T.R.NO 24
o/c

Technical Report

ON DEFICIT FINANCING

by

Dalip S. Swamy

WP 1974/24

WP24
WP
1974
(24)

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD

ON DEFICIT FINANCING

by

Dalip S. Swamy

February 1974

Indian Institute of Management, Ahmedabad

No. 24

To

Chairman (Research)
IIMA

Technical Report

Title of the report ON DEFICIT FINANCING

Name of the Author Dr. Dalip S. Swamy

Under which area do you like to be classified? ECONOMICS

ABSTRACT (within 250 words)

The main conclusion emerging from the analysis is that the inflationary impact of a budget deficit depends upon the method used to finance that deficit. Using a static and a dynamic macroeconomic model it has been shown that the proportion of budget deficit financed by money creation is a crucial determinent of the rate of price inflation. The price inflation will be greater, the higher the proportion of budget financed by money creation. Conditions under which this conclusions holds have derived. A crude empirical test is provided.

Please indicate restrictions if any that the author wishes to place upon this note

Date March 22, 1974

D. S. Swamy
Signature of the Author

ON DEFICIT FINANCING

Dalip S. Swamy*

Indian Institute of Management, Ahmedabad

In recent years we have witnessed increasing concern regarding the effects of deficit financing. At theoretical level it has been stressed by Christ[1] that in macroeconomic models a budget restraint on the government sector should be introduced. An important implication of this suggestion is that the total multiplier effect of increased government expenditure will depend on the way such expenditure is financed. We propose to analyse here the monetary aspect of deficit financing in the context of Hicks' IS-LM framework. In order to make the analysis practically relevant first, the various concepts of 'deficit' (prevailing in India) have been considered and then, a macro-economic model is set up to analyse the monetary effects of a given budget deficit.

In India, overall budgetary deficit[2] of the Central govt. is defined as the excess of total expenditure over total budgetary receipts on current and capital accounts together. Basically, it represents the excess of expenditure over revenue which is covered by the sale of treasury bills and withdrawal from cash balances. A similar procedure is adopted by State Governments. The overall budgetary deficits of State Governments represent the excess of expenditure over revenue which is covered by withdrawal from cash balances and cash balance investment account, withdrawal from revenue reserve fund, ways and means advances and overdrafts from the Reserve Bank of India.

---

[1] Christ, C., "A Short-Run Aggregate Model of the Interdependence and Effects of Monetary and Fiscal Policies with Keynesian or Classical Interest Elasticities," American Economic Review, May 1967. ." A Simple Macroeconomic Model with a Government Budget Restraint", Journal of Political Economy, Jan 1968.

[2] A lucid exposition of budget deficit and its effects on certain financial variables is given by P.D. Ojha, EDeficit : Measurement and its implications for Financial Planning," Arthavikas, Jan 1972. See also V.K.R.V. Rao, "Deficit Financing, Capital Formation and Price Behaviour in an Underdeveloped Economy", The Indian Economic Review, February, 1953.

* I am grateful to Mr. Saha for programming assistance.

It should be noted that the most significant item to cover the overall budgetary deficit of the Central government is the sale of treasury bills while that for the State Governments is ways and means advances and overdrafts from the Reserve Bank of India. State Government treasury bills are virtually non-existent and the Central Government virtually does not take ways and means advances. Both instruments of credit have a maximum maturity of three months. In a sense what are treasury bills to the Central Government are ways and means and overdrafts to the State Governments.

Apparently, an important difference between the two credit instruments seems to be that while the Central Government can use its discretion to issue treasury bills, the State Governments cannot take ways and means advances greater than thrice the level of minimum cash balances that each state is required to maintain with the Reserve Bank. However, the State Governments are also allowed to take special ways and means advances against the pledge of Central Government securities; these are upto twice the level of normal ways and means advances. In addition to normal and special advances the Reserve Bank also sanctions additional ad hoc or special ways and means advances (secured) beyond these limits. Thus, while the Central Government's deficit is fairly elastic (as the issue of Treasury bills can be increased), the State Governments deficit were expected to be constrained by the capacity limits discussed above.

Since 1950, however, the State Governments have been over indulging in their rights to borrow from the Reserve Bank of India. Faced with an inelastic revenue system and growing requirements of expenditures the States' budget deficit continued to mount. The Reserve Bank accommodated them first by increasing the limits of ways and means advances and then by sanctioning additional ad hoc limits for secured advances. Even the new, higher limits were not respected by the states. The excess of borrowings over the fixed limits are called unauthorized overdrafts. Usually such unauthorized overdrafts are covered by special ad hoc loans from the Central Government to the State Governments so that the amount is considered as a loan from the Central Government rather than from the Reserve Bank. This process of legitimization of the so-called unauthorized overdrafts has almost become a regular feature.[3] For all intents and purpose

---

[3] In the last quarter of 1972 when the established channels appeared to be strained, the State Governments used another sophisticated technique to finance their deficits. Since Central Government's deficit was mounting the Reserve Bank used its influence over commercial banks so that they took most of Central Government's securities required to cover its mounting deficits. In the meantime the State Governments also had a significant amount of deficit which they covered by issuing the so-called State Guaranteed securities. Since State Guaranteed securities were loaded with higher coupon rates than Central Government securities it was advantageous to banks to exchange the latter for the former. Thus, the State Governments acquired Central Government securities which they could pledge to the Reserve Bank for 'secured' loans. This technique enabled states to avoid overdrafts with the Reserve Bank.

special credit instrument – ways and means advances and overdrafts – became as elastic to the States as treasury bills to the Central Government. The issue of treasury bills depends upon the Central Government deficits which is ultimately controlled by Lok Sabha and ways and means advances and overdrafts are related to the State governments' defitiicts, which are to be ultimately controlled by the Central Government. In practice the difference between the two instruments of deficit financing is more apparent than real.

