Historical Decompositions of Price and Output in The Post Financial Liberalization Era of Bangladesh and The Role of Monetary Policy*

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Abstract

This paper assesses the relative importance of the various shocks, monetary policy shocks in particular, in explaining the paths of price and output in the post financial liberalization era of Bangladesh. A Structural Vector Autoregressive (SVAR) model is developed and the objective is achieved through the relatively new technique, termed historical decomposition. The results show that monetary policy has begun to play a leading role in price and output determination of Bangladesh after the country adopted neo-liberal prescriptions for financial reform at the beginning of 1990s.

1. INTRODUCTION

Bangladesh emerged as an independent country on March 26, 1971. Before 1971, it was a rural economy with a few public sector industries. The role of manufacturing in the development process was marginal; pattern of industrialization was dominated by import substitution policies. After the war of independence, socialism was adopted as a guiding principle in the Bangladesh Constitution. Banks, financial institutions, and various private sector industries were nationalized. A process of a shift to private capitation was soon initiaful, but proceeded slowly up to the and the 1980s, During the 1990's Bangladesh has steadily liberalized its economy, and increasingly the private sector has assumed a more prominent role as the climate for free markets and trade has improved. The Awami League government, which came to power in June 1996, largely continued the market-based policies of its predecessor, the Bangladesh Nationalist Party Garment. It placed a high priority on increasing foreign direct investment in the economy, and made some regulatory and policy changes toward that end.

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One of the salient features of reforms is interest rate liberalization. In Bangladesh, real rate of interest remained negative for most of the period from late seventies to mid eighties. Real rate started becoming positive and showed an increasing trend since the late 1980s. There has been a certain convergence in monetary policy instruments and procedures in recent years in most of the developing economies. Major forces for change have been the rapid development and deepening of a variety of financial markets and instruments, and diversification of financial institutions. The question naturally arises is: Did monetary policy play any significant role in price and output movement in the post financial liberalization period of Bangladesh?

The objective of this paper is to determine the role of monetary policy in price and output movement in the post financial liberalization period of Bangladesh. A Structural Vector Autoregressive (SVAR) model is developed and the objective is achieved through one of the innovation-accounting technique, termed historical decomposition. The technique can decompose the actual movement of variables in the system into expected path, given information known up to pre-liberalization period, and the unexpected movement attributable to shocks in each variable; thus separate the role of different variables in the post financial liberalization period in Bangladesh. The appropriateness of such a technique to determine the role of policy variables in post financial liberalization era of Bangladesh is, therefore, justified.[1]

The rest of the paper is organized as follows: section II presents a brief overview of the financial sector, reform measures and conduct of monetary policy in Bangladesh. Section III outlines the model and methodology. Section IV gives a brief discussion about the data set used in the present paper. Section V discusses the empirical findings. Section VI concludes.

2. FINANCIAL SECTOR, REFORM MEASURES AND CONDUCT OF MONETARY POLICY IN BANGLADESH

The financial sector in Bangladesh consists of the banking sector, the non-bank financial institutions and the stock market. The banking sector dominates the financial sector accounting for around 96% of the total assets. The banking institutions in Bangladesh comprise the central bank, four nationalized commercial banks, four government owned specialized development banks, 18

[1] To the best of author's knowledge, this paper is the first of its kind in analyzing the role of monetary policy in Bangladesh economy because no one has used the technique of historical decomposition. Empirical study in developing countries in general, using such a technique, is still in its infancy.

private domestic banks and 12 foreign banks (IMF country report on Bangladesh, 1998). The specialized banks and financial institutions are created with specific objectives to address the financial needs of agriculture and industrial sectors. The country has two stock exchanges - one in Dhaka and the other in Chittagong.

Government policy towards the financial sector in Bangladesh since independence can be divided into two regimes. The first regime (1972-1990) was characterized by i) direct control on interest rates, ii) high statutory reserve and liquid asset requirements, both designed to absorb liquidity and to provide government deficit finance, iii) aggregate and individual credit ceilings, iv) lack of close control on the large refinance programs, and v) relaxation of lending criteria for special groups, etc.

