

Profit-sharing versus Interest-taking in the Kaldor–Pasinetti Theory of Income and Profit Distribution

USAMAH A. UTHMAN

Department of Finance & Economics, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia

ABSTRACT *This paper reformulates the Kaldor–Pasinetti model of income and profit distribution by introducing the interest rate from the very outset of the model but maintaining other Kaldor–Pasinetti assumptions intact. It is shown that the profit rate and the share of profits in national income are not independent from either the capitalists’ or workers’ propensity to save. Many contributors to the theory of income and profit distribution have erred in attributing a potentially positive impact of the interest rate upon profits. The interest rate is always and everywhere a tax on functional and personal incomes together. This result explains Schumpeter’s observation that ‘Interest acts as a tax upon profit.’ In an alternative model, workers receive a share of profits instead of fixed contractual interest. It is shown that the profit rate and share are not independent from either propensity to save. Furthermore, the workers’ share of profits has a positive impact on the rate and share of profits. This implies that a profit sharing regime could be more conducive to capital accumulation and job creation. It is found that Pasinetti’s Cambridge Equation is more akin to a profit sharing regime.*

1. Introduction

In a seminal paper, Nicholas Kaldor (1956) argued that, under the assumption that workers have a negligible propensity to save, the profit rate in a capitalist economy is governed by the natural rate of growth and the capitalists’ propensity to save. The most important refinement¹ of Kaldor’s result was provided by Pasinetti (1962), who corrects a ‘logical slip’ in Kaldor’s paper: since workers save, they

Correspondence Address: Usamah A. Uthman, Department of Finance & Economics, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia. Email: osama@kfupm.edu.sa

¹Among the early extensions and refinements of Kaldor’s model are Tobin (1960), Chiang (1973) and Moore (1974). Baranzini (1991) reviews a long list of authors who abandoned the assumption of long-run equality between the interest rate and the profit rate. Further extensions of the growth and distribution theory relax the full-employment assumption, e.g. Dutt (1992), Dutt & Amadeo (1993) and Lavoie (1995). In this paper we maintain both assumptions.

must receive profits, and hence Kaldor's result regarding the irrelevance of workers' saving behavior in determining the profit rate can still be established even if their propensity to save is greater than zero.

Assuming long-run full employment, exogenous investment, a constant rate of growth, a constant distribution of income and the equality of the interest rate and the profit rate in the long run, Pasinetti (1962) decomposes total profits into capitalists' profits and workers' profits. The equilibrium condition becomes:

$$I = s_w(W + P_w) + s_c P_c = s_w Y + (s_c - s_w)P_c \quad (1)$$

where I is investment and s_w and s_c are the workers' and capitalists' propensities to save respectively, P_w and P_c their respective shares of profits, W is workers' wages and Y is national income. Rearranging, we get:

$$\frac{P_c}{Y} = \frac{1}{s_c - s_w} \frac{I}{Y} - \frac{s_w}{s_c - s_w} \quad (2)$$

Pasinetti finds two striking results, namely that

$$\frac{P}{K} = \frac{1}{s_c} \frac{I}{K} = \frac{g}{s_c} \quad (3)$$

and

$$\frac{P}{Y} = \frac{1}{s_c} \frac{I}{Y} \quad (4)$$

where g is the rate of growth, P/K is the profit rate and P/Y is the share of profits in national income.

The above equations imply that although in the long run, the workers' propensity to save influences the distribution of income between capitalists and workers (equation (2)), it does not influence the distribution of income between profits and wages (equation (4)). Nor does it have any influence whatsoever on the rate of profit (equation (3)) (see Pasinetti, 1962, p. 109).

Pasinetti's confirmation of Kaldor's result came to be called the Cambridge equation and it sparked great controversy between Cambridge, England and Cambridge, Massachusetts.

Many economists joined the discussion trying to re-establish or disprove Pasinetti's results. It may be natural to expect different results when the assumptions are changed and the platform is therefore different. To get around this difficulty, the present paper maintains Pasinetti's assumptions intact, but makes one important change in the model's formulation. Pasinetti's model is recast so that the interest rate appears in the model from the very outset.² Examining the validity of the Cambridge Equation with the above-mentioned reformulation is the first objective of the paper.