In the context of economic development, perhaps, income deficit is more than budgetary deficit. Income deficit is defined as the difference between net capital formation and the net savings of the Government. The net savings represent the net savings on current account of Government administration plus the savings of departmental commercial undertakings in the form of their net profits and replacements of departmental commercial undertakings. However, income deficit does not exhaust all financial obligations of the Central Government. As mentioned above, the State Governments take loans from the Central Government to clear their "unauthorized overdrafts." The Central Government also gives loans to Union Territories and private corporate sector besides making investment in shares. Therefore, total requirements of finance is usually greater than income deficit. It is this concept of deficit denoting total requirements of finance which is relevant to analyse the impact of the budget on money supply. It should be pointed out that this concept of deficit includes only unauthorized overdraft of the State Governments, which are covered by the Central Government. To this deficit one should add the State Governments' deficit which are covered by normal and special ways and means advances. This is the supply side, so to say, of total deficit; that is, the Central and State Governments are willing to create additional credit instruments equal in amount to this total deficit.

This total deficit is covered either by running down cash balances or by borrowing from the financial system. The former implies a reduction in the assets and the latter an increase in the liabilities (symbolised in treasury bills) of the Governments. The financial market, mainly the Reserve Bank, takes these liabilities of the Governments. Thus the demand for credit instruments (treasury bills) generated by deficit emanates from the financial market. Although, in the accounting sense, total deficit measured from demand and supply sides will be equal the relevant constraints and determining factors will be different.

How does one measure total deficit from the point of view of the financial market? "In India, where the normal practice is not to rely on the Central Bank for subscription to new issues of long-term securities and where short-term debt of the Government is largely held by the Central Bank a deficit measured in terms of withdrawals of cash balances and net increases in floating debt gives, on the whole, a reasonable reliable indication of the impact of the budget on money supply."[4] However, during the Third Five Year Plan, it was proposed to limit deficit financing to the 'minimum warranted by the genuine monetary needs of the economy.'[5] Thus from the point of view of the Reserve Bank "the term 'deficit financing' came to be applied to the net Reserve Bank financial support given either in the form of buying short-term treasury bills or long-term Government loans during the Third Five Year Plan."[6] Thus the term deficit financing relates to the entire net credit extended by the Reserve Bank of India to the Central and State Governments.

To be specific, the Government sector's budget deficit covered by the Reserve Bank or the RBI credit to the Government sector comprises of

1. Reserve Bank's holding of rupee coins and notes (Issue Department of RBI)
2. Reserve Bank's holdings of Government securities, including Treasury bills (Issue Department and Banking Department of RBI)
3. Reserve Bank's loans and advances to the Government sector (Banking Department of RBI)
4. Government deposits with the Reserve Bank (liability in Banking Department of RBI)

Table 2 gives the total RBI credit to the Government sector. Each item of this table is derived from Table 1 which represents the balance sheets of the Issue Department and the Banking Department of the Reserve Bank. If to this total we add

5. One rupee notes and coins in circulation with the public
6. Government balances with the treasuries, and
7. Commercial banks' holdings of government securities, including Treasury Bills (assets of commercial banks)

---

[4] The Second Five Year Plan, Government of India, New Delhi, 1956, pp. 83-84.

[5] Ojha, P.D., Op.cit., p. 36.

[6] Ibid., p. 36.

Table 1

Balance Sheet of Reserve Bank of India (1969-70)*

Issue Department

(Rs. Crores)

Liabilities		Assets	
1. Notes in circulation	3,842.56	3. Gold coin and bullion	182.53
2. Notes held in banking department	23.38	4. Foreign securities	331.42
		5. Rupee coin	64.63
		6. Government of India rupee securities	3,287.35
3. Total	3,865.93	7. Total	3,865.93

* Table 1 uses 1969-70 data since the latest data on National Income Accounts are available for 1969-70. Reserve Bank's balance sheets are published regularly, almost with no time lag.

Table 1 (Contd.)

Banking Department

Liabilities			Assets	
1.	Deposits	508.01	3. Notes and coins	23.54
1.1	Central Government	167.64	4. Balances Held Abroad	135.14
1.2	State Governments	8.21	5. Loans and Advances	734.29
1.3	Scheduled Commercial Banks	164.11	5.1 Central Govt.	-
			5.2 State Govts.	211.98
1.4	Scheduled State Co-operative Banks	8.09	5.3 Scheduled Commercial Banks	238.02
1.5	Non-scheduled State Co-operative Banks	0.57	5.4 State Co-op. Banks	275.51
1.6	Other Banks	0.15	5.5 Others	8.78
1.7	Others	159.24	6. Treasury Bills	61.92
2.	Other liability	609.90	7. Investment	118.87
2.1	Paid-up Capital and Reserve Fund	155.00	8. Others	44.17
2.2	Agricultural and Industrial Credit Funds	265.00		
2.3	Others	289.90		
	Total	1,117.91	Total	1,117.91

Table 2

Reserve Bank's Credit to the Government Sector
(1969-70)

1.	Reserve Bank's holdings of rupee coins and notes (held in Issue Department)	64.63
2.	Reserve Bank's holdings of rupee securities (held in Issue Department)	3,287.35
3.	Reserve Bank's holdings of Treasury bills (held in Banking Department)	61.92
4.	Reserve Bank's loans and advances to the Govt. sector (held in Banking Department)*	278.95
5.	Central and State Government deposits with the Reserve Bank (held in Banking Department) (-)	175.85
	Total	3,517.00

*This item includes investment and other investment which come to Rs. 66.97 crores.

we get the Government sector's budget deficit.[7]

In terms of the above categories budget defict can be defined as the net changes in (1+2+3-4+5-6+7) while the Reserve Bank's net credit to the Government sector is defined as the net changes in (1+2+3-4). Thus budget deficit is financed by the Reserve Bank (1+2+3-4), the public (5), the treasuries (6) and commercial banks (7). In India, Government securities are virtually not purchased by individuals so that financing of budget deficit by government loan from individuals (public) can be neglected. Regardless of which of these methods is employed a budget deficit transfers the public's savings to the Government sector, and to that extent it aims to transfer real resources from the private sector to the government. Whether it results in an increase in the public's money holdings or not depends on the policy followed by the Reserve Bank of India.

