Wealth Distribution, Elasticity of Substitution, and Piketty: an anti-dual Pasinetti Economy.*

Luca Zamparelli†

Abstract

This paper examines the evolution of wealth distribution between workers and capitalists. It shows that under competitive conditions, and when factors elasticity of substitution is high enough to ensure endogenous growth, capitalists' share of total wealth asymptotically tends to one if they have a higher propensity to save than workers. It is also shown that a tax on capital income shifts wealth distribution in workers' favor and makes any level of wealth concentration feasible. The results of the paper are compared to Piketty's 'fundamental laws' of capitalism, and to the literature on Ramsey's conjecture.

Keywords: Wealth distribution, elasticity of substitution, Pasinetti two-class equilibrium, Piketty

JEL Classification: E12, E13, E21

*I owe my interest in the topic to conversations with Mariasole Garacci. I wish to thank Peter Skott, seminar participants at the 2015 Eastern Economic Association conference, and members of 'Sapienza' reading group on inequality for useful comments and suggestions. The usual disclaimers apply.

†'La Sapienza' University of Rome, Department of Social Analysis and Economics, Piazzale A. Moro 4, Roma, 00185. Email: luca.zamparelli@uniroma1.it.

1 Introduction

Class division is a fundamental feature of heterodox economics. While most mainstream macroeconomic analysis is carried out with the aid of a 'representative' agent who, at the same time, provides labor services and earns interest income by lending her savings to the productive sector, both post-Keynesian and Classical-Marxian economists reject a similar representation of the economy. The recourse to a representative agent, on the one hand, necessarily precludes any analysis of the social distribution of wealth; on the other hand, it can also be misleading if workers and capital-assets owners have different economic behaviors. To strengthen this vision, it appears relevant to understand whether there are forces endogenous to the economy which preserve or make disappear the wealth of any of the two classes over time.

The classical notion that workers own no capital stock relies on the assumption that the wage rate tends to be pushed toward the subsistence level, so that workers consume their whole income. When Kaldor (1955-56) put forward his 'Keynesian' theory of distribution he assumed positive saving out of wages, but he did not concern himself with the implications the new assumption could have on the distribution of wealth. The issue was taken up by Pasinetti (1962). He noticed that if workers do save, they necessarily accumulate wealth and capital; he found the existence of a long run equilibrium where both capitalists and workers own a positive share of the capital stock. The paper contained other important results such as the so-called 'Pasinetti theorem' - i.e. the profit rate non-dependence on workers' saving rate - and spurred a large debate. Meade

(1963) and Samuelson and Modigliani (1966) showed that within the neoclassical growth model and when workers' propensity to save is sufficiently high, workers would end up owning the whole capital stock in the long run. This result is known as the 'dual' Pasinetti equilibrium. The relevance of the neoclassical response is apparent: if capitalists' wealth eventually disappears, we might as well do away with the idea of class division and rely on a representative agent to begin with. Within the post-Keynesian framework, the existence of the two-class economy became an extremely popular topic. Several contributions generalized the analysis along two main directions. First, beginning with Chang (1973) the model was extended to consider more than two saving rates due to the possibility that workers could have different propensities to save depending on the income source (see also Darity 1981). Second, while both Pasinetti (1962) and Samuelson and Modigliani (1966) assumed the equality between the interest rate and the profit rate, some scholars (see Laing 1969; Pasinetti 1974; Fazi and Salvadori 1981, 1985 among others) explored the implications of assuming a postive wedge beteen the profit rate and the interest rate earned on workers' saving.

Of particular interest to our purpose is the 'anti-dual' outcome obtained by Darity (1981). He found that, when the investment function is modelled following '*Tobin's q*' theory, a situation where capitalists' share of wealth tends to unity emerges as a possible long-run outcome. In light of the recent debate on wealth concentration spurred by Piketty's (2014) best-selling book *Capital in the Twenty-First Century*, the anti-dual result appears extremely relevant.

In a commentary to Piketty's book, Taylor (2014) has shown that the anti-dual equilibrium is a distinct possibility in a profit-led Kaleckian economy.