Another source of difficulty in the literature on the Kaldor–Pasinetti model is the tremendous confusion between interest and profit. This confusion, which

²Pasinetti (1962) introduces the interest rate only about halfway into his discussion of the model; we shall see that this modification has significant implications.

perhaps stems in part from the fact that both are property incomes, may explain why many variations of these models adopt the very strong assumption of the long-run equality of the interest rate and the profit rate. Pasinetti has been criticized for this assumption, and models that relax the assumption have been used to challenge his results (see for example Balestra & Baranzini, 1971). But Pasinetti (1974) and other defenders of his results have themselves relaxed that assumption, and claim to have shown that the Cambridge Equation still holds.

Pasinetti's claim that the interest rate has no effect on the distribution of income is, to say the least, open to question. To permit relatively easy comparisons with Pasinetti's own formulation, the interest-based model presented below retains his assumptions. However, the interest-based model in the present paper distinguishes between interest and profit by treating the first as a strictly *contractual* income, and the second as a *residual* income. The second objective of the paper is to show that the treatment just outlined makes a tremendous difference as to the influence of the interest rate on the distribution of income and in particular on the profit rate.

It may be interesting to ask what sort of results we should expect if workers received a share of *residual* profits in return for their savings instead of *contractual* interest income, while continuing to receive wages for their labor. A second model is constructed to investigate this case. The interest-based and the profit-sharing-based models are then compared and contrasted. This is the third objective of the paper.³

2. An Interest-based Model

Assuming, in line with the Post Keynesian tradition (see for example Moore, 1988), that the interest rate is determined exogenously, and retaining the other basic Kaldor–Pasinetti assumptions, let us assume that workers save an amount $s_w W$ from wages every period, and they are to receive an interest payment at a fixed rate, r , on their previously accumulated savings from wages. Assume also that they save some of their interest income. For simplicity, wages are assumed constant throughout. Total savings in the n th (steady-state) period is equal to savings from wages in the n th period, $s_w W$, plus accumulated savings from interest income in all previous periods. By summing the series of saving over time, the workers' steady-state saving is:

$$S_w = s_w W [1 + s_w r + s_w^2 r^2 + \dots], \quad \text{i.e. } S_w = \frac{s_w W}{(1 - s_w r)}, \quad 1 > s_w r > 0$$

Since interest income accrues with a one-period lag from actual savings, interest income from savings from the n th period wages, $r s_w W$, is not yet earned in the n th period and thus ought to be subtracted from the steady-state interest income. In other words, while total workers' savings in any period n is equal to

³We will *not* be concerned with evaluating the soundness of the so-called anti-Pasinetti theorem of Samuelson & Modigliani (1966).

the sum of savings from wages in that period plus accumulated savings from interest income from all previous periods, the amount of interest income in period n is equal to the interest rate, r , multiplied by accumulated savings over $n-1$ periods. Thus, the workers' share of profit (interest income on savings) at equilibrium is:

$$P_w = rS_w - rs_wW, \quad \text{where } S_w = \frac{s_wW}{(1-s_wr)} \quad (5)$$

$$P_w = \frac{rs_wW}{1-s_wr} - rs_wW = \frac{s_w^2r^2W}{1-s_wr}$$

Substituting for the workers' total saving from above, the investment–saving relationship becomes:

$$I = s_cP_c + S_w = s_cP_c + \frac{s_w}{1-s_wr}W, \quad \text{where } s_c > s_w \quad (6)$$

National income is given by $Y = P_c + W + P_w$, or, substituting for P_w from equation (5):

$$Y = P_c + W + \frac{s_w^2r^2W}{1-s_wr} \quad (7)$$

Hence,⁴

$$Y = P_c + \frac{[1-s_wr+s_w^2r^2]}{1-s_wr}W = P_c + \frac{[1-2s_w^2r+s_w^2r^2]W + s_wrW}{1-s_wr}.$$

