Deficit Financing and Inflation in Bangladesh: A Vector Autoregressive Analysis

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Abstract: This paper analyses the dynamics of inflation in Bangladesh using vector autoregressive methods over the period from July 1999 to August 2008. Demand side factors are assessed in comparison with cost-push influences with a particular focus on the role of government borrowing from the domestic banking system. Over the sample period, previous values of inflation are the most significant source of inflation in the short-term, followed by net credit to the government. The results suggest that the management of expectations and the mode of budget financing are the most important focus areas for future price stability efforts.

Keywords: Inflation; Bangladesh; deficit financing; vector autoregressive model.
JEL classification codes: E31, E37, E42.

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1. Introduction

Economic theory posits a causal relationship between budget deficits and inflation, the extent of which is not explicit. Whether demand-pull or cost-push in its ultimate sources, inflation intrinsically reflects the imbalance between the demand and supply phenomena of the economy. While controlled inflation is perceived to supplement economic growth, beyond a limited extent it poses a threat to the sustainability of such growth by affecting the poverty and inequality levels of an economy through the inefficient reordering of relative prices and incomes. Therefore, it has always been an effort of policy makers, particularly central bankers, to control the various mechanisms through which inflation can occur.

For Bangladesh, inflationary pressures remain persistent, emanating from, along with other factors, variations in the production level (mostly influenced by severe climatic conditions), distributional inefficiencies and, according to many, excess growth in the money supply. While many studies since the country's inception provide evidence supporting the hypothesis that money circulation does have an impact on inflation in Bangladesh, there are other studies that find the relationship to be relatively weak. Over the last 12 years, the correlation coefficient between money supply growth and inflation is in fact negative, while the value is estimated to be 0.33 between financial years (FYs)[2] 2000 and 2008, bringing the connection between the two into question (Mujeri and Islam, 2008). However, no studies have looked at monetary factors at a disaggregated level to identify the impact of different components of the money supply on price hikes.

[2] Fiscal years end on June 30.

About 15 per cent of the total Bangladeshi money supply is comprised of government net borrowing from the banking system, and this component rises to about 30 per cent of M2 when borrowing from non-banking sources is added. This paper looks at deficit financing as one of the likely sources of inflation. In contrast to private sector credit, public sector borrowing is not significantly absorbed by the production chain and can thus potentially float inefficiently in the economy. Whether governments' financing mechanism has proven to be expansionary and has had a considerable effect on inflationary developments remains an issue that is largely missing in the contemporary macroeconomic literature concerning Bangladesh.

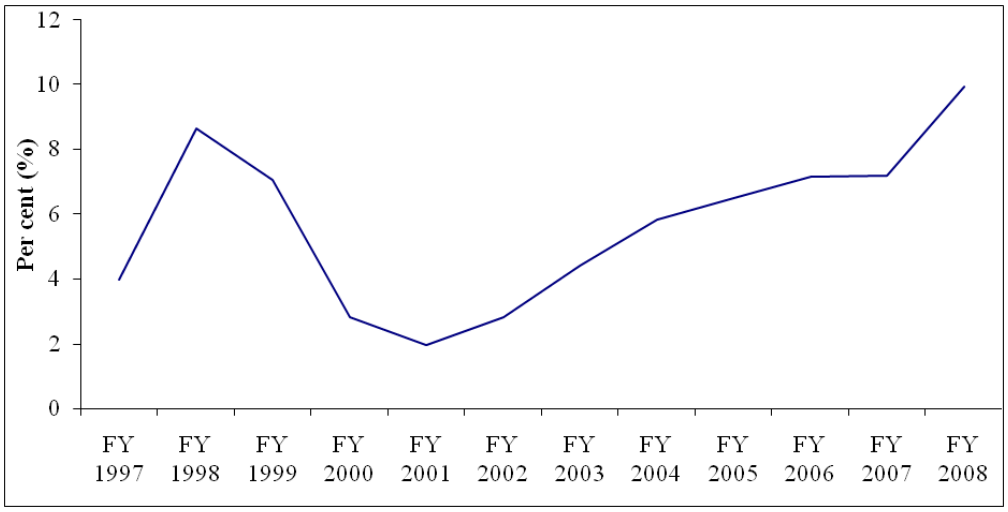
This paper analyses the dynamics of inflation in Bangladesh using vector autoregressive methods to identify the impact of different factors over the period from July 1999 to August 2008. The potential connection between government borrowing and inflation is weighed against other possibilities, including supply-side influences like the pernicious effects of international price shocks.

1.1 ***Overview of trends in inflation and monetary factors***

A very sensitive price situation in Bangladesh has led policy objectives to be driven by the issue of inflation management. According to Mortaza (2006), this could be a reason behind the success in maintaining control over the price level during the 1990s and early 2000s. However, beginning in 2001, the average price level started to gain pace

and approached an alarming state as moving average inflation crossed the 7 per cent mark in FY2006. Inflation eventually reached as high as 10 per cent in 2008.