The second regime (1990-) is characterized by certain major reforms in the financial sector. During the 1990's Bangladesh has steadily liberalized its economy, and increasingly the private sector has assumed a more prominent role as the climate for free markets and trade has improved. Though reform process was initiated in the early eighties, measures to liberalize the financial sector took a formal shape in the late 1980s. The broad features of the Financial Sector Reform Programme (FSRP) that started at the beginning of 1990 are: i) liberalization of interest rates, ii) less reliance on direct control to allocate credit and removal of other discriminatory regulations that segment the financial system, iii) high standards for supervision of bank portfolios, iv) shift toward a system of market based instruments, and v) development of new financial instruments and revitalization of stock market (Bangladesh Economic Review, 1995, 1996).

Bangladesh Bank, the monetary authority of Bangladesh, is responsible for formulating monetary policy and is empowered to implement it. The monetary policy objectives of the bank may be summarized as follows: i) growth of the economy; ii) maintaining external value of the national currency; iii) price stability; and iv) creation of productive capacity in the long run (Bangladesh Economic Review, 1996). Instruments avilable to Bangladesh Bank are: i) open market operations; ii) interest rate; iii) bank rate/ discount rate; and iv) statutory reserve requirement.

The financial sector reform, which was launched in 1990, was continued till the end of the 1990s. However, political interference in highly technical economic management issues still impeldes a barrier on the free functioning of Bangladesh Bank on grounds of expediency. Excessive borrowing by government from the banking system to mitigate budget deficits speaks of the helplessness of the Bangladesh Bank regarding its efforts to contain monetary and credit expansion.

3. MODEL AND METHODOLOGY

Derivation of Historical Decompositions

Let us consider the following SVAR model with M variables and p lags[2]

$$Yt/B + Y/_{t-1}\Gamma_1 + Y/_{t-2}\Gamma_2 + \ldots + Y/_{t-p}\Gamma_p = ?/t \qquad (1)$$

where, Y is an M1 vector of variables, B is an MM nonsingular matrix, Γ*s are MM matrices, and is an M1 vector of structural disturbances. Each column of the co-efficient matrices is the vector of coefficients in a particular equation while each row applies to a particular variable. Assumptions about* $_t$*:*

A1: $E(_t) = 0$

A2: E $(_t\ _t/) = =$

$$\begin{bmatrix} Var(\xi_{1t}) & 0 & \ldots & 0 \\ 0 & Var(\xi_{2t}) & \ldots & 0 \\ 0 & 0 & \ldots & 0 \\ 0 & 0 & \ldots & Var(\xi_{Mt}) \end{bmatrix}.$$

The assumption (A2) arises from the belief that structural shocks originate from independent sources. The solution of the above system in VAR form:

$$Y_t/ = - Y_{t-1}/_1B^{-1} - Y_{t-2}/_2B^{-1} - \ldots - Y_{t-p}/_pB^{-1} + /_tB^{-1}$$
$$= Y_{t-1}/_1 + Y_{t-2}/_2 + \ldots + Y_{t-p}/_p + e/_t \qquad (2)$$

where, $-_iB^{-1} = _i \quad (i = 1\ldots.p)$

and $e_t/ = /_tB^{-1}$

The moving average representation of equation (2) is:

$$Y/_t = e/_{t0} + e/_{t-1}\ _1 + e/_{t-2}\ _2 + \ldots + e/_{t-p}\ _p + \ldots + \ldots \qquad (3)$$

Using the relationship between reduced form error and structural form error ***et/ =*** */tB-1 we can represent Yt as a linear combination of current and past structural shocks.*

$$Y/_t = /_tB^{-1}{}_0 + /_{t-1}B^{-1}\ _1 + /_{t-2}B^{-1}{}_2 + \ldots + /_{t-p}B^{-1}\ _p + \ldots \qquad (4)$$

Alternatively,

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[2] See Sims (1986), Gali (1992), Hamilton (1994) and Enders (1995) for details about SVAR.

$$Y_t = \varepsilon_{t0} + \varepsilon_{t-11} + \varepsilon_{t-22} + \ldots + \varepsilon_{t-pp} + \ldots + \ldots$$

$$\sum_{s=0}^{\infty} = \varepsilon_{t-ss} \qquad (5)$$

where, $B^{-1}{}_i = \quad i \quad (i = 1 \ldots p)$
each $_i$ *is an MM matrix of parameters derived from the structural model.*