We find total (residual plus contractual) profit to be:

$$P_T = \frac{(1-s_wr)^2 + s_wr}{s_c(1-s_wr)^2 + s_cs_wr - s_w}I - \frac{s_w}{(\cdot)}Y + \frac{s_w^2r^2}{(1-s_wr)^2 + s_wr}Y$$

$$- \frac{s_w^2r^2}{(1-s_wr)^2 + s_wr} \left[\frac{(1-s_wr)^2 + s_wr}{(\cdot)}I - \frac{s_w}{(\cdot)}Y \right]$$

where $(\cdot) = s_c(1-s_wr)^2 + s_cs_wr - s_w$.

The share of total profits in national income is:

$$\frac{P_T}{Y} = \frac{1-s_wr}{[s_c(1-2s_wr+s_w^2r^2) + s_cr s_w - s_w]} \frac{I}{Y} - \frac{s_w}{\{\cdot\}}$$

$$+ \frac{s_w^2r^2}{(1-s_wr)^2 + s_wr} - \frac{s_w^3r^2}{\{\cdot\}} \quad (8)$$

where $\{\cdot\} = s_c(1-s_wr + s_w^2r^2) - s_w$.

⁴The complete derivation of the model is available upon request from the author.

Ignoring terms of more than three decimal points, and taking the partial derivative of equation (8) with respect to r , we obtain:

$$\frac{\partial(P_T/Y)}{\partial r} = \frac{s_w^2}{\{\cdot\}^2} \frac{I}{Y} - \frac{s_c s_w^2}{\{\cdot\}^2} < 0, \text{ provided that } s_c > \frac{I}{Y} \quad (9)$$

We also find the profit rate to be:

$$\frac{P_T}{K} = \frac{1 - s_w r}{\{\cdot\}} g + \left[\frac{-s_w}{\{\cdot\}} + \frac{s_w^2 r^2}{(1 - s_w r)^2 + s_w r} - \frac{s_w^3 r^2}{\{\cdot\}} \right] \frac{1}{v} \quad (10)$$

$$\frac{I}{K} = g$$

and

$$\frac{Y}{K} = \frac{1}{v}$$

where g is the rate of growth and u is the capital–output ratio. We also find that

$$\frac{\partial(P_T/K)}{\partial r} < 0 \quad (11)$$

We see from equations (8) and (10) that, in contrast to the results obtained by Pasinetti (1962), the profit rate and the share of profits in national income are *not* independent of the workers’ propensity to save. But we have reached this result while maintaining the same assumptions adopted by Kaldor and Pasinetti. Our equations are more complex than Pasinetti’s Cambridge Equation. We see not only that the interest rate influences the workers’ share of profits – as Pasinetti (1974, p. 141) has shown) – but also that higher interest rates lower the aggregate ‘profit’ rate (equation (11)) and the share of ‘profits’ in national income (equation (9)). This runs contrary to Pasinetti (1974, ch. VI). It should be emphasized once again that this negative impact of the interest rate operates not only on the capitalists’ share of profit – it applies to the whole sum of property income, that is, on capitalists’ profits plus interest income. The relevance of this result will be clarified further when we consider the case in which workers receive a share of profit instead of a fixed interest income.

3. Exogenous Investment and the Impact of the Interest Rate

To see why the interest rate has the impact indicated above, assume that the economy is in full employment equilibrium. Suppose now that the interest rate rises. As a result, the workers’ share of profit rises and that of the capitalists’ decreases. Since we assume that the workers’ propensity to save is smaller than that of the capitalists’, national aggregate savings are going to decline. If we maintain the assumption of exogenous investment, capitalists will not revise their investment plans in response to a rise in the interest rate. This is in line with Pasinetti’s assumption that investment is defined at the level ‘to be undertaken in order to keep full employment over time. This amount of investments as a

proportion of total income is uniquely determined from outside the economic system, by technology and population growth' (Pasinetti, 1962, p. 114).

