ON MICRO-FOUDATIONS FOR THE KALDOR-PASINETTI GROWTH MODEL WITH TAXATION ON BEQUEST*

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Abstract: *In this paper we want to show that the Kaldor-Pasinetti growth and distribution model with government transfers may be supported by orthodox micro-foundations. To achieve this, we expand the simplest version of Baranzini's (1991) two-period analysis to the case in which there is taxation on capitalist's bequest. By doing this we are able to conclude that the life-cycle hypothesis and bequest motive are compatible with basic governmental activities within a post-Keynesian framework.*

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Introduction

In part II of the book, *A theory of Wealth Distribution and Accumulation,* Baranzini (1991) has shown that post-Keynesian growth and distribution theory is well supported by orthodox micro-foundation. In chapter 5, he introduces the basic version of his discrete time-model to deal with capital accumulation, income distribution and inter-generational bequests. His framework is that of the Kaldor (1955-56) and Pasinetti (1962) two-class type of models. In the case, besides wage-earning workers, there is a class of pure capitalists, whose income derives exclusively from capital.

Baranzini focuses his attention on the allocation of disposable income between consumption and life-cycle savings, with only capitalists transmitting their wealth to their descendants, while workers accumulate life-cycle savings only. His approach is an adaptation of the Samuelson-Diamond overlapping generations model and against this theoretical background he enriches the Kaldor-Pasinetti type of model with some neo-classical micro-foundations. Among other things, he shows that workers' and capitalists' propensity to save are no longer fixed and exogenously given, but are derived from inter-temporal utility maximisation. As a result, he is able to determine (a) whether (and when) the saving/income

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ratio of workers is less than that of capitalists, and (b) whether (and when) we are in a Pasinetti or an anti-Pasinetti regime. This is a very income important point in the 'two-Cambridges controversy′ on the theory of capital and income distribution.

In our paper we show in certain conditions Baranzini's concern to guarantee a solid micro-foundation for the Kaldor-Pasinetti basic model may be extended to the case in which there is taxation on capitalists' bequest. To this end, we use both the life-cycle hypothesis and the bequest motive.

In section II, we outline some of the elements of the theoretical framework adopted. In section III, we investigate the possibility of extending Baranzini's simplest model by introducing taxation on the inter-generational transmission of wealth by capitalists to their heirs[1]. This tax, we assume, is in effect transferred to the working class. In section IV, we make some comparisons between the new equilibrium results with those reached by Baranzini (1991). Concluding remarks are presented in section V.

1. Basic theoretical framework

In the simplest version of his model, Baranzini incorporates both the main elements of the life-cycle theory and the existence of an inter-generational bequest in a two-period framework of analysis. Workers do not hold inter-generational assets but capitalists transmit their accumulated wealth to their descendants. In his one-sector model, capitalists' income is derived both from wages and from interest on accumulated life-cycle savings.

For the sake of simplicity, Baranzini postulates the existence of just one capitalist and one worker, which allows him to derive the value of equilibrium variables of his model. The approach has the following main features:

1. Individuals live periods of equal duration, the first being the "active" life and the second, retirement, ending in death. At the end of the first period, each individual has 1+g children, so that the population grows at the rate of $g > 0$ exogenously given.

2. The worker born at the end of period $t-1$ receives (in period t) wage-rate W_t; the capitalist, on the other hand, receives income equal rB_{t-1}, where $r > 0$ is the interest rate and B_{t-1} the bequest inherited when he was born at the end of $t-1$. He assumes that retired individuals earn no person.

3. Both capitalist and worker maximise the discounted volume of their respective consumption, C, and in periods t and $t+1$, to which the former incorporates the utility derived from leaving bequest B_t to his children. Since the worker leaves no endowment to his children, it follows that the capital stock of the economy is entirely given by the inter-generational bequest of the capitalist added on to life-cycle savings of two classes.

[1] Pasinetti (1989) takes post-Keynesians to task for paying little attention to the role of taxation and government expenditure when dealing with the Kaldorian-type of growth and distribution models.

