s when India's inflation was high and turbulent mainly due to the financial crisis and policy shocks of liberalization. We argue that India's financial crisis and the concomitant inflation of the early 1990s have not been properly addressed in this case, and hence the failure of the model to capture that period.

In the early 1990s, both Bangladesh and India embarked on liberalization in a more serious way than before. While Bangladesh began economic openness in the early 1990s mainly due to its regime change, India's background was starkly different. Although India had regime change at around the same time, the most compelling reason for India's massive liberalization was its worst financial crisis in 1991. To contain the crisis and restore economic health, the new Congress government announced a package of policies in 1991, which we refer to as 'reform' or 'liberalization' in the Indian economy (Acharya 2001). The resolution of the crisis took the form of the IMF entering the scene with a program in July 1991 and the World Bank following with a structural adjustment loan (SAL).

As Panagariya (2008:103) asserts, the IMF program and the World Bank SAL initiated a process of liberalization that has continued to move forward. Agarwal (2003) confirms that India's liberalization process was associated with high inflation and financial crises. As Chakraborty (1999) argues, a country is likely to be at the risk of high inflation when the reforming economy is exposed to financial flows in the initial years of liberalization. This case was more relevant for India than Bangladesh mainly because of its financial crisis.

Koshy (1995) argues that the continuous increase in procurement prices of food articles is the primary contributor to India's inflation of the early 1990s. Koshy adds that agricultural prices went up when the Indian economy began to integrate with the global economy. A country study by the Library of Congress (1995) argues that the high inflation in India in the 1991-1994 period can mainly be attributed

to a shortfall in such critical sectors as sugar, cotton, and oilseeds. This financial crisis and liberalization program created some kind of supply shocks in India, and Bangladesh sidestepped high inflation due to a different background. We want to treat this turbulent period with a dummy, "Indian financial crisis," which posts '1's in the years from 1991 to 1994, and '0's otherwise (see also Paul 2009).

Regression 4 in Table 4 shows a drastic improvement in the goodness of fit once the dummy is included in the estimation. R^2 rises from 0.46 to 0.64, adjusted R^2 rises by double from 0.27 to 0.50, and finally the SBC falls from 5.32 to 5.01. The coefficient on the Indian financial crisis becomes highly significant at the 1 percent level. The coefficient on the exchange rate remains significant as before, but no more variables appear to be significant in this regression. After some experimentation, we find Regression 5 a better fit to estimate inflation in India, where lagged money growth becomes robustly significant with a respectable value of the coefficient at 0.35, suggesting a definite role of money growth in determining Indian inflation. Although R^2 went down as expected as we moved to a more parsimonious model than before, adjusted R^2 slightly improved. The selection criterion finds the last regression as the best fit anyway. All the diagnostic tests confirm that this estimation is free of serial correlation, heteroskedasticity, non-normal errors in residuals, and specification errors in the model.

Having confirmed the positive effect of money growth, along with other variables, on inflation in both Bangladesh and India, now we move to estimate the inflation differential between these countries by placing the money-growth differential in the RHS of the regression. Table 5 presents these estimations as per Equation (6). Regression 1 includes contemporaneous and lagged values of money-growth differentials, which alone can drive inflation up as shown in the estimation. The inflation differential with one lag has been added to the RHS to avoid serial correlation. Since money growth is the single common factor that drives inflation in both Bangladesh and India, the money-growth differential would expectedly be a significant determinant of inflation differential between these countries. Although this model does not have an impressive goodness of fit since R^2 and adjusted R^2 are not high, it is an acceptable estimation in that diagnostic tests cannot find any errors of heteroskedasticity and serial correlation at all conventional lag lengths.

In Table 5, Regression 1 has been extended to Regression 2 by adding world inflation and other country-specific elements such as India's financial crisis and its exchange rate, and also Bangladesh's remittance growth. These items were significant in the country-specific estimations in Table 4. While the Indian financial crisis is strongly significant, the small coefficient on Bangladesh's remittance growth is significant only at the 10 percent level. The goodness of fit has increased substantially in Regression 2. This model can be improved by dropping the insignificant elements, as shown in Regression 3. All the coefficients on money-growth differentials, with no lag and lags 1 and 2, are significant at the 5 percent

level, suggesting that the inflation differential between Bangladesh and India is primarily a monetary phenomenon.

The inflation differential has a mean reversion mechanism, a pattern normal for any stationary series, as shown by the negative and significant coefficient, - 0.24, on the lagged inflation differential. Regression 3 is an improvement over Regression 2 since adjusted R^2 has marginally increased from 0.65 to 0.67. The SBC prefers the latter to the previous since the SBC score has gone down from 4.94 to 4.76. The Ramsey F-statistic and Jarque-Bera statistic confirm that the model does not have any specification error or non-normality in residuals. Ljung-Box Q-statistics at all conventional levels confirm that the model has no issues of serial correlation or Autoregressive Conditional Heteroskedasticity (ARCH) errors.