Historical values of a set of time series can be decomposed into a base projection and accumulated effects of current and past shocks. Historical decomposition allows us to quantify the relative importance of specific shocks to each variable.[3] The historical decomposition partitions the MA representation into the following two segments:

$$Y_{t+k} = \varepsilon_{t+k-ss} + \varepsilon_{t+k-ss} \qquad (6)$$

The second sum is the dynamic forecast or "base projection" of Y_{t+k} conditional on information available at time t; it can also include a constant, linear time trend, etc. The first sum represents the difference between the actual series and this base projection due to innovations in the variables in periods $t+1$ to $t+k$. Thus, the gap between each data series and its base projection can be assessed in terms of the contributions of the innovations to each series in the analysis. Since sum of the forecast and the contributions of shocks account for the data, it is always possible to explain the dynamic path of any variable in the VAR model using Historical Decomposition (HD) technique.

Identification
Given the structural form (1), we can deduce the reduced form (2) uniquely since **B** is non-singular. But given the reduced form, we cannot always deduce uniquely the structural form. If a reduced form has two or more structural forms associated with it, the structures are said to be observationally equivalent. If we can deduce a unique structural form, given the reduced form, by imposing restrictions then the model is said to identified.

In each equation, each contemporaneous variable has a coefficient of one. This normalization is a necessary scaling of the equation, which is equivalent to putting

[3] See for example, Fackler and McMillin (1998) and Doan (2000).

one variable on the left-hand side of an equation. So we need (M2-M)/2 restrictions to be imposed on the system.[4]

Model Specification

Since our objective is to examine the relative importance of the various shocks, monetary policy shocks in particular, in explaining the path of price and output, our model includes two policy variables, viz. money stock (m) and interest rate (r) and two non-policy variables, viz. output (y) and price (p). A narrower view of monetarism is that monetary policy is the central cause of business cycle and the time path of money stock is a good single index of monetary policy. The broader view of monetarism, however, includes not only money stock but also other policy variables, such as interest rate as index of monetary policy. When monetary policy shocks are identified with innovations in money stock, such a monetary expansion leads to an increase in price and output. On the other hand, when monetary policy shocks are identified with innovations in the interest rate, monetary contraction generates declining price and output. So the Y-vector is $\mathbf{Y}^{/}$ = [y, p, r, m]

where,
y = Log of real GDP
p = Log of consumer price index
r = Nominal interest rate
m = Log of nominal broad money stock M2.

Matrix of contemporaneous coefficients $\boldsymbol{B}$ is:

$$\begin{bmatrix} 1 & \beta_{12} & \beta_{13} & \beta_{14} \\ \beta_{21} & 1 & \beta_{23} & \beta_{24} \\ \beta_{31} & \beta_{32} & 1 & \beta_{34} \\ \beta_{41} & \beta_{42} & \beta_{43} & 1 \end{bmatrix}$$

We need $(4^2 - 4)/2 = 6$ restrictions to identify the structural system. Identifying restrictions postulate that the output equation allows output innovations to depend on innovations in price, interest rate and money. Price equation is autonomous and no other innovations but price innovations can influence it contemporaneously. The interest rate equation allows interest rate innovations to depend on innovations in money alone. The money equation allows money innovations to

[4] According to Doan (2000, p.295), the simplest approach to check this condition in practice, is to look at the log likelihood value of the estimated model and the log likelihood value of an unrestricted model; for a just identified model those should be equal.

depend on innovations in interest rate, price and output with the latter two having symmetric effects. Under this identification scheme, contemporaneous relations among variables and the innovations are:

$$\begin{bmatrix} y_t & p_t & r_t & m_t \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & \beta_{14} \\ \beta_{21} & 1 & 0 & \beta_{14} \\ \beta_{31} & 0 & 1 & \beta_{34} \\ \beta_{41} & 0 & \beta_{43} & 1 \end{bmatrix} \quad \begin{bmatrix} \xi_{yt} & \xi_{pt} & \xi_{rt} & \xi_{mt} \end{bmatrix}$$

4. DATA

The data used in this study are taken from the IMF, *International Financial Statistics* (IFS) CD-ROM supplemented by IMF, IFS Yearbook except for Consumer Price Index (CPI). Quarterly observations comprising the period 1974:Q2-1998Q4 are used to estimate the models.

