Relative Influence of Monetary and Fiscal Policies on Industrial Output of Bangladesh: A Dynamic Analysis*

Mudabber Ahmed**
Jyoti Prakash Dutta***

1. INTRODUCTION

The share of industrial sector in the GDP of Bangladesh is low (around 15%)[1] and its growth could never achieve a double-digit rate in the last three decades. In the 1970s, 80s and 90s, the actual or compound growth rates of this modern sector were 8.8%, 2.5% and 7.67% respectively[2] Researchers usually tried to assign either demand or supply related factors for explaining the poor performance of this sector (Dutta and Ahmed, 1994; Raj, 1976; Bagchi, 1970, etc). But a complete analysis in this regard should take into cognizance of the monetary and fiscal policy issues to explain the dynamic behavior of industrial output. The previous studies also suffer from a major methodological deficiency. Most of these studies mainly dealt with single equation model and thus important feedback mechanism was overlooked. Some of these studies also were subject to omitted variables bias. Studies exploring the relative influence of public policies (monetary and fiscal policies) on industrial sector are, to the best of our knowledge, rarely available. The present study is an endeavor towards this unexplored area in the sense that a dynamic multivariate and multi-equation model is developed in order to isolate the relative influence of monetary and fiscal policies on industrial output and also trace the behavior of industrial output over time due to each of the policy shocks.

Accordingly, the paper is structured as follows: section 2 specifies the model and

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** Associate Professor, Department of Economics, CU And
*** Professor, Department of Economics, CU

[1] Key indicators of developing Asian and Pacific countries, 2003, ADB.

[2] Dutta J. P. (1993).

methodology. Section 3 presents a brief discussion about the data set used in the present paper. Section 4 displays and discusses the empirical findings. Section 5 concludes.

2. METHODOLOGY

The methodology applied in this study is known as **Vector Autoregressive** (**VAR**) model where each of a set of variables is regressed on past values of itself and past values of all other variables included in the system. As an alternative to traditional econometric system of equations where variables are generally arbitrarily labeled as endogenous or exogenous, VAR models have been developed as powerful multivariate models (Sims, 1980) where no such dichotomy of variables is used. In these models, all variables are simultaneously included in order to unlock the dynamic influence of all the variables of the system.

Since the objective of this paper is to examine the effect of monetary and fiscal policies on industrial output in a multivariate framework, our model includes two policy variables, viz. money stock (M) which represents monetary policy and quarterly development expenditure (QDE) of the government which represents the fiscal policy and one target variable, viz. industrial production index (IPI). So the VAR model with n lags is:

$$IPI_t = \sum_{i=1}^{n} A_i IPI_{t-i} + \sum_{i=1}^{n} B_i QDE_{t-i} + \sum_{i=1}^{n} C_i M_{t-i} + e_{ipit}$$

$$QDE_t = \sum_{i=1}^{n} A_i IPI_{t-i} + \sum_{i=1}^{n} B_i QDE_{t-i} + \sum_{i=1}^{n} C_i M_{t-i} + e_{qdet}$$

$$M_t = \sum_{i=1}^{n} A_i IPI_{t-i} + \sum_{i=1}^{n} B_i QDE_{t-i} + \sum_{i=1}^{n} C_i M_{t-i} + e_{mt}$$

Since in VAR models, estimated coefficients do not provide us with interpretable economic insights, we, therefore, present two important summary measures, namely, **Forecast Error Variance Decompositions (FEVD)** and **Impulse Response Functions (IRF)**, which capture the dynamic properties of the model.

Variance decompositions measure the quantitative effect that individual shocks have on all the variables in the system including the shocked variable itself. A system's reaction to shock in one of the variables can best be explained by IRF[3]

3. DATA

[3] See Enders (1995, p. 310) for details about Forecast Error Variance Decompositions (FEVD) and Impulse Response Functions (IRF).

The data used in this study are taken from the IMF, *International Financial Statistics* (IFS) CD-ROM- supplemented by IMF, IFS Yearbook except for QDE. The QDE figures are taken from the various issues of Statistical Year Book of Bangladesh. Quarterly observations comprising the period 1975:Q2-2001:Q4 are used to estimate the model. Where quarterly observations are not available, figures are obtained by using Lisman and Sandee (1964) method.