Although Regression 3 can be taken as the final model of the inflation differential between Bangladesh and India, there is still room for improvement. We observe in Panel A of Figure 3 that the fitted value of the inflation differential deviates from the actual observations in 2008 – a year when the world experienced a spike in the oil price. In 2007, the crude oil price was around 60 U.S. dollars per barrel, but it went up to as high as 147 dollars in 2008, and then dropped back to around 40 dollars, creating a never-seen-before spike in oil prices. Part of this spike is supposed to be embodied in the variable of world inflation, but the rest can be addressed by adding another dummy for that single year (see Gelos and Ustyugova2011, Kapoor 2001). Hence, we create a dummy, named 'Fuel shock 2008.' The addition of this dummy clearly improves the model as shown in Regression 4. Both R^2 and adjusted R^2 have increased, and the SBC prefers Regression 4 to Regression 3. There is no evidence of serial correlation, ARCH errors, non-normality, and specification errors at the 5 percent level in the new model.

We have also checked that the fuel shock dummy remains insignificant at the country level while it appears to be highly significant at the differential level. The investigation of this reason, which is not the main objective of the paper, goes beyond the scope of this work. We may assume that although fuel prices are controlled in both countries, the magnitude of control differs between them, making it insignificant at the country level and strongly significant at the differential level. All the coefficients in Regression 4 of Table 5 are highly significant. All the coefficients on money-growth differentials are positive and strongly significant, reiterating the Friedman hypothesis about the role of money growth in inflation. The added value of these significant coefficients implies that almost 50 percent of the inflation differentials between Bangladesh and India can be explained by the current and two previous years' money-growth differentials. Panel A of Figure 3 presents goodness of fit for two different estimations. The lower part of this panel shows an impressive goodness of fit for Regression 4 of Table 5. Once we exclude the dummies of the Indian financial crisis and fuel shock 2008 from this regression, we get a less efficient goodness of fit as shown in the upper part of Panel A, which corresponds to the RHS values. We

see a poor performance of the fitted value particularly during two periods: India's financial crisis of the early 1990s and the fuel shock of 2008. Thus, adding these dummies turns out to be appropriate for improving the goodness of fit for the model.

The robustness of a model can further be checked with its power of predictability. Hence, we run dynamic forecasting from Regression 4 of Table 5. The dynamic method of forecasting calculates dynamic, multi-step forecast starting from the first period in the forecast sample. In dynamic forecasting, previously forecasted values for the lagged dependent variables are used in forming forecasts of the current values. The forecast ceiling is created by adding one standard error (SE) to the forecasted series, as shown in Panel B of Figure 3. Similarly, we create the forecast floor by subtracting one SE from the forecasted series. The floor is also shown in the same figure.

With the ceiling and floor, we present a forecast band for the inflation differential between the two countries. The forecast band keeps on falling until the early 1990s. It remains almost flat in the 2000s with a spike in 2008. The way the actual inflation differential remains within the band looks impressive, suggesting the robustness of the model used for forecasting. Although we notice a few points where the actual inflation differential slightly broke either the ceiling or the floor, this type of minor deviations is quite normal in forecasting exercises.

VI. CONCLUSION

Bangladesh and India are comparable mainly due to their similar historical background, institutional similarities and policy synchronization of gradual liberalization since the mid-1980s. They, however, display different pattern of inflation dynamics, suggesting the inflation differential between them as an intriguing area of examination.

Working over the 1979-2010 period, this study finds that the inflation differential between Bangladesh and India can greatly be attributed to the money-growth differential between them. The causality runs from money growth to inflation, but not the reverse. Correlation coefficients also justify this unidirectional causality. This study has two layers: the country level and the differential level. The Friedman hypothesis that inflation is primarily a monetary phenomenon has empirically been grounded on both layers in a consistent way.

Other variables such as the exchange rate, remittance growth, and world inflation become significant at the country level, but not in the final estimations with differential variables. The dummies for the Indian financial crisis of the early 1990s and the fuel price shock of 2008 have shown strong significance in the estimations with the inflation differential. As the diagnostic tests show, the final ADL model of estimating the inflation differential is free of serial correlation, heteroskedasticity, non-normality in residuals, and specification errors. The model also shows its robustness in dynamic forecasting. Finding the main reasons of the inflation differential between these countries has policy implications for

the central banks and the respective governments, which must control money supply whenever they become serious about lowering the level of inflation in their economy. Clearly other factors also matter, such as remittances and the exchange rate, though curiously the output-gap does not in our estimations.

This paper raises some additional questions such as 1) what role does public policy play in these countries to influence money growth and thus inflation? 2) Why was India's financial crisis of the early 1990s associated with remarkably high inflation? 3) Why are higher remittances associated with inflation in Bangladesh but not in India? 4) What should be the optimal rate of money growth for Bangladesh and India? 5) Is there a significant relationship between the degree of monetary policy independence and inflation in these countries? These questions, though interesting, go beyond the scope of this study, and are left for future exploration.

REFERENCES:

Acharya, S (2001) India's Macroeconomic Management in the 1990s, Leading Paper presented at seminar on Sep 3, 2001, "Ten Years of Economic Reform", Indian Council for Research on International Economic Relations, New Delhi, 1-67.

Agarwal, J.D. (2003) Challenges before Indian Economy, Finance India, 17(3), Sep, 861-65.

Aigbokhan B.E. (1991) The Naira Exchange Rate Depreciation and Domestic Inflation. The Indian Journal of Economics, 71,507-517.

