Piketty on Growth and Distribution

JOAN R. ROVIRA I HOMS[1]

First Draft, November 2014

ABSTRACT

In his widely acclaimed book 'Capital in the Twenty-First Century' Thomas Piketty combines two distinct theories to explain the stylized historical facts of growth and distribution in Europe and the US. The first is a partial analysis of the accumulation and concentration of inherited wealth as an increasing function of the difference between the rate of return on capital and the rate of growth of national income, which are taken as given. The second is essentially the standard neoclassical growth and distribution model with a constant (net) saving rate and an elasticity of substitution between capital and labour greater than one, so that as the rate of growth of national income falls the capital-output ratio and the capital share are bound to rise. In this note I show that Piketty's combined analytical framework is hard to conciliate with classical, neoclassical and post-Keynesian models of growth and distribution. Nevertheless, Piketty's 'Capital' must be recognized, among other reasons, for bringing back the crucial relation between social structure and economic behaviour to the analysis of growth and distribution.

1. Introduction

Thomas Piketty asserts at the very start of his book that *"when the rate of return on capital exceeds the rate of growth of output and income… capitalism automatically generates arbitrary and unsustainable inequalities that radically undermine the meritocratic values on which democratic societies are based"* (*Capital*, p. 1). In this note I seek to clarify, in the first place, the arguments behind Piketty's claim, which are not sufficiently developed in the book and have generated a good deal of confusion among many readers and critics of his work. Secondly, I analyse under which specific conditions this claim can be assumed to hold, with reference to alternative theoretical frameworks. Briefly, I come to the conclusion that Piketty projects a partial equilibrium analysis of inherited wealth dynamics –which may be perfectly self-consistent in its own terms– to a macroeconomic, general equilibrium view of the economy. The result is an idiosyncratic perspective on the relationship between growth and distribution[2], mostly cast in the language of standard neoclassical growth theory, but that fits uneasily with some of its central postulates.

---

[1] Gabinet d'Estudis Econòmics i Infraestructures, Cambra de Comerç de Barcelona. Av. Diagonal 454, 08006 Barcelona. E-mail: jrrovira@cambrabcn.org.

[2] Acemoglu and Robinson (2014) call it *"a mix of Marx with Harrod, Domar and Solow's growth models"*. Wren-Lewis (2014b) remarks that *"Piketty briefly refers to some mainstream models for support, but most of his analysis is either statistical, historical or based in his own framework… This is isn't to say Piketty 'belongs' to heterodox economics, either. His book and model stand on their own apart from preexisting schools of thought, and should be (critically) appreciated as such"*.

I also show that some of Piketty's arguments were anticipated more than fifty years ago by post-Keynesian authors such as Nicholas Kaldor and Luigi Pasinetti, who nevertheless arrived at quite different conclusions concerning the relation between the rates of growth and return in balanced conditions –encapsulated in the so-called 'Cambridge growth equation'. Finally, I sustain that although Piketty sees himself as writing in the socially engaged fashion common to the classical political economists of the late eighteenth and nineteenth centuries[3] – from Smith to Ricardo and Marx– his own theory of growth and distribution stands apart from that tradition. Whereas in Piketty's account shifts in secular growth trends play a crucial role in determining the distribution and concentration of wealth –while taken as given the rate of return on capital– for the classical political economists it was the other way around: it is the historically contingent, institutionally determined patterns of wealth and income distribution among distinct social groups that ultimately influence the rate of growth. And it is the specific roles played by these groups in the growth process that justify –or not– such inequalities in the first place.

The note is organized as follows: in section 2 I discuss a highly simplified model of wealth dynamics that serves to capture the essence of Piketty's arguments concerning the impact of $r > g$ on wealth distribution and concentration. In sections 3 and 4 I consider under which conditions the results of this partial analysis can be extended to capital accumulation and distribution for the economy as a whole –with reference to both the neoclassical and post-Keynesian perspectives on growth and distribution. In section 5 I focus on Piketty's identification of financial wealth and non-financial capital and show that it is not consistent with assuming independent secular trajectories for the rates of growth and return in long run, balanced conditions. In section 6 I compare Piketty's views with the classical approach to growth and distribution A final section concludes.

---

[3] As Piketty himself acknowledges, *"I much prefer the expression political economy, which may seem rather old-fashioned but to my mind conveys the only thing that sets economics apart from the other social sciences: its political, normative, and moral purpose"* (*Capital*, p. 574). Milanovic (2014) writes that *"to understand Piketty, one must return to the classics of economics. Like David Ricardo, Thomas Robert Malthus, and Karl Marx, Piketty builds a simple 'machine' that captures the key features of a capitalist economy"*. Kunkel (2014) notes that *"he is one of the very few contemporary economists eager to revive the old-fashioned spirit of political economy… Piketty wants to recover the scope of political economy without forfeiting the quantitative rigour of contemporary economics. He has hitched his orthodox training to a Marxian research programme: to explain the course of capitalism since the French and Industrial Revolutions, no less, and to glimpse its future itinerary, with special reference to inequalities of income and wealth"*. Martin Wolf in the Financial Times wrote that *"in its scale and sweep [Capital in the 21st Century] brings us back to the founders of political economy"*. Acemoglu and Robinson (2014) write that *"like many great thinkers – including Thomas Malthus, David Ricardo and particularly Karl Marx, whom he emulates in his title, in his style, and his powerful critique of the capitalist system – Piketty is after 'general laws' which will both demistify our modern economy and elucidate the inherent problems of the system (and their solutions)"*.

2. Inherited wealth dynamics and $r > g$

Capital in the Twenty-First Century is, fundamentally, an empirically driven enquiry into the mechanisms that may explain long-term trends in wealth and income inequality in capitalist economies. Piketty starts by *"patiently establishing facts and patterns and then comparing different countries"* (*Capital*, p. 16) in order to develop an *"analysis of the internal logical contradictions of the capitalist system"* (*Capital*, p. 9)[4].

The central theme of Piketty's *Capital* is the dominance of "inherited wealth" over "self-made wealth" in capitalist economies throughout history[5] [6]. Self-made wealth grows by accumulating savings out of earned income (i.e. labour and entrepreneurial income) and investing them at the current rate of return throughout an individuals' lifetime. It is the combined result of effort, talent, luck and thrift and corresponds to the stylized figure of the 'life-cycle saver'. Inherited wealth, by contrast, is accumulated within dynastic families by saving and investing some fraction of the bequests received from preceding generations. It generates a class of hereditary rentiers –so vividly described by Piketty with references to nineteenth century literature– who stand counter to the meritocratic principle at the roots of democratic societies[7].

---

[4] Krugman (2014a) notes that *"for all that Capital in the Twenty-First Century is a work of principled empiricism, it is very much driven by a theoretical frame that attempts to unify discussion of economic growth and the distribution of both income and wealth"*. According to Milanovic (2014) *"the key contribution is Piketty's analysis of capitalism. Issues of inequality are only one facet of that analysis. Piketty's unstated objective is nothing less than a unification of growth theory with the theories of functional and personal income distribution, and this a comprehensive description of a capitalist economy"*.

[5] In Piketty's own words, *"when the rate of return on capital significantly exceeds the growth rate of the economy … then it logically follows that <u>inherited wealth</u> grows faster than output and income. People with <u>inherited wealth</u> need save only a portion of their income from capital to see that capital grow more quickly than the economy as a whole. Under such conditions, it is almost inevitable that <u>inherited wealth</u> will dominate wealth amassed from a lifetime's labor by a wide margin, and the concentration of capital will attain extremely high levels – levels potentially <u>incompatible with the meritocratic values and principles of social justice fundamental to democratic societies</u>"* (*Capital*, p. 26; emphasis added).

[6] Krugman (2014 a) notes that *"the big idea of Capital in the Twenty-First Century is that we haven't just gone back to nineteenth-century levels of income inequality, we're also on a path back to 'patrimonial capitalism', in which the commanding heights of the economy are controled not by talented individuals but by family dynasties"*. Ackerman (2014) recognizes that *"what has made Piketty's arguments about wealth distribution so explosive is the central place he gives to the phenomenon of rentier inheritance… [T]here's… a deeply rooted embrace of meritocracy as an ideal, and a stubbornly pervasive inability to perceive modern capitalism as anything but meritocratic. Piketty deliberately sets out to disturb that complacency by raining the specter of a return to the dynastic wealth of the Gilded Age"*.

[7] *"…income from labor is not always equitably distributed, and it would be unfair to reduce the question of social justice to the importance of income from labor versus income from inherited wealth. Nevertheless, democratic modernity is founded on the belief that inequalities based on individual talent and effort are more justified than other*

Piketty claims that the *magnitude* and *concentration* of inherited wealth is an increasing function of the difference between the rate of return on wealth and the rate of growth of the economy. The lower the rate of growth, while taken as given the rate of return, the more dominant and concentrated inherited wealth would be – and, therefore, the more influential the role of the 'rentier' in the structure of society[8]. Furthermore, the logic of the hereditary principle in combination with the $r > g$ inequality is such that entrepreneurs will tend to become rentiers[9]. Starting from some given initial advantage –such as a successful entrepreneurial venture that generates an initial amount of self-made wealth– the dynamics of wealth accumulation across successive generations of inheritors will tend to amplify the weight of the original fortune in the economy, and this effect would be more intense the greater the gap between the rates of return and growth. Some entrepreneurs or their inheritors may eventually lose their fortunes, or leave them to charities, but on average and to the extent that the hereditary principle remains at work self-made wealth will be transformed and dominated by inherited wealth[10].