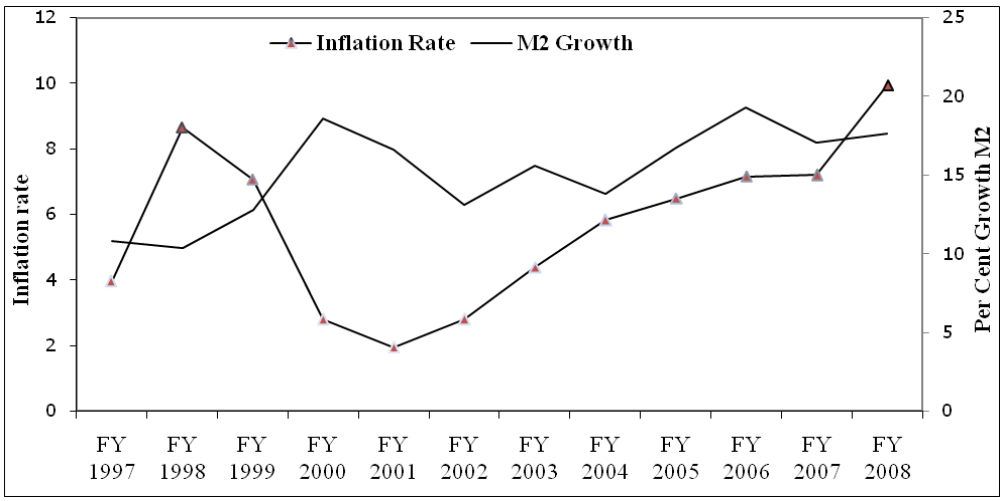
Figure 1: Inflation Rate in Bangladesh



Source: Bangladesh Bureau of Statistics (BBS)

While supply side distributional inefficiencies persisted throughout this period, severe natural catastrophes in 2004 and 2007 had major impacts on the economy by disrupting (mostly agricultural) production. On the other hand, trends in inflation did tend to move along with the growth of money supply (M2), signifying the possibility of a causal effect running from growth in the money supply to price levels. Average growth in M2 between FY1996 and FY2001 was 13.8 per cent, whereas from FY2002 to FY2008 it averaged 16.2 per cent annually.

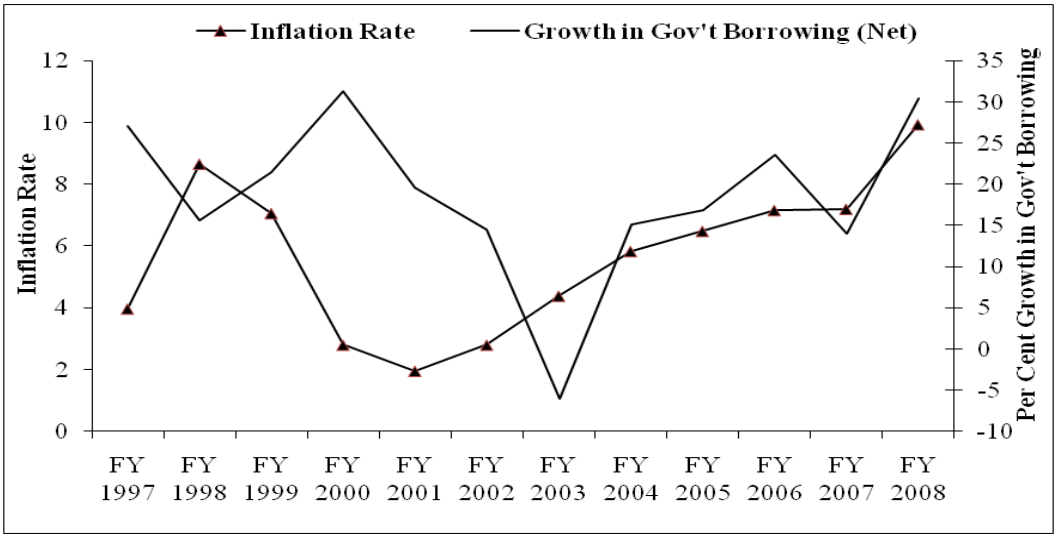
Figure 2: Growth in Money Supply and Inflation Rate



Source: Bangladesh Bank and Bangladesh Bureau of Statistics (BBS)

Within the money supply (M2), the share of net government borrowing from the domestic banking system to finance budgetary deficits increased from around 10 per cent in the early 1990s to 19 per cent in FY2008. At the same time, based on a trend line comparison, the inflation rate appears to follow the direction of government bank borrowing with some lag.