Akhtaruzzaman, M. (2005) Inflation in the Open Economy: An Application of the Error Correction Approach to the Recent Experience in Bangladesh, WP 0602, Policy Analysis Unit, Bangladesh Bank. www.bangladesh-bank.org/openpdf.php

Box, G., Jenkins, G. (1976): Time Series Analysis, Forecasting, and Control, Holden Day, San Francisco, CA.

Caceres, L.R., Saca, N.N. (2006) What Do Remittances Do? Analyzing the Private Remittance Transmission Mechanism in El Salvador.IMF Working Paper, WP/06/250, http://www.imf.org/ external/pubs/ft/wp/2006/wp06250.pdf.

Chakraborty, D (1999) Macroeconomic Conditions and Opening Up – Argentina, Chile, and India: A Comparative Study, International Journal of Social Economics, 26(1-3), 298-311.

Choi, I., Chung, B. (1995) Sampling Frequency and the Power of Tests for a Unit Root: A Simulation Study. Economics Letters, 49, 131-36.

Chowdhury, A.R, Dao, M.Q., Wahid, N.M. (1996) Monetary policy, output, and inflation in Bangladesh: A dynamic analysis, in N.M. Wahid and C.E. Weis (eds.) The economy of Bangladesh: Problems and prospects, Praeger, London, 107-118.

Dave, M.B., Rami, G.D. (2008) A Study of Causality between Money Supply and Price Level in India (Monthly Data): 1953 to 2005, Journal of European Economy, Special Issue, 7

Dickey, D, Fuller, W.A. (1979). Distribution of the Estimates for Autoregressive Time Series with a Unit Root.Journal of the American Statistical Association. 74, 427-431.

Dickey, D., Fuller, W.A. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. Econometrica. 49, 1057-72.

Enders, W. (2010) Applied Econometric Time Series. 3e, Wiley, NJ.

Friedman, M. (1963) Inflation: Causes and Consequences, Asia Publishing House, New York.

Friedman, M. (1977) Nobel lecture: Inflation and unemployment, Journal of Political Economy, 85, 451-472.

Gelos, G., Ustyugova, Y. (2011) Inflation responses to commodity price shocks – how and why do countries differ? An IMF presentation, http://www.imf.org/external/np/seminars/eng/2011/tur/pdf/gg.pdf

GOB (2012) Government of Bangladesh's Annual Budget 2012-2013, Ministry of Finance, http://www.mof.gov.bd/en/budget/12_13/budget_speech/speech_en.pdf

Hannan, E.J. (1980) The estimation of the order of an ARMA process, the Annals of Statistics, 8, 1071-1081.

Honohan P., Lane P.R. (2003) Divergent Inflation Rates in EMU. Economic Policy, 37, 359-94.

Hossain, A.A. (1989) A Monetary Model of Inflation for Bangladesh, 1974-1985, Pakistan Development Review, 28(2), 133-155.

Hossain, A.A. (2010) Monetary Targeting for Price Stability in Bangladesh: How Stable Is Its Money Demand Function and the Linkage between Money Supply Growth and Inflation? Journal of Asian Economics, 21(6), 564-578.

Hussain Z, Naeem F (2009) Remittances in Bangladesh: Determinants and 2010 Outlook. http://blogs. worldbank.org/endpovertyinsouthasia/print/514

IMF (2011) International Financial Statistics (IFS), International Monetary Fund, Washington DC

Imimole, B., Enoma, A. (2011) Exchange Rate Depreciation and Inflation in Nigeria (1986–2008), Business and Economics Journal, BEJ-28, 1-12.

Inflationary Pressure in Bangladesh, Bangladesh Development Studies, 32(1), 1-22.

Joshi, A.R., Acharya, D. (2011) Commodity prices and domestic inflation in India, Global Journal of Emerging Market Economies, 3(2), 223-246.

Kapoor, A. (2011) Economic Impact of Oil Price Shocks on Emerging Markets, Claremont McKenna College Senior Theses Paper 139, http://scholarship.claremont.edu/cmc_theses/139

Kar, S., Sinha, S. (2009) Determinants of Indian WPI inflation, Indian Economic Journal, 57(3), 72-92.

Koshy, T (1995) The 1995-96 Forecast of the Indian Economy, Sep, www.subcontinent.com/sapra/ bulletin/95sep/si950909.html, 1-5.

Library of Congress (1995) India's Economic Growth since 1980: Liberalization in the Early 1990s, www.photius.com/countries/india/economy/india-economy-lib_in_th~8830.html, p. 4.

Ljung, G., Box, G. (1978): On a measure of lack of fit in time series models, Biometrica, 65, 297-303.

Lopez, H., Molina, L., Bussolo, M. (2007) Remittances and the Real Exchange Rate. World Bank Policy Research Working Paper, WPS 4213, http://elibrary.worldbank.org/docserver/download/4213.pdf?expires =1353430799&id=id&accname=guest&checksum=3A1E8DE675477E6BC4F091832D6644A7, 1-33.

Maddala, G. S, Kim, I. M (1998).Unit Roots, Cointegration, and Structural Change.Cambridge University Press.

Mamun, K.A.A., Nath, H.K. (2005) Export-led growth in Bangladesh: A time series analysis, Applied Economics Letters, 12, 361-364.

Mishra, P.K., Mishra, U.S., Mishra, S.K. (2010) Money, Price and Output: A Causality Test for India, International Research Journal of Finance and Economics, 53, 26-36.

