

DOES FISCAL POLICY MATTER?

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Perhaps the most fundamental achievement of the Keynesian revolution was the re-orientation of the way economists view the influence of government activity on the private economy. Before Keynes, it was a commonplace that government spending and taxation were powerless to affect the aggregate levels of spending and employment in the economy; they could only redirect resources from the private to the public sector. This, of course, is an immediate corollary of Say's Law. In a full-employment context, each dollar of additional government spending can only "crowd out" exactly one dollar of private spending; it cannot alter the over-all level of aggregate income.

The Keynesian demonstration that with sticky wages unemployment can persist changed all this. Economists began to stress the macro effects of government spending and taxation. It became a commonplace that not only would a dollar of additional government spending raise national income by the original dollar but that this expenditure would have multiplier effects of perhaps several dollars more. The old view that government spending simply crowded out

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private spending was banished to the scrapheap of discarded economic doctrines. At the same time a new question arose: Does monetary policy matter?

Lately, however, the resurgence of the quantity theory of money -- under the new name of "monetarism" -- has brought with it both a renewed belief in the power of monetary policy and a resurgence of interest in the crowding-out effect. Both the theoretical and empirical work of the monetarists has called into question the basic Keynesian principle that government spending can alter the aggregate level of employment. The new question appears to be: Does fiscal policy matter?¹

The purpose of this note is to re-examine the underlying basis of the Keynesian multiplier in view of the monetarist critique. We hope to show that there are still good theoretical reasons to believe in the efficacy of fiscal policy in an economy with underemployed resources.

I. The Problem Defined

There are several levels at which crowding-out has been alleged to occur. The most obvious, of course, is the possibility that government will engage in productive activities which would otherwise be provided by the private sector, so that public spending

¹L.C. Andersen and J.L. Jordan (1968); R.W. Spencer and W.A. Yohe (1970); and many of the writings of Milton Friedman.

would simply supplant private investment. It can be argued, for example, that total investment in electrical utilities in the Tennessee Valley area would be much the same today even if the government had never created the Tennessee Valley Authority. However, for the bulk of government expenditures -- on national defense, courts, etc. -- it is hard to imagine that public-sector outlays are simply replacing potential private outlays on a dollar-for-dollar basis. In any case, this is not the sort of crowding out we wish to discuss, and would occur whether the spending were financed by taxes, bonds or money.

A second level of crowding-out is an integral part of the Keynesian tradition and is, in fact, disputed by almost no one. This is the notion that deficit spending not accompanied by new issues of money carries with it the need for the government to float debt issues which compete with private debt instruments in financial markets. The resulting upward pressure on interest rates will reduce any private expenditures which are interest-elastic -- which may include some spending by state and local governments as well as private spending on consumer durables, business fixed investment and residential construction. This financial side-effect will partially offset the expansionary effect of the original increase in public spending. Thus in a monetary economy the government spending multiplier is certainly lower than the naive Keynesian formula: $\text{multiplier} = 1/(1 - \text{marginal propensity to spend})$, and is lower for bond-financed spending than it is for money-financed spending.

There is no theoretical controversy over this second level of crowding-out. The only debatable issues are empirical. How much will interest rates rise in response to the greater demand for money and supply of bonds engendered by the government spending? How much will investment fall in response to the rise in interest rates? It is by now well-known that only a zero interest-elasticity of the demand for money will give rise to a multiplier of zero, i.e., make fiscal policy impotent. While this assumption was formerly associated with the new quantity theorists,² there is by now an overwhelming accumulation of empirical evidence against it, and the monetarists have more or less disavowed it.³

Yet monetarists still cling to the view that fiscal policy is powerless, i.e., the multiplier for bond-financed government spending is zero. How can this be so? A possible answer is that when there are significant wealth effects in the model the simple Keynesian story (which is summarized, say, in the IS-LM model) closes the books too soon. Any government deficit requires the issuance of some sort of debt instrument -- outside money or interest-bearing bonds -- and this increase in private wealth will have further reverberations in the economy. It is precisely these wealth effects -- which provide the rationale for the third level of crowding-out -- that we wish to investigate in this paper.

