Fiscal and Monetary Influences On Economic Activity in India

Krishna Kool*
and
Rajindar K. Koshal**

In the wake of the Keynesian revolution and the monetary counter-revolution a number of studies have emerged claiming that money plays the major role in influencing aggregate output and employment;*or* monetary policy is effective in combating inflation but it cannot prevent a recession *or* monetary and fiscal tools are complementary as well as competitive instruments for reaching a set of national economic goals. Empirical studies have attempted to test the above alternatives in relation to economic output and or employment. The purpose of this paper is to test the relative importance of fiscal and monetary influences on economic activity in India.

In a developing economy like India fiscal and monetary action are important for economic growth and stability. The use of fiscal measures stemming from the Keynesian multiplier principles and its accepted role in expansion of investment, income, output, and employment, is regarded as an important instrument of achieving short run national economic goals. However, serious questions have been raised concerning the validity of such relationships because of the absence of excess capacity and inelasticities of supply of certain raw materials and skills in developing countries. It has been suggested that the monetarists approach is more relevant in such economies (Shah, 1962). A few studies using simple alternative models of fiscal and monetary policies have concluded that monetary influences on economic activity in India are more effective than fiscal measures (Blattacharya, 1975 and Lyangar, 1968). These studies, however, are inconclusive because relative performances of these models depend on the definitions of the monetary aggregates and the autonomous expenditures variables utilized.

* Rio Grande College. ** Ohio University.

We do not propose to test rival alternative models of fiscal and monetary actions nor any casual relationships suggested by these theories. On the other hand, this paper is an attempt to test the relative importance of fiscal and monetary policies in India by applying the Anderson-Jordon test, (better known as the St. Louis equation) (1) to India data. Basically, there are three propositions concerning the relative importance of fiscal and monetary actions in implementing economic stabilization policy; namely, the response of economic activity to monetary actions relative to that of fiscal actions is (a) greater, (b) more predictable, and (c) faster. In this paper, we propose to test the first two propositions since the third proposition cannot be tested with the type of data available for India.

Model

Following the Anderson and Jordon's approach we assume that in a given year in India total income (Y) is a linear function of (i) G the government expenditure (ii) T - the tax receipts (iii) M - the stock of money and (iv) Z - the other forces[1] that influence total spending. Specifically the functional relationship is assumed to be as follows:

$$(I) \ldots . Y_t = a_0 + a_1 G_t + a_2 T_t + a_3 M_t + a_4 Z_t + U_t$$

where Y_t, G_t, T_t, M_t, and Z_t are as defined above. t subscript refers to year t. a, is a constant and a_1, a_2, a_3, and a_4 are measures of direct marginal income effects of G_t, T_t, M_t, and Z_t respectively. It is easy to derive the following model from (1):

$$(II) \ldots . \Delta Y_t = a_1 \Delta G_t + a_2 \Delta T_t + a_3 \Delta M_t + a_4 \Delta Z_t + V_t$$

where ΔY_t, ΔG_t, ΔT_t, ΔM_t and ΔZ_t, refer to the first differences in Y, G, T, M, and Z. Whereas, V_t is the random error term in model (II). It may be pointed out that although explicitly there is no constant term in (II), but implicitly $a_4 \Delta Z_t$ measures the effect of "all other forces" influencing spending and income. In a complex market system, it is possible for monetary and fiscal changes to exert an indirect as well as a direct influence on income and spending. This indirect influence would operate through the variable ΔZ. We may assume that ΔZ_t is a linear function of (i) ΔG, (ii) ΔT_t, and (iii) ΔM_t. Specifically we may write:

$$III. . . \Delta Z_t = b_0 + b_1 \Delta G_t + b_2 \Delta T_t + b_3 \Delta M_t + V_t^1$$