Montiel, P.J. (1989) Empirical Analysis of High-Inflation Episodes in Argentina and Brazil, International Monetary Fund Staff Papers, Washington. D. C, 36 (3), 527–549.

MPS (2012) Monetary Policy Statement for 2012-2013, Bangladesh Bank, http://www.bangladesh-bank.org/openpdf.php, 1-14.

Mujeri, M.K., Shahiduzzaman, M., Islam, M.E. (2009) Application of the P-Star Model for Measuring

Nasir, A.B.M. (2011) Nexus Between Inflation Rates and Institutional Rigidities in Bangladesh: An Overlooked Aspect for the Cause of Inflation, The Journal of Developing Areas, 45, 339-358.

Nelson, D.B. (1991) Conditional Heteroskedasticity in Asset Returns: A New Approach, Econometrica, 59(2), 347-370.

Panagariya, A. (2008): India: The Emerging Giant, Oxford University Press, New York.

Patra, M.D., Ray, P. (2010) Inflation Expectations and Monetary Policy in India: An Empirical Exploration, IMF Working Paper 10/84, 1-27.

Paul (2009) In Search of the Phillips Curve for India, Journal of Asian Economics, 20(4), 2009, 479-488.

Paul, B.P. (2011) Revisiting Export-Led Growth for Bangladesh: A Synthesis of Cointegration and Innovation Accounting, International Journal of Economics and Finance, 3(6), 3-15.

Phillips, P. C., Perron, P. (1988). Testing for a Unit Root in Time Series Regression.Biometrika.75(2), 335-46.

Rahman, Md. H. (2005) Money growth and inflation: A case study of Bangladesh, Bangladesh Journal of Political Economy, 22(1-2), 469-485.

Ramachandran, M., Das, R., Bhoi, B.B. (2010) Divisia Monetary Indices as Leading Indicators of Inflation, Development of Economic Analysis and Policy, Study 36, Reserve Bank of India, Mumbai, http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/DRRA020610F.pdf, 1-50.

Rami, G. (2010) Causality between Money, Prices and Output in India (1951-2005): A Granger Causality Approach, Journal of Quantitative Economics, 8(2), 20-41.

Rangarajan, C., Arif R.R. (1990) Money, Output and Prices: A Macro Econometric Model, Economic and Political Weekly, April 21, p. 837-852.

Romer, D. (2006) The Lucas Imperfect Information Model, in Advanced Macroeconomics, 3e, McGraw-Hill Irwin, Boston.

Sargent, T.J., Wallace, N. (1981) Some Unpleasant Monetarist Arithmetic, Federal Reserve Bank of Minneapolis, Journal of Quarterly Review 5, 1-17.

Singh, B., Kanakaraj, A. & Sridevi, T. (2011) Revisiting the empirical existence of the Phillips curve for India, Journal of Asian Economics, 22, 247-258.

Stock, J.H., and Watson, M.W. (2011) ADL Models, in Introduction to Econometrics, Pearson, Addison-Wesley, Boston.

Taslim, M.A. (1982) Inflation in Bangladesh: A Reexamination of the Structuralist – Monetarist Controversy, Bangladesh Development Studies, 10(1), 23-52.

WB (2011) Migration and Remittances Factbook, Development Prospects Group, World Bank, http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1199807908806/Top10.pdf, 1-15.

WB (2012) World Bank, Money and Quasi Money as Percentage of GDP, http://data.worldbank.org/ indicator/FM.LBL.MQMY.GD.ZS

WDI (2012) World Development Indicators, World Bank, available at: http://data.worldbank.org/data-catalog/world-development-indicators

TABLE 1

Comparison of money growth and inflation between Bangladesh and India: 1979-2010

	Money growth			Inflation		
Periods	Bangladesh	India	Differential	Bangladesh	India	Differential
2-year window						
1979-1980	21.77	16.80	4.97	15.06	13.62	1.44
5-year window:						
1981-1985	23.84	17.28	6.56	10.79	8.53	2.26
1985-1990	15.55	16.67	-1.11	8.26	8.69	-0.43
1991-1995	13.55	16.70	-3.15	4.20	10.32	-6.12
1996-2000	13.34	17.38	-4.04	3.82	5.86	-2.04
2001-2005	14.65	15.29	-0.64	3.72	4.65	-0.93
2005-2010	18.32	20.04	-1.72	6.75	7.38	-0.63
10-year window:						
1981-1990	19.70	16.97	2.72	9.52	8.61	0.91
1991-2000	13.44	17.04	-3.59	4.01	8.09	-4.08
2001-2010	16.48	17.66	-1.18	5.24	6.02	-0.78
Entire sample						
1979-2010	16.87	17.20	-0.33	6.81	7.95	-1.14

Note: The figures, expressed in percentage, are the averages of the respective period. Differentials are calculated by subtracting India's value from Bangladesh's. A special window only for 1979 and 1980 has been created to allow other 5-year and 10-year windows begin in 1981. Source: WDI 2012.