²See Milton Friedman (1956, 1959).

³Friedman (1966), Fand (1970).

Figures 1 and 2 illustrate the problem. In Figure 1, IS_0 and LM_0 represent the initial equilibrium of the economy in the ordinary Hicks-Hansen model. Government spending is indicated by an outward shift of the IS curve to IS_1 . Income rises by $Y_1 - Y_0$. Income does not rise all the way to Y_2 -- which represents the naive multiplier effect, $dY = (1/MPS)dG$ because of the second level of crowding-out alluded to above.

This is where the usual textbook story ends, and if there are no significant wealth effects that is correct. However, when wealth effects exist, Y_1 is not an equilibrium position. Greater wealth will, presumably, mean higher levels of consumption out of any given income flow; thus the IS curve will shift out further to IS_2 in Figure 2. This augments the ordinary multiplier. But the greater wealth will also affect the financial markets. Increased household wealth will presumably mean increased demands for money (and bonds) at any level of income and interest rates, represented by a shift in the LM curve to LM_2 in Figure 2.

The outcome of these last two shifts may be either expansionary or contractionary on balance as Silber (1970) has stressed. Advocates of complete crowding-out, of course, believe the result to be contractionary. If they are correct, as long as a budgetary deficit exists there will be increases in private wealth which have deflationary impacts on the level of national income. In the long-run, the fiscal policy multiplier is negative.

