

Macroeconomic Policy in a Small Open Economy when Government Budget Deficits are Financed by Printing Money

SEAN MURRAY*

University College, Dublin

Précis: This paper presents a dynamic macroeconomic model of a small open economy (SOE) in which government budget deficits are financed by printing money, the dynamics arising from a stock-adjustment approach to capital movements and the government's budget constraint. Stability conditions and the medium-term policy multipliers are derived. Fiscal policy raises income in the medium run but an expansionary monetary policy by open market operations (resulting in a fall in the parametric bond stock) reduces income. There are some striking symmetries between fiscal and monetary policies: a one-unit increase in government spending has exactly the same effect on steady-state income, the money stock, and the total bond stock, as a one-unit rise in the stock of government bond.

I INTRODUCTION

In an earlier paper (Murray 1980) I presented a medium-term macroeconomic model of a small open economy (SOE) which is a strict price taker in the market for goods as well as that for assets. That paper examined the effects of monetary and fiscal policies in a flexible exchange-rate SOE on the assumption that government budget imbalances are offset by sales of government bonds to the domestic citizenry. The main results of that paper were:

- (1) Fiscal policy raises income in the short run but has no effect in the long run and that therefore a government wishing to raise income permanently by this means must absorb an ever increasing share of output.
- (2) Monetary policy raises income in the intermediate run.

*An earlier version of this paper was presented to the Dublin Economics Workshop. I am grateful to Rodney Thom for many stimulating discussions and to an anonymous referee for a number of suggestions for improvement, both in this paper and in the earlier one referred to in the text, which suggestions through an oversight I neglected to acknowledge. I am alone responsible for any remaining errors or omissions.

- (3) A policy of bond financing of government budget deficits is inherently destabilising in an SOE, producing at best only a quasi-steady state in which the aggregate bond stock is constant but the stock of domestically held foreign assets is falling (rising) at the same rate at which the stock of government bonds is rising (falling).

The present paper uses essentially the same model as the previous paper to examine the efficacy of monetary and fiscal instruments in an SOE making the opposite polar assumption that the government finances budget deficits (surpluses) by printing (destroying) money. Thus the money stock will be endogenous to the model analysed here. In the comparative static experiments the focus of attention is the medium run, defined as a period short enough for the capital stock to remain fixed and for some degree of price rigidity to persist in the labour market, but long enough for everything else to work itself out (see Section II of the earlier paper).

In the next section the model is set out but discussed only perfunctorily (the interested reader is asked to consult the earlier paper), and reduced to two differential equations in the money stock, and in the stock of foreign bonds held by the domestic private sector. In Section III the stability conditions are derived, as also are the medium-term policy multipliers. Section IV discusses and interprets those results in terms of the underlying economic forces which produce them.

The main policy conclusions are that fiscal policy will raise income in the medium run but that an *expansionary* monetary policy (an open market purchase of bonds) will *reduce* income. The last result confirms for an SOE an earlier result for a closed economy as set out in both Murray (1972) and Blinder and Solow (1973). These results also contradict the earlier conclusions of Mundell (1968) that the government spending multiplier is zero and the money multiplier is the reciprocal of the transactions demand for money in an SOE under flexible exchange rates. The results also establish some striking symmetries between the effects of fiscal and monetary policies. It is shown that a one-unit increase in government spending has exactly the same effect on steady state income, and on the steady state money and total bond stocks, as a rise of one unit in the stock of government bonds. These strong results are explained in the final section.

II THE MODEL

In this section, for the reader's convenience, the model is set out and discussed briefly. (For a further discussion see Murray (1980).) The notation is:

- Y = GNP
 E = domestic private expenditure
 B = the total stock of bonds
 B_f = bonds bought by the private sector from abroad
 B_g = bonds issued by the government and sold to the domestic private sector
 r = the interest rate
 M = the nominal money supply
 π = the exchange rate, set equal to the domestic price level by setting the world price level equal to unity
 S = the trading surplus
 G = government purchases
 t = the marginal tax-transfer rate, a fraction.

