Title	IMPACT OF ALTERNATIVE GOVERNMENT POLICIES IN AN OPEN ECONOMY
Sub Title	
Author	ALOK, RAY
Publisher	Keio Economic Society, Keio University
Publication year	1975
Jtitle	Keio economic studies Vol.12, No.1 (1975.) ,p.51- 60
JaLC DOI	
Abstract	
Notes	
Genre	Journal Article
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AA00260492-19750001-0051

IMPACT OF ALTERNATIVE GOVERNMENT POLICIES IN AN OPEN ECONOMY*

ALOK RAY

I. INTRODUCTION

The primary objective of the present paper is to extend the analysis of the short-run impact of alternative government policies in an *open* economy model, taking explicity into account the wealth effects that arise out of the goverment budget deficit and the current account trade surplus. Though the "long-run" implications[1] of these two types of wealth effects in an open economy model have recently been investigated,[2] the "short-run" implications have remained unexplored so far.

In this paper we shall make a distinction between a number of alternative concepts of monetary and fiscal policies and shall derive the impact multipliers corresponding to these alternative policies in an open economy model. We shall show that with a "high" degree of international capital mobility bond-financed government expenditure is likely to be less expansionary than tax-financed expenditure under a flexible exchange rate system but that the opposite is true under fixed exchanged rates. In our model the derivation of this unorthodox possibility depends crucially on either a positive wealth effect on the demand for money or the demand for money being (indirectly) a function of disposalbe income rather than total national income. Thus, our analysis will also highlight some interesting implications of the alternative specifications of the demand function for money. Finally, with perfect international capital mobility the distinction between "inside" and "outside" money creation will be found to be highly significant under fixed exchange rates but to be of little significance under a flexible exchange rate regime.

We assume the home country to be "small" so that foreign repercussions can be neglected. The home country is open in that there is international trade in commodities as well as international capital movements. We postulate a simple framework with rigid prices, unemployed resources, and the absence of terms of trade effects.

* I am grateful to R. W. Jones and M. Mussa for their helpful comments on earlier drafts.

[1] In the sense of comparing the initial equilibrium values of the variables with those of a situation where the net addition to wealth again becomes zero, however distant that situation might be.

[2] For example, McKinnon and Oates (1966), McKinnon (1969).

Our model for the home country consists of the following equations:

$$(1) \qquad Y = A(D, i, W) + G + X(r) - I(D, W, G, r)$$

$$(2) \qquad M = L(i, A, W)$$

$$(3) \qquad B = X(r) - I(D, W, G, r) + K(i)$$

$$(4) \qquad dM = dM' + dR(1 - s)$$

$$(5) \qquad dR = B$$

$$(6) \qquad G - T = dM' + dV - s\,dR$$

$$(7) \qquad dW = G - T + X(r) - I(D, W, G, r)$$

$$(8) \qquad D = Y - T,$$

where

Y = national income
A = sum of private consumption and investment expenditure
D = disponsable national income
i = the rate of interest
W = aggregate net worth or assets of the private sector
G = government expenditure
r = price of domestic currency in terms of foreign currency
X = value of exports in domestic currency
I = value of imports in domestic currency
M = total stock of domestic money
M' = the autonomous component of the money supply
R = domestic currency value of foreign exchange reserves
B = domestic currency value of the balance of payments
K = domestic currency value of net capital inflow
T = yield of taxes minus transfers
V = the stock of government bonds absorbed by the private sector (including foreigners)
s = the sterilization coefficient.

A methodological point should be made clear at the outset. In our model, we are equating values of flow variables (like, say, G) with changes in stock variables (like, say, M'). This is possible because we are considering changes in stock variables during the same time period (usually a year) over which the various flow magnitudes are defined. In other words, we are confining ourselves to one-period changes and the multipliers in this paper must be interpreted as one-period multipliers.

