STEADY-STATE STABILITY OF MONETARY POLICY WITH A FIXED FISCAL POLICY: AN EXPOSITION

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In moving from the macrostatics to the macrodynamics course, good graduate students are often troubled by the implications of the Blinder and Solow (1973, 1974), Tobin and Buiter (1976) and Steindl (1974) analyses of the stationary state for the stability of the steady-state equilibria when it is assumed that (base) money growth is increased while the government-spending-to-income ratio and the tax rate are fixed so that government borrowing is adjusted passively via open-market operations.[1] This note illustrates conditions under which such "neutral fiscal policy" is consistent with exogenous choice in monetary policy.

Consider the government's budget identity:

$$(1) \qquad \Delta B + \Delta D \equiv R \cdot D + G - T$$

where $\Delta X \equiv dX/dt$ for any X, B is nominal base money, D is nominal government debt, R is the after-tax nominal interest rate, G is nominal government spending, and T is the yield from a proportionate tax on net national product (Y). Since we are dealing with after-tax interest rates,[2] we can work with the simple Fisher equation

$$(2) \qquad R = r + \Gamma P$$

where r is the real after-tax yield on government bonds, $\Gamma X \equiv d \log X/dt$ for any $X > 0$, and P is the price level. Assume that the income elasticity of money demand is unity so that

$$(3) \qquad \Gamma B = \Gamma P + \Gamma y \equiv \Gamma Y$$

where y is real NNP.

Now, divide identity (1) by Y and rearrange terms to obtain:

$$(4) \qquad \Gamma B \cdot \beta + (\Gamma D - R)\delta \equiv \gamma - \tau$$

where $\beta \equiv B/Y$, $\delta \equiv D/Y$, $\gamma \equiv G/Y$, and $\tau \equiv T/Y$. That is, with all variables measured as a fraction of NNP, the excess of spending over taxes on value added must be financed either by base-money creation or by increasing debt at a faster rate than the after-tax interst rate. In steady-state, β and δ are constants so $\Gamma B \equiv \Gamma Y \equiv \Gamma D$. In view of equations (2) and (3) this gives us

$$(5) \qquad \bar{\delta} = \frac{\gamma - \tau - \Gamma B \cdot \beta}{\Gamma y - r}$$

where $\bar{\delta}$ is the steady-state value of δ which is consistent with given values of γ, τ, ΓB, and hence $\beta = f(\Gamma B)$.[3] Note that $\gamma - \tau - \Gamma B \cdot \beta$ measures the excess of government expenditures over value-added and (loosely) inflation taxation; this amount must be financed by net borrowing in excess of the amount needed to make interest payments.[4]

It is important that Γy exceed r in order for the government to find it attractive to maintain an outstanding stock of government debt. If r exceeded Γy, then any positive excess of γ over $\tau + \Gamma B \cdot \beta$ would indeed cause δ to grow without limit, a possibility which has much concerned Sargent and Wallace (1981). While most "unadulterated" monetarist and other economists would agree that the average real return to capital would equal or exceed Γy, certainly there is considerable evidence that nonpecuniary services and a negative correlation with the market return lowers the before-tax return on government bonds to the point that the after-tax real yield r -- the one relevant to the government budget restraint -- is indeed less than Γy.

Let us examine the behavior of δ away from its steady-state value $\bar{\delta}$. Differentiating the definition $\log \delta \equiv \log D - \log Y$ with respect to time:

$$(6) \qquad \Gamma\delta \equiv \frac{1}{\delta}\left(\frac{\Delta D}{Y} - \delta \cdot \Gamma Y\right)$$

$$(7) \qquad \Gamma\delta \equiv \frac{1}{\delta}\left(R\delta + \gamma - \tau - \Gamma B \cdot \beta - \delta \cdot \Gamma Y\right)$$

Assuming full employment and perfect foresight to simplify the dynamics,

$$(8) \qquad \Gamma\delta = \frac{1}{\delta}\left[(r - \Gamma y)\delta + (\gamma - \tau - \Gamma B \cdot \beta)\right]$$

$$(9) \qquad \Gamma\delta = \frac{\Gamma y - r}{\delta}\left[\frac{\gamma - \tau - \Gamma B \cdot \beta}{\Gamma y - r} - \delta\right]$$

Which in view of equation (5) simplifies to

$$(10) \qquad \Gamma\delta = \frac{\Gamma y - r}{\delta}(\bar{\delta} - \delta)$$

The difference between the steady-state and actual debt-income ratio is thus eliminated at the rate $(\Gamma y - r)/\delta$ which is indeed positive in the case in which the government can profitably issue debt.[5] Equation (10) implies that passive changes in debt as implied by constant values of γ and τ will cause δ to converge to the new $\bar{\delta}$ after a change in ΓB.