This paper elaborates on Samuelson and Modigliani (1966) and Taylor (2014) contributions to show that the anti-dual outcome is possible even within the neoclassical growth model. Specifically, if the elasticity of substitution between capital and labor is sufficiently high capitalists' share of wealth keeps rising indefinitely over time and approaches one. Two forces are at work to produce the result. First, once the elasticity of substitution rises beyond a certain threshold the neoclassical growth model yields permanent per capita accumulation of capital; second, when the elasticity of substitution is higher than one the profit share is an increasing function of the capital-labor ratio. The simultaneous and permanent increase in the profit share and capital intensity produces the rise in capitalists' wealth share as long as capitalists save more than workers. Indeed, once the wage share tends to zero, wealth is accumulated only through saved interest income; the wealth of the class with the lower saving rate grows at a slower pace and, if the process goes on indefinitely, in the limit it becomes negligible as a share of total wealth. The paper also shows that a tax on capital income may shift wealth distribution in workers' favor and bring the economy back to the Pasinetti two-class equilibrium. Finally, the results of the paper are compared to Piketty's 'fundamental laws' of capitalism, and to the literature on Ramsey's conjecture.

The rest of the paper is organized as follows. The next Section 2 presents the model; Section 3 compares the results to Piketty's analysis; Section 4 discusses the plausibility of the assumption on the elasticity of substitution; Section 5 discusses the relation to the literature on wealth distribution and optimal growth; Section 6 concludes.

2 The model

2.1 Society

There are two classes in society. Workers supply inelastically labor services and receive the wage rate w. They save the share s_w of their income and use savings to accumulate capital stock (K_w) on which they earn the interest rate r. Capitalists earn profits on the capital stock they own (K_c). Their propensity to save is $s_c > s_w$. The profit rate and the interest rate coincide.

2.2 Production

Production requires labor (L), which grows at the exogenous rate n, and capital $K = K_c + K_w$. Output (Y) is produced through a constant returns to scale and constant elasticity of substitution production function

$$Y = A[aK^{\rho} + (1-a)L^{\rho}]^{\frac{1}{\rho}},$$

where $A > 0$ is a technological parameter, $a \in (0,1)$, $\rho \in (-\infty, 1)$ and $\sigma = 1/(1-\rho)$ is the elasticity of substitution between capital and labor. The production function can be written in per-capita terms as

$$y = f(k) = A[ak^{\rho} + (1-a)]^{\frac{1}{\rho}}.$$

When $\rho > 0$, that is when capital and labor are substitutes, we show in the Appendix that $\lim_{k\to\infty} f'(k) = \lim_{k\to\infty} f(k)/k = Aa^{\frac{1}{\rho}}$. We assume $Aa^{\frac{1}{\rho}} > n/s_w$, which requires $\rho > \ln a/[\ln n/s_w - \ln A]$. We are imposing a sufficient condition on the elasticity of substitution to ensure endogenous growth.

2.3 Distribution

Factors of production are paid according to their marginal products. Hence, $r = F_K = f'(k)$ and $w = F_L = f(k) - kf'(k)$. The interest income share is $\alpha = kf'(k)/f(k)$. Under our assumptions $\alpha = k^{\rho}/(k^{\rho}+1)$. Let $z \equiv K_c/K$ be the capitalists' share of capital (in turn equal to wealth), then the capitalists' share of income is $Y_c/Y = rK_c/Y = \alpha z$, that is the product between interest income share and capitalists' wealth share.

2.4 The Dynamical System

We want to set up a dynamic system to represent the evolution of capital accumulation, interest income share and capitalists' wealth share. Both workers and capitalists save and accumulate capital. Capitalists' saving is $\dot{K}_c = s_c f'(k) K_c$, while workers' aggregate saving is $\dot{K}_w = s_w f'(k) K_w + s_w wL$. In the Appendix we show that the law of motion of per-capita capital is

$$\frac{\dot{k}}{k} = f'(k)z(s_c - s_w) + f'(k)\frac{s_w}{\alpha} - n. \tag{1}$$

Notice the role of wealth distribution in the accumulation of capital. Given the differential saving rates hypothesis there is a positive relation between growth and capitalists' share of wealth. The share of capitalists' wealth, in turn, evolves according to (again see the Appendix for the full derivation)

$$\frac{\dot{z}}{z} = \frac{\dot{K}_c}{K_c} - \frac{\dot{K}}{K} = f'(k)\left[s_c - \frac{s_w}{\alpha} - z(s_c - s_w)\right]. \tag{2}$$