The underlying logic behind the arguments linking the magnitude and concentration of inherited wealth to the $r > g$ inequality are not formally developed in the book but can be found in Piketty's more technical papers with his co-authors Emmanuel Saez and Gabriel Zucman[11]. In this section I present a simplified version of Piketty's more formal models of inherited wealth dynamics, to facilitate a fairly intuitive understanding of the main principles at work.

Let us start by assuming a small open economy in which individuals of a given generation inherit some amount of wealth at some point in their lives and save and invest some fraction of it to pass it on to the next generation. The dynamics

---

inequalities" (*Capital*, p. 241). Mankiw (2014) answers Piketty when he writes that *"inherited wealth is not an economic threat. Those who have earned extraordinary incomes naturally want to share their good fortune with their descendants. Those of us not lucky enough to be born into one of these families benefit as well, as their accumulation of capital raises our productivity, wages and living standards".*

[8] *"Whenever the rate of return on capital is significantly and durably higher than the growth rate of the economy, it is all but inevitable that inheritance (or fortunes accumulated in the past) predominates over saving (wealth accumulated in the present) … The inequality r > g in one sense implies that the past tends to devour the future: wealth originating in the past automatically grows more rapidly, even without labor, than wealth stemming from work, which can be saved. Almost inevitably, this tends to give lasting disproportionate importance to inequalities created in the past, and therefore to inheritance"* (*Capital*, p. 378).

[9] *"Capital is never quiet: it is always risk-oriented and entrepreneurial, at least at its inception, yet it always tends to transform itself into rents as it accumulates in large enough amounts – that is its vocation, its logical destination"* (*Capital*, p. 116)

[10] Looking at the US case, Krugman (2014a) clearly illustrates the case he writes that *"the current generation of the very rich in America may consist largely of executives rather than rentiers, but these executives have heirs. And America two decades from now could be a rentier-dominated society even more unequal tan Belle Époque Europe".*

[11] See, for instance, Piketty and Saez (2012) and Piketty and Zucman (2014).

of inherited wealth accumulation in this stylized world can be described by the following expression

$$B_{t+H} = se^{rH}Y_{Lt} + se^{rH}B_t \quad (1)$$

where B denotes the annual flow of bequests between generations; s is the uniform rate of saving as a proportion of lifetime wealth (which includes labour income, capital income and cumulated wealth over a lifetime); Y_L represents labour income; r is the exogenously determined (after-tax) annual rate of return on wealth and H represents the length of a generation (say, thirty years).

In this model wealth means any assets that can be owned and traded and generate some return to their owners. Individuals save some fraction s of the bequests B_t received at the beginning of period t and invest them at the annual rate r for the next H years. They also save an equal fraction s of their annual labour income and invest it at rate r for the same amount of time. Therefore, the terms $se^{rH}Y_{Lt}$ and $se^{rH}B_t$ represent the capitalized values of savings from labour income and inherited wealth over the course of a generation.

Let $b = B/Y$ stand for the proportion of inheritance flows in national income Y and divide both sides of equation (1) by Y_{t+1} to obtain

$$b_{t+1} = se^{(r-g)H}(1-\alpha_t) + se^{(r-g)H}b_t \quad (2)$$

where α_t represents the share of capital income in national income.

In balanced conditions, when the rates of growth of wealth and income are assumed to converge, it shall be the case that $b_{t+1} = b_t = b$ and we can write

$$b = s(1-\alpha)\, e^{(r-g)H} / [1 - se^{(r-g)H}] \quad (3)$$

which yields an expression for the equilibrium value of annual inheritance flows in national income as an increasing function of the difference $r-g$, given prevailing saving patterns and the share of labour income in national income[12].

To illustrate the workings of this expression let us assume that $s = 5\%$[13]; $\alpha = 30\%$; $H = 30$; $g = 2.5\%$ and $r = 4\%$. With these specific assumptions the steady state value of annual inheritance flows as a percentage of national income, denoted by b, would be equal to 10.4%. However, if the trend rate of growth of

---

[12] Equation (3) effectively reflects Piketty's approach as leading to a stable wealth distribution in balanced conditions, even though it may become more unequal during the transitional period. *"In the model I propose, divergence is not perpetual…"* (*Capital*, p. 27). Some critics of Piketty, like Kotlikoff (2014), miss this point when they interpret the arguments in *Capital* as leading to an ever more skewed wealth distribution.

[13] Summers (2014) critique that Piketty's case depends on whether the returns to wealth are largely reinvested is unjustified, as the basic model used in this section makes clear. So is King's (2014) attributing to Piketty the idea that *"owners of capital reinvest all their profits and the spendthrift workers consume all their wages"*.

national income were to fall by just one percentage point, to 1.5%, then b would almost double, to 20.3%.

Total inherited wealth as a fraction of national income in balanced conditions, denoted by w_h, can be computed by multiplying the ratio of annual inheritance flows to total income by the length of a generation, (H=30). In the previous example, if $g = 2.5\%$ then $w_h = 3.1$; alternatively, if $g = 1.5\%$ then $w_h = 6.1$.

The weight of inherited wealth in total wealth (including self-made wealth from labour savings) in steady state, denoted by φ, can be approximated by the following expression

$$\varphi = b / [b + s(1-\alpha)] \quad (4)$$

which compares the annual flow of bequests to savings out of labour income. Using the same example as before, when $g = 2.5\%$ then $\varphi = 74.8\%$ and when $g = 1.5\%$ then $\varphi = 85.3\%$.

Equations (1) to (4) encapsulate the core of Piketty's claim concerning the accumulation of inherited wealth. They give support to the assertion that inherited wealth, normalized as a ratio of annual inheritance flows or outstanding stocks to national income, or as a proportion of aggregate wealth, increases sharply with the difference r–g, assuming constant other parameters values. Note, in particular, that to obtain this result there is no need to assume implausibly high saving rates or to attach distinct saving propensities to different types of income.

Piketty deploys similar arguments to explain the degree of concentration of inherited wealth. To grasp the logic behind them, let us state a well-known stylized fact according to which income and wealth distributions can be characterized by some type of power law of the form[14]

$$\Pr[\,\text{wealth} > w\,] = w^{-1/\eta} \quad (5)$$

In expression (5) the share of wealth accruing to the top p percentiles is given by $(100/p)^{\eta-1}$. If $\eta = 0.5$, the share of wealth of the top 1% equal $100^{-1/\eta} = .10$ or 10%, while if $\eta = 0.7$ it is .25 or 25%. Therefore, an increase in the parameter η – which is called a measure of Pareto inequality – leads to a more skewed distribution of wealth at the top.

According to Jones (2014), the basic mechanism generating Pareto distributions boils down to *"exponential growth that occurs for an exponentially-distributed amount of time"*. We may assume that some characteristic of dynastic families, such as inheritance, is distributed among them following some type of exponential law. For instance, suppose that at any point in time individuals have some probability $e^{-\delta x}$ of being x generation inheritors, where δ can be

---

[14] See Jones (2014), from whom I borrow the arguments in this and the next paragraphs. Acemoglu and Robinson (2014) elaborate further on this issue.

interpreted as the "death rate" of dynasties. If $\delta = 0.5$ dynasties have a $e^{-\delta 1} =$ 60.7% chance of becoming first generation inheritors, but only a $e^{-\delta 4} = 13.5\%$ probability of arriving at the fourth generation. Secondly, we may also assume that wealth grows exponentially at the annual rate sr (the saving rate s multiplied by the after-tax rate of return on wealth r) for the length of a generation, so that wealth $= e^{srHx}$ and the log of wealth obeys an exponential distribution with parameter δ/srH.

It can be shown that if the log of wealth is exponential the level of wealth obeys a Pareto distribution such as

$$\Pr\,[\,\text{wealth} > w\,] = w^{-\delta/srH} \quad (6)$$

whereas the Pareto inequality measure is given by the inverse of the exponent in this equation, which gives

$$\eta_{wealth} = srH/\delta \quad (7)$$

Note that the Pareto exponent increases with the rate of growth of wealth, given by sr, and decreases with the rate of dynastical extinction δ. The intuition here is that the lower the extinction rate, the longer some lucky dynasties can profit from the exponential growth of wealth accumulated by previous generations[15].

To get further insight into the main forces at work, let us assume an economy composed of N dynastic families that transmit some fixed fraction s of their wealth from generation to generation, with a probability decreasing in $G < z$ (G is the number of generations in a dynasty). That is, the greater the number of generations in any given dynastic family, the lower the probability that current dynastic inheritances would last into the future ($G = z - 1$ is the maximum number of generations that inherited wealth can last within a single dynasty).