4. The capitalist has a utility function $U(C^c_t, C^c_{t+1}, B_t)$ and the worker's utility function is $U(C^w_t, C^w_{t+1})$. Both groups have an inter-temporal utility maximisation problem. An independent discount rate, b, for the bequest and a time-preference for consumption, σ, are assumed, as well as a constant elasticity utility function with parameter $a < 1$.

1. The worker seeks to: $Max\ U(C_t^w, C_{t+1}{}^w) = \frac{1}{a}[(C_t^w)^a + \frac{(C_{t+1}^w)^a}{1+\sigma}]$ (2.1)

st: $W_t = C_t^w + \frac{C_{t+1}^w}{1+r}$

6. The capitalists seeks to: $\text{MaxU}(C_t^c, C_{t+1}^c, B_t) = \frac{1}{a}[(C_t^c)^a + \frac{(C_{t+1}^c)^a}{1+\sigma} + \frac{1+g}{1+b}B_t^a]$

$$(2.2)\quad \text{st:} (1+r)B_{t-1} = C_t^c + \frac{C_{t+}^c}{1+r} + (1+g)B_t\ ,$$

By using the Lagrangean approach the following results are obtained (for details see Baranzini, 1991, p. 111)

$$(2.3)\quad C_t^c = (1+b)^{\frac{1}{1-a}} B_t$$

$$(2.4)\quad C_{t+1}^c = (1+b)^{\frac{1}{1-a}} B_t (1+r)^{\frac{1}{1-a}} (1+\sigma)^{\frac{1}{a-1}}$$

$$(2.5)\quad (1+r)B_{t-1} = C_t^c [1+(1+r)^{\frac{a}{1-a}} (1+\sigma)^{\frac{1}{a-1}} + (1+g)(1+b)^{\frac{1}{a-1}}]$$

$$(2.6)\quad W_t = C_t^w [1+(1+r)^{\frac{a}{1-a}} (1+\sigma)^{\frac{1}{a-1}}]$$

Assuming that there is not technical progress, the equilibrium capital per capita, both for capitalists and for workers, grows at rate zero. Since, in equilibrium, $B_{t-1} = B_t = B^*$, from (2.5) we have:

$$(2.7)\quad r = g + (1+b)^{\frac{1}{1-a}} + (1+b)^{\frac{1}{1-a}} (1+r)^{\frac{a}{1-a}} (1+\sigma)^{\frac{1}{a-1}}$$

For the sake of simplicity let a=0, implying that:

$$(2.8)\quad r^* = g + (1+b)\frac{2+\sigma}{1+\sigma}$$

Notice that this interest rate which keeps the system in equilibrium is independent of technology and therefore the essential feature of the "Cambridge result" holds. It must also be pointed out that if $r^* < g$ capitalists are unable to accumulate the required capital to allow them to leave any bequest. Actually, if $rB^*<gB^*$, the capitalist class tends to disappear. However, we should realise that it is not easy to draw comparisons between Baranzini' s result with either the Cambridge regime or the Meade (1966) equilibrium. In the present approach the rate of interest expresses not simply an equilibrium condition but also optimality condition. Moreover, as pointed out by Baranzini, 1991, pp. 144/115: "The steady-state requirement does not fall uniquely on the interest rate, but also on the value of the inter-generational bequest via the interaction of the two parameters s and b, the consumption and bequest discount rates, respectively".

Let us now move on to the aggregate capital, K_t, in equilibrium, given by:

$$(2.9)\quad K_t = B_{t-1} + S^c_t + S^w_t$$

Where S^c_t, and S^w_t respectively, the capitalists "and the workers" aggregated savings. The former includes gB_{t-1}, the necessary saving to be left as inheritance to preserve the equilibrium path.