Equations (1) and (2) give, respectively, the usual product and money market equilibrium conditions. The demand for money function, however, deserves an explanation. We have made the transactions demand for money depend upon private domestic expenditure (A)[3] rather than national income (Y). The reason for adopting the above specification is that one should expect that the demand for money will be lower if a given Y is sustained by higher foreign spending and lower domestic spending. Since private domestic spending (A) is a function of disposable income (D) rather than national income (Y), government policies which have differential effect on D relative to Y will have interesting effects in our model which are not apparent under alternative specifications. We have also incorporated W in the money demand function. It is assumed that an increase in the wealth of the community causes an increase in the demand for goods, money and bonds as people usually like to hold an increase in their wealth in the form of various types of assets. One can reasonably assume (denoting the partial derivative of A with respect to D as A_D etc.) that $0 \leqq A_D \leqq 1$, $0 \leqq I_D \leqq A_D$, $A_i \leqq 0$, $A_W \geqq 0$, $0 \leqq I_W \leqq A_W$, $(X_r - I_r) \leqq 0$, $0 \leqq I_G \leqq 1$, $L_A \geqq 0$, $L_i \leqq 0$, $0 \leqq L_W \leqq 1$.

Equation (3) defines the balance of payments as the balance of trade (i.e., exports minus imports) plus not capital inflow (K). The net capital inflow is assumed to be an increasing function of i, the domestic rate of interest (the foreign rate of interest being unchanged by "small country" assumption). To simplify analysis we assume away interest payments on past foreign loans by assuming that the country is a zero net creditor to start with.[4]

We make the usual simplifying assumption that there is a 100 percent reserve banking system. Thus, in equation (4) we write dM, the change in the quantity of money, as the sum of dM', the autonomous component of the money supply, and $dR(1 - s)$, the nonsterilized part of the change in foreign exchange reserves. In a fixed exchange rate system, under the assumption that people do not hold any foreign exchange, any change in the stock of foreign exchange, not offset by sterilization operations by the government, must generate an equal change in the quantity of money. Under a flexible rate system there cannot be any change in exchange reserve by definition. Thus equation (4) is applicable for both kinds of exchange rate regimes.

Equation (5) expresses the gain (loss) of foreign exchange reserves as the balance of payments surplus (deficit).

Equation (6) expresses the govenment budget constraint that a government budget deficit must be financed by a combination of money creation and

[3] We can allow the demand for money to depend upon $(A + G)$ instead of A without affecting the analysis of this paper provided (a) we assume that in the background the government is always printing the amount of money needed to satisfy its own demand and (b) M is redefined as the amount of money left for the private sector to absorb.

[4] Since the initial value for foreign indebtendness can be assumed to be as small or large as one likes and it is not endogeneous to our system, assuming it to be zero may not be unduly restrictive for our purposes.

additional bond issues. Note that dV, the entire sales proceeds of additional government bonds, cannot be used to finance the budget deficit. An amount $s\,dR$ of those proceeds must be kept idle by the government to sterlize reserve gains. Therefore, the budget deficit $(G - T)$ must be equal to dM', the autonomous change in money supply, plus $(dV - s\,dR)$, the sales proceeds of additional government bonds that can be used to finance the budget deficit.

Equation (7) defines dW, the change in the wealth of the private sector, as the sum of the government budget deficit and the balance of trade surplus. The underlying definition of W is that it consists of the stock of money and bonds held by the private sector. What constitutes the proper definition of wealth is, as is well known, a rather thorny question and the abvoe definition has been chosen maily for its simplicity. Furthermore, this definition has also been frequently used in the literature.[5,6] The government budget deficit clearly injects an equal amount of money and/or bonds into the private sector. A balance of trade surplus (deficit), in a similar way, must be matched by an equal amount of net accumulation (decumulation) of bonds, gold and/or foreign exchange from the rest—of—the—world in order to balance international accounts and thus will increase (decrease) the stock of wealth by the same amount. Note also that in the present model where we do not allow any difference in the weath effects of bonds and money (or of domestic bonds and foreign bonds) the government cannot offset or even affect the change in wealth, as defined in equation (7), by any kind of "sterlization" or "swap" operations which merely affect the composition of assets.

