THE BUDGET DEFICIT AND INFLATION UNDER FULL EMPLOYMENT

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SUMMARY *

A monetarist model of the economy is constructed and it is shown, within the context of that model, that a reduction in the money supply can lead to a rise in inflation in the future as Sargent and Wallace (1984) predicted, only if fiscal policy is defined as exclusive of interest rate payment on debt. The conclusions of the paper are directly relevant to current Greek macroeconomic problems and the solutions proposed for them, in that they point out the importance of formulating goverment policy on receipts and expenditures after thorough consideration of interest payments on past debt and after giving careful attention to the money-bond mix of financing the deficit.

INTRODUCTION

Blinder and Solow (1973) found the paradoxical result that, in the context of a Keynesian fixprice model, bond - financed deficits, when stable, are in the Long Run more expansionary than money - financed deficits. Tobin and Buiter (1976) showed that this result hinges on having defined the budget deficit as being exclusive of interest payments on debt. They point out that as these payments

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are a form of transfer from the goverment to the public they should either be included in goverment expenditure or netted out of taxes. Otherwise, a stable fiscal policy in terms of exhaustive expenditure and taxation is associated with a rise in total outlays when interest payments are considered. By including interest payments on debt in the definition of the deficit, they demonstrate that the goverment expenditure multiplier is independent of the method of financing the deficit.

Sargent and Wallace (1984) (henceforth S-W) arrived at the startling conclusion that within the context of a model incorporating 'unadulterated monetarism' and with predetermined fiscal policy, a reduction in the growth of the money supply will lead to higher inflation, certainly in the future and possibly in the present as well. The purpose of this article is to show that S-W's result depends critically on having defined fiscal policy as synonymous with the deficit excluding interest payments on debt and that inclusion of these payments in the definition of the deficit invalidates their result. The results render some very strong corollaries for the formulation of current macroeconomic policy in Greece and the way in which the Greek economy can overcome its current macroeconomic difficulties and imbalances.

The present results agree with those in McCallum (1984), who approaches the problem from a different angle, that of intertemporal utility maximisation in a (Sidrausky-type) model of identical individuals with an infinite life-span.

1. THE MODEL

The main characteristics of the model are: (i) a fully predetermined and preannounced fiscal policy, (ii) a quantity theory equation for the determination of the price level, and (iii) a constant real rate of return of goverment securities that exceeds the (common) growth rate of the population and of real income. The model examined is on a per capita basis as, with a growing population and an equally growing real income, it would hardly be true to expect total demand for assets (bonds and money) to remain constant. In contrast we should expect that for each individual the behavioural relationships are independent of total population and, with the standard assumption of identical individuals, it makes sense to examine the behavioural relationships and, therefore, equilibrium on a per capita basis.

The equation for the budget constraint, in per capita terms, is:

$$\frac{D'(t)}{N(t)} \equiv \frac{D(t)}{N(t)} + \frac{B(t-1)\{1+R(t-1)\}}{N(t-1)(1+n)} = \frac{H(t)-H(t-1)}{N(t)P(t)} + \frac{B(t)}{N(t)} \qquad (1)$$

where: H is the nominal stock of high-powered money, P is the price level, B is the real stock of one-period bonds issued by the government (i.e. B also represents the flow of bonds during the period they are issued) and t denotes time period. $R(t-1)$ is the real interest rate on one-period government bonds issued at $t-1$, and is measured in time t goods per unit of time $t-1$ goods. Hence $B(t-1)\{1+R(t-1)\}$ represents the interest payments on debt. Population as of time t is $N(t)$ and its growth rate per period is n. $D(t)$, which is labeled the fiscal deficit, is the real deficit. It is defined as government expenditure minus taxation. To arrive at the relevant figure for taxation one calculates all taxes and subtracts from them all transfers except for interest payments on government debt at time t. Alternatively, one can include all transfers except for interest on government debt in the expenditure figure and subtract taxes from it to arrive at $D(t)$, the fiscal deficit. $D'(t)$ is the comprehensive deficit at time t and is, by definition, equal to the fiscal deficit plus interest payments on government debt at time t.