For instance, let $z = 7$. At any point in time let us suppose that x% of the N families in the wealth distribution, having inherited an equal amount W_0 from the previous generation, end up with a capitalized wealth $e^{rH}W_0$. We may write

---

[15] Krugman (2014b) provides a particularly intuitive approximation to the dynamics involved, when he writes that *"once a family acquires a certain level of wealth, it tends to engage in dynastic accumulation, consuming only a fraction of its asset returns while saving the rest and passing it on. However, there is in each generation some probability that the family fortune will be squandered by a wastrel. In this case there will be an equilibrium distribution of family fortunes, comprising families that have accumulated wealth for three generations, a smaller number who have accumulated for four generations (smaller because some fortunes get squandered), a still smaller number who have accumulated for five generations, and so on. How much wealthier will five-generation dynasties be than four generation? It depends on the rate of return r – and their share of wealth also depends on the growth rate g. The distribution of wealth will follow a Pareto distribution (which is true of actual distributions at the top), with the exponent depending on r minus g. So no dynasty lasts forever; there will be a slow 'circulation of elites'. But some dynasties will last a long time – and if the after-tax rate of return is high, those dynasties will control a large share of wealth"*.

the wealth inherited by the dynastical group i (i.e. all dynasties sharing the same number of generations) normalized by the value of national income, as follows

$$w_{it} = se^{(r-g)HGi} w_0 \quad (8)$$

whereas the average (normalized) wealth inherited by the average dynasty is given by

$$w_{at} = se^{(r-g)HGa} w_0 \quad (9)$$

where $w = W/Y$ denotes inherited wealth as a proportion of national income and the subscripts i and a represent group and average values, respectively.

Therefore, the (normalized) wealth of the dynastical group i, relative to average dynastical wealth a, can be written thus

$$w_{it}/w_{at} = s\,e^{(r-g)H(Gi-Ga)} \quad (10)$$

This expression tells that the concentration of wealth would be an increasing function of the inequality $r-g$, given the values of the remaining parameters.

To illustrate the example with actual figures, let $r = 4.5\%$, $H = 30$, $G_i = 6$ and $G_a = 2$. Let us suppose that the dynastical group i represents sixth generation inheritors and constitutes the upper percentile of the wealth distribution. With these values, when $g = 2.5\%$ the amount of wealth held by the upper percentile of dynastic families, given by w_{it}/w_{at}, would represent about 11 times average wealth and would account for 11.1% of all inherited wealth in this economy. But if the growth rate were to fall, say to 1.5%, then $w_{it}/w_{at} = 36$ and the share of the upper percentile in total wealth would rise to 36.6%.

Therefore, it can be shown that under certain specific assumptions the magnitude and concentration of inherited wealth in an economy is an increasing function of the inequality $r-g$, giving support to Piketty's claim. However, once these assumptions are relaxed –such as homogeneous rates of savings and a uniform rate of return on wealth among social groups or individuals– Piketty's focus on the inequality $r-g$ as the crucial factor driving wealth dynamics appears more questionable. For instance, if we were to assume differential saving rates and differential rates of return between social groups or individuals in these same models, it could be easily shown that these other factors are at least of equal importance to explain wealth inequalities, across society and over time[16].

[16] Actually, Piketty does recognize that *"…the savings rate may increase sharply with wealth. Or even more important, the average effective rate or return on capital may be higher when the individual's initial capital endowment is higher … The fact that the return on capital is unpredictable and arbitrary, so that wealth can be enhanced in a variety of ways, also poses a challenge to the meritocratic model. Finally, all these factors can be aggravated by the Ricardian scarcity principle: the high price of real state or petroleum may contribute to structural divergence"* (*Capital*, pp. 26-27) Ray (2014) points at the fact that *"…the savings rate climbs with higher incomes. This is an important driver of secular inequality. One can pass through several Kuznets cycles, but*

Which specific forces actually dominate wealth distribution across individuals in any given historical period still remains an open question[17] –the answer to which may confirm, or not, the special role accorded by Piketty to the inequality *r–g*.

Two final comments: First, this analysis of wealth dynamics is a partial analysis, that takes as given the rates of growth and return on capital and explains variations in wealth inequality as if both variables were exogenously determined. But in a more general analysis of the economy as a whole the interdependence between the rates of growth and return must be explicitly taken into account and cannot be simply assumed that changes in one variable would affect the distribution of wealth while keeping the other variable constant[18]. Therefore, it has to be asked whether the results obtained from this

---

the rich will always be in a better position to take advantage of them, and they will save at higher rates in the process. The process is cyclical, but not circular". Acemoglu and Robinson (2014), using data from *The World Top Income Database*, find no evidence of a positive impact of *r – g* on top inequality. King (2014) recalls that *"to understand the origins and perpetuation of wealth inequality we need to consider all the relevant differences between people: their talent and drive, education, savings behaviour, inheritances and bequests, and that most important factor – luck".* Finally, Bowles and Gintis (2002) provide an account of the diverse causal mechanisms that underlie the intergenerational transmission of economic status, which go far beyond a simplistic focus on any single factor.

[17] Summers (2014) notes that *"a brief look at the Forbes 400 list provides only limited support for Piketty's ideas that fortunes are patiently accumulated through reinvestment. When Forbes compared its list of the wealthiest Americans in 1982 and 2012, it found that less than one tenth of the 1982 list was still on the list in 2012... In a similar vein, the data also indicate, contra Piketty, that the share of the Forbes 400 who inherited their wealth is in sharp decline".* Sala-i-Martin (2014) does a similar exercise comparing the Forbes ranking between 1915 and 2000, to conclude that *"...ninguno de los apellidos de la lista de 1915 aparece en la lista del 2000. Las grandes dinastías de comienzos del siglo XX (Rockefeller, Ford, Morgan, Carnegie, Vanderbilt, etc.) desaparecieron de las listas de las listas de las familias más ricas del país en menos de un siglo, hecho que refleja la movilidad social que discutíamos... [y] la inmensa mayoría de supermillonarios de 2000 son personas que han hecho su propia fortuna sin haber heredado nada de sus padres".*

[18] Ray (2014) makes this point when he writes that *"...the rate of return on capital, capital's share in income, and the capital-output ratio... are all outcomes or 'endogenous variables', no subset of which can have explanatory significance for the rest unless something more is brought to bear on that piece of accounting"* and *"...there are sections in the book that explain the rise in the capital-output ratio by referring to a fall in the rate of growth. This is silly, because the rate of growth is as much as an outcome as the capital-output ratio, and cannot be used as an 'explanation'... these relationships pertain to simple equations that link macroeconomic aggregates: national income, capital-output ratios, or the overall rate of savings. Without deeper restrictions, they are not designed to tell us anything about the distribution of income or wealth across individuals or groups".* Also, Acemoglu and Robinson (2014) remind us that *"the interest and the growth are also linked from the household side. For example with a representative household, we have that r = θg +ρ, where θ is the inverse of the inter-temporal elasticity of substitution and ρ is the discount rate. The fact that the representative household assumption may not be a good approximation to reality does not imply that r is independent of g. Second, g affects r from the production side, through its impact on the capital stock, [depending on] the elasticity of substitution between capital and labor".* Even Milanovic (2014) in his mostly sympathetic

partial analysis of wealth dynamics can be extended to a more general framework.

Secondly, Piketty believes that the accumulation and concentration of wealth has a limit –by contrast to what he sees as Marx's hypothesis of "infinite accumulation". And even though at times he appears dismissive of arguments based on assuming balanced conditions for the economy, Piketty actually argues in terms of "comparative statics"–i.e. comparing different steady states of the economy based on different fundamentals, such as alternative rates of secular growth– to show what would be the permanent levels of wealth inequality that could be eventually attained under different fundamental conditions. It is within this long-term perspective that he feels justified not to worry about the difference between financial wealth, as recorded in the liabilities side of firms' balance sheets, and non-financial capital values recorded in the asset side. However, it can be shown that to bring the market value of financial wealth in line with the replacement price of the non-financial capital assets commanded by that wealth, the rates of return and growth cannot simultaneously be taken as independently given.

3. Capital accumulation and distribution

The implications of a process of wealth dynamics from what it is essentially a partial analysis, as described in the previous section, cannot be directly extrapolated at the macroeconomic level. To see why, let us begin by writing a wealth accumulation process *à la Piketty*, reduced to its most essential terms

$$W_{t+1} = \sigma \left[Y_{Lt} + (1 + r) W_t \right] \quad (11)$$

This expression is fundamentally the same as equation (1) above with W representing total outstanding (financial) wealth measured at market values and considering only one period (from t to $t+1$). The underlying logic of both (1) and (11) is at the basis of Piketty's theory regarding the accumulation and concentration of inherited wealth.

On its turn, the accumulation of capital at the economy-wide level, supposing a uniform (gross) saving rate that is common to both labour and capital income, can be captured by the following standard expression

$$K_{t+1} = s \left(Y_{Lt} + r K_t \right) + (1 - \delta) K_t \quad (12)$$

where K represents the monetary value of the stock of capital goods, measured at current replacement cost, and δ is the depreciation rate.

---

account of Piketty's work recognizes that *"because the proposition of 'stickiness of r' may run counter to economic logic and an alternative model of factor remuneration is not presented, we have to treat it as an empirical proposition whose accurateness will confirmed or not by future developments".*

Notice that the term s in (12) denotes a gross saving rate out of current income and must be distinguished from the term σ in (11), representing a saving rate out of wealth. Observe also that there are no savings out of the capital stock in equation (12). The outstanding stock K can only diminish from period to period as a result of depreciation or destruction, because in a closed economy at the aggregate level the sale of a capital asset by some agent is a purchase by another agent and both transactions cancel out in aggregate terms. By contrast, in equation (11) it is implicitly assumed that current wealth can be sold and the proceeds exchanged for consumption goods without limit, which could only be true in microeconomic terms or –to some extent– in an open economy[19].