To simplify the analysis we further assume $G = T$ and $B = X - I = 0$ initially so that for our purposes of deriving one-period multipliers (5), (6) and (7) can be expressed as

$$dR = dB \tag{5'}$$

$$dG - dT = dM' + dV - s\,dR \tag{6'}$$

$$dW = dG - dT + dX - dI\,. \tag{7'}$$

Finally, in equation (8) we define disposable income as income minus taxes plus transfers.

We do not need any equilibrium condition for the bond market in our model. This is so because whenever the commodity and the money markets are in equilibrium, the bond market must also be in equilibrium due to Walras' law.

We shall derive one-period multipliers corresponding to the following four

[5] See, for example, McKinnon and Oates (1966), Ott and Ott (1965). Silber (1970).

[6] That this definition presupposes some kind of a "taxillusion" is also well-known. See, for example, McKinnon and Oates (1966, page 16, footnote 16) for more on this point.

alternative government policies:

(i) Balanced Budget Expansion: $dG = dT > 0, dM' = 0, dM = (1 - s)\,dR$, $dV = s\,dR$.
(ii) Bond-financed Budget Deficit: $dG > 0$, $dT = dM' = 0$, $dM = (1 - s)\,dR$, $dV = dG + s\,dR$.
(iii) Money-financed Budget Deficit: $dG > 0$, $dT = 0$, $dM' = dG$, $dM = dG + (1 - s)\,dR$, $dV = s\,dR$.
(iv) Open Market Operations: $dG = dT = 0$, $dM' > 0$, $dM = dM' + (1 - s)\,dR$, $dV = -dM' + s\,dR$.

Policies (i) and (ii) may be considered as variants of "pure" fiscal policy since M', the autonomous component of the money supply, remains constant in both cases. Under flexible rates this would imply a constant M. Under fixed exchange rates, however, M changes (provided $s \neq 1$) due to the impact of the change in reserves on the money supply. Policy (iv), on the other hand, may be termed as "pure" monetary policy since M' is increasing while both G and T remain constant. Policy (iii) is essentially a combination of policies (ii) and (iv) as the government budget deficit is being entirely financed by an increase in M'.

It will be assumed throughout (unless otherwise noted) that the restrictions on the various partial derivatives of the system hold with strict equalities (e.g., $0 < A_D < 1$, etc.).

III. FLEXIBLE EXCHANGE RATE

Under the flexible rate system the exchange rate varies in such a way that $B = dB = 0$. Totally differentiating equations (1), (2), (3), (8) and then using (4), (5′), (6′), (7′) and the restriction $dB = 0$ we can reduce the system to three equations in three endogenous variables dY, di and dr, given dG, dT and dM'. The reduced form system can be written as

$$(9)\quad \begin{bmatrix} 1 - A_D + I_D & -A_i + K_i(A_W \cdot I_W) & -(X_r \cdot I_r) \\ L_A A_D & L_i + A_i L_A - K_i(A_W L_A + L_W) & 0 \\ -I_D & K_i(1 + I_W) & (X_r - I_r) \end{bmatrix} \begin{bmatrix} dY \\ di \\ dr \end{bmatrix}$$
$$= \begin{bmatrix} dG(1 - I_G + A_W - I_W) + dT(-A_D + I_D + I_W - A_W) \\ dM' - dG(A_W L_A + L_W) + dT(A_W L_A + L_W + L_A A_D) \\ dG(I_W + I_G) - dT(I_D + I_W) \end{bmatrix}.$$

The determinant of the above system is

$$(10)\quad \Delta_1 = (X_r - I_r)[L_i(1 - A_D) + A_i L_A - K_i\{L_A(A_W + A_D) + L_W(1 - A_D)\}] > 0\,.$$