Now we are able to obtain the aggregate savings of both classes in period t. If a = 0 and the number of workers and capitalists (who are the first period of their lives) equals 1 *(i.e.,* $L_c = L_w = 1$*)*, from (2.3) and (2.8) we get:

$$(2.10)\quad S^c_t = B^*[g+(1+b)\frac{2+\sigma}{1+\sigma} - 1 - b] = [g + \frac{1+b}{1+\sigma}]B^*$$

Since workers do not leave any inter-generational bequests, their capital stock, K^w_t, may be obtained from (2.6):

$$(2.11)\quad K^w_t = S^w_t = W_t - C^w_t = W_t\{1 - [1 + (1+\sigma)^{-1}]^{-1}\} = W_t(2+\sigma)^{-1}$$

on the other hand, knowing that $W = Y - P$, where P is the aggregate profit, and being $P/K = r$ in the long-run, it is possible to rewrite (2.11) as follows:

$$(2.12)\quad K^w_t = S^w_t = K_t(\frac{\frac{Y}{K} - g}{2+\sigma} - \frac{1+b}{1+\sigma})$$

knowing that $K^c_t = B_{t-1} + S^c_t$ being K^c_t the capitalists' stock of capital, it is possible to obtain the total capital in the economy (in equilibrium) and the relationship between the inheritance and the total capital, respectively:

$$(2.13)\quad K^*_t = B^*(r^* - b) + K_t(Y/K - r^*)\ (2 + s)^{-1}$$

$$(2.14)\quad \left(\frac{B}{K}\right)^* = \left(1+\frac{r^*-\frac{Y}{K}}{2+\sigma}\right)\frac{1}{r^*-b}$$

As Baranzini observed (1991, pp. 120-121), both $\left(1+\frac{r^*-\frac{Y}{K}}{2+\sigma}\right)$ and (r^*-b) may be considered greater than zero. Thus it is acceptable to take $\left(\frac{B}{K}\right)^*$ as positive.

Regarding the distribution of capital between capitalists and workers, two rates can be calculated:

$$(2.15)\quad \left(\frac{K_c}{K}\right)^* = \frac{K-K_w}{K} = 1+\frac{r^*-\frac{Y}{K}}{2+\sigma}$$

$$(2.16)\quad \left(\frac{K_w}{K}\right)^* = \frac{\frac{Y}{K}-r^*}{2+\sigma}$$

at this point it is interesting to obtain the saving propensities of the two classes, denoted by s_c and s_w. from (2.10) and (2.11) we have:

$$(2.17)\quad s_c = \frac{g+\frac{1+b}{1+\sigma}}{g+(1+b)\frac{2+\sigma}{1+\sigma}}$$

$$(2.18)\quad s_w = \frac{S_t^w}{W_t} = \frac{1}{2+\sigma}$$

From (2.17) and (2.18) it is possible to derive the relationship between the two propensities to save. It follows that:

(2.19) for $g<0$, then $s_c < s_w$

(2.20) for $g=0$, then $s_c = s_w = \frac{1}{2+\sigma}$

(2.21) for $g>0$, then $s_c > s_w$.

These three results are easy to understand[2]. They confirm the importance of the rate of growth of population in the long-run models of income and wealth distribution. Needless to say, in a growing economy g is positive and therefore s_c is greater than s_w. This result, obtained in the framework of a life-cycle model, confirms the assumption widely postulated in the Kaldor-Pasinetti literature on growth and distribution.

2. An extension of baranzini's basic model

Here the government intervenes in the economy by levying direct tax (percentage) on the bequest handed down to each new generation of capitalists. This taxation on wealth is totally and immediately transferred to the workers. We assume that there are no transaction costs involved but, that the budget constraint of capitalists and workers is modified accordingly. The remaining assumption are the same as those indicated in the previous section.

We are well aware that the assumption of pure transfer is drastic, but we may add what follows. First, any policy of redistribution fundamentally means that income or wealth is transferred, via the State, from a given class to the rest of society. It is true to say that (i) there are costs associated with this policy, but these costs might easily be considered as salaries of public servants or something similar, (ii) that a share of public expenditure goes to the benefit of richer classes. However, this latter point would simply imply that the total transfer to the workers is a proportion (less than unity) of what initially calculated.