The structural equations are:

$$Y = E\left[(1-t)Y + (1-t)B, \frac{M}{\pi} + \frac{B}{r}, r\right] + S + G \quad (1)$$

$$0 < E_Y < 1 ; E_W > 0 ; E_r < 0$$

$$Y = Y(\pi) \quad (2)$$

$$Y_\pi > 0$$

$$r = r\left(Y, \frac{M}{\pi}, B\right) \quad (3)$$

$$r_Y > 0, r_{\frac{M}{\pi}} < 0, r_B > 0.$$

$$G - tY + (1-t)B_g - tB_f = \frac{\dot{M}}{\pi} \quad (4)$$

$$S + B_f = \frac{\dot{B}_f}{r} \quad (5)$$

$$B = B_f + B_g \quad (6)$$

$$r = \bar{r} \quad (7)$$

$$B_g = \bar{B}_g \quad (8)$$

In these equations a dot indicates a time-derivative, a bar indicates a parameter and the subscripted parameters are partial derivatives with the usual signs. For example, E_Y is the marginal propensity to consume, E_W is the effect on expenditure of an increase in financial wealth. Equation (1) is a conventional aggregate demand equation, (2) describes aggregate supply behaviour, (3) is an asset-market clearing condition and supposes that were the interest rate not parametric, it would rise to clear the assets markets if

income or bonds alone rose and fall if money alone rose. The differential equations in (4) and (5) are the government budget constraint, which states that the difference between the government's disbursements (purchases and transfers) and its tax revenues is financed by printing money, and the foreign exchange market equation, which states that the trading surplus, plus income from abroad, is used to purchase foreign bonds. The domestic bond B_g is a promise to pay a unit of the foreign currency in perpetuity (as is the foreign bond). Hence the domestic government bond is of identical quality to the foreign bond, the two are perfect substitutes in portfolios and the total bond stock is simply the unweighted sum of the domestic and foreign bond stocks. Equation (7) makes explicit the strict price taking assumption in the assets markets and (8) defines the government financing regime. The model consists of eight equations, Y , B , B_f , B_g , M , π , r and S and is fully determined without the need for any independent equations in exports and imports.

We now proceed to linearise the system about a steady state. Using a Taylor's series expansion truncated after the first derivative, linearise (1), (2) and (3). Then substitute for π from the linearised version of (2) and for r and M from (7) and (8). This procedure yields:

$$\begin{aligned} [1 - E_Y(1 - t) + E_W \frac{M^*}{\pi^{*2}} \frac{1}{Y\pi}] Y = k_1 + E_r \bar{r} + \frac{E_W}{\pi^*} M \\ + [E_Y(1 - t) + \frac{E_W}{\bar{r}}] B + S + G \end{aligned} \quad (9)$$

$$\bar{r} = k_2 + \frac{r_M}{\pi^*} M + r_B B + [r_Y - r_M \frac{M^*}{\pi^{*2}} \frac{1}{Y\pi}] Y \quad (10)$$

where the k_i are constants. Now, substituting for S from the foreign exchange market clearing Equation (5) into (10), for Y from (10) and for B from (6), we obtain:

$$\dot{B}_f = -(a - 1)B_f - \left[\frac{\beta}{\pi^* \gamma} r_M + \frac{E_W}{\pi^*} \right] M + k'_1 - G - a\bar{B}_g \quad (11)$$

where:

$$a = [E_Y(1 - t) + \frac{E_W}{\bar{r}} + \frac{\beta}{\gamma} r_B] > 0$$

$$\beta = [(1 - E_Y)(1 - t) + E_W \frac{M^*}{\pi^{*2}} \frac{1}{Y\pi}] > 0$$

$$\gamma = [r_Y - r_M \frac{M^*}{\pi^{*2}} \frac{1}{Y\pi}] > 0$$

$$k'_1 = \text{constant}$$

If we substitute for Y from (10) into the government budget equation (4) we obtain

$$\dot{M} = bB_f + t \frac{r_M}{\pi^* \gamma} M + G + (b+1)\bar{B}_g + k'_2 \quad (12)$$

where:

$$b = t \left(\frac{r_B}{\gamma} - 1 \right)$$

$$k'_2 = \text{constant}$$

Equations (11) and (12) are the basic equations which we shall use to analyse the stability and comparative static properties of the model. To this task we now turn.