If the deficit is financed by drawing down Treasury cash balances or by printing one rupee notes, the public's money holdings will increase by the amount of the deficit but there will be no increase in the private assets of the non-bank public. If the deficit is financed by selling securities to commercial banks, the banks will pay by creating demand deposits for the Treasury. When the Treasury spends that money the public's money holdings will, again, increase by the amount of the deficit. But, in this case the banks will require additional reserves to be held against the newly created deposits. In case the Reserve Bank leaves the total amount of reserves unchanged, the banks will be forced either to sell equivalent amount of other assets to the public or to reduce loans and advances. Consequently, the public ends up with the same amount of money as originally but with more assets; in the former event the public swaps the bank assets by their additional money holdings and in the latter event the public's liabilities to the banks are reduced which also implies a corresponding increase in the public's assets. In case the Reserve Bank increases the total reserves, through open market operations, by an amount exactly equal to the banks' purchases of new Government securities, it would virtually amount to the Reserve Bank financing the budget deficit. In this case the public's money holdings would increase by the amount of the deficit with no added effect on private assets.

2

---

[7]The Government sector's budget deficit since 1956-57 is overstated because of the manner in which the transactions relating to the United States' PL-480 assistances have taken place. The Govt. of India paid for the imports of foodgrains in terms of Rs. to the U.S. Embassy. Under the agreement, a greater part of such assistances (85%) of the United States was to be given back to the Govt. in the form of loans and grants. However, because of some technical delays, it was not possible for the United States Embassy to transfer the rupee balances to the Govt.; as a result, these balances stood in the name of U.S. Embassy with the State Bank principally in the form of tire deposits which were invested mostly in Govt. Securities by the State Bank. As a result, bank credit to the Govt. sector increased to the extent of such investment in Govt. securities by the State Bank. RBI, July 1961, p. 1063.

In real life there may exist a wide range of intermediate possibilities between the two extremes of providing no additional reserves and providing extra reserves in the amount of the deficit. In any case, the effect of deficit financing on the public can be analysed in terms of the composition of the additional money holdings and net new assets. If the deficit is financed by selling securities to the commercial banks without additional reserves the public's assets will increase without any change in money holdings. If the deficit is financed by printing money or drawing down of Treasury cash balances or by the Reserve Bank of India the public's money holdings will increase with no change in their asset holdings. If the deficit is financed by some combination of these methods the public's money as well as asset holdings will increase. Whatever the method of financing, the public's total net holding of financial assets increases by an amount exactly equal to the amount of deficit. The crucial question is to consider the effect of deficit financing on the composition of non-bank public's financial assets and then to consider the effect of that composition on the real sector in terms of production, employment and prices.

If deficit financing results in an increase in the public's holdings of assets with money holdings unchanged, interest rates will rise due to the excess supply of interest bearing assets. This will restrain private spending and thereby, partly offsetting the expansionary effect of the deficit itself. There exists an increase in the money supply such that a budget deficit leaves interest rates unchanged, in which case, there will be no offset against the expansionary effect of the deficit. And, if the money supply increases by more than this amount, interest rates will fall and there will be an expansionary monetary effect to be added to the expansionary fiscal effect. Thus, the monetary effect of a budget deficit depends upon the amount of additional money supply in relation to the amount of new assets held by the non-bank public. This monetary effect depends, in significant measure, on the Reserve Bank policy, and it might be counter-expansionary, neutral, or an addition to the fiscal effect of a budget dericit which is always expansionary.

The next question is to consider whether the monetary and fiscal effects of a budget deficit are expansionary or not. As pointed out above, any method financing a budget deficit aims to transfer real resources from the private sector to the government. If there exist a reserve of trained personnel and idle capacity the government expenditure may improve the utilization of resources or increase the availability of resources. In such circumstances the fiscal effect will not be inflationary. However, what is required is that during the time interval between the expenditure and the increase in production real resources must be transferred to the government to finance its expenditure. It is in this respect that monetary policy plays an important role. If during this time interval, the monetary effect of financing a budget deficit (or excess government expenditure) is neutral and non-inflationary, it will facilitate the smooth transfer of real resources to the government without increasing total effective demand so that there will be no pressure on prices. If, on the other hand, idle capacity does not exist the fiscal effect will be inflationary. In order to facilitate the transfer of real resources to the government in this case, the monetary effect has to be contractionary. In a situation where deficit financing results in a rise in prices the

analytical problem is to decompose the total deficit effect into the fiscal and monetary effects. Such an analysis should also throw light on the appropriate mix of fiscal and monetary policy.