TABLE 2

Phillips-Perron stationarity tests with inflation and related variables of Bangladesh and India: 1979-2010

	Model A: Constant		Model B: Constant + Trend		Model C: None		Integra-tion
Bangladesh's Variable:	Statistic	*p* -value	Statistic	*p* -value	Statistic	*p* -value	
Inflation	**-4.95**	**0.00**	-4.74	0.00	-3.46	0.00	I (0)
Money growth	**-3.91**	**0.01**	-3.96	0.02	-1.07	0.25	I (0)
Remittance growth	**-3.93**	**0.01**	-3.94	0.02	-2.91	0.01	I (0)
Output gap	-4.87	0.00	-4.84	0.00	**-4.92**	**0.00**	I (0)
Exchange rate	**-8.96**	**0.00**	-8.33	0.00	-5.47	0.00	I (0)
India's Variable:							
Inflation	-4.15	0.00	**-5.15**	**0.00**	-0.40	0.53	I (0)
Money growth	**-5.21**	**0.00**	-5.22	0.00	-0.66	0.43	I (0)
Remittance growth	**-6.48**	**0.00**	-6.39	0.00	-4.89	0.00	I (0)
Output gap	-2.86	0.06	-2.79	0.21	**-2.92**	**0.00**	I (0)
Exchange rate	-3.50	0.01	-0.31	0.99	**-5.88**	**0.00**	I (0)
Global Variable:							
World inflation	-4.69	0.00	**-5.89**	**0.00**	-2.55	0.01	I (0)
Differential Variable:							
Inflation differential	-6.52	0.00	-6.41	0.00	**-6.31**	**0.00**	I (0)
Money-growth differential	-3.79	0.01	-3.86	0.03	**-3.85**	**0.00**	I (0)

Note: The critical values and details of the test are presented in Phillips and Perron (1988). The bold elements indicate the actual model as per the unit root estimations. The differential variables have been calculated by subtracting the Indian variable from the respective Bangladeshi variable. Source: WDI 2012.

TABLE 3

Correlation and Granger causality tests with money growth and inflation of Bangladesh and India: 1979-2010

	Variables		
Panel A: Correlation tests	Bangladesh	India	Differential
Correlation coefficients of:			
Corr[money growth(t), inflation(t)]	**0.46 (0.01)**	0.12 (0.52)	**0.39 (0.03)**
Corr[money growth(t-1), inflation(t)]	**0.60 (0.00)**	-0.04 (0.82)	**0.49 (0.01)**
Corr[money growth(t-2), inflation(t)]	**0.41 (0.02)**	0.21 (0.26)	**0.35 (0.06)**
Corr[money growth(t), inflation(t-1)]	0.21 (0.25)	-0.03 (0.88)	0.19 (0.29)
Corr[money growth(t), inflation(t-2)]	0.24 (0.19)	0.06 (0.77)	0.18 (0.33)
Panel B: Granger causality tests			
Money growth doesn't Granger cause inflation			
F-statistic at Lag 1	**7.00 (0.01)**	0.39 (0.54)	**6.03 (0.02)**
Lag 2	**5.03 (0.01)**	1.77 (0.19)	2.04 (0.14)
Lag 3	**4.17 (0.02)**	**2.30 (0.10)**	1.28 (0.30)
Inflation doesn't Granger cause money growth			
F-statistic at Lag 1	0.29 (0.59)	0.05 (0.83)	0.40 (0.53)
Lag 2	1.27 (0.30)	0.24 (0.79)	1.77 (0.19)
Lag 3	0.31 (0.82)	0.19 (0.90)	0.74 (0.54)

Note: The p-values of each statistic are in the parentheses. The statistics are bold when thery are significant at the 10 percent level. Statistics under 'Differential' include money-growth and inflation differentials. The differential variable is calculated by subtracting the Indian variable from the respective Bangladesh's variable. Source: WDI 2012.

TABLE 4

Role of money growth and other factors in the estimations of inflation for Bangladesh and India: 1979-2010

	Bangladesh		India		
Regression No. →	1	2	3	4	5
Regressors:					
Constant	-2.651 (1.60)	-1.77 (1.08)	-4.47 (6.09)	2.242 (5.42)	-0.837 (2.85)
Inflation (t-1)	0.21 (0.17)	0.27*** (0.09)	0.31 (0.18)	-0.16 (0.20)	-0.05 (0.15)
Money growth (t)	0.05 (0.09)		0.18 (0.22)	(0.09) (0.20)	
Money growth (t-1)	**0.25*** (0.08)	**0.27***** (0.06)	0.03 (0.20)	0.01 (0.17)	
Money growth (t-2)	0.03 (0.07)		0.29 (0.21)	0.28 (0.17)	**0.35**** (0.16)
Remittance growth (t)	0.04* (0.02)	0.04** (0.02)	0.01 (0.02)	0.01 (0.02)	
Output gap (t)	-33.65 (66.58)		-11.22 (31.43)	53.87 (32.33)	
Exchange rate (t)	0.02 (0.04)		0.05*** (0.02)	0.08*** (0.02)	0.06*** (0.02)
World inflation (t)	0.11 (0.10)	0.17*** (0.05)	-0.11 (0.08)	-0.09 (0.07)	
Indian financial crisis				5.80*** (1.71)	4.36*** (1.29)
R-squared	0.77	0.77	0.46	0.64	0.58
Adjusted R-squared	0.70	0.73	0.27	0.50	0.51
Schwarz Bayesian creterion	4.96	4.56	5.32	5.01	4.64
Diagnostic tests:					
Serial correlation test:					
Q-stat at lag 1	0.49 [0.49]	0.03 [0.85]	1.63 [0.20]	1.52 [0.22]	2.55 [0.11]
Q-stat at lag 4	1.47 [0.83]	2.34 [0.67]	3.37 [0.50]	5.19 [0.27]	6.02 [0.20]
Q-stat at lag 8	8.71 [0.37]	7.87 [0.45]	10.03 [0.26]	12.34 [0.14]	9.84 [0.28]
Heteroskedasticity test:					
Q-stat at lag 1	0.17 [0.68]	0.00 [0.98]	0.10 [0.75]	0.09 [0.77]	0.01 [0.92]
Q-stat at lag 4	1.72 [0.79]	2.54 [0.64]	3.05 [0.55]	0.70 [0.95]	1.20 [0.88]
Q-stat at lag 8	2.82 [0.95]	3.03 [0.93]	6.32 [0.61]	5.17 [0.74]	4.7 [0.79]
Normalty test:					
Jarque-Bera stat	0.39 [0.82]	0.69 [0.71]	1.81 [0.40]	0.24 [0.89]	1.97 [0.37]
Specification test:					
Ramsey F-stat	0.01 [0.95]	0.02 [0.88]	1.76 [0.20]	5.25 [0.03]	0.90 [0.35]