1 For example, these forces may include variables like technology, resources, world trade and foreign exchange rates.

where b_0 is a constant, and b_1, b_2 and b_3 are marginal "other effects" with respect to ΔG_t, ΔT_t and ΔM_t. V_t is a random error. Combining (II) and (III) we obtain the following model:

$$(IV) \ldots \Delta Y_t = a_4 b_0 + (a_4 b_1 + a_1)\Delta G_t + (a_4 b_2 + a_2)\Delta T_t + (a_2 b_3 + a_3)\Delta M_t + V_t^{11} \quad \text{where} \quad V_t^{11} = (a_4 V_t^1 + V_t)$$

a new error term. Or rewriting (iv) we get:

$$(V) \ldots \Delta Y_t = \alpha_0 + \alpha_1 \Delta G_t + \alpha_2 \Delta G_t + \alpha_3 \Delta M_t + V_t^{11}$$

where $\alpha_0 = b_0 a_4$; $\alpha_1 = a_4 b_1 + a_1$; $\alpha_2 = a_4 b_2 + a_2$; $\alpha_3 = a_4 b_3 + a_3$

It must be noted that α_1, α_2 and α_3, would provide estimates of total effects--both direct and indirect, of G, T, and M on Y. The direct effect, for example of G_t is a_1 and indirect $a_4 b_1$. It must be pointed out that with the existing statistical techniques and data, it is not possible to estimate these effects separately.

Data

Date for this study were obtained from a recent study (Blattacharya, 1975) and these pertain to the years 1948-49-1967-68.[2] These data are in current rupees.

Empirical Results

Applying the ordinary least squares method to model (V) and using the above data, we obtain the statistical results summarized in Table 1. In Table 1, we measure the economic activity by (i) ΔDP--the change in domestic product and, (ii) GNP--the change in gross national product.

Furthermore, we use two measures of the money stock namely, (i) M--currency in circulation, and all commercial and State Cooperative Banks, and other deposits with the Reserve Bank of India and (ii) M_2--M_1 *plus* time deposits. Table 1 lists the values of the coefficients and their t - values are listed in parentheses below the coefficients. R^2 is the coefficient of determination and $\bar{R}^2$ is the coefficient of determination corrected for degrees of freedom. The F-ratio is used to test the over-all significance of the fit.** and * indicate *one* percent and *five* percent levels of significance respectively. It should be pointed out that the step-wise order of the variables

2 Readers are advised to refer to chapter 2 of the study for a comprehensive discussion of the score and limitations of the data.

Table I

SUMMARY OF STATISTICAL RESULTS

Dependent Variable	Equation #	Constant	COEFFICIENT OF				R^2	R^{-2}	F-Ratio
			ΔG	ΔT	ΔM_1	ΔM_2			
ΔDP	VI-1	20.5598	–	–	3.5859** (4.05)	–	0.4914	0.4615	16.42**
	VI-2	10.9116	–	–	–	2.7004** (4.02)	0.4868	0.4566	16.13**
	VI-3	33.4286	2.2195* (1.92)	–	–	–	0.1785	0.1302	3.69*
	VI-4	38.1152	3.9019** (3.15)	-2.9735* (2.40)	–	–	0.3953	0.3197	5.23*
	VI-5	39.6750	-0.3858 (0.25)	-2.2683* (2.35)	4.6813** (3.56)	–	0.6727	0.6071	10.27**
	VI-6	25.3862	0.0753 (0.04)	-1.8269 (1.62)	–	2.9954** (2.73)	0.5961	0.5154	7.38**
ΔGNP	VII-1	27.7879	–	–	3.7894** (5.01)	–	0.5964	0.5727	25.12**
	VII-2	20.6773	–	–	–	2.7272** (4.46)	0.5397	0.5126	19.93**
	VII-3	34.5824	2.6915** (2.60)	–	–	–	0.2853	0.2432	6.79**
	VII-4	37.5146	3.7441** (3.10)	-1.8603 (1.54)	–	–	0.3775	0.2997	4.85*
	VII-5	39.0133	-0.3785 (0.25)	-1.1827 (1.25)	4.4981** (3.48)	–	0.6558	0.5870	8.53**
	VII-6	25.9077	0.2548 (0.15)	-0.8149 (0.72)	–	2.7313* (2.48)	0.5590	0.4708	6.34**

Notes: 1. Values in parenthesis below the coefficients are their t-values.
2. ** 1% level of significance.
3. * 5% level of significance.

in the various equations was selected by the authors.