The basic Hicks-Keynes IS-LM model can be used to analyse the monetary and fiscal effects of deficit financing. A modified version of this model can be written as follows:

1.	$Y = C + I + G$	(commodity - market equilibrium)
2.	$C = C_0 + c_1 YD + fW$	(consumption function)
3.	$I = I_0 + I_r r + I_y Y - I_{tc} \frac{TC}{YC}$	(investment function)
4.	$Y = YC + YNC$	(distribution of income)
5.	$YD = Y - TC - TNC + TR$	(disposable income)
6.	$P.TC = tc_0^* + tc_1^* P.YC$	(corporate tax
7.	$P.TNC = tnc^* + tnc_1^* P.YNC$	(Non-corporate tax)
8.	$T = TC + TNC$	(Total tax)
9.	$G = G^*$	(Government expenditure)
10.	$MD = M_0 + L_Y Y - L_r r + L_w W$	(Demand for money)
11.	$MD = MS$	
12.	$MS = \frac{M^*}{P} + d\,(G-T) + v$	(Money supply)
13.	$P(G-T) = M^{**} + B^{**}$	(Government's budget constraint)
14.	$M^{**} = dP\,(G-T) + pv$	(Money creation)
15.	$B^{**} = (1-d)\,P\,(G-T) - pv$	(Public absorption of new government securities)
16.	$PW = PK^* + M^* + M^{**} + B^* + B^{**}$	(definition of wealth)
16-A.	$W = K^* + \frac{M^*+B^*}{P} + (G-T)$	(Government expenditure)

The symbols are defined as follows:

G = consumption expenditure, in real terms

I = investment expenditure, in real terms

G = government expenditure on goods and services, in real terms

T = taxes, in real terms

TNC = non-corporate taxes, in real terms

TC = corporate taxes, in real terms

TR = transfer payments in real terms

Y = national income, in real terms

YC = corporate income, in real terms

YNC = non-corporate income in real terms

T_r = transfer payments, in real terms

r = the rate of interest

MD = the amount of money demanded, in real terms

MS = the amount of money supplied, in real terms

W = wealth at constant prices

M* = the amount of nominal money supply

B* = the amount of nominal bond supply

v = open market purchases of government securities by the central bank

M** = that part of deficit which is financed by money creation

B** = that part of deficit which is financed by bond supply

P = General price level

K* = stock of capital

This model differs from the conventional Hicks-Keynes model in five ways. First, national output is decomposed into corporate and noncorporate output; it will enable us to analyse some distributional considerations. Second, it introduces the price level[8] in the tax function (6), (7) & (8) and the money supply function (12). It implies that the tax laws are written in nominal terms and the monetary authorities control only the nominal stock of money. Third, the present model introduces 'wealth' as an explanatory variable[9] in consumption (2) and money demand function(10) A decline in current disposable income may not reduce consumption expenditure if wealth is available to balance income streams in bad years. The rational consumer considers all his existing resources when planning consumption. Therefore, consumption should be related to both current disposable income and wealth. Similarly, wealth owners allocate their wealth between different assets so as to optimise the profitability and liquidity of their portfolio. Any increase in wealth will disturb their

---

[8] Holbrook, Robert S., "The Interest Rate, the Price Level, and Aggregate Output" in Smith, W.L. and Teigen, R.L.(Eds), Readings in Money, National Income, and Stabilization Policy, R.D. Irwin, Homewood, Illinois, 1970, pp.43-66.

[9] Silber, William L., "Fiscal Policy in IS-LM Analysis : A correction", Journal of Money, Credit and Banking, Nov. 1970, pp.461-473.

portfolio positions inducing them to acquire additional asset and one of these assets is, of course, money. The greater the public's wealth, the greater will tend to be the amount of money the public wishes to hold, other things being equal. Therefore, it is reasonable to assume that an increase in wealth will raise consumption expenditure and the demand for money so that $0 < f < 1$ and $0 < J < 1$. The quantitative values of f and J will determine the allocation of an increase in wealth between consumption expenditure and the demand for money. Fourth, a budget restraint (13) is introduced which explains that the budget deficit is financed by money creation and bond sales. Fifth, the central bank's policy of open market operations is separated from the government's policy of deficit financing (or debt management, in general)[10]. Equation (13) implies that government deficit or surplus at current prices, P(G-T), equals the new issues or retirement of government securities from the Reserve Bank, M**, and new issues or retirements from banks, other financial institutions and the public, B**. However, in a particular time period the Reserve Bank may acquire more or less government securities than M** depending upon its open market operations. Equation (14) indicates that the Reserve Bank's acquisitions of government securities arise due to budget financing indicated by d P(G-T) and open market operations represented by Pv. Here, d is the proportion of the deficit financed by the Reserve Bank, and v is the parameter of open market operations. These two parameters permit us to separate the policy of open market operations from that of financing a budget deficit. A "pure" open market operations, $v \neq 0$, would imply that the term d P(G-T) = 0, which requires either d = 0 or d = 1 or G-T = 0. That is, a necessary condition for a pure open market operations is either the entire deficit is financed by the Reserve Bank or the public or a balanced budget.

Therefore, in equation (12) money supply is augmented by d(G-T), as a consequence of deficit financing and v as a result of open market operations. To the extent the bond supply (B**) increases as a result of deficit financing it enters the model via a change in wealth. It is clear that wealth increases by the full amount of the budget deficit hence the fiscal effect does not depend on the method of financing the budget deficit. The allocation of the budget deficit between money creation and bond sales affects the demand and supply of money in a different way because the full amount of deficit enters into the demand function for money while only a part of the deficit, d(G-T), enters into the supply function for money. It is this differential which determines the monetary effect of the budget deficit.

The first nine equations along with(16-A) can be solved for Y in terms of r to obtain the equation for IS curve.