Price (line 64): It is the cost of acquiring a fixed basket of goods and services by the average consumer. CPI is obtained from Monthly Statistical Bulletin of Bangladesh, Bangladesh Bureau of Statistics and its various issues. This CPI represents cost of living of the government employees in Dhaka city. This is the only CPI available in Bangladesh that covers the whole sample period. Quarterly figures are calculated as simple averages of the corresponding monthly figures.

Interest rate (line 60): The bank rate (discount rate) is used for the nominal interest rate variable. The bank rate is the main lever that central bank uses to conduct monetary policy. It is the rate of interest that the central bank charges on short term loans to financial institutions. It is seen as the trendsetter for other short-term interest rates.

GDP (line 99b): Comprises of final expenditure on export of goods and services + import of goods and services + government spending + private consumption + gross fixed capital formation + increase/decrease in stock. Real GDP is computed by deflating the nominal GDP by the Consumer Price Index.

Money (lines 34+35): Broad Money (M2) is used as money stock. It comprises of currency in circulation + demand deposit+ time deposit + savings deposit + foreign currency deposit of resident sector.

5. RESULTS

As Bangladesh adopted neo-liberal prescriptions for financial reform at the beginning of 1990s, historical decompositions capture the character of the post liberalization period beginning from the first quarter of 1991. Taking the VAR estimates as given, we decompose the actual movement of the price level and real GDP into the following:

(a) the expected path or base projection, given information known in the 4^{th} quarter of 1990. So "t" is set to the 4^{th} quarter of 1990; and

(b) the unexpected movement attributable to shocks in interest rate, money, price level and real GDP.

Tables 1 and 2 and figures 1 and 2 display the results. It should be noted that the last four columns of each table give the sum of forecasted values plus effects of respective shocks. This addition makes the corresponding graphs more meaningful. The last two rows of each table represent: i) Root Mean Squared Errors (RMSE) of base projection, and base projection plus contribution of innovation to each variable; and ii) ratio of Root Mean Squared Errors (RMSE) of base projection plus contribution of innovation to each variable to Mean Squared Errors (RMSE) of base projection. These statistics are important because they help us rank the variables in explaining output and price in the post liberalization period. While considering the figures, we shall focus on three types of visual evidence: i) how well the base projection is able to track the general pattern of actual movement in price and output; ii) how well innovation to a particular variable closes the gap between the base projection and the actual observation; and iii) how far innovation to a particular variable helps reproduce the turning points in various sub periods.

A two-step procedure is used to estimate the structural VAR model. First, the reduced form VAR, with sufficient lag length, is estimated by OLS method[5].

Next a sufficient number of restrictions are imposed on B to identify the parameters. Finally Broyden, Fletcher, Goldfarb, Shanno (BFGS) method estimates the models; see Press et. al. (1988) and Doan (2000, p. 213).

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[5] The VAR is estimated with a lag length of eight quarters. The lag lengths are determined by likelihood ratio test Sims (1980, p. 17) and also supplemented by Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). Three seasonal dummies and a constant are included.

In figures 1 and 2, the solid line represents the actual value, the small dashed line represents the expected path or baseline projection and the long dashed line represents the baseline projection plus the effects of shock.

According to figure 1, we can divide the gap between actual output in Bangladesh and its baseline projection over the period 1991:1 to 1998:4 into three sub-periods: from 1991:1 to 1992:4 actual output is higher than projected output, from 1993:1 to 1995:1 actual output is lower than projected output and finally from 1995:2 onwards actual output is higher than projected output making the gap positive again.

Although output shock reproduces the turning points of output movement reasonably well, its performance in closing the gap between the base projection and actual observation is poor. In the first and second sub-period, the output shock actually pulls the output above the actual path. On the other hand, in the last sub-period output shock pulls the output below the expected path. The overall performance of output shock in closing the gap is reflected in the RMSE ratio, which is 1.28.