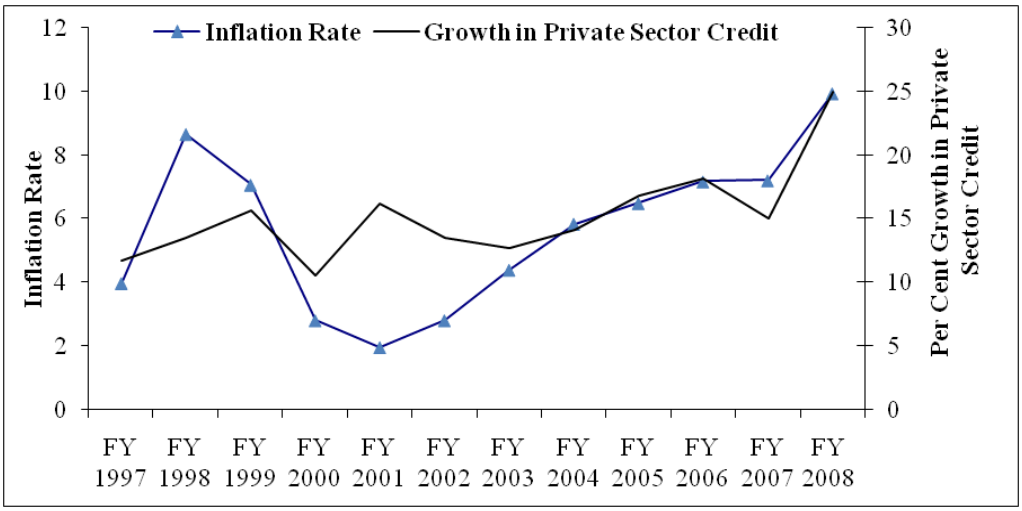
Figure 3: Inflation and Bank Borrowing in Bangladesh



Source: Bangladesh Bank and Bangladesh Bureau of Statistics (BBS)

Private sector credit, which constitutes about 75 per cent of M2, showed high growth of over 18 per cent during the period FY2005 to FY2008, growing 24.9 per cent in FY2008. This is a marked increase from the average per annum growth of 13.5 per cent from FY1997 to FY2004.

Figure 4: Inflation and Private Sector Credit



Source: Bangladesh Bank and Bangladesh Bureau of Statistics (BBS)

The rest of the paper is organized as follows. The following section looks at the theoretical mechanisms by which government borrowing from the domestic banking system may affect inflation and provides a survey of the literature. Section 3 describes the quantitative methodology employed, while Section 4 explains the model specification and data used. Section 5 details the results of the analysis and Section 6 concludes.

2. Links between Deficit Financing, the Money Supply and Inflation

According to the monetarist view, budget deficits can lead to inflation, but only to the extent that they are monetized (Hamburger and Zwick, 1981). If the budget deficit period is accompanied by an accommodative monetary policy, then it forces a rise in the money supply for an extended amount of time. Aggregate demand increases as a result of money growth, exceeding the production capacity of the economy, and leads to a rise in prices.

In an attempt to finance the deficit, if it does not raise taxes, the government has two choices at hand. Either it can borrow from domestic or foreign sources, or it can create money through seigniorage. Bangladesh, however, only borrows to finance the budget deficit in successive years, in lieu of the high-powered money option. Sachs and Lirrain (1993) observe that borrowing today might postpone inflation, but at the risk of even higher inflation in the future. The budget deficit-inflation link often exhibits a two-way interaction where the budget deficit increases inflationary pressure and the high inflation causes further budget deficits, known as the Olivera-Tanzi Effect.

There is ample evidence that budget deficits and resultant inflation can cause greater damage to developing economies such as Bangladesh than developed countries. In a cross-country survey, Luis Catao and Marco E. Terrones (2003) analyze panel data spanning 107 countries over 42 years. The results reveal that fiscal deficits have a powerful impact on inflation in developing economies, whereas the impact is moderate in developed countries. A study by Fischer, Sahay, and Végh (2002) uses panel data

methods on a sample of 133 market economies and finds a significant relationship between deficits and inflation. Similarly, their results point out that these effects are much stronger in the case of high-inflation developing countries than in low-inflation developed countries.

Macroeconomic analyses of individual countries further expose the links between deficit financing and inflation. Evidence from transition economies suggests that fiscal deficits undermine price stability (Komulainen and Prittilä, 2002). Employing vector autoregressive models, the authors find that fiscal deficits have contributed to increased inflation in Bulgaria and Romania, with up to 20 per cent and 14 per cent of the variance in each respective country's prices explained by the fiscal balance within approximately one year following an innovation in the balance. Budget deficits have been identified as one of the main causes of high inflation in the Republic of Croatia where inflation is markedly higher when the burdens of the budget increase due to the considerable amount of monetization stemming from this source (Anusic, 1995). For the economy of Ukraine, a monthly decrease in the budget deficit by 1 per cent of GDP has historically lead to a decrease in annual inflation by 0.8 per cent (Piontkivsky et. al, 2001).