4. RESULTS

The VAR model is estimated with a lag length of 4. To capture dynamics, it is customary to include 4 lags if the data are quarterly and to include 12 lags if the data are monthly (Sims, 1986 and 1992; and Christiano et. al. 1994). In principle there is nothing to prevent us from incorporating a large number of lags in a VAR model. But as a practical matter degrees of freedom are quickly eroded, as more lags are included. The simple VAR model is estimated by applying OLS method.

We start our analysis with Forecast Error Variance Decompositions (FEVD).

Table 1: Variance decompositions for IPI

Steps	Explained by innovations in		
	IPI	QDE	M
1	100	0	0
2	97.79131	0.661873	1. 546816
3	95.91193	2.283018	1.805052
4	92.52711	3.908352	3.564543
5	93.51659	3.843432	2.639975
6	92.38841	4.072404	3.539184
7	91.97650	4.46365	3.559847
8	91.40982	4.706694	3.883491
9	92.02192	4.554596	3.423483
10	91.23951	4.891516	3.868973
11	90.51544	5.550632	3.933931
12	90.05148	5.997592	3.950931
13	90.26881	6.003349	3.727845
14	89.78888	6.146873	4.064248
15	89.23030	6.573194	4.196504
16	88.87864	6.970295	4.151063
17	88.80059	7.157613	4.041800
18	88.27082	7.440406	4.288778
19	87.64491	7.919398	4.435693
20	87.24301	8.347617	4.409371

Though there is no hard and fast rule regarding the number of steps to be examined but it should be enough to understand the dynamic interactions among the variables. We will examine 20 quarters, which is five years worth of steps.

The variance decompositions for series IPI are displayed in table 1. A closer look at the table reveals the following:

(a) From the beginning to the end, the principal factor driving industrial output is the industrial output itself contributing 100% in the first period to 87% in the last period. This result is not surprising as it reflects effect of all factors other than government policy.

(b) Both fiscal and monetary policies have moderate power in explaining industrial output.

(c) Contribution of fiscal policy in explaining industrial output is below 1% in the beginning but the long-run effect is moderate explaining around 8%.

(d) Contribution of fiscal policy in explaining the industrial output is stronger than monetary policy across the entire time horizon.

For information on the simulated trajectory of industrial output due to fiscal policy and monetary shocks, we need to look at the impulse response functions depicted in figures 1 and 2 respectively.

Shock to Fiscal Policy

The impulse response function or the simulated trajectory of industrial output due to a positive one standard deviation fiscal policy shock shows that industrial output reaches its peak level at the 4th period followed by a gradual decline up to 8^{th} period.

Then output increases again up to 11^{th} period and stabilizes thereafter. However,

Then output increases again up to 11th period and stabilizes thereafter. However, the overall trend is positive.

Shock to Monetary Policy

The simulated trajectory of industrial output due to a positive one standard deviation monetary policy shock is shown in figure 2. The response shows an erratic behavior (ups and downs) throughout the entire time horizon for which no acceptable explanation whatsoever is readily available.

Figure 1: Response of Industrial Production to Shock in Fiscal Policy

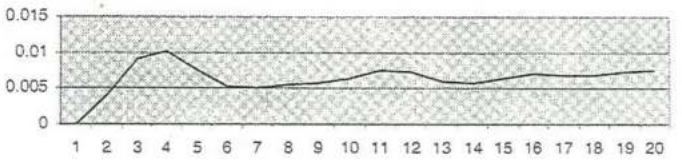
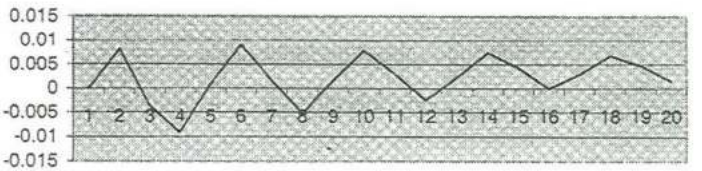


Figure 2: Response of Industrial Production to Shock in Monetary Policy



5. SUMMARY AND CONCLUSIONS

The main objective of this paper was to examine relative influence of fiscal and monetary policy on industrial output and dynamic behaviour of industrial output due to each of the policy shocks. Accordingly, a simple VAR model is developed and our objective is achieved by estimating variance decompositions and impulse response functions. Several conclusions emerge from the results presented above. These are:

i) our finding states that fiscal policy is more effective than monetary policy;

ii) expansionary fiscal policy drives industrial output up;

iii) expansionary monetary policy has uncertain effect on industrial output.

These findings have significant policy implications. The policy maker should be aware of the potential consequences of an expansionary policy since the main objective of the government is to achieve rapid industrial growth.

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