PUBLIC DEBT AND THE PASINETTI PARADOX

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1. Introduction

The Cambridge Theorem states that, on a long run equilibrium path, the rate of profits is equal to the natural rate of growth divided by the capitalists propensity to save. In symbols, $r = g_n/s_c$, where r is the rate of profits, g_n is the natural rate of growth and s_c is the propensity to save of the capitalists. Thus the rate of profits does not depend on technology and on the workers propensity to save (cf. Pasinetti, 1962).

This result has been extended by Steedman (1972) to the case of government taxation and expenditure with balanced budget, which implies that the state has neither debts nor productive assets. In this case the Cambridge Theorem holds with reference to the rate of profits net of profits taxes, i.e. $r(1-t_p) = g_n/s_c$, where t_p is the direct tax rate on profits.

Recently Pasinetti (1989) has considered the case of unbalanced budget. He concludes that "the validity of [...] the Cambridge theory of the rate of profits [...] seems to go beyond the case of taxation with balanced budget and extend to the case of a government deficit whether financed by monetary means or by a public debt, *provided that* Ricardian equivalence holds" (p. 34). He goes on saying that "the question remains, of course, of tracing out the re-distributive effects of different government policies when the conditions of Ricardian Equivalence are not satisfied" (p. 35).

The main purpose of this paper is to show that the Cambridge Theorem holds independently of Ricardian Equivalence, if the net rate of profits is properly defined. This further extension may be of some interest as the case for Ricardian Equivalence depends on a number of restrictive assumptions, which are unlikely to be met in actual economies.

2. Current budget surplus

To begin with, we consider the case of a budget surplus, which implies that in the long run the stock of public debt is negative. This means that the government owns a positive share of the capital stock. In a long-run equilibrium all stocks must grow at the same rate, which equals the long-run rate of growth of the whole economy. This requires that:

$$\frac{S_w}{K_w} = \frac{S_c}{K_c} = \frac{S_G}{K_G} = g_n \tag{2.1}$$

where S_w is workers' savings net of both wages and profits taxes, S_c is capitalists' savings net of profits taxes, and S_G is savings by the government, i.e. the budget surplus; K_w is the amount of capital owned by the workers, K_c is the amount of capital owned by the capitalists and K_G is the amount of capital owned by the government. Since:

$$S_c = s_c(1-t_p)P_c \tag{2.2}$$

where P_c is profits accruing to the capitalists, from (2.1) we get

$$g_n = s_c r_n \tag{2.3}$$

having defined the net rate of profits r_n as:

$$r_n = (1-t_p)\frac{P_c}{K_c} \tag{2.4}$$

This conclusion is not surprising. Indeed, it has already been shown by Pasinetti (1974, pp. 141-142) that the Cambridge Theorem continues to hold when there are more than two groups of savers (here, capitalists, workers and the government). The only modification to the analysis is that the propensity to save that delimits the 'Pasinetti region' is the weighted average of the propensities to save of the workers and of the government.

We conclude the analysis of this case showing an implication of the condition that the rate of growth of publicly owned capital equals the natural rate of growth, i.e. $S_G/K_G = g_n$. On the assumption that the net rate of return on publicly owned capital equals that on private capital, this condition may be written as:

$$\frac{T-G+r_nK_G}{K_G} = g_n \tag{2.5}$$

where G is public expenditure on consumption goods, and $T = t_w W + t_p P$ is total (explicit) taxation [1]. From (2.5) and (2.3) we get

$$\frac{G-T}{K_G} = \frac{1-s_c}{s_c} g_n \tag{2.6}$$

which shows that a long-run equilibrium with a budget surplus (and hence a negative stock of 'public debt') is necessarily associated with a primary budget deficit. The intuition behind this conclusion is the following: since the net rate of profits is greater than (or equal to, if s_c = 1) the natural rate of growth, there is an excess of government's interest receipts over government's net investment in productive capital in a long-run equilibrium. This surplus must be used to finance a primary deficit.

3. Budget deficit

Let us now turn to the more interesting case of a long-run public deficit with a positive public debt. Let us denote by i the rate of interest on government bonds [2]. We assume that the Ricardian Equivalence Theorem does not hold, so that public debt is perceived as net wealth. In this case, workers' and capitalists' total assets are $A_w = K_w + B_w$ and $A_c = K_c + B_c$ respectively, where B_w and B_c denote the amounts of public debt certificates owned by workers and capitalists. Total debt is $B = B_w + B_c$. In a long-run equilibrium the following conditions must hold

$$\frac{S_w}{A_w} = \frac{S_c}{A_c} = \frac{\Delta B}{B} = g_n \tag{3.1}$$

[1] We denote by W the wage bill and by P total profits; t_w is the tax rate on wages. For sake of simplicity, we consider only direct taxation. The analysis could be easily extended to the case of indirect taxation along the lines of Steedman (1972) and Pasinetti (1989).

[2] We are here assuming that there are no taxes on government bonds. This hypothesis, however, can be easily dispensed with defining i as the *net* rate of interest.

Capitalists' savings is

$$S_c = s_c[(1 - t_p)P_c + iB_c] \tag{3.2}$$

where P_c denotes the flow of profits accruing to the capitalists out of productive capital. Let us define

$$r_n = \frac{(1 - t_p)P_c + iB_c}{K_c + B_c} \tag{3.3}$$

that is the net rate of profits is the ratio between capitalists' total net earnings and their total assets.