---

[10] Karl Brunner, and Allan H. Meltzer, "A Monetorist Framework for Aggregative Analysis", (Mimeo., February 1971).

$$(17) \qquad AY + I_r\, r - B\left(\frac{1}{p}\right) - N\,YC - D = 0$$

where,

$$A = 1-c_1\,(1-tnc_1^*) + f\,tnc_1^* - I_Y$$

$$B = f(M^*+B^*) - (tc_0^* + tnc_0^*)\,(f+c_1)$$

$$N = (tnc_1^* - tc_1^*)\,(f+c_1) - \frac{I_{tc}\,tc_0^*}{YC^2}$$

$$D = G^*\,(1+f) + c_0 + c_1\,TR + fK^* + I_0 - I_{tc}\,tc_1$$

At a given price level and corporate income, equation (17) yields different combinations of income and interest rate at which the commodity market remains in equilibrium. In Figure 1, IS curve is the locus of such points. A change in the price level can be seen to affect the position of this curve, but not its slope. Whether an increase in the price level shifts the IS curve to the right or left depends on the sign of tax parameters tc_0^* and tnc_0^*. If the tax system is progressive, that is, the average tax rates, $\frac{TC}{YC}$ and $\frac{TNC}{YNC}$, increase with income, then tc_0^* and tNc_0^* will be negative. In such a case, a rise in the price level will reduce income at a given level of interest rate. In other words, the IS curve will shift to the left. A change in the government expenditure, on the other hand, will shift the IS curve to the right by $\frac{1+f}{1-c_1(1-tnc_1^*) + f\,tnc_1^* - I_y}$. This has been referred

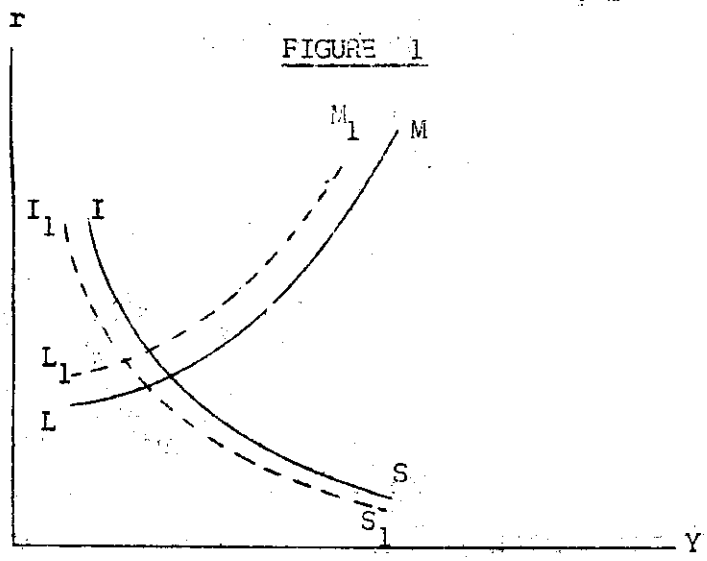


FIGURE 1

to as the "Learner effect".[11] Learner argued that a deficit increases income via a direct wealth impact on consumption expenditures.

It is easy now to analyse the effects of a change in distribution of output between corporate and non-corporate sectors. An increase in the output originating in the corporate sector will shift the IS curve without affecting its slope. Whether there will be a leftward or a rightward shift in this curve will depend upon the sign of N. Since the marginal tax rate on the corporate sector is expected to be higher than that on the noncorporate sector, $tc_1^* > tnc_1^*$, the sign of N will be negative. This implies that a rise in corporate output will lower the demand for aggregate output, Y, by raising corporate taxes and reducing disposable income. It should be recognized that this leftward shift in the IS curve will be accentuated as the level of corporate income rises because N is negatively affected by the square of corporate income, YC^2 (tc_0^* being negative under conditions of progressive tax system).

The solution to the final six equations yields the LM curve (18); it provides different combinations of Y and r, at a given price level and corporate output which are consistent with the equilibrium in the money market.

$$(18) \quad QY - L_r\, r + H\left(\frac{1}{p}\right) + K\, YC + L = 0$$

where,

$$Q = L_y + tnc_1^* \quad (d - L_w)$$

$$H = (tc_0^* + tnc_0^*)\ (d - L_w) + L_w\ (M^* + B^*) - M^*$$

$$K = (tc_1^* - tnc_1^*)\ (d - L_w)$$

$$L = G^*\ (I_w - d) + L_w K - M_0 - v$$

A change in the price level, again, affects the position of the LM curve, but not its slope. However, the effect of a price change on the LM curve will depend not only on the signs of tc_0^* and tnc_0^* but also on the quantitative values of L and d and the existing stock of money relative to the stock of bonds. Under conditions of progressive tax system, if the marginal responsiveness of the demand for money with respect to wealth, L_w, is smaller than the proportion of the budget financed by money creation, d, and also small enough such that $M^* > L_w\ (M^* + B^*)$, then an increase in the price level will bring about

---

[11] Haberler, G. Prosperity and Depression, New York, Atheneum, 1963.

a shift in the LM curve to the left. The effect of a given change in government expenditure on the LM curve will depend on the value of $\frac{d-L_w}{Q}$; if $d > L_w$, the LM curve will shift to the left and if $d = I_w$ the LM curve will remain constant. The effect of a change in distribution of output will also depend upon the relative values of d and L_w. Assuming $tc_1^* > tnc_1^*$ a shift in income distribution in favour of the corporate sector will shift the LM curve to the left if $I_w > d$ and to the right if $I_w < d$. The distributional effect is opposite of the price effect.

Equation (17) and (18) can be solved for equilibrium values of Y and r.