In several SAARC member countries budget deficits along with inflation have caused severe problems to the economy, mostly in the medium to long term. Sri Lanka has been experiencing a deficit to GDP ratio of over 8 per cent along with inflation of more than 20 per cent since the end of the last decade. On the other hand, Pakistan

experienced a fiscal deficit of around 7 per cent of GDP and double-digit inflation in the 1990s.

Bangladesh, which has suffered greatly from inflationary pressures in the recent past, is a country in which the causes of inflation are difficult to pinpoint (Islam et al., 2008). Most recent studies of the underlying causes of inflation in Bangladesh have employed multivariate vector autoregressive (VAR) approaches, which efficiently capture the dynamic interactions of the variables. Chowdhury et al. (1995) analyze the relationship between money, output, prices, and the exchange rate in Bangladesh between 1974 and 1992 and find strong feedback between broad money (M2) and inflation as well as evidence of unidirectional influence of inflation on narrow money (M1). Ahmed and Rao (2006) likewise find bi-directional influence between M2 and the price level. Their empirical evidence demonstrates that money supply and exchange rates have a significant positive influence on inflation, whereas the deposit rate of interest is negatively related to inflation. Mortaza (2006) finds that money supply growth (M2) and exchange rate depreciation appear to be the most significant determinants of increases in the price level, while the deposit rate of interest has a weaker, but nonetheless significant impact. However, by using the levels of the data with the presence of unit roots in the individual series, the results of the two aforementioned studies may be spurious.[3] Moreover, while these studies all obtained similar results regarding the role of the money supply in determining the price level, recent work by the Bangladesh Bank, provides evidence to

[3] See Toda and Phillips (1992) for a detailed explanation.

the contrary, arguing that the relationship between growth in M2 and inflation has in fact been negative over the last 12 years (Mujeri and Islam, 2008).

Surprisingly, the possible contribution of government budget financing on inflation has largely been absent from the discourse. Though the influence that fiscal deficits in Bangladesh may have on inflation through the channel of debt monetization has been theoretically acknowledged in previous empirical work (Akhtaruzzaman, 2005; Mortaza, 2006), no attempt to quantify these effects has been made to date. This paper is the first such attempt to establish an empirical linkage between government borrowing and the rate of inflation in Bangladesh.

3. Empirical Methodology

To test the hypothesis that central and commercial bank financing of government expenditure has consequent significant influences on inflation, an unrestricted vector autoregressive (VAR) model is constructed. There are multiple benefits to using VAR modeling techniques in applied macroeconomic research. By avoiding the need for structural modeling, unrestricted VARs allow for the identification and analysis of mechanisms by which economic time series interact without making any *a priori* assumptions regarding the exogeneity or endogeneity of the concerned variables. By treating each variable endogenously, VARs consider each series as influenced by the lagged values of all the endogenous variables in the system, including its own, which allows for general patterns of interaction to emerge, and thus facilitates the analysis of potential transmission mechanisms. In addition, VAR analysis gives the researcher the

ability to analyze both the short and long run dynamics of a given system of variables through the use of such tools as Granger causality and block exogeneity tests, impulse response functions and forecast error variance decompositions.

An unrestricted VAR with a lag length p is defined as:

$$y_t = v + A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_p y_{t-p} + e_t$$

where, y_t is a $k * 1$ random vector, the A_i are $k * k$ fixed coefficient matricies, v is a $k * 1$ fixed vector of intercept terms, and u_t is a $k * 1$ white noise process. The error terms satisfy the white noise condition if their expected mean value is zero, there is no autocorrelation, variance is constant, and are normally distributed.

Before searching for meaningful long-run relationships between the variables, tests for seasonality and the necessary adjustments are made to remove variation in the series that is irrelevant to the analysis. Unit roots tests are conducted on the log-levels and first differences of the variables to ensure that all of the variables are integrated of the same order. Only variables integrated of the same order can be used in the analysis to ensure meaningful results. Since different unit root tests can sometimes yield wildly divergent conclusions, the Augmented Dickey-Fuller, Phillips-Perron, and Kwiatkowski et al. tests are all employed to provide a more robust assessment of the order of integration of the variables. Although regressions of non-stationary time series may be spurious, it is also possible that a linear combination of two series integrated of the order of one may create a stationary series from which meaningful analysis can be conducted. Therefore, upon discovering the order of integration of each time series under

consideration, those variables that are found to be non-stationary are tested for long-run equilibrium relationships using Johansen's test for cointegration (Johansen, 1996).

To gain a preliminary understanding of what relationships exist between the variables, pairwise Granger causality tests are conducted. These are F-tests constructed under the null hypothesis that the coefficients on a selected number of lags of an independent variable for a given dependent variable are jointly equal to zero. While unable to give a complete picture of the dynamic interactions, these tests provide an indication as to the appropriate time frame for the analysis and basic linkages between the variables.