The price shock also plays virtually no role in closing the gap between the actual and projected output as seen from the left hand figure in the lower panel. In the first and last sub-period, the price shock actually pulls the output below the expected path. On the other hand, in the second sub-period price shock moderately helps close the gap. The overall performance of output shock in closing the gap is reflected in the RMSE ratio, which is 1.29.

The interest rate shock accounts for a remarkable portion of the unexpected run-up in the output. In the upper right panel of figure 1, at the beginning interest rate shock explains almost nothing of unexpected variation in output. But the line giving the path of the output that is obtained due to shock in interest rate is close to the path of the actually observed values from mid 1992. The lowest value of RMSE ratio, 0.74, among all the four ratios captures the fact and the interest rate shock also explains the turning points very well.

Finally, the money shock plays a good role in the second sub-period and a moderate role in the last sub period. But it cannot explain some of the turning points. The RMSE ratio for money shock is 0.99. A ranking of the variables in terms of relative importance in explaining output movement based on historical decomposition is {r, m, y and p}. When monetary policy shocks are identified with innovations in money stock, such a monetary expansion leads to an increase in price, money and output but a decline in interest rate.

Figure 2 and table 2 document the effect of shocks to all the variables on the path of the price in the VAR system. Figure 2 shows that the gap between the actual movement of price and its baseline projection is very close which leaves unexpected shocks with little to explain. We see that it is initially narrow, then the two lines are submerged in the year 1994 and finally the gap gets slightly larger. Although output shock reproduces the turning points of price movement reasonably well, its performance in closing the gap is the worst among all the four variables. The output shock actually pulls up the price above the expected path. This trend grows as we move forward. The overall performance of output shock in closing the gap is reflected in the RMSE ratio, which is 0.90.

The price shock itself also plays virtually no role in closing the gap between the actual and the projected prices as seen from the left hand figure of the lower panel. In this case the picture is just the opposite of what we have seen in the case of the effect of output shock. The price shock actually pulls down the price below both the expected and actual paths. Moreover, the turning points are not captured well. The overall performance of price shock in closing the gap is reflected in the RMSE ratio, which is 0.50.

The interest rate shock again accounts for a remarkable portion of the unexpected run-up in the output as the lowest value of RMSE ratio, 0.17, captures the fact. In the upper right panel of figure 2, the line giving the path of the price that is obtained due to shock in interest rate is close to the actually observed path. The interest rate shock also explains the turning points very well.

Finally, the money shock plays no impressive role of the unexpected run-up of price. It also cannot explain some of the turning points. The RMSE ratio for money shock is 0.30. A ranking of the variables in terms of relative importance in explaining price movement based upon historical decomposition is {r, m, p and y}.

The overall impression from figures 1 and 2 reveals the role of monetary policy during the post financial liberalization period of Bangladesh. Monetary policy shocks are termed as demand shocks in business cycle theories. The main hypothesis of currently popular real business cycle paradigm is that aggregate demand shocks are irrelevant over any time horizon. The business cycle, according to this theory, is the result of dynamic effect of aggregate supply shocks in a competitive economy. The evidence in this paper has put real business cycle paradigm into question.

6. CONCLUDING REMARKS

The main objective of this paper has been to examine the role of monetary policy in the post financial liberalization period of Bangladesh. Structural Vector Autoregressive (SVAR) model has been developed and the objective achieved through historical decomposition. Analyses of historical decompositions show that monetary policy shock, particularly interest rate shock plays a leading role in determining price and output in Bangladesh. In view of interest rate liberalization, the effects of such shocks begin to be felt. The serious problem in conducting empirical study on developing countries like Bangladesh is the quality and availability of data. For that reason, one must be careful in drawing important conclusions and use the results for implementing policy measures. For example, this study uses quarterly time series data, which may mask some important dynamic aspects of the short run behavior of output and prices. An analysis based on monthly data should certainly be more enriching. But availability of monthly data for Bangladesh would continue to be a major stumbling block at least in the foreseeable future.