Rising z requires capitalists' saving rate to be high enough to compensate the extra saving workers earn on labor income. Finally, from the definition of the elasticity of substitution $\sigma = d\ln k/d\ln(F_L/F_K)$, the relation between capital accumulation and the evolution of the profit share is:

$$\frac{\dot{\alpha}}{\alpha} = \frac{\sigma - 1}{\sigma}(1-\alpha)\frac{\dot{k}}{k} = \frac{\sigma - 1}{\sigma}(1-\alpha)[f'(k)z(s_c - s_w) + f'(k)\frac{s_w}{\alpha} - n]. \tag{3}$$

As is well known, the profit share is a positive (constant, negative) function of capital accumulation when the factors elasticity of substitution is larger (equal, smaller) than one.

Equation (1) shows that regardless the values of α and z, the condition $f'(k) > n/s_w$ ensures that per-capita capital accumulation never stops, despite being decreasing in k. As a consequence, from (3), the profit share also keeps increasing over time and approaches one[1]. Finally, equation (2) shows that z has a stable rest point in $z^* = \dfrac{\alpha s_c - s_w}{\alpha(s_c - s_w)}$, so that $\lim_{t\to\infty} z = 1$. Notice that the way z approaches unity may not be monotone. If the system starts off with a high share of capitalists' wealth and a relatively low profit share, capitalists' wealth may initially decrease relative to total wealth before picking up and absorbing it almost completely (in relative terms).

Since in the long run capitalists own almost the totality of capital, their propensity to save determines the accumulation rate regardless of how much workers save. From (1) we find the long run per capita growth rate of the economy as $g = \dot{y}/y = \dot{k}/k \to s_c A a^{\frac{1}{\rho}} - n$. In the long run, the structure of the economy resembles an AK model where the saving rate is given by capitalists' propensity to save.

2.5 Policy

Piketty (2014) argues that a tax on capital income can be an effective tool to halt the positive trend in wealth inequality. We verify the conjecture in our model.

Let us assume that all interest income is taxed at a proportional rate t, and that tax revenues are transferred to workers. The after tax capitalists' and workers' earnings, respectively, are: $Y_c = r(1-t)K_c$ and $Y_w = wL + rK_w + rtK_c$.

The dynamical system becomes[2]

[1] $\lim_{t\to\infty} \alpha = \lim_{t\to\infty} \dfrac{k^\rho}{k^\rho + 1} = \lim_{k\to\infty} \dfrac{k^\rho}{k^\rho + 1} = 1.$

[2] The derivation of (1 bis) is provided in the Appendix.

$$\frac{\dot{k}}{k} = f'(k)[(1-t)z(s_c - s_w) + \frac{s_w}{\alpha} - \frac{n}{f'(k)}] \qquad \text{(1 bis)}$$

$$\frac{\dot{z}}{z} = f'(k)\left[s_c(1-t) - (1-t)z(s_c - s_w) - \frac{s_w}{\alpha}\right] \qquad \text{(2 bis)}$$

$$\frac{\dot{\alpha}}{\alpha} = \frac{\sigma - 1}{\sigma}(1-\alpha)f'(k)[(1-t)z(s_c - s_w) + \frac{s_w}{\alpha} - \frac{n}{f'(k)}]. \qquad \text{(3 bis)}$$

Inspection of (1 bis) shows that, even when capital income is taxed, capital accumulation never stops since $s_w/\alpha > s_w > n/f'(k)$. This occurs because taxes are redistributed to workers, who accumulate capital with a propensity to save high enough to make net investment always positive. The interest income share dynamics is (qualitatively) unaffected by the tax, so that α approaches one in the long run.