The results of Table 1 are quite impressive and interesting. In equations (VI-2) and (VII-2) the signs of the coefficients of the fiscal policy variables are as expected and their sum is almost equal to *one*, the value of balanced budget multiplier. However, when the money variable is introduced in equations (VI-5), (VI-6), (VII-5) and (VII-6), the coefficients of the fiscal policy variables, in general, are not statistically different from zero. This appears to be due to the problem of multicollinearity which is obvious from the step-wise regression and the matrix of the simple correlation coefficients among explanatory variables given in appendix 1.

In order to over-come the problem of multicollinearity, model (V) was redefined as follows:

$$(\text{VIII}) \ldots \Delta Y = \alpha_0 + \alpha_1 \Delta(T\text{-}G) + \alpha_2 \Delta M + U'$$

where the ΔY, and ΔM are as defined above. $\Delta(T\text{-}G)$ is the budget surplus and U' is a random error term. The statistical results for model (VII) are summarized in Table II. An examination of Table II does suggest that the problem of multicollinearity is not completely eliminated, however, the results of this table are according to expectations. The coefficient of $\Delta(T\text{-}G)$ in equations (III-4) are significant at least at 10 percent level. The absolute value of the coefficient of $\Delta(T\text{-}G)$ is between 1.3 and 2.0 and this value confirms the results of some of the earlier studies. According to the domestic product results, the value of the monetary multiplier is between 2.0 and 2.7. These values are also quite plausible in view of other empirical studies. Thus, the results of Table II, especially for domestic product, suggest that both fiscal and monetary policy are important in determining income fluctuations in India. Thus the proposition, namely, the response of economic activity to monetary actions relative to that of fiscal actions is greater, does appear to be valid for India on empirical grounds.

Table III gives values for the *Beta* Coefficients and the partial correlation coefficients for equations (1-2) and (IX-3). According to the results of equation (IX-2) a 1 standard deviation change in $\Delta(T\text{-}G)$ will lead to a 0.35 standard deviation change in ΔDP, on the other hand, a 1 standard deviation change in ΔM, would be accompanied by a 0.53 change in ΔDP. The partial correlation coefficient of 0.43 for $\Delta(T\text{-}Y)$ implies that 0.18 percent (0.43^2) of the variance in ΔDP not accounted for by the monetary variable is accounted for by the fiscal variables. Whereas, the partial correlation coefficient of 0.53 for ΔM, suggests that 0.28 percent (0.53^2) of the variance in ΔDP not accounted for by the fiscal variable is explained by the

Table II

SUMMARY OF STATISTICAL RESULTS

Dependent Variable	Equation #	Constant	COEFFICIENT OF			R^2	R^{-2}	F-Ratio
			Δ(T-G)	ΔM_1	ΔM_2			
ΔDP	IX-1	53.1052	(-)3.4394** (3.17)	—	—	0.3709	0.3338	10.02**
	IX-2	20.4811	(-)1.9885* (1.92)	2.7136** (2.89)	—	0.5863	0.5345	11.34**
	IX-3	15.5276	(-)1.7676 (1.54)	—	2.0100** (2.55)	0.5530	0.5764	9.90**
ΔGNP	X-1	67.9291	(-)2.8057* (2.50)	—	—	0.2682	0.2252	6.03**
	X-2	27.7424	(-)1.0184 (1.07)	3.3427** (3.89)	—	0.6234	0.5764	13.25**
	X-3	22.7558	(-)0.7959 (0.72)	—	2.4163** (3.20)	0.5542	0.4985	9.95**

Notes: 1. Values in parentheses below the coefficients are their t-value.
2. ** 1% level of significance.
3. * 5% level of significance.