The decline in savings results in an investment–saving gap. The shortage in the flow of forthcoming savings implies the disappointment of some investment plans, inadequate stock of capital and the fraction of income invested, I/Y , falls. This translates into a decrease in aggregate expenditures and a further reduction in national income, including wages and profits. The situation is a kind of a *Marxian underemployment*. To restore equilibrium, the interest rate should fall; otherwise the wage rate has to go up until the increase in the workers' income generates enough additional savings to compensate for the shortage. The increase in wages must come at the expense of the capitalists' profits. If the interest rate continues to rise, the ratio I/Y continues to decline and the wage rate will have to rise further. Pasinetti (1962, p. 106) explains that in the limit $I/Y = s_w$, i.e. the fraction of income invested is just equal to the workers' saving ratio, and the capitalists' profits will be completely wiped out, as they see their costs of both capital and labor rising.

A rise in the interest rate causes the general price level to rise through two routes. First, it causes excess demand for goods as workers' income rises. Second, as capitalists see their share of profits decline, they increase the prices of their output. Both of these possibilities reduce real wages, and thus increase the capitalists' share of profits and savings, restoring the system back to equilibrium. What is missing from this argument is the fact that a change in the price level does not affect real wages alone; it affects all economic variables, including savings. Thus, the real saving–investment gap may persist and an increase in the money supply may become necessary to reduce the interest rate. Inflation is validated. Consequently the system can be brought back to equilibrium either via a reduction in the interest rate or a rise in wages. It seems that we have now an explanation of Schumpeter's observation that 'interest acts as a tax upon profit' (Schumpeter, 1934, p. 175; see also Uthman, 1994a). A rise in the interest rate not only redistributes income from one class to another, but taxes aggregate profits and national income for all classes too. Inflation then, becomes another indirect tax of an interest-based system. Taylor (1991, p. 17) explains that from a Schumpeterian point of view '[t]he key analytical question about this process (of creative destruction) refers to both the financial and real sides of the economy – how does the entrepreneur obtain resources to innovate? An exogenous money supply and redistribution of real income flows are required to support his efforts'. Starting from a full employment position, as entrepreneurs ask for more loans and demand more resources, inflationary pressures may ensue and real wages and consumption decline. Thus, forced saving occurs and workers, in reaction, will demand higher wages to reverse the forced savings and previous income redistribution. Taylor explains that the resulting rise in wages allows consumption and eventually profits to rise, and this enables businesses to repay their debts and sustain investment.

Taylor (1991, pp. 77–78), reflecting upon why wage restraint remains 'a central orthodox theme,' suggests that 'at least as far as output responses are concerned, the answer hinges upon positing the real balance effect as the *unique* macro adjustment mechanism, in conjunction with neoclassical input

substitution'. Our results suggest that orthodoxy can be explained as a result of the belief that monetary policy cannot affect the long-run interest rate, which is thought to be governed by the profit rate.

The dilemma that policy-makers and economists face is to determine the direction of causality between economic growth and income redistribution. In an alternative profit-sharing system in which workers receive a variable share of total profits instead of a contractually fixed interest income (see Section 5 of this paper), the absence of fixed interest payments reduces the urgency for the reduction in real wages. Furthermore, the possibility of reductions in real wages through the inflationary process is at least partially offset by a rise in workers' share of profits.

What if the interest rate declines? Then we have the opposite situation. But since we are assuming exogenous investment, the extra savings (of capitalists) may not translate into more investment. Consequently, aggregate profits and national income decline further. The I/Y ratio rises simply because Y is declining. As Pasinetti (1962, p. 106) explains, in the limit $I/Y = s_c$. The decrease in consumption puts downward pressure on prices and the system would experience deflation. Wages must rise to enable workers' consumption to recover and thereby restore equilibrium. The case described above is another instance of an interest-tax: personal income is redistributed in the opposite direction, with no mechanism for compensating the disadvantaged class; and national income and profits are reduced for the opposite reason. *Interest is always and everywhere a tax on both personal and functional incomes.*