III STABILITY CONDITIONS AND MEDIUM-TERM POLICY MULTIPLIERS

Necessary and sufficient conditions for stability of the system described by (11) and (12) are

$$(a) \Delta = - \frac{tr_M}{\pi^* \gamma} (a-1) + b \left(\frac{\beta}{\pi^* \gamma} r_M + \frac{E_w}{\pi^*} \right) > 0 \quad (13)$$

$$(b) \text{trace} = - (a-1) + \frac{tr_M}{\pi^* \gamma} < 0$$

where Δ is the determinant. In deriving our intermediate-run policy multipliers we shall assume conditions (13) (a) and (b) and, in addition, that:

$$(c) r_2 = - (a-b-1) < 0$$

$$(d) \left(\frac{\beta}{\pi^* \gamma} r_M + \frac{E_w}{\pi^*} \right) > 0 \quad (13)$$

It was shown in the earlier paper that condition (13) (c) is the condition for *aggregative* stability of bond-financing, that is if (13) (c) holds then the *aggregate* bond stock will converge to a constant. Condition (13) (d) says that the expenditure effect of an increase in the money stock exceeds the output effect (this condition is discussed more fully in the next section). If this holds then an increase in the money stock throws the current foreign balance into deficit and it seems innocuous to suppose that this is the case. On the assumption that (13) (a) to (d) hold, the government spending multipliers are:

$$\begin{aligned}
 \text{(a)} \quad \frac{dB_f^*}{dG} &= \frac{1}{\Delta} \left\{ \frac{tr_M}{\pi^* \gamma} - \left(\frac{\beta}{\pi^*} r_M + \frac{E_W}{\pi^*} \right) \right\} < 0 \\
 \text{(b)} \quad \frac{dM^*}{dG} &= \frac{1}{\Delta} (a - b - 1) = -\frac{r_2}{\Delta} > 0 \\
 \text{(c)} \quad \frac{dY^*}{dG} &= \frac{1}{t} - \frac{dB_f^*}{dG} > 0 \\
 \text{(d)} \quad \frac{dS^*}{dG} &= -\frac{dB_f^*}{dG} > 0
 \end{aligned} \tag{14}$$

where (14) (c) and (d) are derived respectively from the government budget constraint and the foreign balance equations.

Thus under a regime of money-financing income is no longer independent of government spending. Given that an increase in the money stock worsens the trading balance, and negativity of r_2 , an increase in government spending causes a reduction in the stock of foreign bonds. To balance the budget at a higher level of government spending, income must rise by the reciprocal of the marginal tax rate plus the reduction in the stock of foreign bonds (to offset the loss in tax revenues due to the fall in the foreign bond stock). If bond financing is stable in the aggregate, the steady state money stock will rise. Thus Mundell's result that government spending is impotent under flexible exchange rates, is not confirmed under money financing. Since in the steady state the trading deficit equals the flow of income from abroad, and since the latter has fallen, then the trading deficit has improved.

Under money-financing a once for all change in the money supply via an open market purchase or sale of bonds manifests itself in a change in the parametric stock of government bonds. Hence monetary policy consists of a change in B_g . The multipliers are:

$$\begin{aligned}
 \text{(a)} \quad \frac{dB_f^*}{dB_g} &= -1 + \frac{tr_M}{\pi^*} - \frac{\left(\frac{\beta}{\pi^* \gamma} r_M + E_W \right)}{\Delta} \\
 &= -1 + \frac{dB_f^*}{dG} < 0 \\
 \text{(b)} \quad \frac{dM^*}{dB_g} &= \frac{1}{\Delta} (a - b - 1) = -\frac{r_2}{\Delta} > 0 \\
 \text{(c)} \quad \frac{dY^*}{dB_g} &= \frac{(1 - t)}{t} - \frac{dB_f^*}{dB_g} > 0 \\
 \text{(d)} \quad \frac{dS^*}{dB_g} &= -\frac{dB_f^*}{dB_g} = 1 - \frac{dB_f^*}{dG} > 0
 \end{aligned} \tag{15}$$

where the last two results are again derived from the government budget and foreign exchange equations.

An increase in the stock of government bonds will reduce the stock of foreign bonds, raise the money stock and raise income. The result in (15) (c) that an *expansionary* monetary policy *reduces* steady state income, confirms for a small open economy an earlier result for a closed economy due to Murray (1972), and Blinder and Solow (1973), but contradicts a result of Mundell (1968). Again the steady state trading deficit improves by the amount of the fall in foreign income.

IV THE RESULTS INTERPRETED

We now turn to interpret and discuss our stability and comparative static results. In order to sign the latter, we assumed only that the model is stable, that bond-financing is stable in aggregate, and that an increase in the money supply throws the foreign balance into deficit. For the purposes of exposition only, we shall make further assumptions as we proceed, but none of these additional assumptions is necessary to any result.