The equation for the price level is:

$$P(t) = \frac{1}{h} \times \frac{H(t)}{N(t)} \qquad (2)$$

Equation (2) is derived from the standard quantity theory equation stated on a per capita basis. More specifically it is well known that:

$$P(t) \times \frac{Y(t)}{N(t)} = \frac{H(t)}{N(t)} \times V(t)$$

where $Y(t)$, $V(t)$ are output and velocity at time t respectively. Given that we have assumed above that the model is monetarist, $Y(t)/N(t)$ is of no policy interest as both $Y(t)$ and $N(t)$ are exogenous. The former is determined by productive opportunities and the latter by non-economic considerations.

Without loss of generality, therefore, $Y(t)/N(t)$ can be set equal to 1 and be ignored. Setting, alternatively, $Y(t)/N(t)$ as being equal to an exogenously given $f(t)$ will only complicate calculations by adding a further exogenous variable without at the same time adding any substance or intuition to the result.

Therefore:

$$P(t) = \frac{H(t)}{N(t)} \times V(t)$$

Furthermore, assuming that the money demand is, on a per capita basis, constant and hence $V(t) = V$:

$$P(t) = \frac{H(t)}{N(t)} \times V \quad \text{or} \quad P(t) = \frac{1}{h} \times \frac{H(t)}{N(t)} \quad \text{where} \quad V = \frac{1}{h}$$

In other words, h is the old "Cambridge k" in the Cambridgean statement of the Quantity theory.

The problem addressed is the following: Suppose that the government, following a monetarist policy prescription, decides to lower the growth rate of the money supply. What will be the effect on inflation if fiscal policy remains unaltered? Although the government can temporarily increase its borrowing to meet the reduction in high-powered money finance, it can not do so forever as there is a limit in the public's willingness to absorb government bonds. Therefore, with a fixed fiscal policy, the policy will have to be reversed once the bond stock reaches the limit and probably before that. Hence, the policy rule is specified as:

$1 \leq t \leq T$: $H(t) = (1+m)\, H(t-1)$ (a)

$B(t)$ is given by (1) and (a) (3)

$t > T$: $\frac{B(t)}{N(t)} = b_m \equiv \frac{B(T)}{N(t)}$ (b)

$H(t)$ is given by (1) and (b)

The interpretation of (3) is that the government determines the growth rate m of the money supply between time periods 1 and T and allows the bond stock to be determined residually. At T however it realises that it can not increase the bond stock any further and, for subsequent periods, it stabilises the bond stock at whatever level prevailed at time T and allows the money supply to be determined residually.

2. THE ANALYSIS

The model consists of equations (1) – (3) and the implications of varying m are examined under the alternative assumptions that the government fixes the path of the fiscal or of the comprehensive deficit.

It can be seen from equation (3) that for the time periods 1 to T, one plus the inflation rate equals $P(t)/P(t-1)=(1+m)/(1+n) \approx m-n+1$. Hence, inflation is certainly lower the lower the growth rate in the money supply is*.

Let us consider now the repercussions on inflation for $t>T$.

2.1. Predetermined Fiscal Deficit

It is presently assumed that the government fixes a path for its fiscal deficit $D(t)$. This is the case of S–W, wherefrom this section is adapted.