From (3.1) we get once again the Cambridge Equation

$$g_n = s_c r_n \tag{3.4}$$

Before proceeding, let us analyse the implications of the condition, which must hold in a long run equilibrium, that the public debt grows at the natural rate, i.e. $\Delta B/B = g_n$. Let us assume that the rate of interest equals the net rate of return on productive capital, i.e. $i = (1 - t_p)P_c/K_c$. From (3.3) it then follows $i = r_n$. The condition $\Delta B/B = g_n$ may therefore be written as:

$$\frac{G + r_n B - T}{B} = g_n \tag{3.5}$$

From (3.5) and (3.4) we get

$$\frac{T - G}{B} = \frac{1 - s_c}{s_c} g_n \tag{3.6}$$

which shows that a long-run equilibrium with a budget deficit (and hence a positive stock of public debt) is necessarily associated with a primary budget surplus. This conclusion parallels that obtained in section 2.

Coming back to (3.4), notice that there are two cases in which the net rate of profits as defined by (3.3) does indeed coincide with that defined by (2.4) (i.e., the one used by Steedman, 1972).

The first case arises when the net rate of return on public debt equals that on private capital, that is

$$i = \frac{(1 - t_p)P_c}{K_c} \tag{3.5}$$

The second case arises when all public debt is held by workers, that is $B_c = 0$.

However, the Cambridge Theorem remains true even when the net rate of return on public debt is lower than that on productive capital, and capitalists hold a positive amount of public debt. In this case the Cambridge Theorem holds with reference to the net average rate of return on capitalists' assets. This 'net rate of profits' is equal to the ratio between the natural rate of growth and the capitalists propensity to save, independently of anything else.

Consider, for instance, the case $i = 0$, that is the case where the public deficit is financed by 'money'. This case has been considered by Pasinetti (1989), who assumes that the inflation tax is proportional to explicit taxes. This means that $B_c/B = t_p P_c/T > 0$.

In this case, Pasinetti's finding is that the Cambridge Theorem holds with reference to the 'gross' rate of profits, P_c/K_c and a modified propensity to save of the capitalists. This modified propensity to save of the capitalists depends on fiscal policy parameters, which therefore affect the gross rate of profits. Proceeding in a different way, in this paper we have corrected the rate of profits taking into account both direct taxes and the fact that capitalists' total assets may be greater than their stock of productive capital. Our procedure allows us to identify the distributive variable (i.e., the net rate of return on capitalists' wealth) which is determined solely by the natural rate of growth and a behavioural parameter like the capitalists propensity to save [3]. Since the net rate of return on capitalists' wealth is unaffected by taxation and deficit spending, it is clear that the whole burden of taxation and of public debt must fall on other groups of savers (here, the workers).

We can therefore conclude that the natural rate of growth and the capitalists propensity to save determine the net rate of return on capitalists' wealth, independently of anything else. This is the most general version of the Cambridge Theorem when there is public debt, and it holds independently of whether the conditions for Ricardian Equivalence are satisfied or not.

4. Concluding remarks

This paper has shown that the Cambridge Theorem can be extended to the case of government budget deficit or surplus, even when the conditions on which the Ricardian Equivalence Theorem rests are not satisfied. Also, it has been shown that the net rate of return on capitalists' wealth is completely independent of fiscal policies.

This shows that Kaldor's theory of income distribution does not rest on the Ricardian Equivalence Theorem. On the other hand, it has been convincingly argued that Ricardo, after all, was not a 'Ricardian' [4]. This may perhaps reassure those who would feel somewhat discomforted if Barro were the missing link between Ricardo and Kaldor.

[3] The same comments apply to the case of Ricardian Equivalence. In reaffirming the validity of the Cambridge Theorem in this case, Pasinetti (1989) modifies the capitalists propensity to save in order to take account of the savings that they must set aside in a sort of 'sinking fund' corresponding to their quota of public debt (proportional to their liability to taxation).
Alternatively, we suggets to define the capitalists net disposable income as

$$Y_c^d = (1-t_p)P_c + iB_c - \theta\Delta B \qquad (i)$$

where θ is the share of public debt that will be ultimately financed by taxes on capitalists' profits. For instance, if the liability to taxation of the capitalists is proportional to the explicit taxation which they are already subject to, we have $\theta = t_p P_c / T$. Capitalists' savings is

$$S_c = s_c[(1-t_p)P_c + iB_c - \theta\Delta B] \qquad (ii)$$

From this point of view, the sinking fund is seen as a deduction from net disposable income and not as a part of total savings. This seems to be coherent with the spirit of the Ricardian Equivalence Theorem, which regards debt financing as an indirect form of taxation.
If we now define

$$r_n = \frac{(1-t_p)P_c + iB_c - \theta\Delta B}{K_c} \qquad (iii)$$

then the Cambridge Theorem still holds with reference to the unmodified propensity to save s_c and the 'net' rate of return on capitalists' wealth. Notice that the net rate of profits is defined by dividing capitalists' net disposable income by their productive capital only, as public debt in this case is not perceived as net wealth.

[4] Cf., e.g., Roberts (1942) and O' Driscoll (1977).

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