If W (financial wealth) and K (capital goods at current replacement cost) are to be considered as equivalent –as Piketty assumes in the long run, when balanced conditions prevail– then expressions (11) and (12) should be equivalent as well

$$\sigma\,[\,Y_L + (1 + r)K\,] = s\,(Y_L + rK) + (1 - \delta)K \quad (13)$$

Solving for the saving rate σ we obtain

$$\sigma = [\,s + (1 - \delta)\beta\,] \,/\, (1 + \beta) \quad (14)$$

where $\beta = K/Y$ is the capital-output ratio.

Expression (14) tells us that if financial wealth from (11) and non-financial capital from (12) are to be considered equivalent the saving rate σ depends on the values taken by s, δ and β. This is quite an arbitrary result that highlights the mutual inconsistency of the heterogeneous accumulation processes described by equations (11) and (12).

To illustrate the case with a numerical example, suppose that $s = 10\%$, $\beta = 4$ and $\delta = 6\%$, then $\sigma = 75.6\%$. If we let $\delta = 4\%$ then $\sigma = 78.8\%$. Plugging values of this order of magnitude for σ into the numerical examples of wealth dynamics analysed in the previous section would lead to implausible results, which confirms the fundamentally different nature of the accumulation processes described by equations (11) and (12).

To deal with economic aggregates Piketty actually starts from equation (12), while taking implicitly for granted that it is fully consistent with the logic of wealth dynamics underlying an expression such as (11). To place Piketty's reasoning in the history of economic thought, let us first transform equation (12), abstracting from depreciation (dropping δK) and dividing both sides by output Y_t, to obtain

---

[19] Aspromourgos (2014) makes a similar case when he argues that *"Piketty …is really comparing distinct steady-state paths that have constant, but different, capital-income ratios …Piketty's empirical β measures marketable wealth at current values… so to employ this β, together with measures of g, to infer an empirical saving ratio is strictly invalid. As a consequence of any divergence between marketable values and acquisition prices, Piketty's s, at best, will be an aggregate measure of saving plus capital gains, relative to income".*

$$\beta_{t+1}(1+g) = s(1-\alpha_t) + (1+sr)\beta_t \quad (15)$$

where s now represents a net saving rate.

In steady state conditions expression (15) becomes

$$\beta = s(1-\alpha)/(g-sr) \quad (16)$$

which after replacing r for α/β simplifies into

$$\beta = s/g \quad (17)\,[20]$$

Piketty's calls this equation the "second fundamental law of capitalism", although the fundamental macroeconomic relation behind it is a well-known result in economic theory since Harrod (1939).

If, as Piketty assumes, the saving rate s and the growth rate g can be thought of as independently determined from outside the model, equation (17) can be used to solve for the steady-state value of the capital-to-output ratio β. What happens to the rate of return will depend on how the share of capital α changes as β changes. For r to stay relatively constant as β rises, α must rise in proportion (because, by definition $r = \alpha/\beta$ or, according to Piketty's so called 'first fundamental law of capitalism', $\alpha = r\beta$).

In Harrod's original formulation $gk = s/\beta$, where gk is the growth rate of capital. The growth rate of output g is independently determined in the long-run and $\beta = v/u$, where v represents the capital intensity of production, given by technology, and u the rate of capacity (capital) utilization. In the short-run, if capital accumulation gk is independently given (e.g. by the animal spirits of entrepreneurs) Harrod's equation can be used to determine the rate of capacity utilization u (given saving habits s and the technology v). But in the longer run there is no reason in Harrod's analytical framework why capital growth gk and output growth g may coincide with the economy operating at a normal rate of capacity utilization u^n. Solow's growth model (1956) originates partly as an answer to Harrod's dilemma, by letting the capital-to-output ratio β adjust to the exogenously given s and g through a production function that substitutes capital for labour, so that $gk = g$ in the long-run.

At about the same time, Kaldor (1956) offered an alternative route out of Harrod's dilemma, by taking $v^n = v/u^n$ as given in normal conditions and letting s adjust, so that $gk = g$ in the long-run. He claimed that the propensities to save out of labour and capital incomes differ, so that the aggregate saving rate s will change with changes in the income distribution. Given these different saving propensities, there will always be some pattern of income distribution for which

---

[20] As it stands, net of depreciation, expression (17) leads to the implausible result that as g tends to zero β rises to infinity. Krusell and Smith This point (2014), among others, have noticed this point.

$gk = g$ in normal conditions. Kaldor believed that such a pattern could be attained provided output prices and money wages move at different speeds whenever the capital-to-output ratio (as a proxy for capacity utilization) diverges from its normal value. (For instance, if firms set prices based on a target rate of return on capital and adjust this target rate in the right direction as long as $gk \neq g$).

Piketty retains Solow's analytical perspective[21], which constitutes the foundation of mainstream growth theory to this day, and assumes that β will adjust to equalize g and gk through a constant elasticity of substitution (CES) production function. However, if Piketty's microdynamics of wealth with $r > g$ as the key driver of inequality are to be consistent with the dynamics of capital accumulation (driven by $\beta = s / g$), then an increasing share of inherited wealth in national income as the rate of growth g falls must find its counterpart in an equally increasing share of capital in aggregate output. But in a CES production function this will only be the case if the elasticity of substitution between labour and capital is greater than 1 –which does not seem to be well supported empirically[22].

On other hand, Krusell and Smith (2014) note that Piketty's assumption of a constant (positive) net saving rate leads to the implausible result that as growth

---

[21] Wren-Lewis (2014a) disputes Piketty's reliance on conventional tools, when he writes that *"although Piketty relates his framework back to the neoclassical production function, it plays only a supporting role (he refers to Cobb-Douglas somewhat disparagingly as a 'simple story'), and his conception of 'capital'… is far more general than a literal interpretation of the production function might suggest"*. Beggs (2014) expresses the opposite opinion, as he remarks that *"Piketty interprets [the evolution of the capital share in rich countries] within the framework of the aggregate production function. He accepts the standard neoclassical argument that, at least in the long run, the rate of return on capital equals – and is explained by – its marginal productivity, i.e. the value produced by an additional unit of capital, with a given labour force and level of technology"*. And Palley (2014) attributes Pikettys' phenomenal success in attracting attention to the issue of rising wealth and income inequality, whereas others have failed, to his fundamental adherence to mainstream economics, because *"something is not thought or known until the right person says it"*.

[22] Rognlie (2014) argues that *"when converted from gross to net terms, standard empirical estimates of the elasticity of substitution between capital and labor are well below those assumed in capital. Piketty's inference of a high elasticity from time series is unsound, assuming a constant real price of capital despite the dominant role of rising prices in pushing up the capital/income ratio"*. Summers (2014) writes that *"Piketty misreads the literature by conflating gross and net returns to capital. It is plausible that as the capital stock grows, the increment of output produced declines slowly, but there can be no question that depreciation increases proportionally. And it's the return net of depreciation that is relevant for capital accumulation. I know of no study suggesting that measuring output in net terms, the elasticity of substitution is greater than 1, and I know of quite a few suggesting the contrary"*. Rowthorn (2014) and Acemoglu and Robinson (2014) fundamentally agree. On the other hand, Solow (2014) considers that *"there has been a lot of research about this question, but no definitely conclusive answer has emerged. This suggests that the ultimate effect on the capital share, whichever way it goes, will be small, and I am inclined to agree with [Piketty]"*.

tends to zero and the capital-income ratio rises without bound, an ever larger proportion of income must be saved just to maintain the existing capital stock – assuming a constant depreciation rate. In the limit, it would be necessary to devote all current income to (gross) capital formation. The standard assumption in a Solow growth framework, instead, would be to assume a constant *gross* saving rate, which implies a falling *net* saving rate as the capital-output ratio rises. Moreover, standard theories of consumer behaviour based on optimizing assumptions, like Cass (1965) and Koopmans (1965), come to the conclusion that with zero growth capital is maintained at a constant level, so that the net saving rate is zero –in contrast with Piketty's assumptions[23]. With a falling net saving rate the capital-income ratio would increase only modestly as growth falls –i.e. a fall in the secular growth rate would not be a powerful enough force for generating high inequality in macroeconomic terms.

4. The Cambridge (UK) post-Keynesian view

To sum up: Piketty's view on capital accumulation and distribution can only be reconciled with standard neoclassical postulates under very special assumptions concerning saving behaviour and the elasticity of substitution between factors of production. Had he followed Kaldor's alternative route out of Harrod's dilemma he would have found more solid grounds to justify the impact of $r > g$ at the aggregate level, at least for the transitional dynamics[24]. In fact, Piketty's transitional wealth dynamics were clearly anticipated by the post-Keynesian literature on growth and distribution –developed in Cambridge (UK) in the 1950s and 1960s. This is especially the case when he writes that "*if* g *= 1 percent and* r *= 5 percent, wealthy individuals have to reinvest only one-fifth of their annual capital income to ensure that their capital will grow faster than average income*" (*Capital*, p. 361).[25]

To clarify the connection with this literature I start by sketching a simple model of capital accumulation in which saving propensities differ with social class –in the spirit of Kaldor (1956) and Pasinetti (1962). Let us consider, first, the special case of an economy with two distinct social groups, workers and capitalists, in which there is no saving out of labour income and only the capitalists save some

---

[23] "*More generally, the prediction arising out of this literature is that savings rates tend to fall, not rise, as growth falls*" (Krusell and Smith, 2014).