Table 1: Historical decomposition of output of Bangladesh

Entry	Actual	Base projection	Base projection plus accumulated effects of shocks in			
			y	p	r	m
1991:01	4.83541	4.825813	4.83541	4.825813	4.825813	4.825813
1991:02	4.85537	4.824064	4.857719	4.822362	4.825745	4.821737
1991:03	4.861307	4.818166	4.871611	4.807776	4.820414	4.816004
1991:04	4.876566	4.832156	4.900062	4.809538	4.835544	4.827891
1992:01	4.885302	4.85267	4.923144	4.824164	4.851665	4.84434
1992:02	4.870048	4.866488	4.909147	4.841727	4.861962	4.856677
1992:03	4.883747	4.868247	4.902528	4.864938	4.862805	4.858217
1992:04	4.890008	4.880811	4.916054	4.867961	4.880921	4.867505
1993:01	4.890355	4.899028	4.91999	4.884711	4.899071	4.883666
1993:02	4.886526	4.896624	4.931103	4.871483	4.88785	4.885961
1993:03	4.896722	4.912487	4.951325	4.889935	4.894761	4.898163
1993:04	4.912766	4.936791	4.958402	4.930848	4.912051	4.92184
1994:01	4.926471	4.955133	4.967947	4.943769	4.940273	4.939881
1994:02	4.930885	4.956585	4.954017	4.950788	4.950481	4.945353
1994:03	4.943306	4.96463	4.952668	4.970408	4.958663	4.955456
1994:04	4.977053	4.987363	5.000932	4.989405	4.97538	4.973426
1995:01	4.999361	5.011052	5.037254	4.994444	5.00446	4.996357
1995:02	5.012887	5.013284	5.01566	5.010078	5.019699	5.007301
1995:03	5.024961	5.01658	5.000379	5.02147	5.035591	5.017261
1995:04	5.045688	5.033543	5.0005	5.060858	5.059809	5.025149
1996:01	5.074519	5.054384	5.024304	5.086064	5.083839	5.043465
1996:02	5.093962	5.054583	5.060918	5.055927	5.087636	5.05323
1996:03	5.105042	5.058994	5.08196	5.049964	5.090758	5.05934
1996:04	5.105571	5.077057	5.081344	5.069026	5.106647	5.079724
1997:01	5.107864	5.094906	5.079697	5.101495	5.117759	5.093629
1997:02	5.104322	5.092644	5.075631	5.105181	5.108178	5.093263
1997:03	5.105476	5.09609	5.073947	5.10069	5.113852	5.105258
1997:04	5.134869	5.113915	5.115077	5.111341	5.125856	5.124339
1998:01	5.135937	5.132069	5.155744	5.099069	5.138715	5.138615
1998:02	5.146589	5.128761	5.147503	5.1249	5.129243	5.131225
1998:03	5.156285	5.12942	5.163278	5.117327	5.130632	5.133308
1998:04	5.168048	5.144676	5.184111	5.12271	5.146122	5.149134
Root Mean Squared Error (RMSE)		0.023069	0.029592	0.029779	0.017108	0.022917
RMSE of base projection plus effect of shock / RMSE of base projection			1.282776	1.290867	0.741601	0.993411