Recall from equation (1) that:

$$\frac{D(t)}{N(t)} + \frac{B(t-1)\{1+R(t-1)\}}{N(t-1)(1+n)} = \frac{H(t)-H(t-1)}{N(t)\,P(t)} + \frac{B(t)}{N(t)} \tag{1.1}$$

solve equation (2) for h so that:

$$h = \frac{1}{P(t)} \times \frac{H(t)}{N(t)} \tag{2'}$$

and recall from equation (3b) that for all $t \geq T$:

$$\frac{B(t)}{N(t)} = b_m \Rightarrow \frac{B(t-1)}{N(t-1)} = b_m \tag{3b}$$

Substituting from (3b) into (1.1):

$$\frac{D(t)}{N(t)} + b_m \frac{1+R(t-1)}{1+n} = \frac{H(t)-H(t-1)}{N(t)\,P(t)} + b_m$$

and collecting all b_m–terms on the left hand side (LHS):

$$b_m \frac{n-R(t-1)}{1+n} = \frac{D(t)}{N(t)} - \frac{H(t)-H(t-1)}{N(t)\,P(t)}$$

or:

$$\frac{D(t)}{N(t)} + b_m \frac{R(t-1)-n}{i+n} = \frac{H(t)}{N(t)\,P(t)} - \frac{H(t-1)}{N(t)\,P(t)}$$

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* S–W offer an alternative rational expectations variant of the same basic model where this is not true.

Substituting into this equation from (2′) and from the assumption that $N(t)=(1+n)\,N(t-1)$ yields:

$$LHS = h - \frac{H(t-1) \quad x \quad P\,(t-1)}{N(t-1)\,P(t-1) \times P(t)\,(1+n)}$$

or, by multiplying both the numerator and the denominators of the second term on the right hand side (RHS) by $P(t-1)$:

$$LHS = h - \frac{H(t-1) \times P(t-1)}{N(t-1)\,P(t-1) \times P(t)\,(1+n)}$$

Substituting from (2′) into the above yields:

$$LHS = h - h\,\frac{P(t-1)}{P(t)\,(1+n)}$$

and, therefore:

$$\left[\frac{D(t)}{N(t)} + b_m\,\frac{R(t-1)-n}{1+n}\right] \times \frac{1}{h} = 1 - \frac{1}{(1+n)} \times \frac{P(t-1)}{P(t)} \qquad (4.1)$$

Under the assumption that $R(t-1)$ is greater than n (which Darby (1984) argues is wrong for the US in the postwar period) it is straightforward from (4.1) that the larger b_m is the higher the inflation rate is. S–W show (in p. 21) that b_m is larger the lower the growth rate of the money supply is up to T. Therefore, a reduction in the growth rate of the money supply between periods 1 and T, will lead to higher inflation after T.

2.2 Predetermined Comprehensive Deficit

Let us now assume that the government fixes the path of the comprehensive deficit.

Recall from equation (1) that:

$$\frac{D'(t)}{N\,(t)} = \frac{H(t)-H(t-1)}{N(t)\,P(t)} + \frac{B(t)}{N(t)} \qquad (1.2)$$

recall equation (2'):

$$h = \frac{1}{P(t)} \times \frac{H(t)}{N(t)} \tag{2'}$$

recall (3b):

$$\frac{B(t)}{N(t)} = b_m \Rightarrow \frac{B(t-1)}{N(t-1)} = b_m \qquad \text{for all } t > T \tag{3b}$$

and recall that $N(t) = (1+n)\, N(t-1)$.

Substituting from (3b) into the second term of the RHS of (1.2), and by analysing the money supply growth term (first term of RHS of (1.2)) as above with the help of (2') and of the population growth equation for N(t), it is straightforward to derive:

$$\frac{D'(t)}{N(t)} = h\left[1 - \frac{1}{(1+n)} \times \frac{P(t-1)}{P(t)}\right] + b_m$$

and hence:

$$\left[\frac{D'(t)}{N(t)} - b_m\right]\frac{1}{h} = 1 - \frac{1}{(1+n)} \times \frac{P(t-1)}{P(t)} \tag{4.2}$$

Consequently inflation is clearly lower the larger b_m is, irrespective of the relationship between R and n. So a lower growth rate of the money supply entails lower inflation both before and after T.

2.3. Comments and Intuition

What is intuitively the reason for so vastly different results depending on whether it is assumed that it is the fiscal or the comprehensive deficit that is predetermined?