Next, the model lag length is selected using the likelihood ratio. As a sequence-based test, the likelihood ratio tends to provide more reliable results than information-based tests such as the Akaike and Schwarz information criteria as the order of the VAR that best approximates the data generating process increases (DeSerres and Guay, 1995). Given the requirement that the residuals be white noise, a lag structure of adequate length that ensures the absence of serial correlation in the residuals is necessary for the validity and interpretability of the variance decompositions and impulse response functions. In addition, as the present analysis uses monthly observations, the optimal lag structure is likely to be relatively large. Therefore, the likelihood ratio seems to be the best technique for lag selection given the nature of the data.

After estimating the model, tests to assess the stability and implications of the model are executed. Diagnostics, including the Lagrange multiplier test for serial correlation, residual normality tests, and lag exclusion tests are performed to evaluate the adequacy of the model with respect to the requirements of VAR. Since the parameters of unrestricted VAR models are difficult to interpret, impulse response functions and variance decompositions are generated through 1000 Monte Carlo simulations to better understand the dynamic relationships between the variables. Impulse response functions delineate the effect of a one-time shock to one of the series on current and future values of the endogenous variables thus indicating the directions of their dynamic relationships. Variance decompositions show the relative importance of each variable in determining the values of all of the variables in the system over different time periods by separating the proportion of the movements in a series that is due to innovations in its own values compared with the other variables.

4. The Model and Data

The data for the variables considered in the analysis span the period July 1999 to August 2008 on a monthly basis, comprising a total of 110 observations. Most empirical analyses of inflation in Bangladesh have relied on either annual or quarterly data, but using monthly data gives a more nuanced picture of the short-term temporal dynamics of the system. The variables considered in the model are total credit to the government from the domestic banking system, consisting of the outstanding liabilities of the government to the Bangladesh Bank as well as deposit money banks excluding government deposits, and National Savings Directorate (NSD) certificates (*gtot*), outstanding private sector

credit (*psc*), the Quantum Index of Medium and Large Scale Manufacturing Industries (*qip*), total import payments (*imp*), and the general nationwide Consumer Price Index (*cpi*). The government net credit, NSD certificates, private sector credit, and total import payments series were retrieved from various issues of the Bangladesh Bank's monthly Economic Trends publication. The Quantum Index of Medium and Large Scale Manufacturing Industries and Consumer Price Index series were compiled with data obtained from the Bangladesh Bureau of Statistics. All of the variables are considered in their natural logarithm form, denoted by *l*. *Sa* indicates seasonally adjusted series and *diff* denotes series in first differences.

In an effort to identify the fundamental causes of price changes in the Bangladesh economy, potential monetary influences on inflation are disaggregated to the largest possible extent. Since one of the primary objectives of the study is to test whether government borrowing to finance the budget exerts a significant influence on inflation, government net credit from the domestic banking system and NSD certificates, and private sector credit are included in the final specification, which together account for almost 90 per cent of the money supply during the sample period. Both credit to the government and the private sector can be potentially inflationary through the consequent increases to the monetary base that result from increases in these two indicators, though their relative influences on inflation have more to do with their allocation and degree of monetization than their overall levels. In other economies in the region such as Pakistan, excessive growth of private sector credit has been determined to be a primary source of

inflation, and is thus of interest in the context of Bangladesh (Khan and Schimmelpfennig, 2005).

The Quantum Index of Medium and Large Scale Manufacturing Industries is included in the final specification as a proxy for output given the absence of monthly GDP data.[4] Including a measure of output helps better understand the connection between real sector fluctuations and price developments, and establishes the appropriate dynamic timeframe for these effects.

Because of the significant impact that volatile international commodity prices have had on domestic price increases in recent times, an open economy variable is included as an attempt to capture these effects (Rahman et al., 2008; Mortaza, 2008). While the inclusion of the nominal exchange rate would be favorable, given that our data set spans FY2000 to the first months of FY2009, the change from a fixed to a floating exchange rate regime in May 2003 constitutes a significant structural change that could potentially yield non-constant parameters in our model. Given Bangladesh's position as a net food importer, high international commodity prices can profoundly influence price hikes in Bangladesh, and thus total import payments on a monthly basis are the most direct way to gain a better understanding of the empirical linkages between external price developments and the domestic inflation rate.

[4] Over the sample period, the correlation coefficient between annual Quantum Index of Medium and Large Scale Manufacturing Industries and annual real GDP is 0.99, which suggests that the Quantum Index is a good proxy for output.