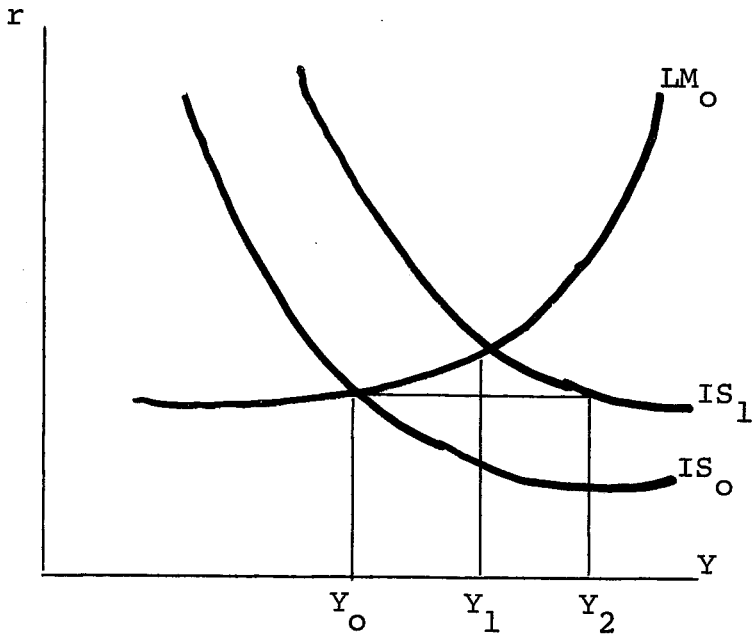


Figure 1

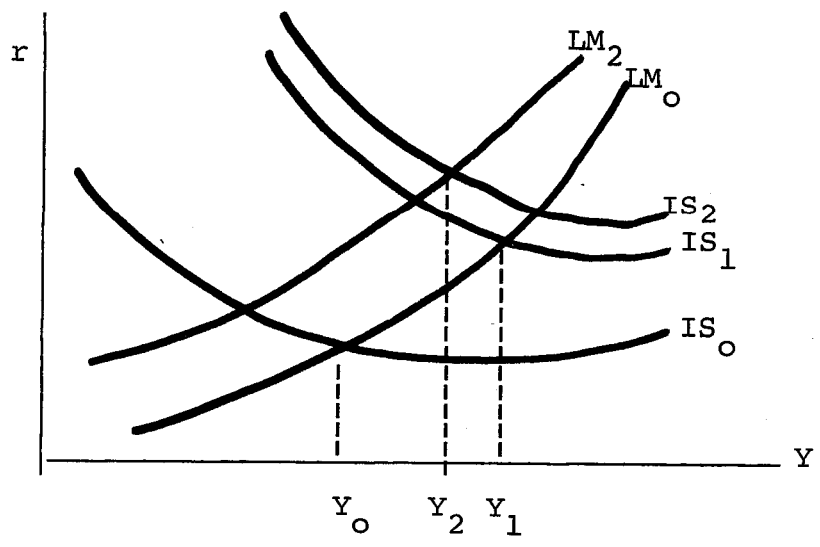


Figure 2

On the other hand, old-fashioned Keynesians have always believed that government spending financed by issuing new bonds will raise the level of economic activity.⁴ After all, if this were not so, symmetry would imply that reducing spending in order to pay off part of the national debt would be expansionary.

But is it only faith in Keynes that supports this view? We hope to show that in fact there are good theoretical reasons to believe that debt-financed deficit spending will be expansionary, i.e. to believe that fiscal policy works. In particular, we shall prove the following two results:

THEOREM I: In the simple IS-LM model (with fixed capital stock), the sign of the pure government expenditure multiplier is in principle ambiguous in the long run; but the empirical magnitudes necessary to render deficit spending contractionary imply that the system is unstable under bond-financed deficits (though stable under money financing).

THEOREM II: When we allow for the fact that the capital stock changes whenever net investment deviates from zero, no such ambiguity arises; under the usual assumptions deficit spending is always expansionary, and the system is always stable, irrespective of the mode of financing.

⁴There is no controversy over government spending financed by printing money. Both sides agree that it will be expansionary; but one group likes to call it fiscal policy, while the other prefers to call it monetary policy. In terms of Figure 2, the LM curve would shift outward instead of inward if financing were by money instead of by bonds.

The intuition behind Theorem I is clear. The net wealth effect from an increase in the stock of government bonds outstanding is the resultant of an expansionary effect via increased consumption and a contractionary effect via increased portfolio demand for money, higher interest rates, and reduced investment. Suppose this net wealth effect were actually contractionary as in Figure 2. Then national income -- and hence tax receipts -- would be lower in the second period (at Y_2) than in the first (at Y_1). But the bulge in government spending that initiated the whole process is assumed to remain constant. This means that the budget deficit would be even larger in the second period than in the first, and a second issue of new bonds, larger than the first, would be required. If the net wealth effect continues to be negative, Y_3 will be less than Y_2 , and the process would repeat indefinitely, with income falling and the budget deficit rising. In other words, in this anti-Keynesian case the economy would be unstable. There would be no convergence towards a balanced-budget equilibrium as long as the policy of strict bond financing were maintained. Note that this argument applies in principle to any shock which perturbs the budget from equilibrium, not just to government spending.

Theorem II is somewhat less intuitive. Suppose the deflationary case obtained, as depicted in Figure 2. Then the continuing issues of government debt would cause interest rates to rise and national income to fall. But rising interest rates mean that

investment is depressed below what it would otherwise have been, and this means that the capital stock carried over to the next period will also be lower. A smaller inherited capital stock will have a stimulative effect on investment in the next period, which will raise the IS curve and partially offset the initial contractionary impact. At the same time, the falling capital stock will generate wealth effects equivalent to those of the government debt. That is, it will shift the LM curve outward and the IS curve inward. So if the net wealth effect of the rising stock of government bonds is contractionary, the analogous effect of the falling capital stock must be expansionary. It is proved in Section III that these two effects more than offset the deflationary impact of the bond financing.

II. Crowding-Out In The Simple IS-LM Model

The conventional IS-LM model,⁵ with wealth effects added, consists of the following ingredients:

⁵As is well-known, the IS-LM model treats the price level as exogenously fixed, and we shall adhere to this convention. However, it should be noted that we do this strictly for simplicity. There are no real difficulties in adding a production function and a labor market and allowing the price level to be endogenously determined. The result would be that expansionary fiscal policy causes some inflation of the price level which reduces the value of the multiplier for (at least) three reasons: (1) With prices higher, the real value of the money stock is lower, which shifts the LM curve inward; (2) Higher prices reduce the real wealth of the private sector, which has a negative "Pigou effect" on consumption, shifting the IS curve inward; (3) If taxes are progressive in terms of money income, inflation will increase the real yield of the tax system at each level of real income, again lowering the IS curve. While each of these serves to reduce the absolute value of the fiscal multiplier, none of them has any bearing on its sign, which is what is at issue here.