The introduction of the capital income tax, however, makes a difference in the steady state distribution of wealth. z has a steady state in $z^* = \frac{(1-t)\alpha s_c - s_w}{(1-t)\alpha(s_c - s_w)}$; it follows that $\lim_{t\to\infty} z = \frac{(1-t)s_c - s_w}{(1-t)(s_c - s_w)} \in (0,1)$ for $t < (s_c - s_w)/s_c$, with $z'(t) < 0$. Therefore, by managing the tax rate t the policy maker can implement any wealth distribution.

Our result confirms Piketty's policy prescriptions. A tax on capital can effectively achieve any configurations of wealth distribution. But there is a price to pay: a more workers friendly wealth distribution reduces per capita growth because workers save less than capitalists. Plugging z^* into (1 bis) we find that in the long run $g = \dot{y}/y = \dot{k}/k \to (1-t)s_c A a^{\frac{1}{\rho}} - n$

Notice also that the capitalists' income share is $Y_c/Y = (1-t)rK_c/Y = (1-t)\alpha^* z^* = \dfrac{(1-t)s_c - s_w}{s_c - s_w}$. The tax on capital income reduces capitalists' income share both directly, through the reduction of the net interest rate, and indirectly given the effect on the long run distribution of wealth.

3 Comparison to Piketty

Piketty's work is more concerned with personal wealth inequality than with the social distribution of wealth (z). As a consequence, the result we proved is not immediately comparable to his analysis. However, showing the implications his theoretical structure has on the evolution of z is relatively straightforward within our framework. Two 'fundamental laws of capitalism' are at the core of Piketty's representation of the process of growth and distribution. The first law is simply the definition of the profit share as the product between the profit rate and the capital-output ratio (β, in his notation): $\alpha = r\beta$. He accepts the neoclassical theory of distribution so that $\alpha = f'(k)k/f(k)$. The second law is the characterization of steady state in a standard neoclassical exogenous growth model: $s/g = k^*/f(k^*)$. In a steady state, the economy reaches a constant level of capital per worker, profit share, and capital-output ratio. The simultaneous rise in the profit shares and capital output ratios we have observed in the past three decades is interpreted as the effect of a negative shock to the exogenous (population) growth rate, coupled with an elasticity of substitution higher than one. Capital and labor are substitutes, but not enough to ensure endogenous growth. If the economy reaches a steady state, equation (2) shows that the distribution of wealth converges to $z^* = \dfrac{\alpha^* s_c - s_w}{\alpha^*(s_c - s_w)}$, which is an increasing function of the steady state profit share α^*. A negative shock to the growth rate thus raises the capital-output ratio, the profit share and the capitalists' share of wealth. The result on the evolution of wealth functional distribution is therefore analogous to the one we proposed, but the transmission mechanism is different. In our model, endogenous capital accumulation, rather than a negative shock to population growth, produces the rise in wealth concentration[3].

4 On the Elasticity of Substitution

The possibility that the elasticity of substitution be higher than one is at the core of Piketty's analysis on rising wealth inequality. Within the neoclassical framework with perfect competition, two factors of production and no technological change, reconciling an increasing capital-output ratio and a rising profit share requires that capital and labor are strict substitutes. This is the reason why Piketty and Zucman (2014, p. 1304), without an explicit econometric estimation, support the thesis of substitution elasticity higher than one.

There are several reasons why this conclusion may be mistaken. A number of authors have criticized Piketty for identifying capital with wealth (inclusive of housing and land), which may lead to an over-estimation of productive capi-

[3] Piketty and Zucman (2014, p.38) do acknowledge alternative theoretical frameworks, such as endogenous growth models where the growth rate is a positive function of the saving rate. They do not use them, however, for their analysis on wealth distribution.

tal (Galbraith 2014, Stiglitz 2015) and, in turn, of the elasticity of substitution (Rowthorn 2014, Semieniuk 2014). Piketty and Zucman (2014, p.1303) themselves suggest alternative explanations compatible with the evidence, such as: 'a model with imperfect competition and an increase in the bargaining power of capital,... [or] a production function with three factors—capital and high-skill and low-skill labor—where capital is more strongly complementary with skilled than with unskilled labor.. if there is a rise in skills or skill biased technical change'. An elasticity of substitution smaller than one, coupled with technical change sufficiently biased towards labor-saving, is also compatible with the patterns in factors shares and capital-output ratio identified by Piketty.