[24] Taylor (2014) remarks that Piketty "*elides Luigi Pasinetti's (1962) path-breaking growth model focusing on the control of capital in a capitalist economy*". On the other hand, Acemoglu and Robinson (2014) affirm that "*the approach of Capital … builds on ideas proposed by Nicholas Kaldor (1955)*", even though there is no basis for this claim in Piketty's work. They proceed to build upon Kaldor's work to formalize "*the various intuitions and statements made in Capital in a rather straightforward manner*". They concentrate first in the conditions for an ever-increasing divergence in wealth shares between capitalists and workers, with and without social mobility, stressing the fact that allowing for even "*modest amounts of social mobility can significantly change the conclusions*".

[25] Solow (2014) calls this "*the rich-get-richer dynamic*".

fraction s_c of their capital income. Capital accumulation at the aggregate level in this extremely simplified world can be expressed as follows

$$K_{t+1} = (1 + s_c r) \, K_t \quad \text{or} \quad gk = s_c \, r \quad (18)$$

where $gk = \Delta K / K$ represents the rate of growth of the (net) capital stock.

Dividing by Y_t yields

$$\beta_{t+1} = (1 + s_c r) \, / \, (1 + g) \, \beta_t \quad (19)$$

showing that as long as $gk = s_c r > g$ the capital-to-output ratio β will be increasing, justifying Piketty's claim along the transitional period.

But equation (19) cannot represent a permanent situation. When the stock of capital rises systematically faster than output the degree of capacity (capital) utilization tends to fall, putting downward pressure on profit margins and discouraging investment in new capacity[26]. Therefore, the only plausible long-run situation implies output and output capacity (capital) growing at the same rate, on average over the cycle. And in such long-run normal or balanced conditions, when $gk = g$, expression (19) becomes

$$r = g / s_c \quad (20)$$

which is the so-called 'Cambridge growth equation' (derived in Pasinetti, 1962). If g and s_c on the right-hand side of this equation are given from outside the model r must adjust for balanced conditions to exist. Piketty's fundamental contradiction of capitalism, encapsulated by $r > g$, becomes irrelevant in this framework as a determinant of steady-state inequality at the aggregate level, supposing that s_c is assumed constant –because as the growth rate falls, so must the rate of return.

Following Pasinetti (1962), let us consider a more general situation in which workers do have some positive propensity to save out of both their labour and capital incomes[27]. Let us also assume that there is a uniform rate of return on capital, independently of who owns it. The accumulation of capital in this context is given by the following expression

$$K_{t+1} = s_w \, (Y_{Lt} + r \, K_{wt}) + s_c \, r \, K_{ct} + K_t \quad (21)$$

where K_w stands for workers' wealth, K_c for capitalists' wealth and s_w and s_c are the saving propensities of workers and capitalists, respectively, with $s_c > s_w$.

---

[26] See Arestis and Sawyer (2014).

[27] Passinetti (1962) thought that Kaldor had made "a logical slip" by not recognizing workers' saving propensities out of capital income. But there is no logical error in Kaldor's approach if it is assumed that there is only one class of agents with different saving propensities out of labour and capital incomes, rather than two social classes (workers and capitalists) with class-based saving propensities.

The wealth of capitalists will grow at the following rate

$$K_{ct+1} = s_c \, r \, K_{ct} \text{ or } gk_c = s_c \, r \quad (22)$$

Given that in balanced conditions it must be the case that the wealth of both workers and capitalists grows at the same rate as output, expression (22) leads us back to the Cambridge growth equation

$$r = g/s_c$$

which means that if we take g and s_c as given from outside the model the rate of return must adjust for balanced conditions to be attained, and must be equal to the ratio between the rate of growth of output and the saving rate of capitalists. The saving rate of workers is irrelevant to this result.

To obtain the respective steady state shares of workers and capitalists in total capital let us begin by dividing both sides of (21) by Y_t

$$\beta_{t+1} / (1 - g) = s_w (1 - \alpha) + r (s_w \beta_{wt} + s_c \beta_{ct}) + \beta_t \quad (23)$$

where β_{wt} and β_{ct} represent the capital shares of workers and capitalists in national income, respectively, so that $\beta_{wt} + \beta_{ct} = \beta$.

Letting $\beta_{t+1} = \beta_t = \beta$ and solving for the capitalists' share β_c / β we obtain

$$\beta_c / \beta = [\, g - (s_w / \beta) \,] \, / \, r (s_c - s_w) \quad (24)$$

As it stands, this equation tells us that provided that $s_c > s_w$ it will be the case that β_c/β will be increasing in g and decreasing in r. In other words: the share of the capitalists in total wealth will be a decreasing function of r–g –in full contradiction with Piketty's hypothesis.

However, in this framework $r = g/s_c$ cannot be taken an independent term and therefore expression (24) must be re-written thus

$$\beta_c / \beta = [\, g - (s_w / \beta) \,] \, / \, [\, g \, [\, (s_c - s_w) \, / s_c \,] \,]^{28} \quad (25)$$

---

[28] To build some intuition about the mechanism behind this result observe that the rate of growth of workers' wealth will evolve according to the following expression

$$gk_{wt} = s_w r + [\, s_w(1 - \alpha)/\beta_{wt} \,]$$

whereas the wealth of capitalists will grow at rate $gk_w = s_c \, r = g > s_w r$. To attain a stable distribution of wealth between the two classes the contribution of labour savings to the growth of workers' wealth must account for this difference. Given s_w and r the weight of the adjustment falls on β_{wt}. If the value of β_{wt} is below its normal value workers' wealth will grow faster than output ($gk_{wt} > g$), but as β_{wt} increases gk_{wt} will slow down – until β_{wt} converges with β and $gk_{wt} > g$. The opposite will be true if β_{wt} is above its normal value. Now, the faster the growth rate of output the lower the value of β_w that will be

which under plausible parameter values still leads to β_c/β being an *increasing* function of the rate of growth in balanced conditions. To illustrate this point with some actual numbers, let $s_w = 5\%$, $s_c = 50\%$ and $\beta = 5$. Under these assumptions when $g = 1.5\%$ then $\beta_c/\beta = 37\%$, but if $g = 2.5\%$ then $\beta_c/\beta = 66.7\%$.

To conclude: Piketty's claim that the inequality $r > g$ is a crucial force of divergence regarding wealth inequality cannot be easily conciliated with processes of growth and distribution in long run balanced conditions –either from a neoclassical or a non-neoclassical perspective. In terms of marginal productivity theory the constancy of the rate of return as the rate of growth changes requires an empirically implausible degree of elasticity of substitution between capital and labour. On the other hand, Piketty's observation that the greater the difference between r and g, the lower the saving rate required from wealth-holders to make their wealth grow faster than national income, was thoroughly analysed in consistently macroeconomic terms in the 1950s and 1960s by post-Keynesian authors such as Kaldor and Passinetti –initiating a large literature on this subject. Piketty's transitional dynamics can still be rationalized within this literature, but the inequality $r > g$ becomes irrelevant in long term, steady state conditions –when these two variables become interdependent according to the Cambridge equation and the relation between growth on wealth inequality may run contrary to Piketty's claim.

5. Wealth versus capital

In his book Piketty uses the terms "wealth" and "capital" interchangeably, to represent all types of non-human assets that can be owned and traded and generate a return to their owners[29]. This broad definition encompasses assets –

---

just needed to generate a rate of growth of workers' wealth that matches that rate of output growth.

[29] Taylor (2014) remarks that *"a more standard definition in terms of the national income and flows of funds accounts would include capital, net foreign assets, and government debt"*. From a Marxian perspective, Harvey (2014) sustains that *"money, land, real state and plant and equipment that are not being used productively are not capital... Restricting the supply of capital to new investment ensures a high rate of return on that capital which is in circulation. The creation of such artificial scarcity... is what underpins the tendency for the rate of return on capital (no matter how it is defined and measured) to always exceed the rate of growth of income"*. On the other hand, Hodgson (2014) comments approvingly that *"Piketty has to reverse more than two centuries of abuse by economists and sociologists of the notion of capital to make his powerful empirical and theoretical case... Capitalism is arguably a historically specific system where capital plays a dominant role... Capital (as defined by business people, Shumpeter, Piketty and myself) is much more historically specific than its purported relatives, and hence is much more useful in identifying the highly dynamics system of capitalism that first emerged a few hundred years ago"*. Wren-Lewis (2014a) also defends Piketty's choice *"since Piketty's main aim is to understand how financial capital is accumulated over time... In fact, Piketty's use of market value to mesure this type of capital is exactly the type of analysis where it is most relevant, as market*

real and financial– as diverse as land, residential buildings, industrial plant and equipment, government bonds and company shares[30]. To measure wealth Piketty uses the market value of financial assets and assumes that this value will tend to converge with the replacement cost of the underlying real assets in the longer term[31]. Given that his focus is on historical developments in the very long run he is largely unconcerned with transitory deviations between these two alternative measures[32].

In practice, deviations in the market price of certain capital assets can make a big difference with respect to the observed measure of certain ratios, such as the capital-to-income ratio. As pointed out by some critics, the increase in the market value of residential capital –which accounts for about a half of total wealth– can explain a fair share of the reported increase in the capital-to-income ratio in both Europe and the United States. Correcting for this effect significantly changes the conclusions to be drawn from the data[33].

---

valuation reflect the actual nominal returns or capital gains being made by holders of capital".