$$\text{(goods-market equilibrium)} \quad Y \equiv \text{NNP} = C + I + G \quad (1)$$

$$\text{(consumption function)} \quad C = C(Y - T, W) \quad (2)$$

$$\text{(net investment function)} \quad I = I(r) \quad (3)$$

$$\text{(tax function)} \quad T = T(Y) \quad (4)$$

$$\text{(demand for real balances)} \quad M^d/P = L(r, Y, W) \quad (5)$$

$$\text{(exogenous money supply)}^6 \quad M^s = M \quad (6)$$

$$\text{(money-market equilibrium)} \quad M^s = M^d \quad (7)$$

$$\text{(definition of wealth)} \quad W = K + M/P + B/P \quad (8)$$

To this we must add what Carl Christ (1967, 1968) has called the "government budget restraint:"⁷

$$P[G - T(Y)] = \dot{B} + \dot{M} \quad (9)$$

Since we shall treat P as fixed, we can set $P=1$ with no loss of generality. Equations (1) - (9) above⁸ are easily reduced to the following three-equation dynamic model:

⁶This is again a simplification solely for the purposes of notational convenience. We here ignore the banking system which enables us to ignore the distinction between inside and outside money, and to treat the money stock as exogenous. These complications could all be brought in, and would in no way affect the central conclusions.

⁷A final simplification is to ignore the fact that changes in the interest rate will change the market value of the existing stock of government debt. Again, this would cost only notational inconvenience to bring into the model.

⁸This is essentially the model studied by Silber (1970), with the added proviso (which is necessary if a long-run equilibrium is to exist) that taxes depend on income.

$$Y = C(Y - T(Y), M + B + K) + I(r) + G \quad (10)$$

$$M = L(r, Y, M + B + K) \quad (11)$$

$$\dot{M} + \dot{B} = G - T(Y) \quad (12)$$

Equations (10) and (11) are the static IS and LM equations which hold at each instant; equation (12) drives the model from one instantaneous equilibrium to the next by changing the stock of wealth.

Before investigating the dynamics of this model, consider the long-run steady-state solution of the differential-equation system. In addition to $\dot{Y} = \dot{r} = 0$, it must satisfy $\dot{M} = \dot{B} = 0$, which by (12) implies that $G = T(Y)$, i.e., the government budget is balanced. But this already implies that the steady state multiplier for government spending which is not financed by higher tax rates (but is ultimately financed by higher tax receipts at the same rates) is, as Christ has pointed-out:

$$\frac{dY}{dG} = \frac{1}{T'(Y)} \quad (13)$$

Observe that this steady-state multiplier is independent of all the functional relations in the model except the tax function, and is independent of the mode of financing. In other words, (13) is the steady-state multiplier for either money-financed government spending or bond-financed government spending, provided only that

the system is stable under each method of financing. This happens because we have more or less defined "equilibrium" to be a situation with a balanced budget.⁹

In other words, what we have found is that to assess the efficacy of fiscal policy it suffices to analyze the stability of the model. If the system is stable, not only is bond-financed spending expansionary, but in the long-run it is just as expansionary as money-financed spending. However, as we shall show below, it turns out that the stability of the system may depend on the method of financing deficits. In particular, for certain sets of parameter values, the economy will be stable under pure money financing but unstable under pure bond financing. In this case the monetarists will be vindicated, at least in the context of the conventional IS-LM model. But their victory may be a pyrrhic one; it is doubtful that we want to model the economy as an unstable system of differential equations.

For the stability analysis in this and the following section, it will be useful to consider the static equilibrium equations (10)-(11) as defining Y and r as functions of M , B , and K for a given G :

$$Y(t) = f(M, B, \bar{K}; G) \quad (14)$$

$$r(t) = g(M, B, \bar{K}; G) \quad (15)$$

⁹If we were to carry out a similar analysis for an exponentially growing economy, it would be more natural to define fiscal equilibrium as a situation in which, say, the public debt (and therefore the budget deficit) was in fixed ratio to national income.