Still, the thesis of capital and labor substitutability cannot be easily dismissed. The reason lies in the so-called 'impossibility theorem' devised by Diamond, McFadden and Rodriguez (1978), which states that, given the relevant empirical series, factors substitution elasticity and the bias of technical change cannot be simultaneously identified. The challenge posed by the theorem is typically overcome by imposing some specific structure on technical change; the choice of the structure, however, affects the estimation of the elasticity of substitution. It is true that most estimates of the elasticity of substitution in the U.S. appears to be smaller than, or at most equal to, one (see Leòn-Ledsma et al. 2010 for an account), but recent studies making use of cross-country data suggest that σ may be higher than one (see Bentolila and Saint Paul, 2003; Duffy and Papageorgiou, 2000; and Masanjala and Papageorgiou, 2003).

An additional reason not to dismiss our theoretical exercise is that substitution elasticity, while smaller than one, may be increasing over time and could eventually cross the endogenous growth threshold. This hypothesis has been suggested by Sato and Hoffman (1968), who argued that as time passes and new technologies become available the opportunities for factor substitution are increased. Piketty himself appears to reason along similar lines: 'It is natural to imagine that [the elasticity of substitution] was much less than 1 in the eighteenth and nineteenth centuries and became larger than 1 in the twentieth and twenty-first centuries. One expects a higher elasticity of substitution in high-tech economies where there are lots of alternative uses and forms for capital.' (Piketty and Zucman 2014, p. 1306).

5 On Ramsey's conjecture

'...equilibrium would be attained by a division of society into two classes, the thrifty enjoying bliss and the improvident at the subsistence level' (Ramsey, 1928 p. 559). This quote concludes Frank Ramsey's paper *A Mathematical Theory of Saving*, which is widely considered the seminal contribution to the modern theory of optimal growth. The statement is known as the Ramsey's conjecture, the idea that most patient household would eventually own the economy's whole capital stock, while the remaining households would only consume their wage income. The conjecture has been thoroughly investigated, and formally proved, in the context of optimal growth with heterogeneous agents both in discrete time (for a survey of the main contributions see Becker, 2006) and, more recently, in continuous time (Mitra and Sorger, 2013). The concentration of wealth in the hands of the thriftiest household is typically obtained without special restrictions on technology other than the standard concavity assumption of neoclassical growth. Our result, on the contrary, requires the elasticity of substitution to be particularly high; accordingly, it seems important that we clarify why it is not simply a special, and less general, case in the literature on Ramsey's conjecture. The fundamental point to be emphasized is that wealth concentration in favor of the most patient household is not a general result in neoclassical growth theory. As we discussed in the Introduction, the neoclassical growth model with exogenous differential saving rates for capitalists and workers produces balanced growth paths where workers own a positive share (or even the totality) of wealth despite their lower saving rate (see also Stiglitz 1967, 1969). Responsible for the validity of the Ramsey's conjecture is the assumption of optimal endogenous saving. The saving behavior of an optimizing household is regulated by the Euler equation, which states that consumption growth is positive as long as the net interest rate is higher than the rate of time preference: when the reward for postponing consumption is higher than its cost, households save and have access to higher future consumption. In steady state, where consumption is constant, the net profit rate need be equal to the rate of time preference; but when households are heterogeneous with respect to their time preferences the equality can be satisfied for one household only, the one with the lower rate of time preference who will hold the totality of wealth. For all other households consumption growth is negative, and they will dissave till depleting their whole wealth. No such mechanism is at work with exogenous saving, so that further restrictions on technology are required to produce the concentration of wealth in the hands of the most patient households.