19. $$Y = \frac{BL_r - HI_r}{AL_r + QI_r}\left(\frac{1}{p}\right) + \frac{NL_r - KI_r}{AL_r + QI_r} YC + \frac{DL_r - LI_r}{AL_r + QI_r}$$

20. $$r = \frac{QB + AH}{AL_r + QI_r}\left(\frac{1}{p}\right) + \frac{QN + AK}{AL_r + QI_r} YC + \frac{QD + AL}{AL_r + QI_r}$$

From 19 the effect of a change in government expenditure on income is

$$\frac{dY}{dG^*} = \frac{(1+f)\,L_r + (d-L_w)\,I_r}{AL_r + QI_r}$$

which is composed of two effects : (1) fiscal effect, roughly represented by the shift in the IS curve and is equal to

$$\frac{1+f}{A} = \frac{1 + f}{1-c_1(1-tnc_1^*) + f\,tnc_1^* - I_y}$$

and (2) monetary effect of deficit financing represented by the shift in the LM curve and is equal to

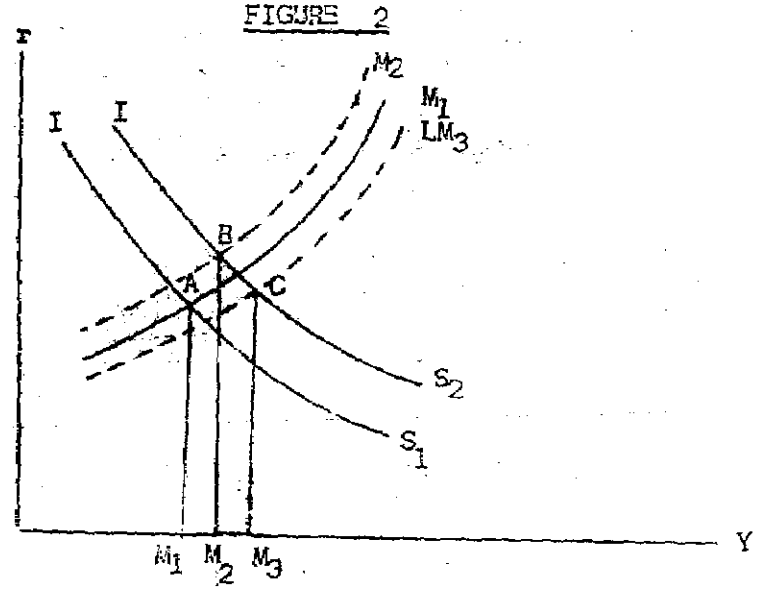
$$\frac{d-I_w}{Q} = \frac{d-L_w}{L_y + tnc_1^*\,(d-L_w)}$$

However, the net effect of a change in government expenditure may not be equal to the algebriaic sum of the two effects. It will depend on

the simultaneous interactions of all the relevant functions.

This point is illustrated by Figure 2, where the long-run equilibrium is at a point A, assuming that government expenditure equals tax receipts. An increase in government expenditure shifts the IS curve to the right, say, to IS 2. Now, whether the LM curve shifts to the left, right or remains intact depends on the particular method of financing this increased government expenditure. If the deficit is financed entirely by new money creation, i.e. d = 1, the LM curve shifts to the right, say, to LM_3 and a new equilibrium is established at C.

FIGURE 2



If the deficit is financed entirely by bond sales to the public, i.e. d = 0, the LM curve shifts to the left, say, to LM_2 and a new equilibrium is established at B. In this case the contractionary *portfolio impact* of the increase in wealth in the form of government securities will lead to a higher interest rate than at previous equilibrium point, A. It is possible to find a value of $d(d = L_w)$ such that the LM curve does not shift on either side. The LM curve will remain constant if the increase in the supply of money is just sufficient to compensate for the increase in the demand for money brought about by the simultaneous increase in bond supply consequent upon a given budget deficit. Thus, while the wealth effect of a deficit on total expenditure is always expansionary its portfolio effect can be expansionary or contractionary depending on the method of financing.

It is slightly complicated to analyse how a given policy of deficit financing would affect the price level. A simple way to analyse this effect is to find out how the price level responds to a parametric shift in d (the proportion of budget deficit financed by money creation). From (19)

$$\frac{\partial P}{\partial d} = P\left(\frac{tc_0^* + tnc_0^*}{H} - \frac{I_r(G^*-(tc_1^* - tnc_1^*)\,YC - tnc_1)}{(NL_r - KI_r)YC+DL_r - LI_r-AL_r-QI_r}\right)$$

Now the numerator of the first term in parentheses will be negative as implied by the progressive tax system and the denominator of the second term will also be negative to ensure a positive solution for P under all circumstances whether H and the numerator of the second term, NU will be positive or negative will depend upon the following conditions:

$$H < 0 \quad \text{if } d > L_w \text{ and } \left[M^*(1-L_w) - (tc_0^* + tnc_0^*)\,(d-L_w)\right] > L_w B^*$$

$$NU > 0 \quad \text{if } G^* > (tc_1^* - tnc_1^*)\,YC + tnc_1$$

Thus,

$$\frac{\partial P}{\partial d} > 0 \quad \text{if } H < 0 \text{ and } NU > 0$$

In words, an increase in the proportion of budget deficit financed by money creation would generate inflationary pressure if

(1) this proportion (d) is greater than the wealth effect on the demand for money (L_w),

(2) the non-wealth demand for money and the possible tax relief on account of the reduction in average tax caused by expansionary monetary and fiscal policies are greater than the demand for money arising out of bond holding and

(3) Government expenditure is greater than the additional tax recovery from the corporate sector (on account of differential tax rates applicable to corporate and non-corporate sectors).

It is clear that the inflationary effect of a budget deficit will depend upon the level of prices. As the proportion of deficit financed by money creation increases its triggering effect on prices will increase as the price level rises.