By constraining only the time path of the fiscal deficit, the comprehensive deficit is allowed to change by as much as the fiscal deficit does p l u s the (net) change in bond related payments. But as it is clear from the LHS of (4.1) it is the extent to which the per capita comprehensive deficit is financed by high-powered money that determines inflation, even when the government determines the path of the fiscal deficit. But a lower growth rate m of the money supply up to T, makes necessary that a bigger proportion of the comprehensive

deficit is financed by bonds during that period. Consequently, bond related payments grow and, under the assumption that $R>n$, so does the per capita comprehensive deficit. When, therefore, the government fixes $B(t)$ at $N(t)\ b_m$ after T, a bigger per capita issue of high-powered money becomes necessary to finance the relatively bigger per capita comprehensive deficit. This makes inflation higher than it would have been had m not been lowered in the period up to T.

With a predetermined comprehensive deficit on the other hand, every increase in bond related payments is offset by a decrease in the fiscal deficit on a one-to-one basis and a bigger per capita bond stock entails that less money has to be issued to finance the rest of the (comprehensive) deficit and so inflation is lower.

Alternatively, as Meltzer (1984) points out, it is impossible in an economy that remains on its equilibriu*-i growth path for the share of government expenditure to grow relatively faster than the rest of the economy in a steady state without increasing taxation or inflation. It is only by fixing the comprehensive deficit that the relative size of government expenditure is constrained.

3. IMPLICATIONS FOR CURRENT GREEK MACROECONOMIC POLICY

The comments that follow do not purport to be a thorough analysis of the current (beginning of 1990) economic crisis in Greece but merely wish to point out some of the factors that will have to be considered in formulating macroeconomic policy for a successful exit from the crisis as these factors derive from the present analysis. It can be safely argued that, at the moment, the Greek economy fulfills the necessary assumptions behind the model, i.e. production at capacity-at least with the existing capital structure and infrastructure, positive interests rates in excess of the population growth rate, prices being determined — to a significant extent-by the growth in high-powered money.

The above analysis shows that:

1. It is important to account fully for interest payments on government debt before formulating fiscal policy and for the debt implications of setting a maximum growth rate for the money supply with a predetermined fiscal policy. Setting targets for the fiscal deficit without regard for interest payments and restricting the growth of the money supply by law, as is currently the case in Greece, without regard for the amount of debt that has to be raised to finance

the comprehensive deficit has led to an "explosion" of the comprehensive deficit and the accompanying financing requirements, as has happened recently in Greece in 1989 and 1990, as interest payments soar (section 2.1).

2. For an economy that, like Greece, shows no signs of offsetting rises in interest payments by appropriate adjustments in the receipts or the expenditures of the government, it can be said that the sooner it abandons a money supply growth rate rule in favour of a bond supply growth rate rule the better, in terms of the likely implications for future inflation (section 2.1).

3. Given the level of outstanding government debt, the only way for reducing inflation is by making reductions in the level of the comprehensive deficit. Barring a favourable trend in world interest rates this entails an increase in government taxation or a reduction in government expenditure. If world interest rates rise (fall) and consequently debt servicing payments rise (fall), further increases (decreases) in taxation and/or decreases (increases) in expenditure will be necessary to compensate for the rising (falling) burden of servising the debt (section 2.2).

4. Alternatively, the government can keep the comprehensive deficit constant and reduce the level of outstanding debt, presumably by redirecting part of its expenditure towards retiring the debt (section 2.2).

5. In summary, given that the economy has reached the limit of the amount of debt it can issue and that it can therefore finance future deficits by high powered money only (plus, obviously, the amount of debt maturing), this can only be done at the cost of inflation (section 2.1). Reductions in inflation can only be achieved if either the comprehensive deficit or the amount of debt outstanding are reduced (section 2.2). Either of these results can only be achieved at the cost of higher taxation and/or reduced payments from the government to the public.

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