Secondly, there might be normative aspects connected with such a redistribute policy. In fact, as is pointed out in Teixeira and Araujo (1996 and 1997), the State might impose a special tax in order to achieve, simultaneously, a higher level of economic growth and a better distribution of income between profits and wages. This contrasts with the common belief that there always exists a trade-off between growth and a more equal distribution of incomes.

Note that in our model the bequest is actually paid by the descendants and that it is not progressive (a flat rate). In fact, it would be easy to extend the model to consider a progressive inheritance tax, but this not alter the main conclusons of our analysis.

To proceed, we illustrate how the new general account is constructed in a very simple two-period overlapping generations model of a closed economy. The tax structure does not try to mimic real-world complexities, but to concentrate attention on a proportional tax on capitalists wealth.

The capitalists maximises his new utility function taking into accounts his inter-temporal consumption preference as well as his wishes to leave a taxable bequest to his descendants. Following the notation previous section, the capitalists needs to solve the problem:

[2] When $g > 0$ capitalists' saving includes, besides life-cycle saving for the retirement period, the required amount of saving to maintain the same capital per capita for their descendants. When $g = 0$ the behaviour of the capitalists regarding the effort to save will be equal to the effort of the workers, for they will save only part of the interest on their capital for the life-cycle (since it is sufficient to maintain constant the received legacy and deliver it totally to their descendants). An effort to save greater than that of the workers will be necessary only when $g > o$, for besides saving for the life-cycle, the capitalist must bestow on his children the same inheritance he have originally received.

$$(3.1) \quad Max\ V(C_t^c,\ C_{t+1}^c,\ B_t) = Max\ \frac{1}{a}[(C_t^c)^a + \frac{(C_{t+1}^c)^a}{1+\sigma} + \frac{1+g}{1+b} B_t^a]$$

st: $(1-t_b)(1+r)B_{t-1} = C_t^c + \frac{C_{t+1}^c}{1+r} + (1+g)B_t$, where: t_b = bequest tax collected at the start of each new generation $(0 < t_b < 1)$.

The workers have the following problem:

$$(3.2) \quad Max\ V(C_t^w,\ C_{t+1}^w) = Max\ \frac{1}{a}[(C_t^w)^a + \frac{(C_{t+1}^w)^a}{1+\sigma}]$$

s.t: $t_b(1+r)B_{t-1} + W_t = C_t^w + \frac{C_{t+1}^w}{1+r}$, where $t_b(1+r)B_{t-1}$ = government transfers = tax collected from bequest.

Accordingly, we have the solutions:

$$(3.3) \quad C_{t+1}^{w,c} = C_t^{w,c}(1+\sigma)^{\frac{1}{1-a}}(1+r)^{\frac{1}{1-a}}.$$

$$(3.4) \quad C_t^c = (1+b)^{\frac{1}{1-a}} B_t \qquad \text{or} \qquad B_t = (1+b)^{\frac{1}{a-1}} C_t^c$$

$$(3.5) \quad C_{t+1}^c = (1+b)^{\frac{1}{1-a}} B_t (1+r)^{\frac{1}{1-a}} (1+\sigma)^{\frac{1}{a-1}}$$

$$(3.6) \quad (1-t_b)(1+r)B_{t-1} = C_t^c[1+(1+r)^{\frac{a}{1-a}}(1+\sigma)^{\frac{1}{a-1}} + (1+g)(1+b)^{\frac{1}{a-1}}]$$

$$(3.7)\ W_t + t_b(1+r)B_{t-1} = C_t^w[1+(1+r)^{\frac{a}{1-a}}(1+\sigma)^{\frac{1}{a-1}}]$$

Assuming that there is no technological progress, the growth rate of capital per capita is zero. The equilibrium value of the interest rate is defined in these conditions. This influences the capitalist's behaviour. The capitalist's maximises his utility function to ensure that his capital stock grows in equilibrium. With this in mind, we rewrite the budget constraint in terms of the bequest only. From (3.4) and (3.6) we have:

$$(3.8) \quad (1-t_b)(1+r)B_{t-1} = B_t[(1+b)^{\frac{1}{1-a}} + (1+b)^{\frac{1}{1-a}}(1+r)^{\frac{a}{a-1}}(1+\sigma)^{\frac{1}{a-1}} + 1 + g]$$