It is a routine exercise in comparative statics to find that the partial derivatives of these functions are

$$\left. \begin{aligned} f_M &= \mu \left[C_W + \frac{I_r}{L_r} (1 - L_W) \right] > 0 ; & g_M &= \frac{\mu}{L_r} [S' - h] \\ f_B &= \mu \beta & ; & g_B = - \frac{\mu}{L_r} h > 0 \\ f_K &= \mu \beta & ; & g_K = - \frac{\mu}{L_r} h > 0 \end{aligned} \right\} \quad (I)$$

where $h \equiv S' L_W + C_W L_Y > 0$; $0 < S' \equiv 1 - C_Y(1 - T') < 1$;
 $\beta \equiv C_W - \frac{I_r}{L_r} L_W$; and μ is the ordinary multiplier: $\mu = \frac{1}{S' + \frac{I_r}{L_r} L_Y}$.

Note that $dY/dB \equiv f_B$ is ambiguous ^{on} a priori grounds.

Equations (14-15) enable us to reduce the dynamic system (10-12) to a single non-linear differential equation:

$$\dot{M} = G - T[f(M, \bar{B}, \bar{K})] \quad \text{under money finance, or} \quad (16a)$$

$$\dot{B} = G - T[f(\bar{M}, B, \bar{K})] \quad \text{under bond finance.} \quad (16b)$$

Under a regime of pure money financing of deficits (and ignoring changes in K), the stability condition for differential equation (16a) is:

$$\frac{\partial \dot{M}}{\partial M} = -T' f_M = -T' \mu \left[C_W + \frac{I_r}{L_r} (1 - L_W) \right] < 0 \quad (17a)$$

which is obviously satisfied. Under a regime of bond financing, the

corresponding stability condition is:

$$\frac{\partial \dot{B}}{\partial B} = -T'f_B = -T'\mu\beta \quad (17b)$$

which has the opposite sign from β , and is therefore ambiguous on purely theoretical grounds. A necessary and sufficient condition for stability under bond financing, then is:

$$\beta \equiv C_W - (I_r/L_r)L_W > 0. \quad (18)$$

But our comparative static analysis above revealed that $dY/dB = \mu\beta$, so Theorem I is proved.¹⁰

What we have found, then, is that the stability of the IS-LM model under bond-financed deficit spending is an empirical question, resting on whether or not condition (18) holds. The stable case corresponds to the case where fiscal policy is normally effective; it implies that if someone discovered a hitherto unsuspected government bond in the attic, the result would be an increase in the net national product. It is an obvious application of the Correspondence Principle that if we wish to use the IS-LM framework to model the behavior of the macroeconomy, and if we believe our model should have the property of dynamic stability, then we immediately deduce that fiscal policy does indeed work as Keynes suggested.

¹⁰For easy comparability with Section III to follow, we have proven only local stability here. In fact, it is possible to prove global stability in the simple IS-LM model considered here.

Even if one eschews this sort of reasoning, it is possible to marshal empirical evidence in support of condition (18). Using the notation $E(X,Y)$ for the partial elasticity of X with respect to Y , (18) can be written:

$$C_W - \frac{E(L,W)}{E(L,r)} E(I,r) \frac{\dot{K}}{K} \frac{K}{W} > 0 \quad (18')$$

Franco Modigliani (1971) has estimated C_W to be about .053 for the U.S.; Gregory Chow (1966) has found $E(L,W) = .64$ and $E(L,r) = -.64$; Charles Bischoff (1971) has estimated $E(I,r)$ at $-.23$. Using these values and ^{the} safely over-optimistic rate of growth of the capital stock of 10%, condition (18') reduces to: $K/W < 2.30$, which must hold since real capital is only one component of total wealth.

We conclude that within the conventional IS-LM framework there are persuasive reasons to believe that fiscal policy works as expected, although the theoretical possibility of perversity remains. However, once we drop the rather odd convention of macroeconomics which treats K as fixed over time in spite of net investment, no such ambiguity arises, even in pure theory. It is to the proof of this assertion that we now turn.