The multipliers corresponding to the four alternative policies (i) through (iv) are, respectively,

$$(11)\quad \frac{dY}{dG} = \frac{(X_r - I_r)[L_i(1 - A_D) + A_i L_A - K_i\{L_A(A_W + A_D) + L_W(1 - A_D)\}]}{\Delta_1} = 1$$

$$(12)\quad \frac{dY}{dG} = \frac{(X_r - I_r)[L_i(1 + A_W) - A_i(L_W - L_A)]}{\Delta_1} \gtreqless 0$$

$$(13)\quad \frac{dY}{dG} = \frac{(X_r - I_r)[(L_i - K_i)(1 + A_W) + A_i(1 + L_A - L_W)]}{\Delta_1} > 0$$

$$(14)\quad \frac{dY}{dM'} = \frac{(X_r - I_r)[A_i - K_i(1 + A_W)]}{\Delta_1} > 0\,.$$

Several interesting points emerge from the above exercise.

First, note that we get a unit balanced budget multiplier in our model. This is interesting since the unit multiplier result is usually derived only in a closed economy model which also neglects the monetary sector. Here we are considering an open economy model which takes into account the repercussions in the monetary sector and we still get the same result. The explanation is simple. With D remaining constant as Y increases by $dG = dT$, the private sector's demand for money and imports remains unchanged.[7] The government's demand for money does not increase by assumption in our model. With constant money supply, the rate of interest does not change. A_i and K_i, though non-zero, cannot affect anything. Increase in G causes an increase in the demand for imports. But the exchange rated alters to maintain balance of payments equilibrium. With unchanged capital flows this implies unchanged balance of trade. The wealth effect is also inoperative since $dG = dT$ and $dX = dI$.[8] Once Y rises by $dY = dT$, there will be no further tendency for Y to change.

Second, a look at (12) shows that bond-financed government expenditure can be *contractionary* in our model since it is possible to have $L_W > L_A$ and $|A_i(L_W - L_A)| > |L_i(1 + A_W)|$. A comparison of (11) with (12) also reveals that bond-financed government expenditure can be *less* expansionary than tax-financed government expenditure. Note that this possibility crucially depends on L_W and/or L_A being positive since with $L_W = L_A = 0$ the numerator

[7] If the demand for money is made a function of Y instead of A or D, the multiplier will be less than unity. Making I a function of Y instead of D does not, however, affect the unit multiplier result under flexible rates.

[8] The assmption that net capital inflow is zero to start with is crucial here. If net capital inflow is initially non-zero, it will continue to be non-zero with its associated wealth effect and the multiplier will not be unity under balanced budget expansion.

in (11) is clearly smaller than that in (12).[9] Moreover, with L_W and/or L_A being positive the likelihood of this unorthodox possibility depends positively on the value of K_i. In the limiting case of $K_i \rightarrow \infty$, dY/dG in (11) remains unity but dY/dG in (12) tends to zero, and bond-financing becomes definitely less expansionary than tax-financing. There are three reasons in the present model for a higher demand for money and hence a higher rate of interest with a bond-financed budget deficit vis-a-vis balanced budget expansion. The increase in wealth due to the budget deficit causes an increase in the demand for money through peoples' attempts at portfolio balance. The demand for money also increase as higher wealth induces greater spending on commodities which, in turn, requires more transactions balances. Finally, since the tax yield remains constant with bond-financed government expenditure but increases with balanced budget expansion, the disposable income and hence the transactions demand for money becomes greater at the same level of Y with bond-financed expenditure vis-a-vis tax-financed expenditure. The higher rate of interest, associated with bond-financed expenditure as against tax-financed expenditure, causes greater capital inflow and hence, under a flexible exchange rate system, a greater balance of trade deficit. The primary expansionary effect of bond-financed expenditure will be greater than that of tax-financed expenditure. But, the secondary contractionary influence through the resultant trade deficit whose size depends upon K_i might tip the balance the other way if the interest-rate-sensitivity of capital flows is sufficiently high. Money-financed government expenditure, however, can never be contractionary in the present model since $L_W \leqq 1$.