In the equilibrium $B_{t-1} = B_t = B^*$, thus:

$$(3.9)\quad (1-t_b)(1+r) = (1+b)^{\frac{1}{1-a}} + (1+b)^{\frac{1}{1-a}}(1+r)^{\frac{a}{a-1}}(1+\sigma)^{\frac{1}{a-1}} + 1 + g$$

If $a = 0$, it implies:

$$(3.10)\quad r^* = \frac{1+b}{1-t_b} + \frac{1+b}{(1+\sigma)(1-t_b)} + \frac{g}{1-t_b} + \frac{t_b}{1-t_b}$$

We are ready to analyse the modifications made necessary by the introduction of bequest taxation on the capital accumulation as well as its impact on the distribution of capital between the two classes. Following the previous section, we divide the capital stock into the following there parts: (i) the capitalist's life-cycle savings, (ii) the worker's life-cycle savings, and (iii) the capitalist's inter-generational heritage, as was originally done in Baranzini (1991, ch. 5).

In equilibrium, the total capital stock at period t is:

$$(3.11)\quad K_t = B_{t-1} + S_t^c + S_t^w.$$

Assuming that a=0 and setting the number of workers (L_w) and capitalists (L_c) equal to one, use (3.4) to obtain, in equilibrium:

$$(3.12)\quad S_t^c = B_{t-1}[(1-t_b)r - 1 - b]$$

From (3.7) we have:

$$(3.13)\quad K_t^w = \frac{1}{2+\sigma}[W_t + t_b(1+r)B_{t-1}]$$

Being $W = Y - P$, we rewrite (3.13) as follows:

$$K_t^w = \frac{Y-P}{2+\sigma} + \frac{t_b(1+r)B_{t-1}}{2+\sigma} = \frac{K(\frac{Y}{K} - \frac{P}{K})}{2+\sigma} + \frac{t_b(1+r)B_{t-1}}{2+\sigma}$$

since in the long-run $\frac{P}{K} = r^*$, we obtain:

$$(3.14)\quad K_t^w = K(\frac{Y}{K} - r^*)(2+\sigma)^{-1} + [t_b(1+r^*)B_{t-1}](2+\sigma)^{-1}$$

We have now the opportunity to obtain the total capital stock in equilibrium:

$$(3.15) \quad K^* = \frac{(2+\sigma)(1-t_b)r^* - (2+\sigma)b + t_b(1+r^*)}{(2+\sigma) - (\frac{Y}{K} - r^*)} B^*$$

From (3.15) we are able to get the shares of bequest in relation to the capital stock:

$$(3.16) \quad (\frac{B}{K})^* = \frac{(2+\sigma) - (\frac{Y}{K} - r^*)}{(2+\sigma)(r^* - t_b r^* - b) + t_b(1+r^*)} > 0$$

under the condition that $r^* > (t_b r^* + b)$ and $(Y/K - r^*) < 1$.

We are ready to see the effect of governmental transfer on the distribution of capital, in equilibrium. In this case the share of the capitalists in:

$$(3.17) \frac{K_c}{K} = 1 + \frac{r^* - \frac{Y}{K}}{2+\sigma} - \frac{t_B(1+r^*)(2+\sigma+r-\frac{Y}{K})}{(2+\sigma)[(2+\sigma)(r^* - t_b r^* - b) + t_b(1+r^*)]}$$

The new capitalists' propensity to save results from:

$$(3.18) \; s_c = \frac{S_t^c}{(1-t_B)r^* B_{t-1}} = \frac{B_{t-1}[(1-t_B)r^* - 1 - b]}{(1-t_B)r^* B_{t-1}} = 1 - \frac{(1+b)}{(1-t_B)r^*}$$

As we know that $S_t^w = K_t^w$, using (3.13) we obtain the worker's propensity to save:

$$(3.19) \; s_w = \frac{S_t^w}{W_t + t_B(1+r^*)B_{t-1}} = \frac{\frac{W_t + t_B(1+r^*)B_{t-1}}{2+\sigma}}{W_t + t_B(1+r^*)B_{t-1}} = \frac{1}{2+\sigma}$$

This result is identical to (2.18), meaning that transfers, such we have introduced them here, do not affect the worker's propensity to save.

