

Is the Pasinetti Theorem a Theorem on Income Distribution?

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1 Introduction

According to the so-called Pasinetti Theorem, in a long-term equilibrium growth path, under which the share of capitalists' saving to the saving as a whole is equal to the share of capitalist' capital to the capital as a whole, the rate of profit is determined solely by the rate of growth and by capitalists' propensity to save, and the share of profits in income is determined by the ratio of investments to income and by capitalists' propensity to save; both are independent of workers' propensity to save. The theory is understood to confirm 'Keynes' and Kalecki's intuitive results obtained in the early 1930s on a higher level of generality' (Bortis 1993, p.107). Keynes' and Kalecki's intuitive result here means that investment levels and capitalis' consumption levels determine the profits and the distribution of income.

In this paper, I will

1. address the issue of what is the role of the principle of multiplier in the Pasinetti Theorem—is it to determine the income distribution, or to determine the level of income?—,
2. clarify in what conditions, the Theorem is said to determine the income distribution, and
3. investigate to what extent does the Theorem explain the actual income distribution.

First, the issue of the role of the principle of multiplier is presented, referring to Kaldor's argument. Second, it is shown that in Pasinetti Theorem, the role of the principle of multiplier depends on what variables are assumed to be constant. After mentioning the issue in the Neo-calssical case, it is investigated to what extent does the Pasinetti Theorem explain the actual income distribution.

2 The Issue of the Role of the Principle of Multiplier

As is well known, Pasinetti (1962) derived the following equations:

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

$$\frac{P}{K} = \frac{g}{s_c}, \quad (2)$$

which came to be known as the Pasinetti Theorem, where P : profit, Y : income, I : investment, K : capital, g : growth rate, and s_c : capitalists' propensity to save.

These equations are derived as follows. In the long-run equilibrium, the profit rate for capitalist' capital is equal to that for workers' capital, i.e. $P_c/K_c = P_w/K_w = P/K$, and capitalist' and workers' shares of capital is constant, i.e. $K_c/S_c = K_w/S_w = K/S$. Therefore, $P/S = P_c/S_c$, from which $P = S/s_c$. Since $I = S$ according to the principle of effective demand (or the principle of multiplier), $P = I/s_c$, from which the above two equations results.

Regarding the implication of this theorem, it is said:

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It means that, in the long run, workers' propensity to save, though influencing the distribution of income between capitalists and workers, does not influence the distribution of income between profits and wages. Nor does it have any influence whatsoever on the rate of profit. (Pasinetti 1962, p.272)

Since the rate of profit and the income distribution between profits and wages are determined independently of s_w , there is no need for any hypothesis whatever on the *aggregate* savings behaviour of the workers. (*idem.*, p.274).

The Cambridge equation confirms Keynes' and Kalecki's intuitive results obtained in the early 1930s on a higher level of generality: even if workers save, their propensity to save does not influence the profit share and the rate of profits. (Bortis 1993, p.107)

With respect to Keynes' intuitive result, it is said:

higher investment levels and more spending on consumption out of profits lead to larger profit volumes: "profits...are a widow's cruse..." (*idem.*, p.106).

Bortis also argued:

Across the Cambridge equation s_c contributes to governing the wage-profit ratio $W/P = (Y/P) - 1$. s_w then determines the share of workers profits in total profits: P_w/P increases with s_w . (*idem.* p.110)

The Pasinetti Theorem is considered as representing the independence of the share of profit in income from workers' propensity to save, and its dependence on capitalists' propensity to save and the volume of investment. The equation (1) apparently shows that.

However, as Kaldor pointed out, determination of income distribution is the alternative role of the principle of multiplier to determination of income level, and the two roles are exclusive to each other. Kaldor said:

The principle of the Multiplier (which in some way was anticipated in the *Treatise* but without a clear view of its implications) could be alternatively applied to a determination of the relation between prices and wages, if the level of output and employment is taken as given, or the determination of the level of employment, if distribution (i.e., the relation between prices and wages) is taken as given. ...

And its use for the one appears to exclude its for the other.' (Kaldor 1956, p.94)

Kaldor assigned the role of determining the level of income to the short-term, and the role of determining the income distribution to the long-term. But, even in the long-term the level of income may be dependent on investment, because mechanisms for attaining full employment in the long-run are not so established.

The Pasinetti Theorem is regarded as referring to the long-term. What is the role, in the theorem, of the principle of multiplier? Is it the determination of income distribution? Has the principle lost the role of determining the level of income?