Figure 1: Historical decomposition of output of Bangladesh

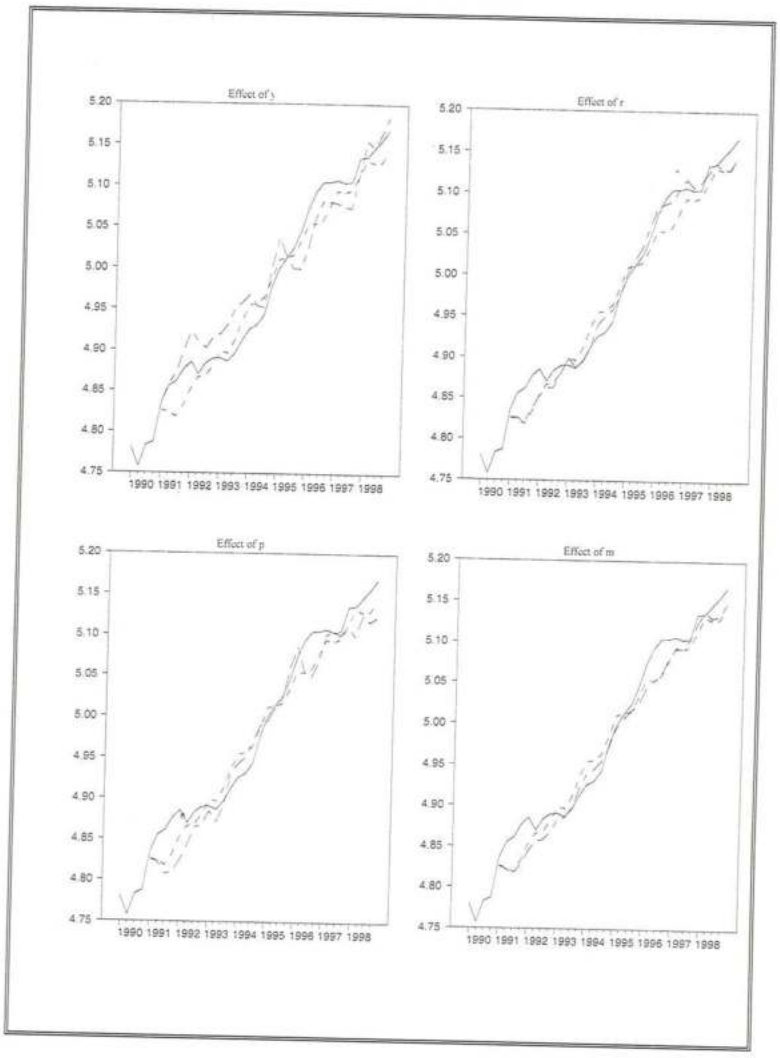
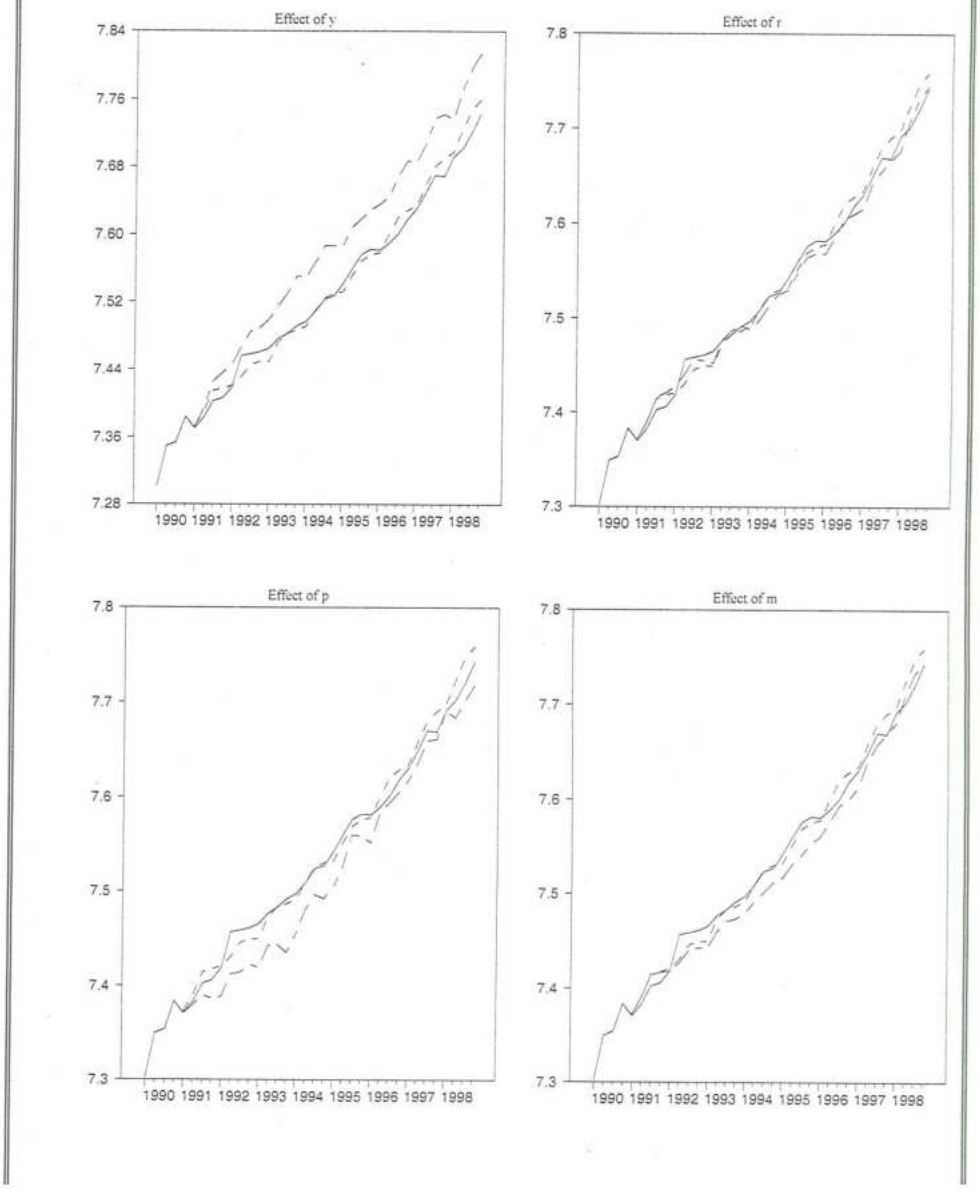