The phase diagram Figure 1 illustrates the dynamic behaviour of the model. The curve labelled BB plots the singular line of Equation (12), and shows combinations of money and of foreign bonds which yield a balanced government budget. A rise in the stock of foreign bonds has two separate effects on the government budget deficit and therefore on the rate of money creation, summarised in the coefficient on B_f , which is

$$b = t\left(\frac{r_B}{\gamma} - 1\right)$$

Firstly, if the stock of foreign bonds rises, this puts upward pressure on the interest rate and to relieve this pressure and maintain portfolio balance at the fixed world rate of interest income must fall by $\frac{r_B}{\gamma}$ and with it tax revenue. Secondly, an increase in foreign bonds directly raises income from abroad, and with it tax revenues (because income from abroad is taxed at the same marginal rate as income from any other source). The first effect operates to worsen the government budget deficit, the second to improve it. We assume (for exposition only) that the first effect predominates, so that the partial effect of an increase in the bond stock is to worsen the deficit. The coefficient on M is unambiguously negative. A rise in M must be accompanied by a rise in income if portfolio balance is to be maintained at a fixed interest rate. Hence tax revenues increase and the deficit improves. Therefore, since a rise in the stock of foreign bonds (on our assumptions) worsens the deficit, and a rise in the money stock improves it, then a rise in M must

be accompanied by a rise in B to maintain portfolio balance. Any point above BB is a point of government budget deficit and positive \dot{M} (given M , B_f is too high) and any point below it a point of budget surplus. The arrows show the direction of movement.

The curve labelled FB shows combinations of money and foreign bonds which produce a zero current foreign balance, and therefore a zero rate of change of the foreign bond stock. The coefficient of B_f is:

$$-(a - 1) = - \left[E_Y (1 - t) + \frac{E_W}{\bar{r}} + \frac{\beta r_B}{\gamma} - 1 \right]$$