3 The Principle of the Multiplier in the Pasinetti Theorem

The shares of workers' and capitalists' capital are assumed constant in the long-term equilibrium. Let the share of capitalists' capital be represented by π , i.e. $\pi = K_c/K$, then $\pi = P_c/P$. When investment, I , is given, P is determined to be I/s_c . A proportion of it, πP , is obtained by capitalists and the residual, $(1 - \pi)P$, is obtained by workers, i.e. $P_c = \pi P$ and $P_w = (1 - \pi)P$. Out of the profit, $s_c P_c + s_w P_w$ is saved, which must be equal to $I - s_w W$, where W is the total wage. This relation determines the wage as

$$W = I \left(\frac{1 - \pi}{s_w} - \frac{1 - \pi}{s_c} \right).$$

Since P and W is determined by I , the total income Y is also determined as

$$Y = I \left(\frac{1 - \pi}{s_w} + \frac{\pi}{s_c} \right).$$

Therefore, the share of the profit in the income becomes

$$\frac{P}{Y} = \frac{s_w}{\pi s_w + (1 - \pi) s_c} \quad (3)$$

and the share of the wage in the income is

$$\frac{W}{Y} = \frac{(1 - \pi)(s_c - s_w)}{\pi s_w + (1 - \pi) s_c}.$$

Those shares are independent of I , and dependent on s_w .

When I increases, P increases, but Y increases proportionately, so the share P/Y does not change. The income distribution is determined solely by s_c , s_w and π , and not affected by I nor g .

But, the above results are dependent on the assumption of constancy of π . As is pointed out by Pasinetti (1974, p.130), in the long-term,

$$\pi = \frac{s_c(g\kappa - s_w)}{(s_c - s_w)g\kappa}, \quad (4)$$

where κ represents capital/output ratio. Substituting this into (3), we obtain

$$\frac{P}{Y} = \frac{g\kappa}{s_c}.$$

This is equivalent to the original (1), taking $I/Y = g\kappa$ into account, and it seems to show P/Y is dependent only on g , κ and s_c , and independent of s_w .

Equation (4) reveals that when s_c and s_w are given, either π or κ is dependent on g ;

- π is uniquely determined by g when κ is fixed, and
- κ is uniquely determined by g when π is fixed.

When κ is fixed, π will be so adjusted that P/Y is not dependent on s_w nor π . When π is fixed, κ will be so adjusted that $g\kappa$ is kept constant, and that P/Y is dependent only on s_c , s_w and π . Which is fixed π or κ cannot be determined *a priori*; any of them can change when the long-term g changes.

4 Comparison to the Neoclassical framework

Meade (1966) presented a geometric taxonomy to illustrate what separates the Pasinetti case from the ‘anti-Pasinetti’ case. In Fig. 1, the lines OH and OL correspond to the profit-income ratio of α_H and α_L respectively. When the profit-income ratio is high (α_L), the line OL intersects the segment DE, which represents the Pasinetti case and $P/K = g/s_c$. When the profit-income ratio is low (α_H), the line OH intersects the segment CD, which represents the anti-Pasinetti case, and $Y/K = g/s_w$.

The controversy between Pasinetti and the neoclassical economists, including Meade, Samuelson and Modigliani, was mainly on the relevance of the anti-Pasinetti case (Meade 1963, 1966, Meade and Hahn 1965, Samuelson and Modigliani 1966, Pasinetti 1964, 1966), but as Pasinetti (1974) argued, the anti-Pasinetti case, where capitalists disappears because workers’ propensity to save is too high, is of no interest. Meade’s diagram is important because it illustrates what is given, what is determined internally and what is indeterminate in the neoclassical framework in comparison with in Pasinetti’s framework.

In the neoclassical framework, which assumes the marginal productivity theory of income distribution, the income distribution is determined by technological parameters in the production function. When a Cobb-Douglas production function $Y = AK^\alpha L^{1-\alpha}$ is assumed, the share of profit in income is determined to be α , and then the share of capitalists’ capital in total capital π is accordingly determined as