In comparison, Kaldor (1956, p. 96), argues that the irrelevance of the workers' propensity to save implies that 'wages (not profits) are a residue, profits being governed by the propensity to invest and the capitalists' propensity to consume, which represent a kind of "prior charge" on the national output'. Kaldor means, of course, an *economic* 'prior charge' in the sense that capitalists' behavior determines the *functional* distribution of income between capital and labor, but it does not determine the *personal* distribution of income between workers and capitalists. The latter is determined by contractual relations; for interest charges represent a *contractually predetermined* property income, before it becomes known what total profit will be. This contractual relationship is addressed by neither Kaldor nor Pasinetti.⁵ As we noted above, Pasinetti introduces the interest rate only about half way in his 1962 paper, under the assumption of long-run equality of the interest and profit rates. He relaxes that assumption in a subsequent paper (Pasinetti, 1962, pp. 139–141), where he assumes the interest rate is some proportion of the capitalists' profit rate. But this is only an arithmetic expression, not a contractual one. Such an approach makes the interest rate an endogenous variable – something that is very contrary to the Post Keynesian persuasion! Both Kaldor and Pasinetti seem to be concerned primarily with the impact of the behavioral parameters (i.e. the propensities to save) on the distribution of

⁵Balestra & Baranzini (1971) are among the very few economists who come close to recognizing interest income as a deduction from total profits. Unfortunately, that insight is lost when, later in the paper, they simply assume that the interest rate is a fraction of the profit rate.

income. To put the contractual problem in better focus, we need to introduce the interest rate from the very outset of the discussion.

4. A Comparison of Different Exogenous Investments

It is important to note that the impact of a change in the I/Y ratio depends on the source of the change. For example in the first case above, I/Y declines because a rise in the interest rate redistributes income in a way that creates a *shortage of savings that decreases realized investment* (i.e. I/Y decreases because I decreases). Alternatively, if investment decreases because of pessimistic expectations, the system will end up with a *surplus of savings*. The workers' interest income and wages decline due to Keynesian under-employment. In both sub-cases investment decreases, aggregate profit and national income decline, and a rise in wages becomes necessary to restore equilibrium. In the second case, a decrease in the interest rate redistributes income to capitalists and raises aggregate savings, but it does not cause exogenous investment to compensate for the lost consumption: the I/Y ratio increases because Y decreases. Alternatively, investment may rise because of optimistic expectations or favorable dynamic forces such as technical progress. The rise in investment demand raises savings and decreases consumption, and I/Y rises, but instead of deflation, inflation develops.

As prices and profits rise, there is a redistribution of income in favor of the capitalists. While the workers' interest income may rise due to the rise in investment demand, their real wages may suffer because of inflation. It is not unreasonable to assume that the workers' interest income is (much) smaller than their wages. But excess demand for investment will eventually subside and an increase in wages becomes necessary to increase the demand for the extra consumption goods that were brought about by the additional investment. Dougherty (1980, p. 156) notes that 'To the extent that [workers] are successful in offsetting the effects of inflation, they make the inflation persist that much longer.'

We next consider what happens to the distribution of income if the contractual interest regime is replaced with a profit-sharing one.

5. A Profit-sharing Model

Two decades ago Martin Weitzman (1984) pioneered a new line of research which argued that unemployment can be cured by replacing the wage-based system by a profit-sharing (or revenue-sharing) economy. Weitzman seems to have had little to say about the financing side of a profit-sharing economy. This paper assumes that workers continue to receive wages for their work, but discusses some of the implications of a financing system based upon profit-sharing.

We consider an economy with no contractual interest at all. Let h represent the workers' share in aggregate profit P ; $(1-h)$ therefore represents the capitalists' share of profit. Assume further that workers have the same propensity to save out of wages and profits. The saving-investment relationship is:

$$I = s_c(1 - h)P + s_w(hP + W) \quad (12)$$

Divide both sides by Y and rearrange the terms, the share of profits in national income is then:

$$\frac{P}{Y} = \frac{1}{(1-h)(s_c - s_w)} \frac{I}{Y} - \frac{s_w}{(1-h)(s_c - s_w)}$$