For the calculation of impulse response functions and variance decompositions, the ordering of the variables is crucial since the first variable can have contemporaneous effects on the others but not vice-versa. The variables are ordered from the least endogenous to most on a theoretical basis. In the final specification, government net borrowing from the domestic banking sector and NSD certificates is placed first, followed by private sector credit, the Quantum Index of Medium and Large Scale Manufacturing Industries, import payments, and finally the Consumer Price Index. This ordering gives the variables the best opportunity to affect inflation, and is theoretically coherent as well.

5. Results

The variables are first analyzed for seasonal trends. Government net credit from the central and deposit money banks and NSD certificates, the Quantum Index of Medium and Large Scale Manufacturing Industries, and the Consumer Price Index all display strong evidence of seasonality, and are thus adjusted using the Census X-12 seasonal adjustment method. Those variables without such qualities, namely private sector credit and total import payments, are left in their original log-level form.

To test for unit roots, the results of the Augmented Dickey-Fuller, Phillips-Perron, and Kwiatkowski et al. are compared (Table 1). The Augmented Dickey-Fuller test indicates that the log-levels of all of the variables contain unit roots, but their first differences are all stationary. Though the Phillips-Perron test indicates that total import payments may be stationary in levels when specified with a constant and a time trend, the

results of the Augmented Dickey-Fuller and Kwiatkowski et al. tests contradict these results, and thus we accept that the total import payments series contains a unit root in levels, but is stationary in first differences. The possibility of a long-run equilibrium relationship between the variables is assessed using the Johansen cointegration test, however, no such relationship exists over the sample period. Therefore, an unrestricted VAR model in first differences is specified.

As a preliminary step in understanding the interrelationships between the variables, Granger causality tests give an indication as to what dynamic relationships we may discover (Table 2). Tests at various lag lengths indicate an interesting relationship between government net credit and NSD certificates and the price level. With a one-month lag, the Consumer Price Index exerts a significant influence over government credit, an effect that dissipates after this point. Beginning with six lags, government net borrowing from the domestic banking system and NSD certificates Granger causes prices, a relationship that remains statistically significant at each lag length up to the 24^{th}. Also, there seems to be a complex dynamic relationship between the level of import payments and the growth of private sector credit, which endures at varying levels of intensity for over 20 lags. While Granger causality tests do not paint the full dynamic picture of interaction between the variables, these results seem to indicate that government net borrowing may exert a significant influence on inflation, which persists over a long time horizon.

The optimal lag order is 11 as determined by the likelihood ratio. A lag of this length is long enough to ensure that autocorrelation is eliminated from the residuals and that all of the dynamic interactions of the variables play out in their entirety without exhausting exorbitant degrees of freedom. The results of the VAR estimation indicate that the model meets the stability condition, which requires that no roots lie outside the unit circle. Autocorrelation is absent from the residuals, however, there are some problems with their normality. The residuals, while displaying no skewness suffer from excess kurtosis, a problem normal for developing economies (Komulainen and Pirttilä, 2002). No dummies are added to improve the normality of the residuals with a view to simplifying the interpretation of the data and given the necessity of conserving degrees of freedom given the relatively small sample size.

The impulse response functions for the price level in Figure 5 depict the impact of innovations in each of the variables on inflation over 18 months. The most striking features of the impulse response functions are the impact of innovations in government net borrowing from the domestic banking system and in the Consumer Price Index itself on current and future values of the price level. During initial periods, the price level reacts most strongly to its own past values, an effect which declines rapidly over the course of a few months. In response to innovations in government borrowing from Bangladesh Bank, deposit money banks, and NSD certificates, the change in the price level becomes sharply positive during the ninth month, an effect that dissipates over the following months after reaching a peak in the 10^{th} month. The effects of total import payments and private sector credit are rather non-descript at all time horizons, while the

Quantum Index of Medium and Large Scale Manufacturing Industries exhibits a weakly negative relationship with prices over the 18 month period.

The variance decompositions in Table 3 give greater detail as to the degree to which each variable affects the variation of the others. Though few influences on inflation are statistically significant (as defined as twice the standard error), the variance decompositions lend some important insight as to the relative impact that the variables have on the price level. Previous values of the Consumer Price Index are the strongest determinant of the current price level at all time periods. Almost 98 per cent of contemporary inflation can be determined by past values of inflation during the first month following an innovation, an effect that steadily decreases, going down to 57 per cent in the 20^{th} month. Not until the 10^{th} month, when net credit to the government accounts for 20.74 per cent of inflation does any other variable exert significant influence on the price level. 18 months following an innovation in government net credit from the domestic banking system and NSD certificates, the series can explain 23.97 per cent of the variance in inflation, its greatest proportion over all time horizons. The result of an innovation in government borrowing on prices remains statistically significant through the 29^{th} month, after which time it stabilizes at around 22 per cent. With standard errors greater than the proportion of the variance in prices attributed to the Quantum Index of Medium and Large Scale Manufacturing Industries, import payments, and private sector credit during much of the sample period, no credible conclusions regarding these factors can be reached.