How do open market operations affect the level of income and interest rate? The income effect of open market operations can be obtained by differentiating (19) with respect to the parameter, v. This is

$$\frac{dY}{dv} = \frac{I_r}{AL_r + QI_r}$$

When the Reserve Bank purchases government securities from the open market it increases money supply which puts a downward pressure on the interest rate. This reduction in interest rate will stimulate investment by I_r which is the primary effect on income. The multiplier effect is given by $\frac{1}{AL_r + QI_r}$. How the policy of open market operations differs from that of fiscal policy or debt management policy can be analysed by comparing $\frac{dY}{dG^*}$, $\frac{dY}{dd}$ and $\frac{dY}{dv}$.

One important consideration is relevant here. If the Reserve Bank buys government securities (with newly created money) the government no longer pays interest rate on these securities; whatever profit accrues to the Reserve Bank goes to the government. This reduction in interest payment by the government would imply a corresponding reduction in disposable income; that is, an increase in v implies a reduction in YD. In this case the effects on aggregate economic variables will depend upon the policy adopted by the government. The reduction in interest bill improves the government's budgetary position. The government may remove this disequilibrium by reducing taxes or increasing transfer payments.[12] The method by which taxes are reduced is crucial to the final result.

If tax rate on non-corporate income is reduced $\frac{dY}{dv}$ will be higher than otherwise, because a reduction in tnc_1* depresses A and R and hence raises $\frac{dY}{dv}$. A reduction in noncorporate income tax rate increases savings and thus creates excess demand in the market for government

---

[12] R.A. Mundell, "Money, Debt and the Rate of Interest", Journal of Political Economy, December 1960.

securities so that the LM curve shifts to the right by $(d-L_w)$ as can be seen from equation (18)[13]. The IS curve shifts the left by $(f+c_1)$ YC given by equation (19). This would lead to a reduction in interest rate. If, alternatively, corporate income tax rate, tc_1^*, is reduced investment in corporate securities becomes attractive so that their value will rise. In this case, effect of the reduced disposable income (due to interest saving by the government) is to lower the value of government securities and raise the value of corporate securities; the negative wealth effect of the reduction in the public debt is cancelled by the positive wealth effect of the capital gains experienced by owners of corporate securities. Total wealth remains unchanged and so the LM curve does not shift. But the reduction in corporate income taxes enhances the rate of return of capital so that investment increases. (In equation (3) TC declines and I increases.) Hence the IS curve will shift to the right by $(f+c_1 + \frac{I_{tc}}{YC}_2 + I_{tc})$, inducing a higher rate of interest. Open market purchases combined with corporate income tax reductions, therefore, raise the equilibrium rate of interest. The fiscal effect of monetary policy is in the opposite direction from that of the effect of the expansionary monetary policy. Just like monetary effect of deficit financing can be expansionary, neutral or contractionary fiscal effect of monetary policy can be credit loosening or credit tightening.

The model analysed so far is essentially static. All the variables relate to the same time period and no rates of change in the variables are allowed for. The model can by dynamised in several ways. Introducing acceleration principle in the investment function would make the model dynamic; allowing for a process of partial adjustment in the demand for money function or permanent income effect or habit persistence in the consumption function would also dynamise the model. We assume that the demand for money function depends upon the money rate of interest, i, among other factors while the investment function depends upon the real rate of interest, r. The money rate of interest can be defined as the real rate of interest plus the rate of price inflation. Thus, substituting (10-A)

---

[13] One finds an additional shift factor of $(d-L_w)$ YC in the context of equation (18) which arises on account of the effect of the tax rate reduction on the budget deficit. This effect should be ignored since we are concerned with this very effect.

in place of (10) and using (10-B) we get a dynamic macro model.

$$10\text{-A.} \qquad MD = M_0 + L_y\, Y - L_r\, i + L_w\, W$$

$$10\text{-B.} \qquad i = r + \frac{dP}{dt}\,\frac{1}{p}$$

This modification does not change the IS curve. It affects the LM curve, which is modified as

$$18\text{-A.} \qquad QY - L_r\, r + H\left(\frac{1}{p}\right) - L_r\left(\frac{dP}{dt}\,\frac{1}{p}\right) + K\,YC + L = 0$$

As compared to (18) equation (18-A) contains a new term, $-L_r\,\frac{dP}{dt}\,\frac{1}{p}$. When combined with the IS curve, equation (17), the solution turns out to be a differential equation in P, which is

$$19\text{-A.} \qquad Y = \frac{BL_r - HI_r}{AL_r + QI_r}\left(\frac{1}{p}\right) + \frac{I_r L_r}{AL_r + QI_r}\,\frac{dP}{dt}\,\frac{1}{p} + \frac{NL_r - KI_r}{AL_r + QI_r}\,YC + \frac{DL_r - LI_r}{AL_r + QI_r}$$

Equation (19-A) is the economy's dynamic aggregate demand. In order to find out the equilibrium level of income (19-A) is to be solved with an aggregate supply equation. To simplify matters we assume that the economy faces an inelastic supply function, $Y = Y^*$. Now, equation (19-A) can be written as

$$21. \qquad \frac{dP}{dt} + K_1^* + K_2^*\, P = 0$$

where,

$$K_1^* = \frac{(BL_r - HI_r)}{I_r L_r}$$

$$K_2^* = \frac{(NL_r - KI_r)\,YC + DL_r - LI_r - Y^*(AL_r + QI_r)}{I_r L_r}$$

Solution[14] of 21 is

$$22. \quad P = (P_0 - P^*)\, e^{-K_2^* t} + P^*$$

where,

P_0 = the initial price level

$P^* = -\frac{K_1^*}{K_2^*}$ (steady state) equilibrium price level.