Multiplying both sides by K/K gives:

$$\frac{PK}{KY} = \frac{1}{(1-h)(s_c - s_w)} \frac{IK}{KY} - \frac{K}{K} \frac{s_w}{(1-h)(s_c - s_w)}$$

If we now multiply both sides by Y/K , we find that the share of profits in national income is:

$$\frac{P}{K} = \frac{1}{(1-h)(s_c - s_w)} g - \frac{s_w(Y/K)}{(1-h)(s_c - s_w)}$$

The profit rate would be:

$$\frac{P}{K} = \frac{g - (s_w/v)}{(1-h)(s_c - s_w)} \tag{14}$$

where $v = K/Y$.

Taking the partial derivatives of P/Y with respect to $(1-h)$ and h we find that:

$$\frac{\partial(P/Y)}{\partial(1-h)} = \frac{-(s_c - s_w)}{[(1-h)(s_c - s_w)]^2} \frac{I}{Y} + \frac{s_w(s_c - s_w)}{[(1-h)(s_c - s_w)]^2} < 0$$

provided that $I/Y > s_w$; and

$$\frac{\partial(P/Y)}{\partial(h)} = \frac{(s_c - s_w)}{[(1-h)(s_c - s_w)]^2} \frac{I}{Y} - \frac{s_w(s_c - s_w)}{[(1-h)(s_c - s_w)]^2} > 0$$

provided that $I/Y > s_w$.

Equations (13) and (14) imply that under a profit-sharing system, the share of profits and the profit rate are not independent of either propensity to save. Furthermore, as shown in the above partial derivatives, the distribution of profit shares seems to play an important role. The higher (lower) the workers' (capitalists') share in profits, the higher (lower) will be the total profit share in aggregate national income. Also, when workers receive a profit share (instead of interest) for their contribution to national capital, it can be shown that it has a positive effect on the economy's profit rate, i.e.:

$$\frac{\partial(P/K)}{\partial h} > 0 \quad \text{and} \quad \frac{\partial(P/K)}{\partial(1-h)} < 0$$

Comparing the two models, we can see that replacing the workers' interest income with a share in profits has a positive impact on the profit rate and on the total share of profits in national income. The above results do not directly prove that the share and rate of profits are higher under one regime than the other. However, since the profit-sharing regime removes an important source of cost (the contractual cost of interest) and an important source of risk (the risk of

forced foreclosure in case of failure), we can expect the profit-sharing regime to be more conducive to investment. This point will be discussed further in the next section.

The reader might have noticed that we have sidestepped discussing the determination of the values of h and $(1-h)$. For simplicity we have assumed they are given. More importantly we have not so far indicated how profits are going to be split. This makes the expressions of P/Y and P/K in equations (13) and (14) general enough to apply to any profit-splitting regime. For example, if profit shares are institutionally determined in accordance with the respective shares of capital (Pasinetti's assumption), then it can be easily proven using Pasinetti's ratio method that equation (14) reduces to Pasinetti's Cambridge Equation.

As a matter of fact, the model of Pasinetti's 1962 paper is more akin to a profit-sharing model than to an interest-based model. This is not because he assumes that workers receive the same return on their assets as capitalists, for some of Pasinetti's defenders have shown more effectively than Pasinetti himself that different rates of return leave the Cambridge equation almost unblemished.⁶ It is because Pasinetti's assumption that profits are distributed in accordance with capital shares is *not* compatible with an interest-based system, for interest represents a prior contractual charge on profits before they could ever be realized or known.⁷ Consequently, we can consider Pasinetti's model as more akin to a profit sharing model. Having said that, we can conclude that the Cambridge Equation is a special case of the equation we derived in the second model for the profit rate. We may call Pasinetti's case the *pure partnership* case.