$$\pi = \frac{\alpha s_c - s_w}{\alpha(s_c - s_w)},$$

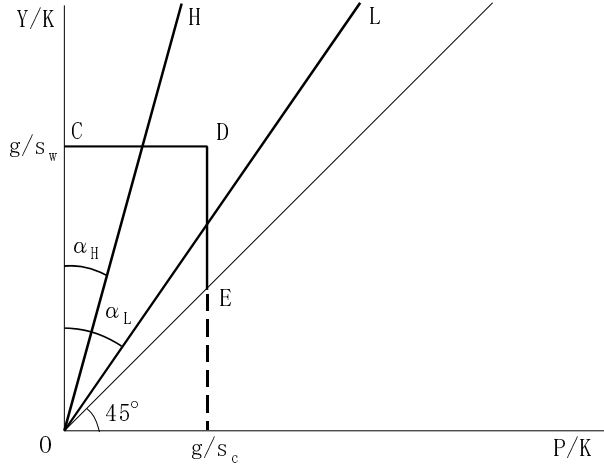


Figure 1: Meade's geometric taxonomy

which results from (3) when P/Y is given as α . κ is also determined by the equation (4).

Fig. 2 shows the mechanism of the Pasinetti Theorem using Meade's diagram. Fig. 2(a) represents the case with a constant κ . When g rises to g' , P/Y increases to $(P/Y)'$. Fig. 2(b) represents the case with a constant π . When g rises to g' , κ decreases to κ' , and P/Y does not change.

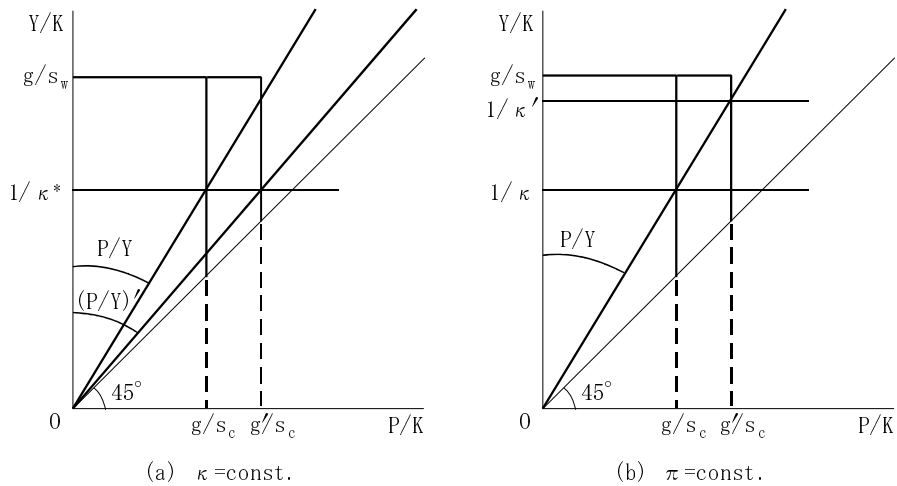


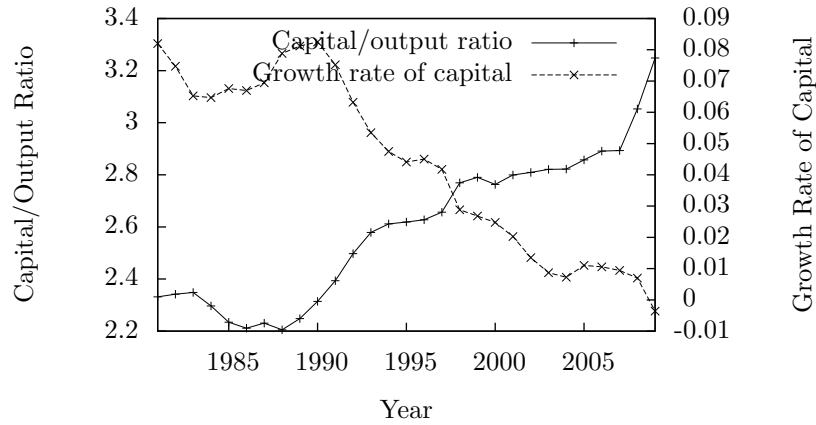
Figure 2: The Pasinetti Theorem Using Meade's Diagram

5 Empirical Data and the Theory of Distribution

Fig. 3 shows actual developments in the growth rate of capital and in the capital/output ratio in Japan from 1981 to 2009. κ has increased steadily since 1989, while g decreased since 1991. The increase in κ may have offset the decrease in g .