Note: The coefficients of interest are made bold when significant. *, **, *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively. "stat" stands for statistic. Null hypotheses for diagnostic tests are: (1) No serial correlation (2) No heteroskedasticity (3) No nonnormal errors in residuals and (4) No specification error. Values in parentheses against coefficients are their standard errors, and values in brackets are p-values of the respective statistics. Source: WDI 2012.

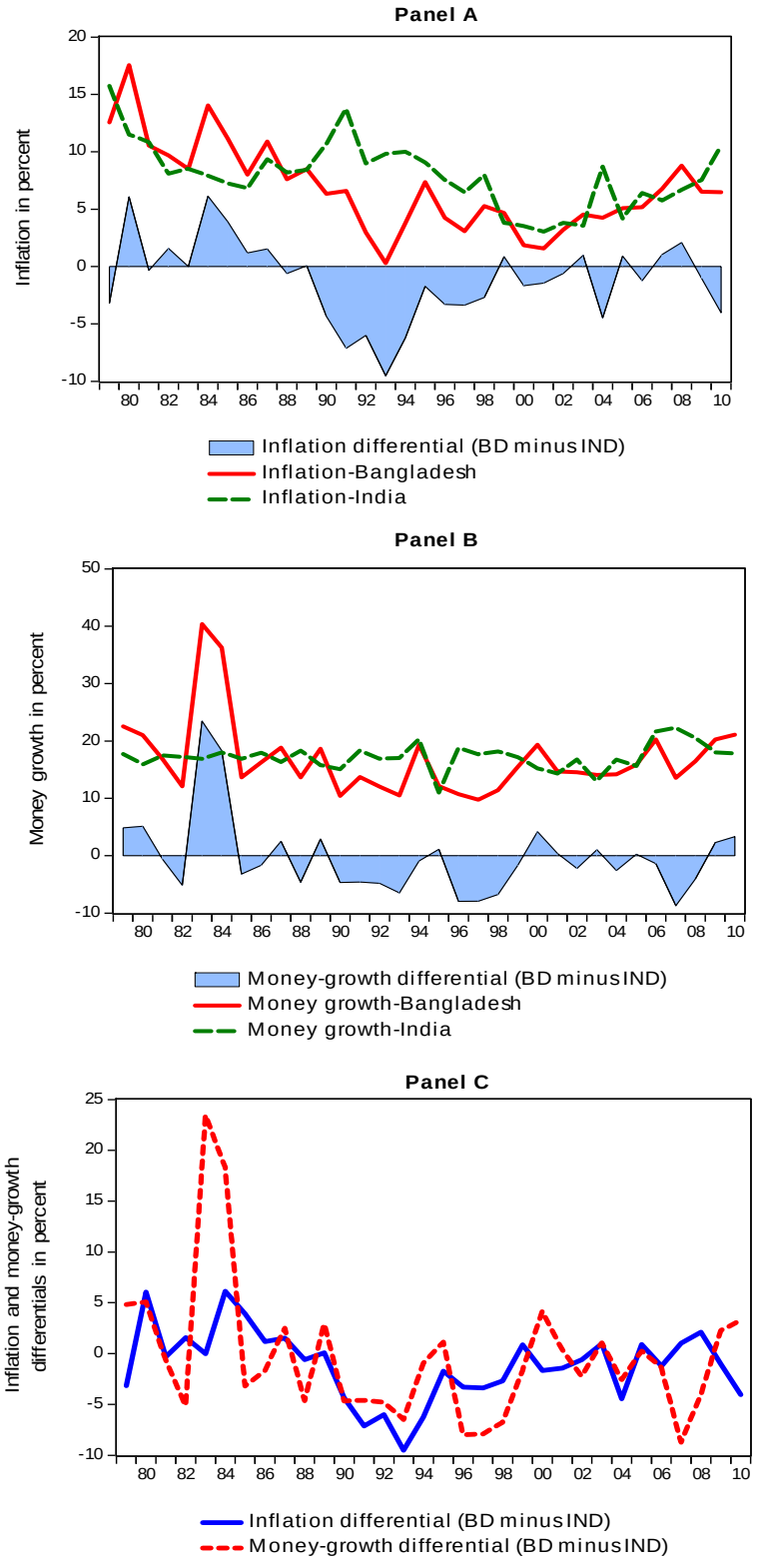
TABLE 5

Role of money-growth differentials in the estimations of inflation differentials between Bangladesh and India: 1979-2010