Suppose that capitalists, since they manage capital also on behalf of workers, claim a right to a more than proportionate share of profits. There are a variety of

⁶Moore (1974) shows the irrelevance of the long-run equality of the two rates of return. Assuming that workers receive a lower rate of return than capitalists, so that capitalists earn a higher rate of return than the profit rate for the economy as a whole: $P_c = \lambda P$, where $\lambda > 1$. The share of profits received by capitalists will then exceed by the same proportion (λ) their share of total capital and saving:

$$\frac{P_c}{P} = \lambda \frac{K_c}{K} = \lambda \frac{S_c}{S}$$

Since $S = \lambda S_c P$, we have:

$$\frac{P}{K} = \frac{1}{\lambda S_c} \frac{I}{K} = \frac{g}{\lambda S_c}$$

This confirms Pasinetti's result about the irrelevance of S_w . It brings the additional result that the higher capitalists' rate of return (λ) relative to the workers', given g and S_c , the lower are the profit rate and the share of profits in income. Our model is more general than Moore's, as we establish the negative impact of a higher capitalist share of profits on the overall profit rate without imposing the condition of a higher rate of return to capitalists as a starting assumption.

⁷Balestra & Baranzini (1971, p. 242) present an interesting discussion as to why the assumption of long run equality of the interest and profit rates must be relaxed. They argue that this assumption is the reason behind why Pasinetti's result and its dual of Samuelson and Modigliani are not realistic. On the latter, they argue that if a higher workers' propensity to save will cause 'the workers' capital to grow indefinitely, the workers' paradise should not be far away' (Balestra & Baranzini, 1971, p. 241).

possible arrangements under this kind of partnership (see Uthman, 1994b). Profits could be split according to a mix of institutional and market-determined methods. The question that arises is how to classify the capitalists' extra profit income. One way to look at this charge is to consider it as part of the capitalists' return on their capital. Another is to consider that charge as compensation for the capitalists' managerial skills – a sort of remuneration for capitalists' labor income. If it is the first interpretation, one is tempted to say that we are back to Moore's version of the Cambridge Equation. This is not accurate however. For regardless of how we classify that charge, capitalists have two sources of income, and the additional income depends indirectly upon, among other things, the workers' share of capital. Thus, the economy's overall profit rate (equation (13)), is not independent of workers' propensity to save.

Now that we have derived the results of the two models, we may turn to analyze them.

6. The Fundamental Relationship between Profits and Savings Reconsidered

One advantage of our profit-sharing model is not only that it shows the respective profit shares of both classes, but that it also shows how these shares are related to each other via the total national profits. An interest rate and a profit share are not directly comparable. The interest rate is an *ex ante* pre-determined rate of return but it is not an *ex ante* determined share (percentage) of profit. A profit share is just the opposite

The two models discussed in this paper represent *two different institutional set-ups* in rewarding savings and contributions to national capital. In the profit-sharing model, contributions to national capital are strictly governed by the saving propensities of economic agents. No external factor (see Note 8) influences the *personal* distribution of income between workers and capitalists, or the *functional* distribution of income between labor and capital. This is contrary to the case under the interest-based model, where savings and contributions to national capital are influenced not only by the behavioral propensities, but also by an *external* (non-behavioral) factor called the interest rate. In line with our argument that an interest-based model is not compatible with a distribution of profits in proportion to savings, the capitalists' profit-saving ratio in the interest-based model, can be greater than, equal to, or less than the workers' ratio. Thus, we can write:

$$\frac{P_w}{s_w(W + P_w)} \geq \frac{P_c}{s_c P_c}$$

If we substitute the definition of workers' savings from Section 2 above into this last equation,

$$\frac{P_c}{P_w} \geq \frac{s_c P_c}{(s_w W)/(1 - s_w r)} \tag{15}$$

This means that the ratio of capitalist's to workers' profit is not only influenced by their respective propensities to save, but also by the interest rate, assuming a constant wage. For the profit-sharing model, assuming profits are split in accordance with savings, the ratio of the respective profits is:

$$\frac{(1-h)}{h} = \frac{s_c(1-h)P}{(s_w)(hP+W)} \quad (16)$$

If we assume constant wages and aggregate profits, the ratio of the workers' to the capitalist's profits is strictly governed by their propensities to save and their proclivities for work and entrepreneurship. For both classes, a change in their flow of savings, ownership of capital, and share of profit can be financed only by a change in their own consumption and nothing else. *A genuine sacrifice is a must for an additional reward.*

