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A NOTE ON FISCAL POLICY UNDER FLEXIBLE EXCHANGE RATES

by

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Abstract

The paper studies the effects of fiscal policy under flexible exchange rates. The demand for real money balances, in terms of the expenditure basket of goods, is a function of income in terms of the same basket. It turns out that fiscal expansion is expansionary, neutral, or contractionary in the money wage model depending on whether the income elasticity of the demand for money is smaller than, equal to, or greater than one. The price of domestic goods rises, is unchanged, or declines in this model depending on whether the income elasticity is smaller than, equal to, or greater than one.

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1. Introduction

The effects of fiscal and monetary policies have been one of the most intensively studied subjects in open economy macroeconomics. Two aspects of recent work in this area have been a) a more fully specified supply side (Sachs 1980, Ahtiala 1984), and b) endogenous expectations (Branson-Buiter 1983, and Dornbusch-Fischer 1980). The consensus that emerged from this discussion is that with endogenous prices fiscal policy is neutral or expansionary in the money wage model and expansionary in the real wage model (the supply of labor a function of the money wage and real wage, respectively).

The purpose of the present paper is to examine the effects of fiscal policy under flexible exchange rates. The main focus is on a consistent specification of the open economy money demand function. The demand for money is demand for real balances in terms of the goods to be purchased with those balances. They should therefore include imported goods and domestic goods but exclude exported goods. Therefore real balances should be defined with respect to the expenditure price, as is widely accepted. However, by the same logic real income in the demand function has to be defined in terms of the same goods (see Ahtiala 1984).

It turns out that the direction of the effect of fiscal expansion depends on the supply side and the income elasticity of the demand for money. While always expansionary in the real wage model, it is expansionary, neutral, or contractionary in the money wage model depending on whether the income elasticity of the demand for money is less than, equal to, or greater than one. The price of domestic goods declines in the real wage model with generally obtained parameter values, and rises, is unchanged, or declines in the money wage model depending on whether the income elasticity is smaller than, equal to, or greater than one.

In the following, the model is developed in part 2 and solved in part 3.

2. The Model

We will analyze a small open economy, with exogenous foreign goods prices and foreign interest rate, and the absence of foreign repercussions. The foreign demand curve for domestically produced goods is, however, negatively sloped. Capital is perfectly mobile. The equations are, in logs:

$$(1)\quad y = -\alpha(p^d - e) - \beta r + \varepsilon g$$
$$(2)\quad m - p = \gamma(p^d + y - p) - \delta r$$
$$(3)\quad p = \Theta p^d + (1 - \Theta)e$$
$$(4)\quad p^d = \lambda y + \mu e$$

The variables are, all in logs: $y \equiv$ real output, $r \equiv$ interest rate, $e \equiv$ price of foreign currency in terms of domestic currency, $p^d \equiv$ domestic goods price, $p \equiv$ expenditure price, $g \equiv$ real government expenditures, $m \equiv$ nominal money supply.

Equation (1) represents aggregate demand for the domestic good and is a function of the real exchange rate, the interest rate, and government expenditures. The government purchases domestic goods only.

Equation (2) is the money market equation: The real money supply equals the demand, which is a function of real income in terms of the expenditure price, as argued in the Introduction, and the interest rate.

Equation (3) defines the expenditure price as a weighted average of domestic and foreign goods prices. Equation (4) is the reduced-form expression for the supply side. We focus on two alternative conditions for equation (4). In the money wage model, $\mu = 0$ holds. Then supply is a function of p^d alone. In the real wage model, $\mu = 1$, and supply is a (negative) function of the real exchange rate.[1] For an explanation, see Sachs (1980).

The assumption of static expectations is maintained in the model (1) - (4). This allows us to present the key result as simply as possible. Amending the model to allow for perfect foresight over

exchange rate and price movements would leave the qualitative features of the results unchanged.

Substituting (4) into (1) and (3) and (4) into (2) the model may be described by equations (5a) and (5b).

(5a) $\lambda^{-1}(p^d-\mu e) = \alpha(e-p^d) - \beta r + \varepsilon g$

(5b) $m - \Theta p^d - (1-\Theta)e = \gamma[\lambda^{-1}(p^d-\mu e) + (p^d-e)(1-\Theta)] - \delta r$

Equation 5a represents equilibrium in the domestic goods market. It is upward sloping in p^d, e space for both $\mu = 1$ and $\mu = 0$, as represented by the GG curve in Figure 1. For $\mu = 1$ the slope is unity, while for $\mu = 0$ the slope is $1/[1 + (\alpha\lambda)^{-1}] < 1$.