6 Conclusions

The organization of society described by classical political economists was representative of the prevailing economic conditions in the early nineteenth century. At the time, wealth concentration in western countries was so high that a division in classes where workers own no wealth had to appear as a natural assumption. Nowadays, the structure of the economy and society in industrialized countries is obviously very different. However, as Piketty and coauthors have documented, we have been witnessing a rapid increase in wealth inequality during the latest decades. On this basis, they argue that we are facing a return of 'patrimonial capitalism', a condition where private wealth is highly concentrated and high relative to income. Current day patrimonial capitalism, however, is not a simple replica of the nineteenth century economic situation. In the first place, the emergence of extremely high labor incomes allowed some workers to enter the wealthy of the economy alongside rentiers. Second, a patrimonial 'middle class' emerged: in the early twentieth century the wealthiest 10% of wealth distribution owned almost the totality of wealth; today, the middle 40% of the wealth distribution manages to own between a third and a fourth of total wealth.

Our theoretical note shows the possibility that workers' share of wealth approaches zero in the long run. As such, it is not a faithful representation of the new, current day, patrimonial capitalism. Still, we think that it is in line with the broad tendency to rising wealth concentration and that it strengthens the case, even from an orthodox perspective, for modeling economics in terms of social classes. Additional work to explore wealth dynamics which may account for the emergence of a 'patrimonial middle class' is left to future research.

7 Appendix

The asymptotic behavior of the marginal and average product of capital is given by:

$$\lim_{k\to\infty} f'(k) = \lim_{k\to\infty} A[ak^\rho+(1-a)]^{\frac{1-\rho}{\rho}} ak^{\rho-1} = \lim_{k\to\infty} Aa\left[\frac{ak^\rho+(1-a)}{k^\rho}\right]^{\frac{1-\rho}{\rho}} = Aa^{\frac{1}{\rho}},$$

and

$$\lim_{k\to\infty} f(k)/k = \lim_{k\to\infty} A[ak^\rho+(1-a)]^{\frac{1}{\rho}}/k = \lim_{k\to\infty} A\left[\frac{ak^\rho+(1-a)}{k^\rho}\right]^{\frac{1}{\rho}} = Aa^{\frac{1}{\rho}}.$$

Let us now derive (1), (2) and (1 bis). As of (1):

$$\begin{aligned}
\frac{\dot{k}}{k} &= \frac{\dot{K}}{K} - n = \frac{\dot{K}_c + \dot{K}_w}{K} - n = \frac{s_c r K_c + s_w r K_w + s_w w L}{K} - n = \\
&= s_c f'(k) z + s_w f'(k)(1-z) + s_w[f(k)/k - f'(k)] - n = \\
&= f'(k) z (s_c - s_w) + f'(k) \frac{s_w}{\alpha} - n.
\end{aligned}$$

Regarding (2):

$$\begin{aligned}
\frac{\dot{z}}{z} &= \frac{\dot{K}_c}{K_c} - \frac{\dot{K}}{K} = s_c r - \frac{s_c r K_c + s_w r K_w + s_w w L}{K} = \\
&= s_c f'(k) - s_c f'(k) z - s_w f'(k)(1-z) - s_w \left[\frac{f(k)}{k} - f'(k)\right] = \\
& \quad f'(k) \left[s_c - \frac{s_w}{\alpha} - z(s_c - s_w)\right].
\end{aligned}$$

(1 bis) follows from:

$$\begin{aligned}
\frac{\dot{k}}{k} &= \frac{\dot{K}}{K} - n = \frac{\dot{K}_c + \dot{K}_w}{K} - n = \frac{s_c(1-t) r K_c + s_w r K_w + s_w w L + s_w t r K_c}{K} - n = \\
&= s_c(1-t) f'(k) z + s_w f'(k)(1-z) + s_w[f(k)/k - f'(k)] + s_w t f'(k) z - n = \\
&= f'(k)(1-t) z (s_c - s_w) + f'(k) \frac{s_w}{\alpha} - n.
\end{aligned}$$

References

[1] Bentolila, S. and G. Saint-Paul (2003), 'Explaining Movements in the Labor Share', *Contributions to Macroeconomics,* 3.

[2] Becker, R.A. (2006), 'Equilibrium Dynamics with Many Agents', in *Handbook on Optimal Growth*, Dana R.-A., Le Van C., Mitra T., Nishimura K. eds., Heidelberg, Springer-Verlag, 385-442.

[3] Chiang, A. C. (1973), 'A Simple Generalization of the Kaldor-Pasinetti Theory of the Profit Rate and Income Distribution', *Economica*, 40, 311-13.