Third, as $K_i \rightarrow \infty$, dY/dG in (13) and (14) approach the same value $[(1 + A_W)/L_A(A_W + A_D) + L_W(1 - A_D)]$. This is due to the fact that policy (iii) is essentially a combination of policies (ii) and (iv). We have already seen that dY/dG for policy (ii) approaches zero as $K_i \rightarrow \infty$. Hence, it is quite understandable that policy (iii) will have the same effect as policy (iv) as $K_i \rightarrow \infty$. Under flexible exchange rates with perfect capital mobility, a dollar increment in money supply will have the same expansionary impact, irrespective of whether it is brought about through a budget deficit ("outside" money creation) or through open market operations ("inside" money creation).

IV. FIXED EXCHANGE RATE

Under the fixed exchange rate system $dr = 0$. Totally differentiating (1), (2), (3), (8) and then using (4), (5′), (6′), (7′) and $dr = 0$ we get the following

[9] If demand for money is made a function of Y instead of A or D the possibility of a loan-financed budget deficit being less expansionary than balanced budget expansion will depend crucially on L_W being non-zero.

three equations in three variables dY, di and dB where dG, dT and dM' are the exogenous policy parameters:

$$(15)\quad \begin{bmatrix} 1 - A_D + I_D & -A_i K_i(A_W - I_W) & -A_W + I_W \\ L_A A_D & L_i + A_i L_A - K_i(A_W L_A + L_W) & A_W L_A + L_W + s - 1 \\ -I_D & K_i(1 + I_W) & -(1 + I_W) \end{bmatrix} \begin{bmatrix} dY \\ di \\ dB \end{bmatrix}$$
$$= \begin{bmatrix} dG(1 - I_W + A_W - I_W) + dT(-A_D + I_D + I_W - A_W) \\ dM' - dG(A_W L_A + L_W) + dT(A_W L_A + L_W + L_A A_D) \\ dG(I_W + I_G) - dT(I_D + I_W) \end{bmatrix}.$$

The determinant of the system is

$$(16)\quad \Delta_2 = -A_i[L_A(1 + I_W) + I_D(1 + L_A - s - L_W)] + [K_i(1 - s) - L_i][(1 - A_D)(1 + I_W) + I_D(1 + A_W)] \gtreqless 0 .$$

The sign of Δ_2 is, in general, indeterminate since $(1 + L_A - s - L_W)$ can be positive or negative. With $L_W = 0$ and/or $s = 0$, $(1 + L_A - s - L_W)$ and hence Δ_2 must be positive, however.

The multipliers corresponding to policies (i) through (iv) are, respectively,

$$(17)\quad \frac{dY}{dG} = \frac{1}{\Delta_2}[-A_i\{L_A(1 + I_W) + (I_D - I_G)(1 + L_A - s - L_W)\} + \{K_i(1 - s) - L_i\}\{(1 - A_D)(1 + I_W) + (I_D - I_G)(1 + A_W)\}] \gtreqless 0 ,$$

$$(18)\quad \frac{dY}{dG} = \frac{1}{\Delta_2}[\{-L_i + K_i(1 - s)\}\{(1 - I_G)(1 + A_W)\} - A_i\{(1 - I_G)(L_A - L_W) - (1 - s)(I_W + I_G)\}] \gtreqless 0 ,$$

$$(19)\quad \frac{dY}{dG} = \frac{1}{\Delta_2}[\{-L_i + K_i(1 - s)\}\{(1 - I_G)(1 + A_W)\} - A_i\{s(I_G + I_W) + (1 - I_G)(1 - L_W + L_A)\}] \gtreqless 0 ,$$