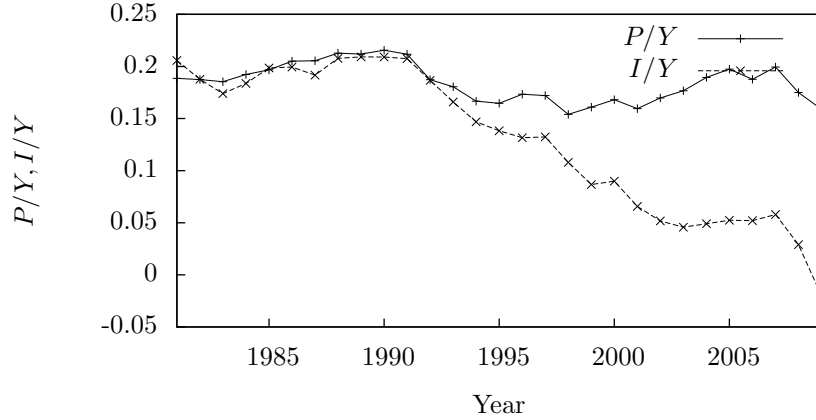
However, I/Y has declined since 1991 (Fig. 4). This means $g\kappa$ has decreased. Therefore, the increase in κ has not fully compensated the decrease in g . In spite of the decline in I/Y , P/Y has stayed relatively high. This means s_c has decreased.

On the other hand, government deficit has increased during the same period, and the government's propensity to save (s_T) has sharply declined and be kept less than zero (Fig. 5). According to Pasinetti



National Account of Japan. Capital/output ratio is fixed assets divided by net domestic products. Growth rate of capital is net investment divided by fixed assets.

Figure 3: Development of capital/output ratio and growth rate of capital in Japan



National Account of Japan. P is 'operating surplus'. Y is net domestic product. I is the sum of net fixed capital formation, changes in inventories, and exports minus imports.

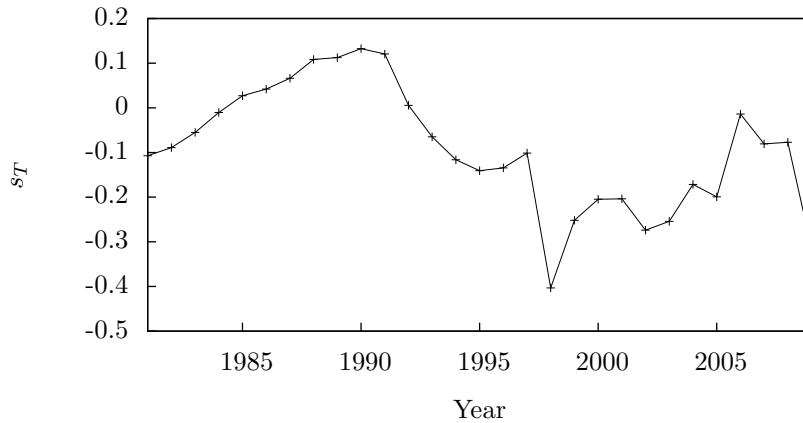
Figure 4: Development in P/Y and I/Y in Japan

(1989), when the public sector is taken into account, s_c should be replaced by s'_c , which is equal to

$$s_c(1 - t_p) + s_T \frac{t_p + t_i(1 - s_c)(1 - t_p)}{1 - t_i(1 - s_T)},$$

where t_p is the tax rate for profits, t_i is the tax rate for consumption, and s_T is the government's propensity to save.

s_T has declined, but considering the present levels of tax rate, the decline in s_T by about 0.4 at the maximum cannot explain the discrepancy of P/Y and I/Y , which shows s'_c has decreased by about 0.7. That means s_c itself has decreased during this period. However, it is difficult to identify facts corresponding to the decrease in s_c .



National Account of Japan. s_T is primary balance divided by the revenue for the government sector, which includes tax revenue, social security revenue and net interest received.

Figure 5: Governments' propensity to save in Japan

6 Conclusion

- In Pasinetti's framework, there is a possibility that the principle of multiplier still has a power to determine the income level even in the long-run. This is the case when π is constant.
- When κ is thought to be constant and π is to be adjusted, the principle of multiplier determines solely the income distribution.
- In fact, κ has increased when g has decreased in the period as long as 20 years.
- Income distribution is actually influenced significantly by the change in s_c and s_T .
- The government policy to spend more money seems to have offset the effect of the decrease in investment and to have had an effect of keeping the profit share at high levels.
- The aim of the theory of distribution is to identify what is the decisive factor for determining the shares of profits and wages. We can find no evidence that investment is the decisive factor from our recent experience.

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