[30] Kotlikoff (2014) notes that *"the biggest empirical problem with Piketty's work is relying on private wealth data to measure wealth inequality. In so doing, he leaves out much, if not most, of the total wealth of the poor and middle-class households – their claims to Social Security, Medicare and Medicaid benefits (or their equivalent in other countries)… The fact that households acquired these assets by saving through the government doesn't justify excluding them in analysing total wealth inequality. Were Piketty to include them, he might find declining wealth inequality in recent decades".*

[31] *"…The market value of a company … is its stock market capitalization … Thus far I have used market values to measure stocks of private wealth … The accounting value of a firm, also called book value or net assets or own capital, is equal to the accumulated value of all assets – buildings, infrastructure, machinery, patents … vault cash, and so on – included in the firm's balance sheet, less the total of all outstanding debt. In theory, in the absence of all uncertainty, the market value and the book value of a firm should be the same, and the ratio of the two should therefore be equal to 1 (or 100 percent)"* (*Capital*, p. 188-189).

[32] Rowthorn (2014) remarks that *"Piketty finesses the issue of valuation by assuming in effect, that $g_v = 0$"* [where g_v means the rate of change of the market values of wealth relative to produced goods, which are taken as the numeraire]. In line with Piketty, Solow (2014) recognizes that *"stock market values, the financial counterpart of corporate productive capital, can fluctuate violently, more violently than national income. In a recession, the wealth-income ratio may fall noticeably, although the stock of productive capital, and even its expected future earning power, may have changed very little or not at all. But as long as we stick to longer-run trends, as Piketty generally does, this difficulty can safely be disregarded".*

[33] See, for example, Galbraith (2014): *"[Piketty] isn't measuring physical volumes, and his formula does not explain the patterns in different countries very well… A simple mind might say that it's market value rather than physical quantity that is changing, and that market value is driven by financialization and exaggerated by bubbles, rising where they are permitted and falling when they pop".* Rowthorn (2014): *"Piketty argues that the higher income share of wealth-owners is due to an increase in the capital-output ratio resulting from a high rate of capital accumulation. The evidence suggests just the contrary. The capital-output ratio, as conventionally measured has either fallen or being constant in recent decades. The apparent increase in the capital-income ratio identified by Piketty is a valuation effect reflecting a disproportionate increase in the market value of certain*

The same can be said of the difference between financial wealth and the value of capital goods measured at their current replacement cost. Whereas changes in the financial wealth might soar and plummet reflecting the volatility of stock market valuations, the latter follow a much more stable path. In a competitive economy the gap between these two measures will tend to disappear in the very long run, but it may remain significant over relatively long periods of time[34]. If, for practical reasons, one chooses to take financial valuation as the main reference –as Piketty does– then it is crucial to ensure that one's own theory is consistent with the conditions for the long run convergence between financial wealth and non-financial capital.

The purpose of this section is to analyse to which extent is Piketty's theory consistent with the long run convergence in values between financial wealth and non-financial capital. To do so, I reserve the term "financial wealth" to denote the monetary value of liabilities in the balance sheet of firms, which are assets to households. When these liabilities take the form of equities their value is set in financial markets and represents the net present value of the stream of profits expected to be accruing to shareholders. When expectations change, so does the market value of financial wealth. On the other hand, I use the term "non-financial capital" to denote the stock of means of production, tangible and intangible, accounted for in the asset side. Their monetary value is set in capital goods markets and is equal to the replacement cost of those assets at current prices[35].

---

assets". Rognlie (2014): *"Recent trends in both capital wealth and income are driven almost entirely by housing, with underlying mechanisms quite different from those emphasized in Capital"*. Homburg (2014): *"…the book's most significant pitfall is the misleading equalization of the terms 'capital' and 'wealth'. Due to this semantic maneuver, readers are liable to get the impression that recent rises in land prices indicate an industrial revolution which will change the income distribution in favour of capital. Such a presumption is unfounded because rising land values boost wealth but leave production processes unaffected"*. Bonnet et al. (2014) observe that once house prices are removed from Piketty's series on capital the observation of a rising share of capital income disappears.

[34] Stiglitz (2014) questions this convergence when he observes that "*sometimes an increase in measured financial wealth corresponds to little more than a shift from 'unmeasured' wealth to measured wealth – shifts that can actually reflect deterioration in overall economic performance. If monopoly power increases, or firms (like banks) develop better methods of exploiting ordinary consumers, it will show up as higher profits and, when capitalized, as an increase in financial wealth… reported financial wealth increases, though the wealth of ordinary citizens does not*".

[35] The critiques of J. Galbraith (2014) and Palley (2014) highlight Piketty's misreading of the Cambridge controversies on the theory of capital, which revolved around the legitimacy of using a "physical" measure of aggregate capital to determine its rate of return according to its marginal productivity. The point of the controversies was that the only meaningful measure of any aggregate stock of heterogeneous capital goods has to be given in monetary terms, which on its turn depends on their prices and, therefore, on the rate of return on capital itself. But despite his conditional allegiance to the neoclassical theoretical framework and superficial grasp of the capital controversies, Piketty is fundamentally concerned with monetary values of capital, not physical quantities.

At any point in time, the (net) stock of non-financial capital would be equal to the cumulated investment flows of newly produced capital goods, net of depreciation and re-valued at their current prices. This definition ensures consistency between capital stocks and flows of capital goods as accounted for under the heading of "Fixed Capital Formation" in the National Income and Product Accounts. On the other hand, financial wealth, as accounted for in the National Financial Accounts[36], reflects the current market valuation of present and future returns from financial assets owned by individuals, and need not bear any direct relationship to past savings[37].

Under competitive conditions the value of financial wealth (market value) would tend to converge with the value of the non-financial capital ultimately generating the returns (book value), in which case the steady-state values of the wealth-to-income and capital-to-output ratios at the aggregate level may be assumed to coincide[38]. But out of balanced conditions this need not be the case and the dynamics of wealth valuation and capital accumulation may evolve along different, even divergent paths.

To develop these arguments further it is useful to consider a basic model relating the market valuation of wealth to the stream of profits accruing to firms. For ease of exposition, let us assume that all financial wealth in the economy takes the form of equity and fixed-income debt in firms. The value of equity at any point in time would be equal to the market value of the expected stream of profits accruing to shareholders. In long run normal conditions, when a constant rate of growth of output, capital and profits may be assumed to prevail, the value of equity in firms can be formulated in terms of Gordon's Dividend Discount Model (1956, 1959) with constant growth

$$V = (1 - s_f) \, (\Pi - \rho D) \, / \, (r^e - g^e) \quad (26)$$

where V denotes the market value of shares; Π represents firms' earnings, gross of interest on external finance, denoted by D; s_f represents the fraction of earnings, net of interest payments, saved by firms for investment purposes[39]; ρ denotes the cost of external finance, which may be conceived as the sum of a baseline rate of interest i plus a risk premium θ, defined as an increasing

---

[36] Flow Of Funds (FOF) in the USA.

[37] The concept of fixed capital formation as it is used in national accounting does not include some of the categories considered by Piketty as wealth. Among other differences, changes in the financial value of firms or in the market value of land do not add to or subtract from fixed capital formation. Real assets are measured at their estimated replacement cost and savings out of current income are cumulated in the form of non-financial capital. Furthermore, current income does not include returns from financial wealth, in what is called the "primary distribution of income".

[38] In practice "market values" and "book values" do not coincide exactly even in the long run, for different reasons – such as immaterial investment not properly accounted for in the balance sheets of firms and institutional factors (see *Capital*, p. 190-191).

[39] According to Piketty *"profits reinvested by firms (also referred to as "retained earnings") … in some countries accounts for as much as half the amount of private savings"* (*Capital*, p. 176)

function of the leverage ratio $\lambda = K/D$. The rate of return r is equal to the rate of discount of future dividends and the superscript ^{e} denotes expectations. (Observe that in this expression financial market value is a *decreasing*, not an increasing function of $r^e - g^e$.)

Dividing this expression by the replacement value of physical capital K yields

$$V/K = (1 - s_f)\,(r - \lambda\rho)/(r^e - g^e) \quad (27)$$

whereas adding $\lambda = D/K$ to both sides of the equation leads to

$$Q = [\,(1 - s_f)\,(r - \lambda\rho)/(r^e - g^e)\,] + \lambda \quad (28)$$

where $Q = (V + D)/K$ is Tobin's Q: i.e. the value of all financial claims on firms' earnings as a proportion of the current replacement value of their capital stock.

In steady state we may assume that $r^e = r$, $g^e = g$ and $Q = 1$ (that is, the market value of equity in firms plus the value of their debt matches the replacement value of their capital). Therefore

$$1 = [\,(1 - s_f)\,(r - \lambda\rho)/(r - g)\,] + \lambda \quad (29)$$

and after rearranging

$$r - g = [\,(1 - s_f)/(1 - \lambda\rho)\,]\,(r - \lambda\rho) \quad (30)$$

which implies that $r > g$ as long as $r > \lambda\rho$ and that the difference will be larger the greater the value of the leverage ratio λ.

However, this expression cannot represent truly long-term balanced conditions, because as long as $r > \rho$ it will be the case that the market value of firms will increase solely by changing their financial structure. Therefore, $r = \rho$ must be a necessary condition for a long-term equilibrium, in which case expression (30) simply becomes

$$r = g/s_f$$

which brings us back to the Cambridge growth equation.