III. Crowding-Out When the Capital Stock May Vary

We wish to make only two small alterations to the IS-LM model of equations (10)-(12). First, we recognize that the change in the capital stock (\dot{K}) is identical to net investment (I). Second, in line with modern investment theory which envisions an equilibrium demand for the capital stock and a disequilibrium demand for investment, we alter the investment function of equation (3) to read:

$$I = I(r, K), \quad I_r < 0, \quad I_K < 0; \quad (3')$$

with the property that $I(r^*, K^*) = 0$ if r^* is the long-run equilibrium interest rate corresponding to any long-run equilibrium capital stock, K^* .

With these modifications, our dynamic system becomes:

$$Y = C(Y - T(Y), M + B + K) + I(r, K) + G \quad (19)$$

$$M = L(r, Y, M + B + K) \quad (20)$$

$$\dot{M} + \dot{B} = G - T(Y) \quad (21)$$

$$\dot{K} = I(r, K) \quad (22)$$

Once again, we can treat the static IS-LM equations, (19) and (20), as defining Y and r as functions of M , B and K :

$$Y = F(M, B, K) \quad (23)$$

$$r = G(M, B, K), \quad (24)$$

with the following comparative-static derivatives:

$$\left. \begin{aligned} F_M &= \mu \alpha > 0 & ; & & G_M &= \frac{\mu}{L_r} (S' - h) \\ F_B &= \mu \beta & ; & & G_B &= -\frac{\mu}{L_r} h > 0 \\ F_K &= \mu(\beta + I_K) & ; & & G_K &= -\frac{\mu}{L_r} (h + L_Y I_K) \end{aligned} \right\} \quad (\text{II})$$

where $\alpha \equiv C_W + (1-L_W) \frac{I_K}{L_r} > 0$. Note that the only change from equations (I) is in the derivatives with respect to K . In particular $dY/dB \equiv F_B$ remains ambiguous. Substitution of (23)-(24) into (21)-(22) reduces our system to two non-linear differential equations:

$$\dot{K} = I[G(M, B, K), K] \quad (26)$$

and either:

$$\dot{M} = G - T[F(M, \bar{B}, K)] \quad (25a)$$

in the case of money financing, or:

$$\dot{B} = G - T[F(\bar{M}, B, K)] \quad (25b)$$

in the case of bond financing.

Let us take up the case of monetary finance first.

Linearizing the non-linear system (25a)-(26) about its equilibrium, M^* , \bar{B} , K^* , $G = T(Y^*)$, $0 = I(r^*, K^*)$, gives:

$$\begin{bmatrix} \dot{m} \\ \dot{k} \end{bmatrix} = \begin{pmatrix} -T'F_M & -T'F_K \\ I_r G_M & I_r G_K + I_K \end{pmatrix} \begin{bmatrix} m \\ k \end{bmatrix}, \quad (27)$$

where $m \equiv M(t) - M^*$ and $k \equiv K(t) - K^*$. Denoting the matrix in (27) by D , the stability conditions are:

$$\text{tr}(D) < 0 \quad (27a)$$

$$\det(D) > 0 \quad (27b)$$

where $\text{tr}(D)$ and $\det(D)$ denote respectively the trace and the determination of matrix D . Substituting from (II) into (27a) yields:

$$\begin{aligned} -T' \mu \alpha + I_K + I_r \left(-\frac{\mu}{L_r} \right) (h + L_Y I_K) &< 0 \\ = -T' \mu \alpha + I_K \mu S' - \frac{I_r}{L_r} \mu h \end{aligned}$$

which is negative since T' , μ , α , h , S' and (I_r/L_r) are all assumed to be positive while I_K is negative. Substituting (II) into (27b) yields:

$$- \begin{vmatrix} T' \mu \alpha & T' \mu (\beta + I_K) \\ \frac{I_r}{L_r} \mu (S' - h) & -\frac{I_r}{L_r} \mu (h + L_Y I_K) + I_K \end{vmatrix} > 0$$