$$(20)\quad \frac{dY}{dM'} = \frac{1}{\Delta_2}[-A_i(1 + I_W)] \gtreqless 0 .$$

Note that even under the usual assumption of $I_D \leqq I_G$, *contractionary* balanced budget expansion is a possibility under fixed exchange rates. With no sterilisation ($s = 0$), balanced budget expansion must, however, be expansionary if $I_D \geqq I_G$ (a sufficient condition). The unit balanced budget multiplier holds if $I_G = 0$. As Y rises by $dG = dT$ and D remains constant, the public sector's demand for imports goes up with consequent contractionary influence unless $I_G = 0$. Recall that this restriction was not necessary for unit multiplier under flexible rates.

Comparing (17) with (18) it can be checked that (assuming $\Delta_2 > 0$ and both policies (i) and (ii) to be expansionary) policy (ii) will be more expansionary than policy (i) if and only if

$$(21) \quad \{-L_i + K_i(1 - s)\}\{(1 + A_W) - (1 + I_W)(1 - A_D)\} \\ - A_i\{(s - 1)(I_W + I_D) + (L_A - L_W)(1 - I_D) - L_A(1 + I_W)\} > 0 \,.$$

Since $-A_i\{\ \}$ can be negative the above condition need not necessarily be satisfied. As in the case of flexible rates, bond-financed govenment expenditure could be less expansionary than tax-financed exenditure.

There is an important contrast to be noted here. Under flexible rates the likelihood of policy (i) being more expansionary than policy (ii) increases as K_i increases. In the limiting case of $K_i \to \infty$, we found policy (i) to be definitely more expansionary than policy (ii). Under fixed rates the balance tips the other way. As K_i increases (provided $s \neq 1$) the likelihood of (21) being satisfied clearly increases. In the limiting case of $K_i \to \infty$, (21) will definitely be satisfied since $(1 + A_W) > (1 + I_W)$ and $(1 - I_D) > (1 - A_D)$. Under fixed rates, the higher rate of interest associated with bond-financed expenditure vis-a-vis tax-financed expenditure leads to greater capital inflow, a greater balance of payments surplus and hence a gain in reserves and (unless completely offset by sterilization operations) a secondary monetary expansion. In contrast, under flexible rates it led to a greater balance of trade deficit and a secondary contractionary influence. Thus, international capital mobility has quite opposite implications for the relative stabilizing impact of bond-financed government expenditure vis-a-vis tax-financed expenditure under the two alternative exchange rate systems.

Note, finally, that as $K_i \to \infty$, dY/dM' tends to zero. This explains why the multipliers for policies (ii) and (iii) approach the same value $\{(1 - I_G)(1 + A_W)\}/\{(1 - A_D)(1 + I_W) + I_D(1 + A_W)\} > 0$ under fixed rates with perfect capital mobility. Since policy (iii) is a combination of policies (ii) and (iv), and policy (iv) becomes totally ineffective as $K_i \to \infty$, the effectiveness of policy (iii) must approach that of policy (ii). Under perfect capital mobility injection of additional money is highly effective (in its impact on Y) if brought about through a budget deficit but completely ineffective if done through open market operations. Unlike the flexible rate case, the distinction between "inside" and "outside" money creation is of great significance when there is a high degree of international capital mobility.

Indian Institute of management

REFERENCES

McKinnon, R. I. (1969), "Portfolio Balance and International Payments Adjustment" in *Monetary Problems of the International Economy*, ed. R. A. Mundell and A. K. Swoboda, University of Chicago Press.

McKinnon, R. I. and Oates, W. E. (1966), The Implications of International Economic Integration for Monetary, Fiscal and Exchange-Rate Policy, *Princeton Studies in International Finance, No. 16.*

Ott, D. J. and Ott, A. F. (1965), "Budget Balance and Equilibrium Income," *Journal of Finance*, March.

Silber, W. L. (1970), "Fiscal Policy in IS-LM Analysis: A Correction," *Journal of Money, Credit and Banking*, November.