Table 2: Historical decomposition of price of Bangladesh

Entry	Actual	Base projection	Base projection plus accumulated effects of shocks in			
			y	p	r	m
1991:01	7.37086	7.372614	7.372614	7.37086	7.372614	7.372614
1991:02	7.383157	7.390613	7.393497	7.379765	7.390068	7.391668
1991:03	7.402452	7.414305	7.42577	7.39017	7.415737	7.413689
1991:04	7.405897	7.417866	7.436147	7.386374	7.420365	7.41661
1992:01	7.418379	7.420183	7.444914	7.388654	7.427331	7.418029
1992:02	7.456645	7.430232	7.467871	7.412026	7.440648	7.426797
1992:03	7.458567	7.445502	7.484885	7.414011	7.456729	7.439449
1992:04	7.46087	7.449537	7.489577	7.422397	7.454827	7.442682
1993:01	7.465272	7.779415	7.499868	7.418922	7.452297	7.442433
1993:02	7.476659	7.472907	7.515782	7.442404	7.477349	7.459845
1993:03	7.482868	7.483089	7.530856	7.443615	7.48665	7.471015
1993:04	7.491645	7.48668	7.550763	7.43497	7.492453	7.473501
1994:01	7.49739	7.49139	7.549247	7.454644	7.488315	7.479357
1994:02	7.508787	7.509695	7.567538	7.480101	7.498552	7.491679
1994:03	7.523481	7.525041	7.587279	7.496134	7.513428	7.501763
1994:04	7.527256	7.529941	7.587214	7.492142	7.52579	7.511932
1995:01	7.541858	7.531919	7.587895	7.503799	7.52942	7.516501
1995:02	7.559731	7.551681	7.608836	7.526869	7.547968	7.531101
1995:03	7.57661	7.569453	7.619036	7.559988	7.564503	7.541442
1995:04	7.582569	7.575923	7.629024	7.558793	7.569087	7.553435
1996:01	7.58172	7.578623	7.635711	7.55213	7.568532	7.561215
1996:02	7.590008	7.601113	7.645315	7.585009	7.585902	7.577122
1996:03	7.601232	7.620573	7.669806	7.594041	7.604521	7.594582
1996:04	7.617922	7.628168	7.687003	7.605426	7.609451	7.600547
1997:01	7.629811	7.633913	7.6859	7.616959	7.615639	7.613049
1997:02	7.649216	7.658508	7.707213	7.635343	7.641984	7.640199
1997:03	7.670116	7.680075	7.737479	7.6593	7.655688	7.657874
1997:04	7.668561	7.690168	7.742369	7.660476	7.666474	7.669745
1998:01	7.691502	7.697587	7.736191	7.69098	7.67624	7.680851
1998:02	7.701951	7.723952	7.771872	7.6838	7.707803	7.710331
1998:03	7.720311	7.747676	7.796862	7.701422	7.732018	7.733037
1998:04	7.742979	7.759492	7.81458	7.718246	7.745224	7.743405
Root Mean Squared Error (RMSE)		0.056788	0.051402	0.028452	0.009773	0.017538
RMSE of base projection plus effect of shock / RMSE of base projection			0.905156	0.501021	0.172096	0.308833

Figure 2: Historical decomposition of price of Bangladesh



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