A careful analysis of P^* shows that, under three conditions mentioned above, the steady state price level will be higher, the greater the proportion of budget deficit financed by money creation; that is,

$$\frac{\partial P^*}{\partial d} > 0.$$

Equation (22) is non-linear in d so that a true empirical test would require application of a non-linear estimating method. Alternatively, one can estimate the entire model using appropriate methods and solve it for P. Due to obvious limitations in using nonlinear methods of estimates and developing a complete macroeconomic model, we have followed a rough and ready procedure to give empirical content to equation (22). Theoretical considerations suggest a positive relationship between P and d. We postulate that this relation is linear in variables but the slope coefficient is not constant; it varies with the changes in the level of deficit financing. In symbols,

$$23. \quad P_t = a_0 + a_1 \, d_{t-1} + U_t$$

$$24. \quad a_1 = b \, DEF_{t-1}$$

Where, d is the proportion of RBI credit to total bank credit advanced to the government. Substituting (24) in (23) we get

$$25. \quad P_t = a_0 + b \, RBI_{G,t-1}$$

---

[14] I am grateful to Kanti Swarup and V.K. Agarwal for helpful discussion on solution of differential equations.

where, $RBI_{G,t-1}$ is RBI credit to the government with a log of one quarter.

Ordinary Least Squares

1.1 $P_t = \underset{(10.5329)}{0.7381} + \underset{(16.5066)}{0.2841}\ RBI_{G,t-1}$ $\quad \bar{R}^2 = 0.922$, D.W = 0.809

First Order Markov Scheme

1.2 $P_t = -25.1169 + 0.0088\ RBI_{G,t-1} + u_t - \rho u_{t-1}$ $\quad \bar{R}^2 = 0.963$, D.W = 2.03, ρ = 1.19

Second Order Markov Scheme

1.3 $P_t = -25.6636 + 0.0088\ RBI_{G,t-1} + U_t - \rho_1 U_{t-1} - \rho_2 U_{t-2}$ $\quad \bar{R}^2 = 0.964$, D.W = 1.939, ρ_1 = 1.166, ρ_2 = -0.025

First Differences

1.4 $P_t = 2.0811 + 0.0152\ (RBI_{G,t-1} - RBI_{G,t-2}) + P_{t-1}$ $\quad \bar{R}^2 = 0.955$, D.W = 1.577

Note : Numbers in parentheses are t-ratios. Since t-ratios in other equations are equally high, they are not given.

Table 1

WHOLESALE PRICES AND RBI CREDIT TO GOVERNMENT

	Wholesale price index 1961-62 = 100	RBI Credit to Government Rs. in Crores	Wholesale price index estimated by 1.4	Residual
1968.1	162.7	3,242.7		
1968.2	163.2	3,363.3	166.2	-3.0
1968.3	168.9	3,257.6	167.1	1.8
1968.4	166.5	3,262.1	169.4	-2.9
1969.1	163.1	3,471.7	168.6	-5.5
1969.2	167.8	3,594.4	168.4	-0.6
1969.3	174.2	3,441.7	171.3	2.5
1969.4	170.0	3,653.0	174.0	-4.0
1970.1	174.4	3,474.4	178.3	-3.9
1970.2	178.6	3,591.0	170.7	7.9
1970.3	182.2	3,441.7	182.3	-0.1
1970.4	181.5	3,547.8	182.2	-0.7
1971.1	182.1	3,716.0	185.2	-3.1
1971.2	190.7	4,240.0	186.7	4.0
1971.3	191.1	4,200.0	200.7	-9.6
1971.4	187.6	4,345.0	192.6	-5.0
1972.1	191.1	4,455.0	191.9	-0.8
1972.2	193.3	4,926.0	194.8	-1.5
1972.3	206.8	5,062.0	202.6	4.3
1972.4	210.8	5,001.0	210.9	-0.1
1973.1	217.3	5,309.0	212.0	5.3
1973.2	234.0	6,004.0	224.1	10.0
1973.3	251.7	6,135.0	246.6	5.1

Equation (25) is estimated using quarterly data from 1968.1 to 1973.3. A straight-forward applications of Ordinary Least Squares technique yielded

good results[15] in terms of R^2 and t-ratios of the coefficients (Equation 1.1). But the Durbin-Watson statistic was too low indicating serial correlation of the residuals. To remove this autocorrelation the variables were transformed as $(Y_t - \rho Y_{t-1})$ and $(RBI_{G,t-1} - \rho RBI_{G,t-2})$. Scanning the entire parameter space of ρ from -1.0 to +1.0, we selected a value of ρ at which the sum of the Squares of the residuals was minimum. Surprising enough the optimum value of ρ is estimated to be greater than unity($\rho = 1.18$). The application of Second Order Markov Scheme $(U_t = \rho_1 U_{t-1} + \rho_2 U_{t-2} + e_t)$ yielded $\rho_1 = 1.166$ and $\rho_2 = 0.025$ with serial correlation of the residuals entirely eliminated. These results suggest that $\rho = 1$. Therefore, equation 1.4 was estimated using first differences of the variables. In all cases the coefficient b is positive and statistically significant at 1% level. Due to different schemes of transformations the quantitative values of b are not comparable, however. In any case, 1.4 provides a meaningful explanation of the current inflationary situation in India.

Conclusions

The main conclusion emerging from the above analysis is that the inflationary impact of a budget deficit depends upon the method used to finance that deficit. Using a static and a dynamic macroeconomic model it has been shown that the proportion of budget deficit financed by money creation is a crucial determinent of the rate of price inflation. The price inflation will be greater, the higher the proportion of budget financed by money creation. Conditions under which this conclusion holds have been derived. A crude empirical test is also provided.

---

[15] When seasonal dummies were introduced the explanatory power of 1.1 did not improve and the coefficients of seasonal dummies were statistically not different from zero.

* * * * *

58/74

r pan
31 jan 74