Equation 5b represents money market equilibrium. This is represented by the MM curve in Figure 1. The slope of the MM curve depends upon both the income elasticity of money demand γ, and the assumption concerning the supply side ($\mu = 0$ or $\mu = 1$).

Take the real wage model first. Then the slope of MM is positive (negative) if $((1-\Theta)(1-\gamma) - \gamma/\lambda) < 0$ (> 0). For $\gamma \geq 1$ this is clearly satisfied, but may also hold for $\gamma < 1$. The explanation for this is as follows. Given p^d, a rise is e a) reduces real balances by $(1-\Theta)$, b) by reducing real income, reduces money demand by $\gamma[\lambda^{-1} + (1-\Theta)]$. If a) dominates, there is an excess demand for real balances, and p^d must fall to increase supply and reduce demand for real balances. In this case it may also be checked that the slope of MM is always less than unity, so that the MM curve cuts the GG curve from above. This is illustrated in Figure 1 as the M'M' curve.

Now take the money wage model, setting $\mu = 0$. Then the slope of MM is positive (negative) as $\gamma > 1$ ($\gamma < 1$). An intuitive argument similar to the $\mu = 1$ case can be given for this. In this case however, the MM curve, if positively sloped, need not unambiguously cut GG from above. As this condition is necessary for `sensible` comparative statics, it is assumed to hold in the analysis.[2]

3. The Effects of Fiscal Policy

Now we may analyse the effect of an increase in government spending. This is given algebraically by equations (6), (7) and (8).

$$(6)\quad y = (1/D)\Omega_1 \varepsilon g$$

$$(7)\quad e = -(1/D)\Omega_2 \varepsilon g$$

$$(8)\quad p^d = (1/D)[\lambda(1 - \Theta)(1 - \gamma) - \mu\gamma]\varepsilon g$$

where

$$\Omega_1 \equiv 1 - (1 - \mu)[(1 - \Theta)\gamma + \Theta]$$

$$\Omega_2 \equiv \gamma + \lambda[\Theta + (1 - \Theta)\gamma] > 0$$

$$D \equiv (1 + \lambda\alpha)\Omega_1 + (1 - \mu)\alpha\Omega_2$$

First of all, take the case where $\mu = 1$. Then an expansion in government spending shifts the GG curve in Figure 1 up to the left. Since this causes unambiguous real exchange rate appreciation output must rise, as in (6): In addition, the nominal exchange rate will also experience appreciation. The effect on the domestic price level is ambiguous. For a negatively (positively) sloped MM, the domestic price level rises (falls). In the former case, the nominal appreciation causes a net excess supply of real balances, and p^d must rise to clear the money market, while the opposite occurs in the latter case.

The results of the above paragraph are familiar from previous studies e.g. Sachs (1980). Now however, turn to the case where $\mu = 0$. This corresponds to the complete absence of wage indexation in the labour market. From (6) we see that, in response to a rise in g, output will rise (fall) when $\gamma < 1$ ($\gamma > 1$).

Figure 1 also illustrates this case. Again a fiscal expansion shifts GG up to the left. This will always cause nominal (and real) exchange rate appreciation under the condition that MM cuts GG from above. However, the effect on the domestic price level, and hence output, depends upon the slope of the MM curve. For a given domestic price level the rise in government spending will require a nominal appreciation in order to clear the goods market. For $\delta < 1$ this will cause a net excess supply of real balances, necessitating a rise in p^d to clear the money market. This results in an increase in domestic output, and thus the fall in e required to equilibrate the goods market is reduced. In Figure 1, this corresponds to a move from A to B.

When $\delta > 1$ however, we have quite a different scenario. Again a fiscal expansion requires a nominal appreciation for a given p^d. This now causes a net excess demand for real balances. To equilibrate the money market, p^d must fall, leading to a fall in domestic output. This requires a further nominal appreciation to clear the goods market, and we move from A to C in Figure 1.