As can be seen from equation (16) above, since there are two sources of the workers' income, then for any given s_w there are infinite proportions between profits and savings which can satisfy the equality of the capitalists' and workers' profit-savings ratio. This makes the workers' profit rate indeterminate (Pasinetti, 1962, p. 111). By introducing the interest rate explicitly in these ratios, (equation (15)), we have another complicating reason for such an indeterminacy. By a stroke of a pen, changes in the interest rate may create or destroy wealth and thus abruptly change the distribution of wealth and income in society. Such an additional source of indeterminacy is absent in the profit-sharing model. The absence of such an external source of disturbance should make a profit-sharing system not only more equitable, but also more conducive to investment and growth.⁸

The institutional transformation from an interest-based economy into a profit-sharing one implies that a haphazard process of income distribution (through variation in the interest rate) is removed. The *level and composition* of output will respond more freely to social needs. A major element of stagnation in investment is removed and no longer acts as a check against its level and direction. The removal of such an element is expected to reduce greatly the source of conflict between capitalists, *rentiers*, and workers. The proposed institutional transformation can bring about better *market-based redistribution* of wealth and incomes since the central-bank-controlled exogenous interest rate will be replaced by the propensities to save and work. *The return to financial investment will be brought into closer harmony with the rate on real investment. This is another meaning of the socialization of investment and a less interventionist way accomplishing it.*

⁸Actually, if we examine the profit-saving ratios in both systems, we see that W is another contractual variable that causes fluctuations in savings and leads to an indeterminate workers' profit rate. But since W is common to both systems, the interest-based system has one more volatile variable – the interest rate. Moreover, one can assume, and experience confirms, that the wage rate is less volatile than the interest rate. Hence, the interest-based system is prone to be less conducive to investment and growth.

8. Summary and Conclusion

Our paper reformulates the Kaldor–Pasinetti model of profit and income distribution by dealing with interest as a contractual income and introduces the interest rate from the very outset of the model. Within this formulation, the profit rate and the profit share in national income are revealed to be not independent of the workers' propensity to save, in contrast with what the standard Kaldor–Pasinetti model contends. Furthermore, we have shown that the interest rate has a negative impact on the profit rate and the profit share; and that interest is always and everywhere a tax on personal and functional income, giving a macroeconomic explanation for Schumpeter's observation that 'interest acts as a tax upon profit'.

Using an alternative profit-sharing model, we showed that the profit rate and the profit share are not independent of workers' propensity to save. Furthermore, the workers' share of profit has a positive impact upon the national profit rate and share. This implies that the profit-sharing system is more conducive to investment, capital accumulation and hence job creation than the interest-based system.

Dynamic forces that are supposed to raise the marginal efficiency of capital and activate investment operate over a longer run than changes in the interest rate. Ironically, favorable dynamic forces may be impaired by the very disease they are supposed to cure. It is not without reason that Keynes saw in his theory of the interest rate a

fundamental inference . . . which has a bearing on the future of inequalities of wealth. . . . [I]t would mean *the euthanasia of the rentier*, and, consequently, the euthanasia of the cumulative oppressive power of the capitalist (the financier) to exploit the scarcity-value of capital. *Interest to day rewards no genuine sacrifice*, any more than does the rent of land. The owner of capital can obtain interest because capital is scarce, just as the owner of land can obtain rent because land is scarce. But whilst there may be intrinsic reasons for the scarcity of land, there are no intrinsic reasons for the scarcity of capital. (Keynes, 1936, pp. 374–376; emphasis added)

Pasinetti (1962, p. 119) describes his own analysis 'as a logical framework to answer interesting questions about what *ought* to happen if full employment is to be kept over time, more than as a behavioral theory expressing what actually happens.' In contrast, the differences between the two models presented in this paper are behavioral not in the sense they express what actually happens, but in the sense that they represent two distinct social choices. They may give us a clue about some of what *ought to be done* in addition to what *ought to happen*, if full employment is to be maintained over time.

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