3. Comparisons between the "model without government intervention" and the "model with government intervention"

We are now able to compare some of our new results with those of Baranzini's original formulation. We will concentrate our attention on the changes of the equilibrium variables after the introduction of taxation on capitalist bequest.

The equilibrium rate of interest in (3.10) differs from (2.8). The difference between them is:

As we know that $S_t^w = K_t^w$, using (3.13) we obtain the worker's propensity to save:

$$(3.10) - (2.8) = \frac{1+(2+\sigma)bt_b + (1+\sigma)(2+g)t_b}{(1+\sigma)(1-t_b)} > 0.$$

This shows that the equilibrium rate of interest increases when a tax is imposed on the capitalist class[3]. How should this result be interpreted? One way might be to say that, all other things being equal, if the capitalist wants to (a) leave a bequest to his child or children as he has himself inherited and (b) maximise the utility of total consumption, he needs a higher rate of profit on his capital stock.

In other words, part of the inheritance tax introduced by the government will have to be paid for by a higher profit share, a sort of mark-up on the rate of profit earned by the entrepreneurs. This outcome will be easier to grasp once the share of inter-generational bequest to total capital stock has been assessed and once the propensity to save of the two classes defined. Remember also that, in our model, such propensity are endogenously given.

We might also say that, in the event of the capitalist's having a higher number of children (independently of the number of offspring of the other class), he will need to save more if he wants to endow his descendants with the same bequest he himself inherited. Workers do not have such a constraint. Indeed, they may have a larger number of children. Who will go to schools and will be educated, increasing their human capital accumulation and economic performance[4]. In this way, inter-generational transmission of human capital creates fewer financial constraints for the class concerned than for the capitalists'.

[3] To simplify the presentation and provided that the direction of the results are not autered, for the next comparisons the same value for the equilibrium rate of interest is (r*) preserved

[4] Chiu (1998) has shown that greater income equality implies higher human capital accumulation and the economic performance of an overlapping-generations model with heterogeneity of income and talent. Assuming that the more talented create more human capital when educated, greater initial income (and wealth), equality for one generation will imply not only higher aggregate human capital accumulation by that generation but an improvement is all subsequent generations' initial income distribution. For an interesting overlapping generation model dealing with pension schemes, see Casarico (1998). She established the conditions under which such schemes are associated with a higher investment in human capital, and concluded that the transition path may involve poverty traps.

With the aim of having more evident results, in the following comparisons we let the interest rate (r_t) with the tax rate explicitly related to the equilibrium rate of interest without taxation, i.e., $r_t = \dfrac{r^* + t_b}{1 - t_b}$

The variation in the capitalists' capital stock is given by (3.17)-(2.15). the (approximate) result is:

$$\frac{t_b(1+r_t)(2+\sigma+r_t-\frac{Y}{K})}{(2+\sigma)[(2+\sigma)(r_t - t_b r_t - b) + t_b(1+r_t)]} - \frac{t_b(1+r_t)}{2+\sigma} > 0$$

, meaning that there is a reduction in the capitalists' share of the total stock of capital, thus an explanation for the decline in wealth inequality[5].

Subtracting (3.18) from (2.17) we obtain the result:

$$\left[\frac{1-b}{g+(1+b)\dfrac{2+\sigma}{1+\sigma}+t_B} - \frac{1+b}{g+(1-b)\dfrac{2+\sigma}{1+\sigma}}\right] < 0$$

, showing capitalist propensity to save increases with the introduction of taxation on bequest. The main reason for such increment is the necessity of extra effort to assure that the relation $B_{t-1}=B_t=B^*$ is preserved.