This latter case illustrates that contrary to conventional wisdom, fiscal expansion may be contractionary under flexible exchange rates, provided the income elasticity of money demand exceeds unity. When $\delta > 1$, a fiscal expansion causes such an increase in money demand in the home economy that a large real appreciation is required to provide the increase in real balances, and this real appreciation more than offsets the original demand stimulus from the fiscal expansion, resulting in a fall in output.[3]

An important point to note however, is that while domestic output falls (when $\delta > 1$), real income, as defined by $p^d + y - p$, must rise. This follows easily from the fact that real balances must be larger as a result of the fiscal expansion. Thus, even though production and employment are reduced, residents of this economy have a higher income level.

Footnotes

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1. An analogous relationship is found in Purvis (1979, p.229) in an asset substitution context.

2. The diagrammatic analysis was developed by Michael Devereux.

3. Sachs (1980) obtained neutral fiscal policy in the money wage model, specifying real balances and real income in the money demand function in terms of the domestic good. This makes $\Omega_1 = 0$ in this model. Branson and Buiter (1983) specify the demand for money, in terms of the expenditure price, as a function of real income in terms of the domestic good, and characterize the supply side as either a fixed price of domestic output, or fixed output. In the fixprice model, they obtain the same output effects, and in the fixed output model the same price effects as our money wage model with $\gamma < 1$. Argy and Salop (1979) obtain a contractionary income effect in the real wage model and an expansionary one in the money wage model. They specify the money market like Branson and Buiter and assume that the government's expenditure elasticity for the demand for imports is the same as that of the private sector.

References

Ahtiala, Pekka (1984), "A Synthesis of the Macroeconomic Approaches to Exchange Rate Determination". European Economic Review, March, vol.24: 117-136.

Argy, Victor, and Joanne Salop (1979), "Price and Output Effects of Monetary and Fiscal Policy Under Flexible Exchange Rates", IMF Staff Papers, June, vol.26: 224-256.

Branson, W. and W. Buiter (1983), "Monetary and Fiscal Policy Under Flexible Exchange Rates", in Bhandari & Putnam (eds.), Economic Interdependence and Flexible Exchange Rates. Cambridge, Mass.: MIT Press: 251-285.

Dornbusch, Rudiger, and Stanley Fischer (1980), "Exchange Rates and the Current Account", American Economic Review, December, vol.70: 960-971.

Fleming, M. (1962), "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates", IMF Staff Papers, November, vol.9: 369-380.

Mundell, R.A. (1963), "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates", Canadian Journal of Economics and Political Science, November, vol.29: 475-485.

Purvis, Douglas (1979), "Wage Responsiveness and the Insulation Properties of a Flexible Exchange Rate", in A. Lindbeck (ed.): Inflation and Employment in Open Economies, Amsterdam, North-Holland, 215-245.

Sachs, Jeffrey (1980), "Wages, Flexible Exchange Rates, and Macroeconomic Policy", Quarterly Journal of Economics, June, vol.94: 731-747.

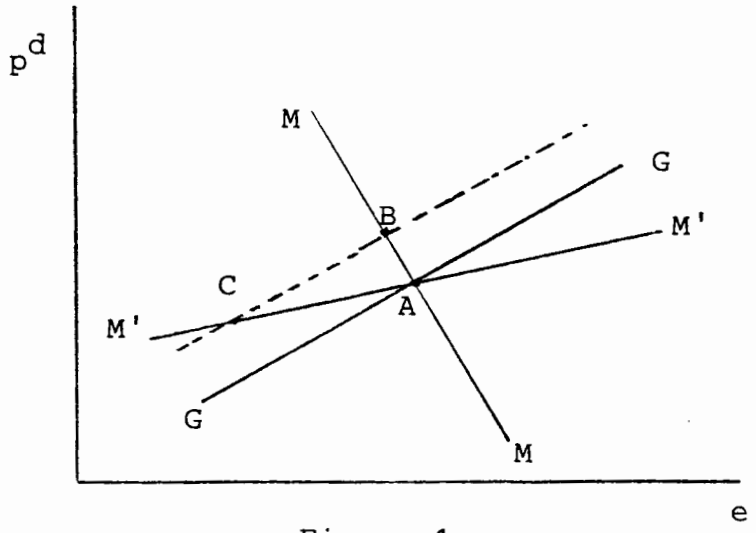

Figure 1