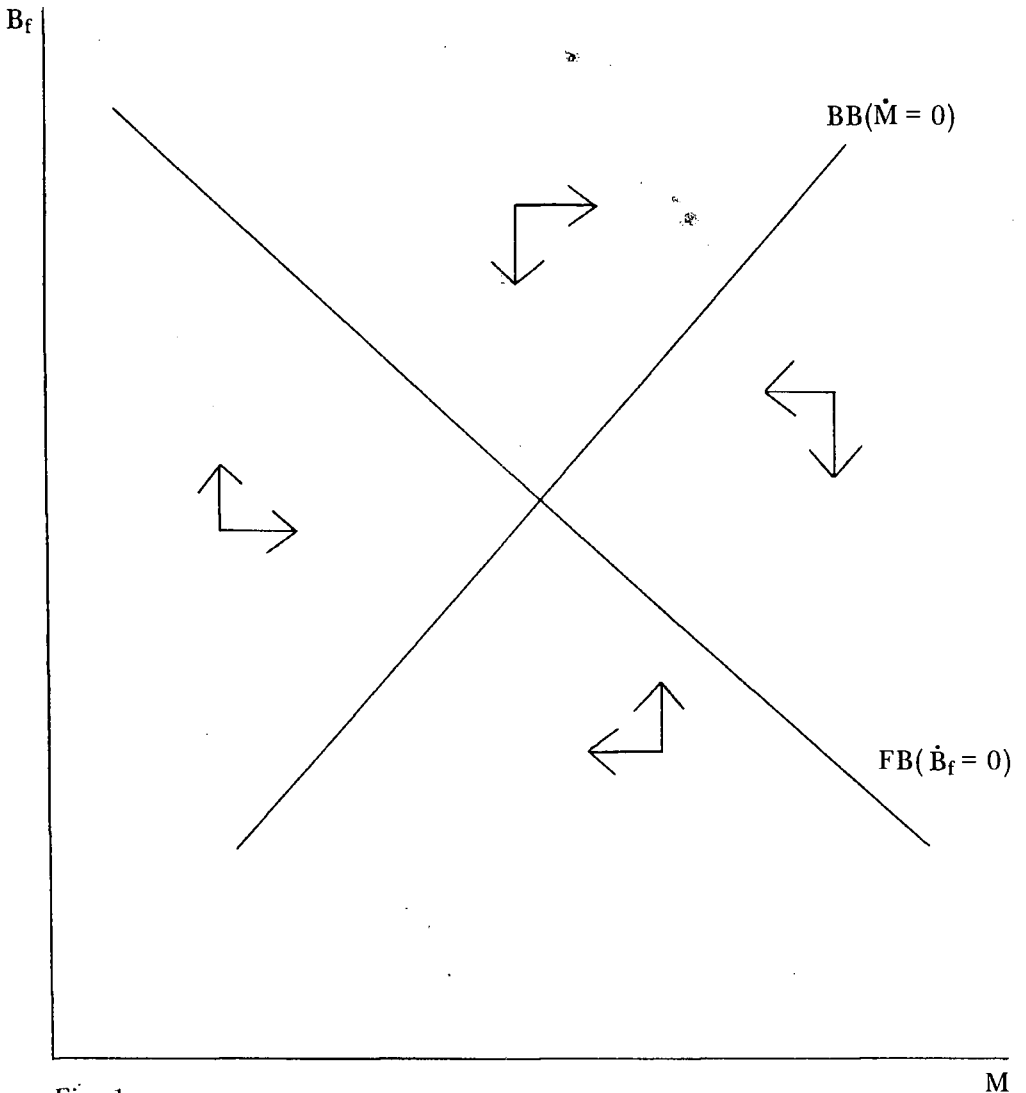


Fig. 1

M

and summarises the economic forces operating on the balance of payments which are set in motion by a rise in the stock of foreign bonds. The first two terms are the income and wealth effects on expenditure of a rise in B_f . These are positive and by themselves cause a deterioration in the balance of payments. The third is the output-effect. Portfolio balance requires a rise in B_f (which by itself would cause a rise in the interest rate) to be accompanied by a fall in output if the rate of interest is to be kept constant. Hence a rise in B_f causes a rise in expenditure and a fall in output, and these forces cause the balance of payments to worsen. The third term means that a rise of one unit in B_f raises income from abroad by one unit and improves the balance of payments. This force is clearly highly destabilising and operates against the other forces summarised in the first three terms. We shall make the assumption most favourable to stability that expenditure and output effects outweigh the effects on income from abroad so that:

$$\frac{\delta \dot{B}_f}{\delta B_f} < 0$$

The coefficient on M is the partial effect on the current balance of a rise in M . The first term is the partial derivative of Y with respect to M in the portfolio balance equation (10) and says that if the money stock rises, then to relieve the downward pressure on the rate of interest then Y must rise to maintain portfolio balance at a fixed r . The first is therefore the output effect of an increase in M . The second term is the effect on expenditure of an increase in the money stock operating via the wealth-effect. Our assumption (13) (d) is that the expenditure effect of a rise in the money stock outweighs the output-effect so that the current balance deteriorates. Given our assumptions, then, an increase in M and B_f cause the current account to deteriorate, and therefore a rise in one must be accompanied by a fall in the other if the current account is to remain in balance and the rate of change of foreign bonds to be zero. The FB curve therefore slopes downward. Any point above FB is a point of current account deficit (the bond and money stocks are too high) and any point below it a point of current surplus. Again the arrows show how B_f changes. Given our sign restrictions the system is stable, but cycles cannot be excluded.

We now discuss the policy multipliers with the aid of Figure 2 which reproduces the FB and BB curves of Figure 1. Suppose the system to be initially at equilibrium at the point A and consider first the effect of an increase in G on the balance budget curve BB. An increase in G has the impact-effect of throwing the government's budget into deficit. An increase in M would improve the government's budget by raising income (the portfolio balance effect) and with it tax revenues. Therefore, at a constant bond

stock, an increase in G has to be accompanied by an increase in M if the government's budget is to be balanced. The BB curve shifts rightwards.

The impact-effect of an increase in G is to cause the foreign balance to deteriorate, since there is complete crowding out of sales of goods abroad. The partial effect of a rise in the money stock is also to cause a worsening of the balance of payments. Hence at constant B_f an increase in G must be