It is interesting to observe that by calculating the difference between (2.13) and (3.15) we obtain:

$$t_b B^* \left\{ \frac{(2+\sigma)\left\langle\left[r^* \dfrac{(1+r^*)}{1-t_b} + \dfrac{Y}{K}\right] - \left[\dfrac{b(1+r^*)}{1-t_b} + 2+\sigma+r\right]\right\rangle - \left[1 + \dfrac{(r^*+t_b)}{1-t_b}\right]}{\left(2+\sigma-\dfrac{Y}{K}+r^*\right)\left(2+\sigma-\dfrac{Y}{K}+\dfrac{r^*+t_b}{1-t_b}\right)} \right\} < 0,$$

Meaning that the total capital stock expands (in equilibrium) with introduction of taxation on capitalists' bequest and its receipts transferred to the workers.

With regard to the rate: bequest/total capital, a straightforward comparison between (2.14) and (3.16) and also between (3.15) and (2.13), show that transfers from capitalists to workers, through taxation of the former's bequest reduces the (equilibrium) quotient bequest/capital capital, since (2.13) – (3.16) < 0 => (2.14) – (3.16) > 0.

[5] This result addresses one the most interesting questions about the performance of Western, industrilalised countries in our century: How can we explain the marked downward trend in wealth inequality till the early 80s? In the neo-classical tradition, Wolf (1988) reaches a conclusion that contrasts sharply with that of Stiglitz (1969), according to which there is a tendency toward convergence to an egalitarian society so long as the economy converges to a stable steady-state.

4. Concluding remarks

On the basis of the above argument, we are able to conclude that the main features of the "Cambridge equation" are preserved in our extension of Baranzini's approach, to include taxation on capitalists' bequest. Despite the higher formal complexity of the new formulation, it is worth highlighting the fact that the essential nature of the distribution equilibrium remains unaffected: the key components are still s_c and g, only "corrected" by major features of the new economic environment. Within this framework, technology *(K/Y)* does not exercise any influence on the equilibrium rate of interest. On the other hand, the latter is dependent solely on parameters s, *b* and g respectively, the discount rate of the utility function, the bequest discount rate of the capitalist class, and the rate of growth of the population.

Furthermore, the propensity to save, both the capitalist' and the workers', are not exogenously given but are related to the inter-temporal preference to consume and to the population's rate of growth. Needless to say, the hypothesis that capitalists' propensity to save is greater than that of workers is also endogenously obtained. In this sense, we are able to say that our analysis not only confirms but also strengthens Baranzini' s microeconomics support for the post-Keynesian kaldor-Pasinetti type of model.

It is also worth recalling that in the context of our model, total investment, according to the post-Keynesian tradition, is exogenously given and determined by the entrepreneurs' animal spirits as well as governmental economics and social policy. Normally it would take the form of full-employment but, as Bortis (1976) has shown, it may also be consistent with positions of lees-than-full employment. The presence of the State makes such a goal (full employment) more plausible or somewhat easier to attain. On the other hand, savings adjust themselves passively to ex-ante investment[6]. In this way, the equilibrium solutions that we have obtained ensure that:

1. the distribution of income between profits, wages and taxes is such that total savings equal ex-ante investment;
2. individuals maximise the flow of their life-cycle consumption utilities;
3. the inter-generational bequest of capitalists grows in line with the population.

As argued above, it is clear that the identity of investment and savings (I=S) is ensured by redistribution between profits and wages as well as among capitalists, workers, and State.