Regression No. →	1	2	3	4
Regressors:				
Constant	-1.03* (0.54)	-1.55* (0.87)	-1.01* (0.51)	-1.10** (0.48)
Inflation differential (t-1)	-0.05 (0.11)	-0.31** (0.12)	-0.24*** (0.08)	-0.25** (0.08)
Money-growth differential (t)	**0.18**** (0.09)	**0.14*** (0.08)	**0.14**** (0.06)	**0.15***** (0.06)
Money-growth differential (t-1)	0.13 (0.09)	0.10 (0.08)	**0.14**** (0.07)	**0.17***** (0.06)
Money-growth differential (t-2)	**0.17*** (0.09)	**0.13*** (0.07)	**0.15**** (0.06)	**0.16**** (0.06)
Indian financial crisis		-7.00*** (1.36)	-6.53*** (1.23)	-6.31*** (1.16)
Remittance growth (t)-Bangladesh		0.04* (0.02)	0.04** (0.02)	0.04** (0.02)
Exchange rate (t)-India		0.03 (0.03)		
World inflation (t)		-0.06 (0.10)		
Fuel shock 2008				4.30** (2.02)
R-squared	0.36	0.74	0.73	0.78
Adjusted R-squared	0.26	0.65	0.67	0.71
Schwarz Bayesian creterion	5.43	4.94	4.76	4.70
Diagnostic tests:				
Serial correlation test:				
Q-stat at lag 1	2.47 [0.12]	0.10 [0.75]	0.04 [0.85]	0.51 [0.48]
Q-stat at lag 4	4.81 [0.31]	2.02 [0.73]	1.72 [0.79]	3.24 [0.52]
Q-stat at lag 8	7.90 [0.44]	2.67 [0.95]	2.26 [0.97]	4.31 [0.83]
Heteroskedasticity test:				
Q-stat at lag 1	0.76 [0.38]	0.01 [0.93]	0.43 [0.51]	1.21 [0.27]
Q-stat at lag 4	2.31 [0.68]	0.21 [1.00]	0.82 [0.94]	8.30 [0.08]
Q-stat at lag 8	6.14 [0.63]	1.69 [0.99]	3.53 [0.90]	11.51 [0.17]
Normalty test:				
Jarque-Bera stat	0.52 [0.80]	0.33 [0.85]	0.42 [0.81]	0.57 [0.75]
Specification test:				
Ramsey F-stat	0.34 [0.56]	0.12 [0.72]	0.08 [0.77]	0.46 [0.51]

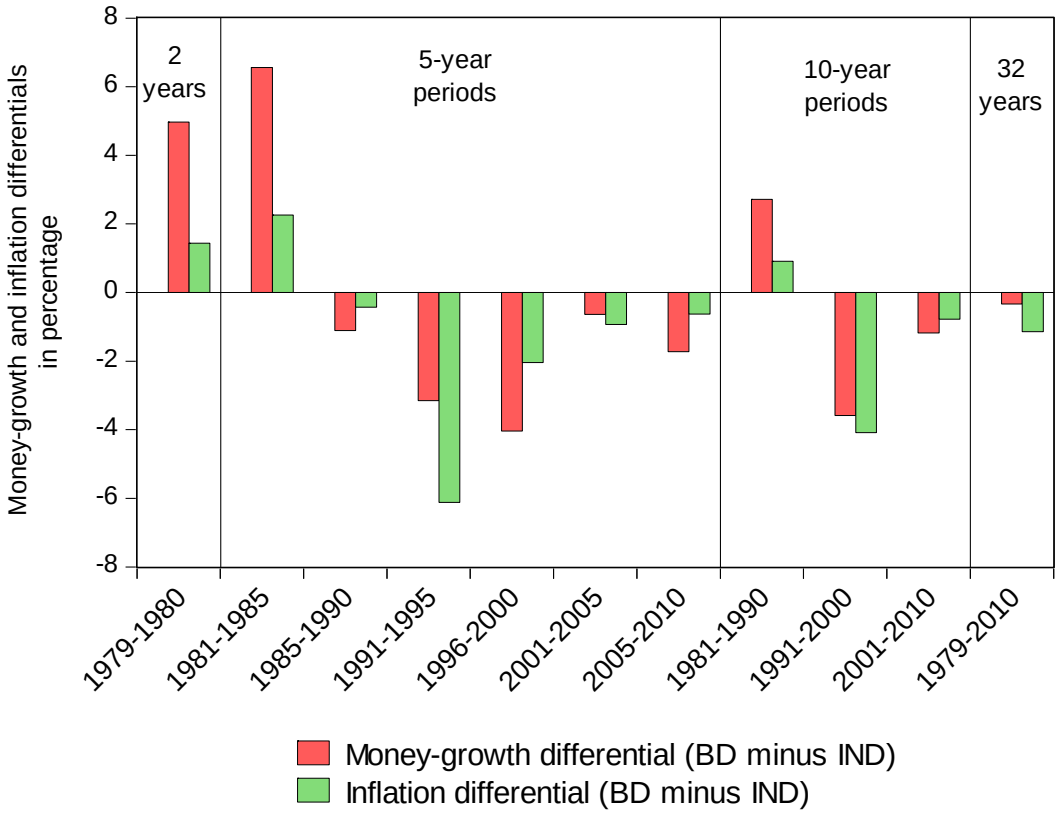
Note: A differential variable is calculated by subtracting India's values from Bangladesh's. The coefficients of interest are made bold when significant. *, **, *** indicate that the coefficients are significant at the 10%, 5%, and 1% levels, respectively. "stat" stands for statistic. Null hypotheses for diagnostic tests are: (1) No serial correlation (2) No heteroskedasticity (3) No nonnormal errors in residuals and (4) No specification error. Values in parentheses against coefficients are their standard errors, and values in brackets are p-values of the respective statistics. Source: WDI 2012.