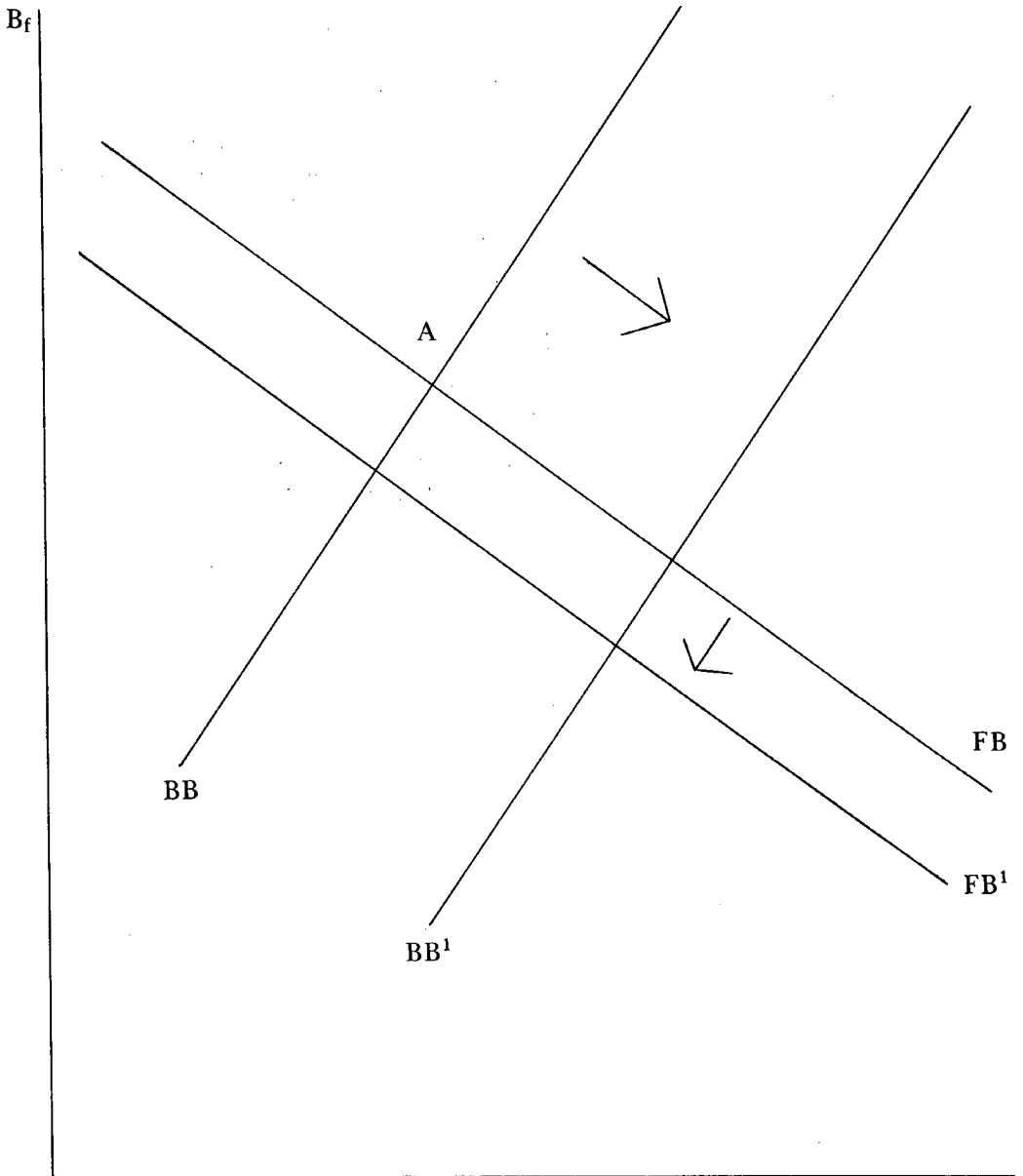


Fig. 2.

accompanied by a fall in M if the balance of payments is to be kept constant at zero. The FB curve shifts leftwards and the new equilibrium must occur below the point A , at a lower equilibrium stock of foreign bonds.

The effect on M of an increase in G depends on the relative strengths of the *downward* shifts (at a constant M) in BB and FB . The deterioration in the government's deficit caused by the increase in G must be accompanied by a fall in B_f (which by itself would improve the government's budget) if the budget is to be balanced. The deterioration in the foreign balance caused by increased G must be accompanied, at constant M , by a fall in B_f if the balance of payments is to be zero. The condition satisfied by negative r_2 is that the downward shift in BB exceeds the downward shift in FB . Thus M rises. The effect then of an increase in G is to turn the point A from a point of foreign balance and government budget balance into a point of foreign deficit and government budget deficit. These deficits are financed respectively by the sale of bonds abroad and by the printing of money. Hence the equilibrium stock of foreign bonds must fall and the money stock must rise.