6. Conclusions and Policy Implications

This paper estimated a model of inflation in Bangladesh considering four potential sources of price increases. In particular, it focused on estimating the effect of government deficit financing on inflation, which is a principal contribution of the study to the contemporary macroeconomic literature concerning Bangladesh.

The results suggest that the strongest determinants of the current price level are previous values of the Consumer Price Index and credit to the government from the Bangladesh Bank, deposit money banks, and NSD certificates. These findings reveal that while government credit from banking and non-banking sources does have a role in raising inflation, credit to the private sector, which has been the sole driver of economic growth in Bangladesh, does not exert any discernable influence on prices, either proportionally or directionally. The traditional view is that private sector credit contributes more to higher inflation than credit to the government since it composes a relatively greater share of the money supply. However, this evidence to the contrary could be explained by the relative inefficiency of government credit compared to credit to the private sector, which is largely absorbed by the production chain. Moreover, this creates concern over the mode of financing of deficits by the government since higher borrowing from the banking system has the potential to crowd out private investment compared to non-bank borrowing. In view of the absence of an impact of private sector credit growth on inflation, the current accommodative stance of the Bangladesh Bank appears to be the right choice. However, higher borrowing by the government from the

central bank should be limited by a ceiling, as has been done by most developed economies and some developing countries such as India.

As the results suggest, it is inflation itself that has the highest impact on inflationary developments in subsequent periods. This could point to the role of inflationary expectations and adaptation of the masses to higher living costs at the expense of welfare in raising current and future commodity prices. Given that almost 98 per cent of the variance in contemporary inflation can be explained by past price levels during the first month following an innovation, managing market sentiments and inflationary expectations appears to be the major task in taming price increases. People likely expect future price increases after experiencing initial hikes, the high impact of which may be the result of informational asymmetries prevailing in the market. The lack of reliable information available to the general public inhibits the formation of rational expectations, which would theoretically reduce inflationary inertia. Therefore, ensuring the steady flow of information and measures to maintain market confidence may prove to be an effective tool in fighting inflation.

With regard to supply side factors that contribute to higher inflation, supply chain inefficiency is a major concern for Bangladesh. Apart from the long-lasting suspicion of the presence of syndicates in manipulating prices, unnecessary and an excessive number of market intermediaries might play a role as has been recently documented (Centre for Policy Dialogue, 2008). Dramatic correction efforts to change a system in place for hundreds of years have been tried, but created only panic in the market leading to further

fuel price hike. A systematic and facilitative role of the government in supporting the gradual shift to a more efficient market chain should prove to be helpful, perhaps through the improvement of infrastructure.

Given that the food production situation is a vital component of the Consumer Price Index, the absence of an efficient estimate regarding the extent of the deficit (or surplus) in agricultural production makes market sentiment volatile as has been seen during the time of high food inflation in 2008 after two major floods and Cyclone *Sidr*. Maintaining a higher public food stock throughout the year may help to preserve market confidence, even after a production shock. The insignificance of total import payments on prices could potentially reflect the relatively short time period during which imported inflation has been a major concern. While high international commodity prices have certainly affected the general price level in recent times, these effects have not permeated the entire period under consideration, and are therefore not a major factor over the sample as a whole.

Recently Bangladesh has been experiencing a stable growth of around 6 per cent per annum. Striving to achieve higher growth requires greater financing while the expenses of the state are also increasing owing to greater demand for social protections. Therefore, the government is compelled to run deficits in financing growth requirements. Tolerable levels and the mode of financing are the two key questions at hand and this paper should provide important feedback in this regard.

Caution must be taken in view of the limitations of the study, which pave the way for future work. One major drawback of the study is the lack of an adequate measure of food output. While the inclusion of the Quantum Index of Medium and Large Scale Manufacturing Industries is meant to capture the influences of real sector activity on the other variables, without including information on agricultural output, the measure inherently misses an important feature of the Bangladesh economy. Given that the majority of the Consumer Price Index is composed of food items, any complete picture of the causes of inflation would include some measure of agricultural output. Even so, the study highlights some very important facts regarding monetary management. Most importantly, perhaps, it suggests that the availability of credit to the private sector not be jeopardized even in times of higher deficit and high inflation to supplement the growth requirements of the economy.

The areas for future research stemming from this paper are many. Firstly, a better understanding of what drives inflationary expectations in Bangladesh must be obtained. Given the highly sticky nature of prices in the economy, managing expectations is an important part of price stabilization, rivaling that of even monetary policy. Also, more information on the inflationary impacts of different forms of deficit financing is needed to identify the most innocuous public expenditure mechanisms. Lastly, a more complete understanding of supply-side constraints and their potential inflationary consequences could help alleviate the distributional inefficiencies in the economy and their cost-push price effects.