To conclude: if financial wealth and non-financial capital are to converge in the long run and both the rate of growth and firms' retention ratio are exogenously given, then the rate of return must adjust. That is, r and g are interdependent in the long run and a theory that relies on a falling g and a constant r to explain changes in inequality can only be justified out of balanced conditions –when financial wealth and non-financial capital need not converge. But in this case it cannot be considered a truly long run theory.

6. The classical perspective

The classical economists conceived competition not as an equilibrium state, but as a dynamical process that tends to push actual market prices into equality with natural prices or prices of production. At each point in time, different economic activities may generate different rates of return and capitals will flow towards those activities where a higher relative return is expected. Absent the disruptive forces of innovation this relentless competitive process would eventually bring about a uniform normal rate of return to all firms and sectors of activity (adjusted for risk). One may think of a more or less stable long-term rate of return, like the 4% to 5% envisaged by Piketty.

But, in practice, this trend rate of return is only an average rate computed from a statistical distribution characterized by a significant degree of dispersion of individual rates of return. Innovation is a central engine of capitalist development and a source of continuous technical and organizational change, from where new opportunities are constantly emerging in a radically uncertain world. In this world of continuous change there would always be a multiplicity of actual rates of return in different activities, fluctuating about a more or less stable average. At any point in time this dispersion of rates of return reflects the balance between the centrifugal forces of innovation and the centripetal impulse of competition.

Processes of accumulation, concentration and –eventually– dispersion of capital must be jointly analysed in this dynamical context. Think, for instance, of an economy constituted by a diversity of family businesses each one exhibiting a different rate of return. The return to business activities may vary greatly at each point in time and within the same firm across time. Assuming that the propensity to save and invest as a function of the earnings generated by each firm is similar to all, individual rates of capital accumulation and growth will vary in line with the dispersion in rates of return[40].

With time, the dimension of these family businesses will vary, even if they started with a similar scale and, as a result, the degree of wealth concentration among them will also vary. Perhaps following a Pareto distribution. But such a distribution would have little to do with the inequality $r > g$ at the aggregate level and, instead, very much to do with the dispersion of rates of return among different business projects.

The dispersion could also be predicated in relation to individual propensities to save, invest and grow. But the classical authors also pointed at significant regularities and general patterns to be observed and predicated of social groups. For instance, they thought that capitalists or wealth-holders have a higher propensity to save than those whose main income comes from labour. And to the extent that growth depends on savings and investment, the existence and wealth of the capitalist class could be justified, at least to the extent that they reinvest

---

[40] Fully developed models based on a classical notion of competition as a dynamical process can be found in Metcalfe (1998).

their profits productively, directly within their firms or indirectly through the credit system.

Whereas in Piketty's world long term growth is an exogenous variable that affects the distribution of income and wealth, from the perspective of the classical political economists it is the other way around: causality runs from distributional patterns, as determined by institutional and socio-political factors, to savings, investment and growth[41].

The Cambridge growth equation[42] can be used to illustrate the nature of classical growth models

$$g = s_f r$$

where r can be interpreted as an average rate of return for the whole economy and s_f as a proxy of the propensity to invest in productive assets by firms – through reinvested profits and external resources. Assuming that this expression applies to long run conditions it would the case that $g = gk$. At the aggregate level the rate of return r is the result of dividing the share of capital income in total output α by the capital-output ratio β. If we take the values of s_f and β as given, then as the value of α rises so will the rate of return. Therefore, in this particular case the greater the share of capital in national –and the greater the degree of inequality– the faster the rate of growth.

But, on the other hand, the same fundamental equation can be used to obtain quite different results equally consistent with a classical framework. For instance, we may conjecture that as r increases the value of s_f diminishes more than proportionally (perhaps reflecting increasing oligopolistic power being associated with a greater propensity to distribute profits rather than reinvest them)[43]. Or that as profit margins increase consumption and the degree of

---

[41] For a thorough survey on classical growth model see Salvadori (2003). Kurz and Salvadori (1993) show that in John von Neumann's famous growth model (1945) *"the distributive variables, the wage rate and the rate of interest, are not determined in the conventional, symmetric way in terms of the demand for and supply of the respective factors of production, labour and 'capital'. Moreover… in von Neumann the rate of growth is endogenously determined and full employment of labour (or natural resources) is not assumed. While the structure of the von Neumann model is difficult to reconcile with the neoclassical point of view, it is fully compatible with the classical one"*.

[42] This equation appears in the intellectual climate of Cambridge University in the 1950s and 60s, at a time when economists such as Joan Robinson and Piero Sraffa *"sought to revive and perfect aspects of the earlier classical approach of David Ricardo and Marx… In the Cambridge vision, social, historical, and political forces – class struggle – are the essential factors in setting the income distribution. Once that distribution is fixed, the rest of the economy adjusts around it"* (Ackerman 2014).

[43] Wren-Lewis (2014b) notes that *"Piketty repeatedly distinguishes between the returns to entrepreneurship and the returns to simply owning capital. His major concern is that over time the latter will dominate the former, as those whose who were previously entrepreneurs and their heirs begin to live off rents from their accumulated capital"*. Naím (2014) extends the discussion to question the fact that *"in countries like Russia, Nigeria, Brazil, and China, the main driver of economic inequality is a rate of return on capital that*

capacity utilization fall, depressing investment in new capacity. In these alternative cases a more unequal distribution would bring about a lower rate of growth.

These examples simply illustrate the fact that there can be no mechanical relation between distribution and growth in classical analysis. The sign of the relationship between profitability and growth can go both ways, depending on historically contingent institutional and socio-political factors. But despite the stark differences between this approach and the 'fundamental laws of capitalism' established in *Capital*, Piketty clearly brings back to the core of the analysis the role of systematic and significant differences in income and wealth[44]. Most importantly, he recognizes that these differences are intrinsic to the nature and fabric of capitalist societies, not the result of accidental imperfections in otherwise ideal market economies. Piketty views capitalism as a complex social and economic system evolving in time, which must be analysed in explicitly historical terms, and questions the universal explanatory power of the representative agent so central to mainstream economics.

---

is larger than the rate of economic growth. A more holistic explanation would need to include the massive fortunes regularly created by corruption and all kinds of illicit activities… Corruption-fueled inequalities flourishes in societies where there are no incentives, rules, or institutions to hinder corruption". Stiglitz (2012) sustains that the increase in inequality is due to rent-seeking rather than inexorable market forces and can be reversed through policy intervention. For him *"the problem may not be with how markets should or do work, but with our political system, which has failed to ensure that markets are competitive, and has designed rules that sustain distorted markets in which corporations and the rich can (and usually do) exploit everyone else… If we get the rules of the game right, we might be able to restore the rapid and shared economic growth that characterized the middle-class societies of the mid-twentieth century. The main question is not really about capital in the twenty-first century. It is about democracy in the twenty-first century"* (Stiglitz, 2014). From outside the mainstream, Taylor (2014), in his critique of Piketty, presents an alternative growth model in which wage repression can lead to secular stagnation by enriching the rentier. Barbosa-Filho (2014), in a symposium paper on Piketty's work, asserts that *"the functional distribution of income can change, temporary or permanently, because of institutional and demand shocks not related to technology… Economic policy in general, and macroeconomic policy in particular, plays an important role in determining the steady state of income distribution and employment rates. The fact that the wage share is stable does not mean that it tends to stabilize at a high or adequate level for a democratic regime. It may actually stabilize at a very low level if the major world economies engage in a race to the bottom to gain international competitiveness by reducing their unit labor costs".* By contrast, "*Piketty's formulation of the mathematical law (r > g) disguises more than it reveals about the class politics involved"* (Harvey, 2014).

[44] For the classical political economists issues of growth and income distribution were inextricably intertwined with social, political and institutional factors. As Aspromourgos recalls, David Ricardo's statement in the Preface to his *Principles of Political Economy and Taxation* (1817) asserts that the principal problem in political economy is *"to determine the laws which regulate… distribution".* Whereas title of book I of Adam Smith's Wealth of Nations (1776), reads *"Of the Causes of Improvement in the productive Powers of Labour, and of the Order according to which its Produce is naturally distributed among the different Ranks of the People".*

7. Concluding remarks

Bruenig (2014) has noted that Piketty's *Capital in the Twenty-First Century* presents *"two separate arguments for why income inequality will increase in the future… Piketty's first argument [the Capital Share Effect] is that a decline in growth will cause capital's share of the national income to increase… Piketty's second argument [the Capital Concentration Effect] is that capital, and therefore capital income, will become more unevenly distributed and concentrated at the top"*. The Capital Share Effect is encapsulated by Piketty's 'fundamental laws of capitalism', namely: $\alpha = r\beta$ and $\beta = s/g$, whereas the Capital Concentration Effect derives from what he sees as the 'fundamental contradiction of capitalism': $r > g$. The main conclusion of this note is that for both theories to be mutually consistent the interdependence between the rates of growth and return must be recognized, so that Piketty's emphasis on $r > g$ as the crucial factor behind the historical evolution of wealth inequality across countries and over time is hard to reconcile with classical, neoclassical and post-Keynesian models of growth and distribution[45].