The effect on income can be seen by solving the steady-state version of the government budget constraint for steady-state income as a function of G and B_f^* thus:

$$Y^* = \frac{1}{t} G + \frac{(1-t)}{t} \bar{B}_g - B_f^*$$

If B_f^* did not change at all as a consequence of the increase in G , then income would have to rise by the reciprocal of the marginal tax rate multiplied by the increase in G to generate additional taxes and balance the budget at a higher G . But since B_f^* falls, output must in addition rise by the full amount of the fall in B_f^* , in order to balance the budget and fully offset the loss of tax revenue on income from abroad (since factor incomes and income from abroad are taxed at the same marginal rate).

The effect of an increase in the stock of government bonds can also be analysed with the aid of Figure 2. The impact-effect of a change in B_g on the rate of accumulation of foreign bonds is

$$\frac{\delta \dot{B}_f}{\delta B_g} = -a = -\left(E_Y(1-t) + \frac{E_W}{r} + \frac{\beta}{\gamma} r_B\right) < 0$$

An increase in the stock of government bonds raises expenditure, via income and wealth effects (the first two terms of a). It reduces income via the portfolio balance effect at a constant rate of interest. Hence the foreign balance deteriorates. Hence, at constant B_f , the money stock must fall to offset this deterioration and FB shifts leftwards.

The impact-effect of an increase in the stock of government bonds on the government's budget deficit is

$$\frac{\delta M}{\delta \bar{B}_g} = b + 1 = \frac{tr_B}{\gamma} + (1 - t) > 0$$

The increase in B_g causes income to fall (for portfolio balance) and with it tax revenues, and this effect is captured in the first term in $b + 1$. The second term is the increase in net coupon payments due to increased B_g . On both counts the government's budget goes into deficit. At constant B_f , the money stock must increase, to raise income and tax revenues and offset the deterioration in the budget. The BB curve shifts rightwards.

In this case also the new intersection must occur below the old, and B_f must fall. As the government budget equation shows, the government's net disbursements have risen (because its interest obligations have risen) and its tax revenues have fallen because of the fall in foreign income. Consequently domestic output Y must rise to generate taxes to offset this deterioration in the budget. A contractionary (expansionary) monetary policy has an expansionary (contractionary) effect on output.

There are some striking parallels between the effects of fiscal and monetary policies. From equation (15) (a) it can be seen that:

$$\frac{dB_f^*}{dG} = \frac{dB_f^*}{d\bar{B}_g} - 1$$

and from (14) (b) and (15) (b) that:

$$\frac{dM^*}{dG} = \frac{dM^*}{d\bar{B}_g}$$

Moreover, if we substitute from equation (15) (a) for $\frac{dB_f^*}{d\bar{B}_g}$ into (15) (c) we obtain:

$$\frac{dY^*}{d\bar{B}_g} = \frac{1}{t} - \frac{dB_f^*}{dG} \quad (16)$$

But the right-hand side of (16) is the same as that of (14) (c) so that

$$\frac{dY^*}{d\bar{B}_g} = \frac{dY^*}{dG} \quad (17)$$

and we have the striking result that an increase on the bond stock has the

same multiplier increase on income as an increase in government spending. If we consider the effects of fiscal and monetary policies on the *total* stock of bonds we have:

$$\frac{dB^*}{dG} = \frac{dB_f^*}{dG} \quad \text{and:} \quad (18)$$

$$\frac{dB^*}{d\bar{B}_g} = \frac{dB_f^*}{dG} + 1 \quad (19)$$

And if we now substitute for $\frac{dB_f^*}{d\bar{B}_g}$ from (15) (a) we have

$$\frac{dB^*}{d\bar{B}_g} = \frac{dB_f^*}{dG} = \frac{dB^*}{dG}$$

and fiscal and monetary instruments have the same effect on the *total* steady state stock of bonds. Indeed, fiscal and monetary policies have the same steady-state effects on everything except the trading deficit and the stock of foreign bonds.

The key to these striking symmetries lies in the government budget constraint, together with the assumption of perfect substitutability between domestic and foreign bonds. Consider again the government budget constraint in a steady state:

$$G - tY^* + (1 - t)\bar{B}_g - tB_f^* = 0$$

A one unit increase in G will have the impact effect of raising the government's budget-deficit by one unit. This will be financed by printing money. This will raise spending, producing a foreign deficit. Therefore the money stock will increase and the bond stock will fall over time until a new steady state is reached with a higher price level and therefore a higher output.