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Tables and Figures:

Table 1: Unit Roots Tests

Variables	ADF Test		PP Test		KPSS Test		Decision
	Without trend	With trend	Without trend	With trend	Without trend	With trend	
lcpi_sa	I(1)	I(1)	I(1)	I(1)	I(2)***	I(1)	I(1)
lgtot_sa	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)**	I(1)
limp	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)***	I(1)
lpsc	I(1)	I(1)	I(1)	I(1)	I(1)**	I(1)	I(1)
lqip_sa	I(1)	I(1)	I(1)	I(0)	I(1)	I(1)	I(1)

Note:

1. All tests have been performed on the basis of 1-per cent significance level using Econometric Views 5 Package
2. *** and ** means significant at 5-per cent and 10 per cent levels, respectively
3. Lag length for ADF tests have been decided on the basis of Schwarz's Information Criteria (SIC)
4. Maximum Bandwidth for PP and KPSS tests have been decided on the basis of Newey-West (1994)
5. The ADF and PP tests are based on the null hypothesis of unit roots while the KPSS test assumes the null hypothesis of stationarity.

Table 2: Granger Causality Tests

	Lag Length						
	1	**3**	**6**	**9**	**12**	**15**	**18**
lpsc → lgtot_sa	0.219	0.227	0.147	0.405	0.382	0.356	0.343
lgtot_sa → lpsc	2.446	2.177	1.213	0.58	1.241	1.203	1.411
lqip_sa → lgtot_sa	10.675***	4.269***	2.139*	2.124**	1.773*	1.197	1.203
lgtot_sa → lqip_sa	0.898	1.046	1.037	1.163	1.636	1.723	1.509
limp → lgtot_sa	1.924	0.855	0.588	0.746	0.438	0.371	0.473
lgtot_sa → limp	0.364	0.202	0.454	0.474	1.071	0.954	0.895
lcpi_sa → lgtot_sa	4.326**	1.361	0.951	0.735	1.116	0.726	0.738
lgtot_sa → lcpi_sa	0.054	0.282	2.192*	3.792***	2.833***	2.398***	2.009**
lqip_sa → lpsc	0.493	1.526	0.954	1.146	0.727	0.549	0.519
lpsc → lqip_sa	0.002	0.368	0.439	1.154	1.501	1.341	0.948
limp → lpsc	2.913*	2.881**	1.687	3.339***	2.222**	1.929**	2.063**
lpsc → limp	2.078	2.801**	2.063*	2.292**	1.391	1.041	1.391
lcpi_sa → lpsc	0.637	0.597	1.086	1.313	1.223	1.131	1.159
lpsc → lcpi_sa	1.075	0.658	1.065	0.799	0.489	0.708	0.729
limp → lqip_sa	0.744	0.229	0.205	0.986	1.239	1.209	0.616
lqip_sa → limp	0.051	0.471	0.818	0.912	1.758*	1.634*	1.611*
lcpi_sa → lqip_sa	0.989	0.739	0.846	1.599	1.297	1.597	1.199
lqip_sa → lcpi_sa	1.061	0.965	0.799	0.978	0.768	0.681	0.836
lcpi_sa → limp	0.029	0.732	1.476	1.243	1.312	1.104	1.502
limp → lcpi_sa	0.118	0.708	0.649	0.474	0.614	0.693	1.071

Note: * Denotes significance at the 10% level
** Denotes significance at the 5% level
*** Denotes significance at the 1% level

Table 3: Variance decomposition for the Consumer Price Index

Month	S.E.	LGTOT_SADIFF	LPSC_DIFF	LQIP_SADIFF	LIMP_DIFF	LCPI_SADIFF
1	0.016452	0.023	0.049	0.088	1.761	98.079*
2	0.017016	0.182	1.741	0.085	3.573	94.420*
4	0.017488	1.152	2.400	6.264	4.026	86.158*
6	0.017805	10.549	3.474	5.548	3.396	77.033*
8	0.018622	10.259	4.733	5.792	3.452	75.764*
10	0.019123	20.744*	4.189	6.204	3.025	65.837*
12	0.020297	20.774*	4.939	8.891	2.911	62.486*
14	0.020782	22.650*	5.362	8.583	2.807	60.599*
16	0.021123	23.145*	5.231	8.793	2.793	60.038*
18	0.021354	23.966*	4.890	9.006	3.339	58.798*
20	0.021766	23.607*	5.365	10.033	3.587	57.408*
22	0.021885	22.583*	5.096	9.687	4.245	58.388*
24	0.022057	22.422*	5.115	10.043	4.230	58.190*
26	0.022135	22.204*	5.289	9.673	4.089	58.746*
28	0.022438	21.650*	6.024	10.471	3.960	57.895*
30	0.022500	22.316	5.879	10.413	4.104	57.288*

Note: An asterisk (*) denotes that the associated figure is at least twice the standard error.

Figure 5: Impulse Responses for the Consumer Price Index