[4] Darity, W.A. (1981), 'The Simple Analytics of Neo-Ricardian Growth and Distribution', *The American Economic Review*, 71 (5), 978-993.

[5] Diamond P., McFadden D. and M. Rodriguez (1978), 'Measurement of the elasticity of factor substitution and bias of technical change', in *Production economics: a dual approach to the theory and application,* Fuss M., MacFAdden D. eds., Amsterdam, North Holland,Elsevier.

[6] Duffy, J. and C. Papageorgiou (2000), 'A Cross-Country Empirical Investigation of the Aggregate Production Function Specification', *Journal of Economic Growth*, 5(1), 87-120.

[7] Fazi, E. and Salvadori, N. (1981), 'The Existence of a Two-Class Economy in the Kaldor Model of Growth and Distribution', *Kyklos*, 34, 582-92.

[8] Fazi, E. and Salvadori, N. (1985), 'The Existence of a Two-Class Economy in a General Cambridge Model of Growth and Distribution', *Cambridge Journal of Economics*, 9, 155-64.

[9] Galbraith, J. (2014), 'Kapital for the Twenty-First Century?', *Dissent Magazine*, Spring 2014, http://www.dissentmagazine.org/article/kapital-for-the-twenty-first-century.

[10] Kaldor, N. (1955 - 1956), 'Alternative Theories of Distribution', *The Review of Economic Studies*, 23 (2) , 83-100.

[11] Laing, N. F. (1969), 'Two Notes on Pasinetti's Theorem', *Economic Record*, 45, 373-85.

[12] León-Ledesma, M., McAdam, P. and A. Willman (2010), 'Identifying the Elasticity of Substitution with Biased Technical Change', *American Economic Review*, 100 (4), 1330-57.

[13] Masanjala, W. H. and C. Papageorgiou (2004), 'The Solow model with CES technology: nonlinearities and parameter heterogeneity', *Journal of Applied Econometrics*, 19(2), 171-201.

[14] Meade, J. E. (1963), 'The Rate of Profit in a Growing Economy', *Economic Journal*, 73, 667-674.

[15] Mitra, T. and G. Sorger (2013), 'On Ramsey's Conjecture', *Journal of Economic Theory*, 148, 1953-1976.

[16] Pasinetti, L. L. (1962), 'Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth', *The Review of Economic Studies*, 29 (4), 267-279.

[17] Pasinetti, L. L. (1974), *Growth and Income Distribution*, Cambridge: Cambridge University Press.

[18] Piketty, T. (2014) *Capital in the Twenty-First Century*, Harvard: Harvard University Press.

[19] Piketty, T. and G. Zucman (2014) 'Capital is back: wealth-income ratios in rich countries 1700-2010', *Quarterly journal of economics*, 129 (3), 1255-1310.

[20] Rowthorn, R. (2014), 'A note on Piketty's *Capital in the Twenty-First Century*', *Cambridge Journal of Economics*, 38, 1275–1284.

[21] Samuelson, P. and F. Modigliani (1966) 'The Pasinetti Paradox in Neoclassical and More General Models', *The Review of Economic Studies*, 33 (4), 269-301.

[22] Sato, R. and R. F. Hoffman (1968), 'Production Functions with Variable Elasticity of Factor Substitution: Some Analysis and Testing', *The Review of Economics and Statistics*, 50 (4), 453-460.

[23] Semieniuk, G. (2014) 'Piketty's Elasticity of Substitution: A Critique', New York, SCEPA WP.

[24] Stiglitz, J. (1967), ‘A Two-Sector Two Class Model of Economic Growth’, *Review of Economic Studies*, 34, 227-238.

[25] Stiglitz, J. (1969), ‘Distribution of Income and Wealth Among Individuals’, *Econometrica*, 37(3), 382-397.

[26] Stiglitz, J. (2015), ‘New Theoretical Perspectives on the Distribution of Income and Wealth Among Individuals’, NBER Working Paper No. 21189.

[27] Taylor, L. (2014), ‘The Triumph of the Rentier? Thomas Piketty vs. Luigi Pasinetti and John Maynard Keynes’, New York, SCEPA WP.