Factoring out $T' \mu > 0$, and replacing the second column by the first column minus the second (which changes the sign of the determinant) yields:

$$\begin{vmatrix} \alpha & \frac{I_r}{L_r} - I_K \\ \frac{I_r}{L_r} \mu (S'-h) & S' \mu (\frac{I_r}{L_r} - I_K) \end{vmatrix} > 0$$

or

$$\mu (\frac{I_r}{L_r} - I_K) [\alpha S' - \frac{I_r}{L_r} (S'-h)] > 0 .$$

But

$$\begin{aligned} \alpha S' - \frac{I_r}{L_r} (S'-h) &= S'(\beta) + \frac{I_r}{L_r} h \\ &= C_W (S' + \frac{I_r}{L_r} L_Y) \quad \text{by the definitions of } \beta \text{ and } h \\ &= \frac{C_W}{\mu} > 0 \quad \text{by the definition of } \mu . \end{aligned}$$

Q.E.D.

This establishes (27b) and thus the stability of the system (27).

Now turn to the system under bond financing of deficits, equations (25b) and (26). Linearizing as before results in:

$$\begin{bmatrix} \dot{b} \\ \dot{k} \end{bmatrix} = \begin{bmatrix} -T' F_B & -T' F_K \\ I_r G_B & I_r G_K + I_K \end{bmatrix} \begin{bmatrix} b \\ k \end{bmatrix} \quad (28)$$

where $\dot{b} = B(t) - B^*$. Defining Δ as the matrix in (28), the stability conditions for the system are:

$$\text{tr} (\Delta) < 0 \quad (28a)$$

$$\text{det} (\Delta) > 0 . \quad (28b)$$

First, substituting from (II) into (28a), we have:

$$- T' \mu \beta + I_K - \frac{I_r}{L_r} \mu (h + L_Y I_K) < 0$$

or, using the definitions of β and h and the fact that $1 - \frac{I_r}{L_r} L_Y \mu = S' \mu$:

$$- \mu \left\{ T' (C_W - \frac{I_r}{L_r} L_W) + \frac{I_r}{L_r} (S' L_W + L_Y C_W) - I_K S' \right\} < 0 .$$

Simplifying and dividing by $-\mu$ gives:

$$C_W [T' + \frac{I_r}{L_r} L_Y] + L_W \frac{I_r}{L_r} (S' - T') - I_K S' > 0$$

which clearly holds since $S' > T'$. This establishes condition (28a) irrespective of the sign of β .

Turning now to (28b), substitution from (II) gives:

$$\begin{vmatrix} - T' \mu \beta & - T' \mu (\beta + I_K) \\ - \frac{I_r}{L_r} \mu h & I_K - \frac{I_r}{L_r} \mu (h + L_Y I_K) \end{vmatrix} > 0 .$$

Following the same manipulations used to establish condition (27b), this can be reduced to:

$$- T' \mu I_K C_W > 0$$

which will again be true for $T', \mu, C_W > 0$ and $I_K < 0$, regardless of the sign of β . Q.E.D.

So the system is (locally) stable under any mode of financing. Since we know the final equilibrium satisfies $G = T(Y^*)$, we therefore know that bond financing of deficits must ultimately be expansionary even though its initial impact, $dY/dB = \mu\beta$, is ambiguous a priori.

IV. Summary and Conclusions

What we have shown is that the Keynesian view of fiscal policy as a means to alter aggregate spending survives the monetarist challenge. Fiscal policy does matter after all. While it is true that in the simplified IS-LM framework the long-run sign of the pure fiscal multiplier is indeterminate a priori (for example, it will be negative if $C_W = 0$ while $L_W > 0$), fiscal policy only acts perversely in unstable systems. Once we allow for the fact that additional government debt will displace real capital in individual portfolios, the possibility of instability and fiscal perversity disappears -- provided only that for a given interest rate net investment is greater the lower the capital stock. Although the time pattern of response, and the behavior of the interest rate and capital stock, may depend on how a budgetary deficit is financed, the long-run multiplier effect on net national product does not.

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