Table III
BETA COEFFICIENTS AND PARTIAL
CORRELTATION COEFFICIENTS = ΔDP AS
DEPENDENT VARIABLE

Variable	BETA-COEFFICIENT		PARTIAL CORRELTATION	
	Equation IX-2	Equation IX-3	Equation IX-2	Equation IX-3
Δ(T-G)	-0.3521	-0.3121	-0.4319	-0.3590
ΔM_1	0.5305	–	0.5851	–
ΔM_2	–	0.5194	–	0.5380

Notes: *Beta*-coefficients are equal to estimated coefficients times the ratio of the standard diviation of the independent variable over the S.D. of dependent variable.

monetary variable. These findings do suggest that the monetary variable is somewhat more predictable. However, for developing nations like India one must keep in mind that changes in the monetary variable are mainly in response to the fiscal variables and the two variables, namely; the monetary and fiscal, are not independent to the degree one may find in the developed nations.

It should be noted that our model and results are based on the reduced-form or single equation approach and this technique has limitations. It is difficult to come up with reasonable measure of exogenous variables which quantify adjustment in policy. In addition there is always some possibility of specification error--either including some irrelevant exogenous variables or excluding relevant exogenous variables. Accordingly, there is no obvious way to predict the direction of bias in the coefficients.

Conclusions

In summary, we may conclude that according to our statistical test monetary and fiscal tools appear to be complementary as well as competitive instruments for reaching a set of national economic goal. We feel that these conclusions would apply to most of the developing nations.

Appendix 1

MATRIX OF SIMPLE CORRELATION COEFFICIENTS

Variable	ΔGNP	ΔG	ΔT	ΔM_1	ΔM_2	Δ(T-G)
ΔDP	0.98	0.42	-0.14	0.70	0.70	-0.61
ΔGNP	—	0.53	0.05	0.77	0.73	-0.52
ΔG	—	—	0.57	0.81	0.79	-0.47
ΔT	—	—	—	0.36	0.25	0.46
ΔM_1	—	—	—	—	0.94	-0.48
ΔM_2	—	—	—	—	—	-0.57

Notes: 1. ΔDP change in domestic product.
2. ΔGNP change in gross national product.
3. ΔG change in government expenditure.
4. ΔT change in taxes.
5. ΔM_1 change in money stock (M_1).
6. ΔM_2 change in money stock (M_2).
7. Δ(T-G) change in government surplus.

References

Andersen, L.C. and Jordan, J.L., "Monetary and Fiscal Action: A Test of Their Relative Importance in Economic Stabilization," *Federal Reserve Bank of St. Louis--Review,* January 1970.

Blattacharya, B.B., *Short-term Income Determination,* MacMillan Company of India Limited, Delhi 1975.

Fand, D.I., "A Monetarist Model of the Monetary Process," the *Journal of Finance,* Vol. 25 (May, 1970).

Iyaugar, S.S., Multiplier Analysis of India, *Indian Economic Journal,* Vol. 7, (1969).

Keran, H.W., "Monetary and Fiscal Influences on Economic Activity: The Foreign Experience," *Federal Reserve Bank of St. Louis--Review,* February, 1970.

Leeuw, Frank de and Kalchbrenner, John, "Monetary Versus Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization Comments," *Federal Reserve Bank of St. Louis--Review,* (April 1969).

Rod, V.K.R.V, "Investment, Income, and Multiplier in an Underdeveloped Economy," *Indian Economic Review,* Vol. 1 (Feb., 1952).

Shah, V.C., "Monetary Analysis in India: 1948-49--1958-59," *Indian Economic Journal,* Vol. 9 (Jan. 1962).