Consider the following simple example:

$$\gamma = 0.22 \qquad \tau = 0.18$$
$$\Gamma y = 0.04/\text{year} \qquad r = 0.02/\text{year}$$
$$\Gamma B = 0.10/\text{year} \qquad \beta = 0.10 \text{ year}$$

Therefore, the steady-state debt-income ratio is

$$\bar{\delta} = \frac{0.22-0.18-(0.10/\text{year})(0.10 \text{ year})}{(0.04/\text{year})-(0.02/\text{year})} = \frac{0.03}{0.02/\text{year}}$$

$$\bar{\delta} = 1.5 \text{ year}$$

Suppose that the Fed decided to increase money growth to $\Gamma B' = 0.20/\text{year}$ and that this induced β to fall to $\beta' = 0.09$ year. Then

$$\bar{\delta}' = \frac{0.04-(0.20/\text{year})(0.09 \text{ year})}{0.02/\text{year}} = 1.1 \text{ year}$$

When this policy is initiated, the growth rate of the debt-income ratio would be

$$\Gamma\delta = \frac{0.02/\text{year}}{1.5 \text{ year}} (1.1 \text{ year} - 1.5 \text{ year})$$

$$\Gamma\delta = -0.0053/\text{year}$$

That is, over the first year of the new policy δ would fall by approximately (1 year) (-0.0053/year) (1.5 year) = -0.0080 year to 1.492 year. The rate of decline would decrease as δ assymptotically approached $\bar{\delta}' = 1.1$ year.[6] Thus, the government-budget identity does not pose any problems for the existence or stability of the steady-state equilibrium as money growth is varied exogenously with fiscal policy fixed. Similarly, government spending or tax rates can be varied exogenously with the other fiscal variable and monetary policy held unchanged. In this way the standard macroeconomic practice of varying fiscal or monetary instruments with government borrowing adjusting passively is shown to be consistent with a stable steady-state equilibrium.

REFERENCES

Auerbach, R. D., and Rutner, J. L., "A Negative View on the Negative Money Multiplier: Comment," Journal of Finance, December 1977, 32: 1814-1817.

Blinder, A. S., and Solow, R. M., "Does Fiscal Policy Matter?," Journal of Public Economics, November 1973, 2: 319-337.

______________________, "Analytical Foundations of Fiscal Policy," in A. S. Blinder, et al., The Economics of Public Finance, Washington: Brookings Institution, 1974.

Darby, M. R., "The Financial and Tax Effects of Monetary Policy on Interest Rates," Economic Inquiry, June 1975, 13: 266-276.

__________, and Lothian, J. R., "British Economic Policy under Margaret Thatcher: A Midterm Examination," Carnegie-Rochester Conference Series on Public Policy, Spring 1983, 18: in press.

Fischer, S., "Comments on Tobin and Buiter," in J. L. Slein, ed., Monetarism, Studies in Monetary Economics, vol. 1, Amsterdam: North-Holland Publishing Co., 1976.

Sargent, T. J., and Wallace, N., "Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis Quarterly Review, Fall 1981, 5 (3): 1-17.

Steindl, F., "Money and Income: The View from the Government Budget Restraint," Journal of Finance, September 1974, 29: 1143-1148.

Tobin, J., and Buiter, W., "Long-Run Effects of Fiscal and Monetary Policy on Aggregate Demand," in J. L. Stein, ed., Monetarism, Studies in Monetary Economics, vol. 1, Amsterdam, North-Holland Publishing Co., 1976.

FOOTNOTES

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[1]This paper does not attempt to comment on the relevance of the balanced-budget condition within the stationary state. See, however, Fischer (1976) and Auerbach and Kutner (1977) on this point.

[2]See Darby (1975).

[3]The assumption above equation (3) implies that velocity (or fluidity) has a 0 growth rate in any steady-state, but higher values of ΓB imply higher values of ΓP and R and hence a lower value of β.

[4]An alternate term for net borrowing $(\Gamma y-r)D$ would be "negative capital service."

[5]At least for the U.S., the before-tax real yield on government debt approximates the growth rate of real income so that the after-tax real yield <u>a fortiori</u> is less than Γy.

[6]Note however that absent perfect foreisght or a prior refunding into indexed bonds of long-term bonds -- see Darby and Lothian (1983) — this adjustment will be much faster as the real value of the existing bonds and debt service drops.