FIGURE 1
Inflation and money-growth differentials between Bangladesh and India: 1979-2010



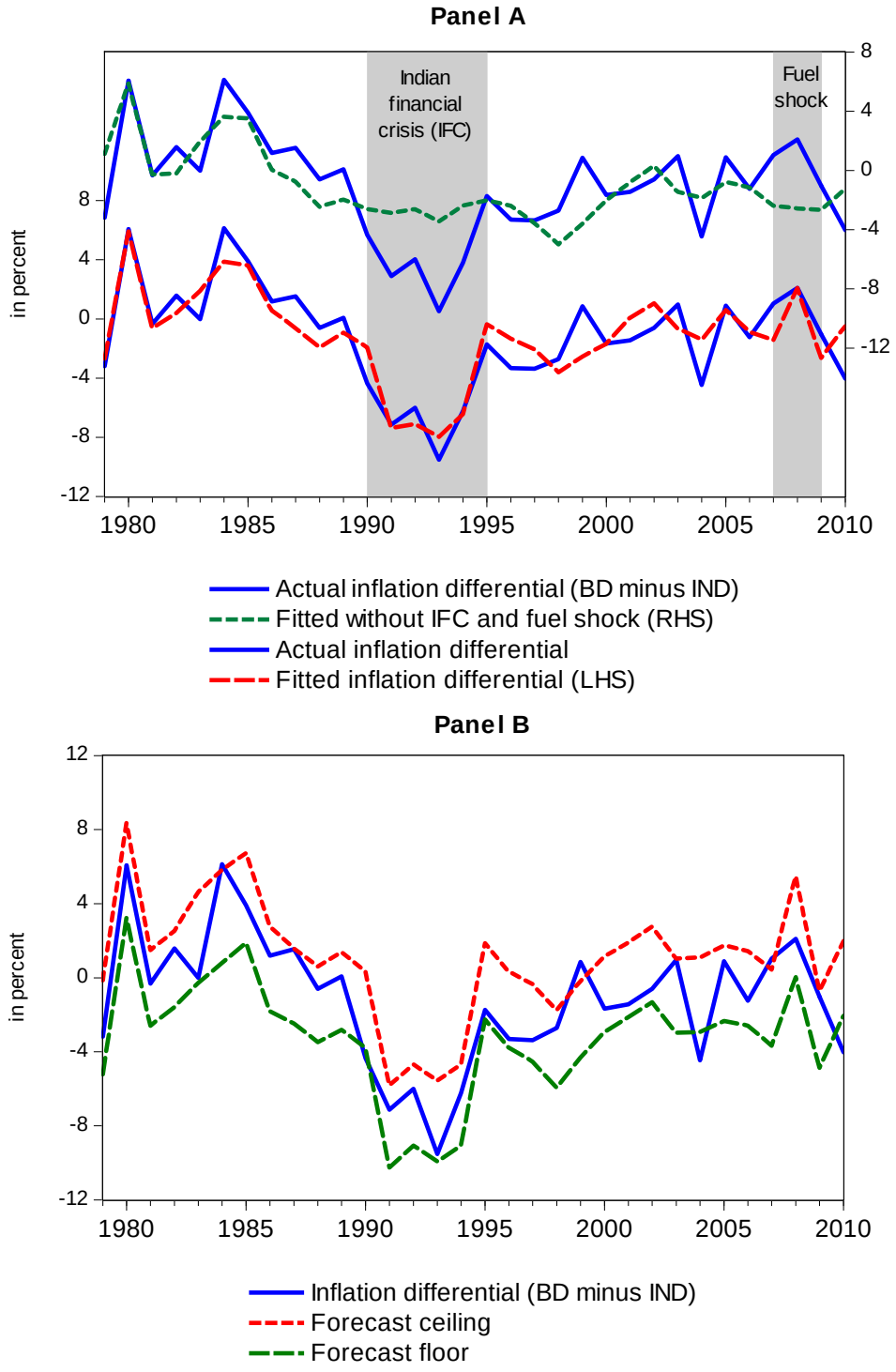
Source: WDI 2012

FIGURE 2
Period-wise relationship between money-growth and inflation differentials



Source: WDI 2012

FIGURE 3
Goodness of fit and dynamic forecasting of inflation differential between Bangladesh and India: 1979-2010



Source: WDI 2012