Consider now what happens to the government budget deficit if there is a one-unit sale of bonds. The private sector is in portfolio equilibrium to begin with. It will hold the extra bond, but given perfect substitutability between the domestic and foreign bonds, it will reduce its foreign bond holdings by one unit to restore portfolio balance. The government's net interest liabilities have increased by $(1 - t)$ (on the newly-issued bond), and its tax revenues on income from abroad have fallen by t . Hence a one-unit sale of government bonds will result in a government budget deficit of one unit, (just as a one unit increase in government spending causes a one-unit deficit). Just as in the government spending case, the deficit will be financed by printing

money. This will cause private spending to increase, the current balance to go into deficit, and the bond stock to fall. Thus the time paths of money, bonds, and output will be exactly the same as if the government had increased its spending by one unit, and the terminal (aggregate) assets stocks will be the same.

Finally, two interesting questions remain to be answered. Firstly, why is it that government spending, in these models, has no effect on income under bond-financing (as the earlier paper established), but does under money-financing? Secondly, an increase in G adds directly to aggregate demand, whereas an increase in the stock of government bonds does not, but increases aggregate demand only *indirectly*, via the wealth-effect. Why then under money-financing, do not these differential effects on aggregate demand lead to differential consequences for output, notwithstanding the identical effects on assets stocks?

The answers to these two questions are interrelated. Prachowny has taught us that an increase in government spending on tradeables will have no effect on either output, the price-level, or indeed on the domestic price of tradeables (see, for example, 1973). These results hold even in the case of flexible exchange rates, in which if goods markets are to clear the domestic price level must also be flexible. (Of course, Prachowny was considering a short run in which government spending was unaccompanied by changes in assets stocks, a topic to which we shall return below.) These consequences ensue from the fact that, if an economy is a price-taker in a goods market then so, *a fortiori*, is that economy's government. But, in one respect at least, the economies analysed in these papers are merely special cases of Prachowny's in which *all* commodities are tradeables. Another way of making the same general point as Prachowny in the case of this class of economy is that output is supply-determined, as I argued in the introduction to the earlier paper.

Why then is fiscal policy efficacious under money financing but impotent under bond-financing? The burden of the last paragraph is that a policy which cannot affect supply conditions cannot affect output. Under money-financing, an increase in government spending (which by itself cannot affect output) is accompanied by a rise in the money supply. In turn this causes the price-level to rise (and the exchange rate to depreciate), and since output is an increasing function of the price level, then it also rises. In the case of bond-financing, on the other hand, the excess supply of bonds created by a budget deficit will be eliminated by an equal reduction in the stock of foreign bonds. The total stock of bonds will remain unchanged, as will the money stock, and therefore the price-level, and therefore output. Of course, the key characteristic of money in this world is that it is not held by foreigners. If it were, then the excess supply of money created by a budget deficit

would be got rid of abroad, just as, under bond-financing, the excess supply of bonds was got rid of in essentially the same way. There would be no effect on the price-level or output. Another way of saying the same thing is that in these models we are explicitly assuming that the government of our SOE is big in the market for money.

As for the symmetry between fiscal and monetary policies under money-financing, since output is supply-determined, then the differential demand-effects of the two policies are immaterial. Since the policies create identical deficits, the time-path of the money stock will be the same, as will that of the price-level and output.

REFERENCES

- BLINDER, A. and R. SOLOW, 1972. "Does Fiscal Policy Matter?" *Journal of Public Economics*.
- CHRIST, C., 1968. "A Simple Macroeconomic Model with a Government Budget Constraint", *Journal of Political Economy*.
- MUNDELL, R., 1968. *International Economics*, London: Macmillan.
- MURRAY, SEAN, 1972. "Financing the Government Budget Deficit", University of Essex: Discussion Paper No. 42.
- MURRAY, SEAN, 1980. "Macroeconomic Policy in a Small Open Economy when Government Budget Deficits are Financed by Selling Bonds", *The Economic and Social Review*, Vol. 11, No. 3, April.
- PRACHOWNY, MARTIN F. J., 1973. "The Effectiveness of Stabilization Policy in a Small Open Economy", *Weltwirtschaftliches Archiv*, pp. 214-31.