One more word about the role of government is in order, since in a certain sense government represents a third class. First, an additional actor makes the whole saving processes more flexible, since there will always be a distribution of disposable income among profits, wages and taxes, which, by means of the subjective discount rates and other behavioural

[6] We refer to the Robinsonian-Kaldorian argument according to which if S > I, consumption is lower than expected and profits margins will fall, leading to a redistribution of income from profits to wages. Since savings out of wages are lower than savings out of profits, such a process will continue until S = L. And vice versa.

parameters of the classes, ensures the possibility of steady-state equilibrium. In a sense it makes the determination on the equilibrium variables of the model easier to grasp and toachieve. Secondly, the government may play an active part both in the determination of ex-post savings and in the determination of ex-ante investment. In particular, the State may, quite independently of the 'animal spirits' of the entrepreneurs, try to implement atotal level of investiment good enough to produce full employment. Alternatively, it may aim at a different level for reasons of economic policy[7] . Thirdly, and finally, the State may decide to run a budget deficit or surplus, so that in the case of equality between total investment and savings, the savings of the socio-economic classes will have to cover such a deficit/surplus.

When the State decides to increase its expenditure beyond explicit taxation, and to go in for a budget deficit, to be met by public debt, it should take into account that debt financing may involve sophisticated arguments, as pointed out by Pasinetti (1989) and Buiter (1997), based on the "Ricardian Equivalence Theory"[8] . Naturally, the presence of a Ricardian inter-generational bequest motive requires further analysis of the effects of this budget , both on inter-generational distribution and on savings.

It may be useful, however, to consider a further aspect at this point, namely that taxes may not be neutral in various ways. First of all, taxes may be progressive (it is not the case in our model) and may cause a strong transfer from one class to another. Secondly, taxes may be heavier on capital income than on other kinds of income. Thirdly, taxes may play in favour of life-cycle savings as opposed to inter-generational capital. This last argument is particularly important in so far as the two kinds of wealth accumulation are rather different in their nature.

A number of countries have introduced a more or less heavy tax on inter-generational transfers (see 'estate duty'), with various sorts of allowances and exceptions. Such a tax may be more useful for improving the finances of the State than for stopping the progressive concentration of wealth. But during the individual life-cycle, wealth is normally taxed in the same manner – whether life-cycle or inter-generational bequest. On the other hand, it is difficult to distinguish while individuals are still living, what is what. And even if this was possible, one might still not know what will be left to the next generation and watch will be consumed by the present generation[9] . For this reason, the hipothesis of a flat tax-rate on capitalist earnings seems quite plausible, although we are fully aware of its implications and shortcomings.

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[7] Here again, note that Bortis (1976) has shown explicitly that the ex-ante level of investment in these Kaldor-Pasinetti types of models may also be slightly different from that of full employment.

[8] This proposition asserts that the undertaking of a public debt or the imposition of taxes ends up having the same effects taxpayers. In its more stringent form, it became known as "Neutrality Theorem" (see Barro (1974))

[9] Recent empirical work (Horioka and Watanake, 1997) on Japan has shown that the motives to be found behind total personal savings are many and, above all, they change along the life-cycle. Some of them are clearly associated with a strong willingness to endow the next generation (saving for housing, for 'overshooting', to endow children at marriage or to leave them a bequest), while others are connected with life-cycle expenditure plans (savings for leisure, travel, cars, retirement, etc.). In this way, the picture that emerges is quite complex, and a differentiated tax on savings and wealth seems difficult and unlikely ever to be introduced.

To conclude, we point out that with the introduction of transfers there is a relative decline of the capitalists' share in the total capital stock. On the other hand, the new rate of interest (in equilibrium) is in tune with the inclusion of taxation on profits as indicate by Steedman (1972). We can go no further here, but it must be said that as soon as we move away from the simplest version of Baranzini's model, and relax the assumptions on the role of government taxation and expenditure, many difficulties arise. Most of them have yet to be solved in this research programme, to incorporate the rich literature developed by some authors, notably by Barro (1974) on public debt and Becker (1993), on altruism, inter-generational mobility and human capital transfers. As well as Meade in a number of papers and books published in the Sixties and Seventies and where he has introduced the concepts of "pure altruism", "altruism", and "selfishness" applying to the relationships between generations[10] .

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[10] Cf. the reference – bibliography in Baranzini (1991). In particular, we address the reader to Meade (1966b) where he captures the basic ideas on life-cycle savings, inheritance and economic growth.

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