To be consistent with neoclassical growth models Piketty's analytical apparatus depends on very special assumptions about the elasticity of substitution between capital and labour and about saving behaviour. Beyond marginal productivity theory, Piketty's claim that $r > g$ may lead to increasing inequality was anticipated *out of balanced conditions* by models of growth and distribution in the 1950s and 1960s Cambridge (UK) post-Keynesian tradition. But these models generate quite different results about the role of $r > g$ in long run, balanced conditions. And although Piketty portrays himself as a socially engaged 'political economist', there are also substantial differences that set his work apart from the way Smith, Ricardo or Marx approached the central issue of growth and distribution at the economy wide level. Whereas for Piketty the central driver determining distribution is a secular rate of growth that is determined from outside the economic system[46], for the classical political economists it was the

---

[45] DeLong (2014) writes that *"for Piketty's argument to be more than a footnote, a high [wealth-to-income ratio] must shape political economy in ways that retard the erosion of rates of profit from higher accumulation"*. Echoing DeLong's remark, Ackerman (2014) notes that *"…as the book is digested, it's increasingly doubtful whether (or how) its arguments can be reconciled with the MIT-style economic paradigm to which Piketty's most ardent American promoters – liberal economists like Joseph Stiglitz, Paul Krugman, Brad DeLong – swear allegiance… He's having trouble on his left flank, too. For instance, Thomas Palley, a left economist formerly with the AFL-CIO, has expressed the fear that after the excitement dies down, 'Piketty's book may end up being Gattopardo economics that offers change without change'"*.

[46] Kunkel (2014) remarks that *"Piketty makes little connection between the 20th century's atypically low inequality and atypically high growth… [He] doesn't credit greater equality with any causal role in the rapid overall growth that did so much to reduce capital/income ratios… If r > g is the general law, the middle of the 20th century is the anomaly to be explained and our own time simply a reversion to the immemorial trend"*. Husson (2014) notes that *"Piketty raisonne… a l'envers… ce taux de croissance peut-il être considéré comme indépendant du stock du capital? Les inventeurs de cette 'loi fondamentale', Harrod*

other way around: for them distributional patterns, determined by institutional factors[47], are a key factor to explain capital accumulation and growth. They did not think in terms of a representative agent, but of well-defined social groups with specific roles in production and distribution. Capitalists could be justified as a class to the extent that their income was mostly redirected, in the form of reinvested profits or loans to other firms, towards productive investment[48].

Finally, it must be recognized that beyond all these controversial issues the unprecedented impact of Piketty's work has served to highlight the central importance of wealth and income dynamics in capitalist economies[49] –even if it eventually turns out that the more relevant mechanisms at work happen to be differential saving rates and/or differential rates of return. This is a lasting and powerful contribution –supported with extensive historical data– that questions the universal explanatory power of macroeconomic theories based on the fiction of a homogeneous representative agent. Piketty's emphasis on a historical and empirically backed approach to the subject of growth and distribution has shed light and motivated debate on the crucial relation between social structure and economic behaviour, in the true spirit of the classical political economists[50].

---

et Domar... raisonnent autrement, parce qu'ils cherchaint à jeter les bases d'une theórie de la croissance. Ils écrivent donc la relation à l'envers de ce que ait Piketty: g = s/β. Et là encore, cèst le bon sens: le taux de croissance g depend de... la propnesion de l'economies a investor s et du coefficient du capital β".

[47] Acemoglu and Robinson (2014) in their critique of what they see as Piketty's a-institutional approach, argue that *"it is the institutions and the political equilibrium of a society that determine how technology evolves, how markets function, and how the gains from various different economic arrangements are distributed"*. At the same time, they also criticize the classical political economists, citing specifically Ricardo and Marx, for their over-reliance on general laws of capitalism.

[48] A progressive economist like Gintis (2007) echoes this idea when he writes that *"the USA has purchased a thriving economy and full employment at the cost of having a bunch of super-rich families. Not a bad deal, after all ... if the wealth were redistributed to the middle class, the US investment rate would fall, since the rich save their money and it is translated into investment, whereas the middle classes would spend their gains on consumption, thus driving out investment"*. Bill Gates (2014) makes a similar point in his review of Piketty's work when he writes that *"Piketty's r > g doesn't adequately differentiate among different kinds of capital with different social utility... Imagine three types of wealthy people. One guy is putting his capital into building his business, Then there's a woman who's giving most of her wealth to charity. A third person is mostly consuming, spending a lot of money on things like a yacht and plane. While it's true that the wealth of all three people is contributing to inequality, I would argue that the first two are delivering more value to society than the third"*.

[49] Ackerman (2014) observes that *"to a remarkable extent for a work of modern economics, Piketty's book explores social class in all its rich historical dimensions. It pierces the veil of income shares to observe the medieval peasants, civil servants, and coupon-clipping rentiers who populated them. It inquires into the differing types of property held by families of contrasting social stations – the penchant for real state of the interwar French middle class, the imposing bulk of enslaved humans in the antebellum US capital stock, the surprisingly sophisticated securities portfolios of Belle Époque legatees"*.

[50] In Galbraith's words (2014), *"Piketty's book about capital is neither about capital in the sense used by Marx nor about the physical capital that serves as a factor of production in the neoclassical model of economic growth. It is a book mainly about the <u>valuation</u> placed*

on tangible and financial assets, the <u>distribution</u> of those assets through time, and the <u>inheritance</u> of wealth from one generation to the next. Why is this interesting? Adam Smith wrote the definitive one-sentence treatment: 'Wealth, as Mr Hobbes says, is power'. Private financial valuation measures power, even if the holder plays no active economic role". Konczal (2014) writes: *"…the ability of social science to know something is the ability to anthropologize it,a power to define it. As such, it becomes a problem to be solved, a question needing an answer, something to be put on a grid of intelligibility, and a domain of expertise that exerts power over what it studies. With Piketty's capital, this process is now being extended to the rich and the elite. Understanding how the elite become what they are, and how their wealth perpetuates itself, is now a hot topic of scientific inquiry".* And Kunkel (2014) concludes: *"The book is more exciting considered as a failure than as a triumph. Piketty has bid a lingering goodbye to the latter-day marginalism of mainstream economic but has not yet arrived at the reconstructed political economy foreseen at the outset".*

REFERENCES

Acemoglu, D. and J.A. Robinson (2014) "The Rise and Fall of General Laws of Capitalism".
http://economics/mit/edu.

Ackerman, S. (2014) "Piketty's Fair-Weather Friends".
https://www.jacobinmag.com.

Arestis, P. and M. Sawyer (2014) "A Reflection on Capital in the 21st Century".
http://triplecrisis.com.

Aspromourgos, T. (2014) "Thomas Piketty, the future of capitalism and the theory of distribution: a review essay", Centro di Recerche e Documentazione Piero Sraffa, Working Papers n. 7.
http://www.centrosraffa.org.

Barbosa-Filho, N.H. (2014) "Elasticity of substitution and social conflict: a structuralist note on Piketty's Capital in the 21st Century", paper presented at a Structuralist Symposium on Thomas Piketty's Capital in the Twenty-First Century, Schwartz Center for Economic Policy Analysis, The New School for Social Research.
http://www.economicpolicyresearch.org.

Beggs, M. (2014) "A General Without an Army".
https://www.jacobinmag.com.

Bonnet O., Bono P.H., Chapelle G. and E. Wasmer (2014) "Does housing capital contribute to inequality? A comment on Thomas Piketty's *Capital in the Twenty-First Century*", Sciences Po Economics Discussion Paper 2014-07.
http://spire.sciencespo.fr.

Bowles, S. and H. Gintis (2002) "The Inheritance of Inequality", *Journal of Economic Perspectives*, Vol. 16 N. 3.

Bradford DeLong, J. (2014) "Mr. Piketty and the 'Neoclassicists': A Suggested Interpretation".
http://equitablegrowth.org/blog.

Bruenig, M. (2014) "Piketty Has Two Separate Income Inequality Theories".
http://www.demos.org/blog.

Cass, D. (1965) "Optimum Growth in an Aggregative Model of Capital Accumulation", *Review of Economic Studies*, 32: 233-240.

Furman, J. (2014) "Global Lessons for Inclusive Growth", speech delivered at the Institute of International and European Affairs, Dublin, Ireland, May 7, 2014.
http://www.whitehouse.gov.

Galbraith, J. (2014) "*Kapital* for the Twenty-First Century?", *Dissent* 61 (N. 2): 77-82.
http://www.dissentmagazine.org.

Gates, B. (2014) "Why Inequality Matters"
http://www.gatesnotes.com.

Gintis, H. (2007) "Review of Paul Krugman's *The Conscience of a Liberal*".
http://www.amazon.com.

Gordon, M.J. and E. Shapiro (1956) "Capital Equipment Analysis: The Required Rate of Profit", *Management Science* 3 (1): 102-110.

Gordon, M.J. (1959) "Dividends, Earnings and Stock Prices", *Review of Economics and Statistics*.

Harrod, R. (1939) "An Essay in Dynamic Theory", *Economic Journal* 49 (193): 14-33.

Harvey, D. (2014) "Afterthoughts on Piketty's Capital".
http://davidharvey.org.

Hodgson, Geoffrey M. (2014) "Piketty has redefined capital, after 200 years of confusion".
http://theconversation.com.

Homburg, S. (2014) "Critical Remarks on Piketty's *Capital in the Twenty-First Century*", Discussion Paper No. 530, Institute of Public Economics, Leibniz University of Hannover.
http://diskussionspapiere.wiwi.uni-hannover.de.

Husson, M. (2014) "Le capital aux XXIe siècle. Richesse des données, pauvreté de la théórie".
http://www.contretemps.eu/interventions.

Jones, Ch.I. (2014) "The Macroeconomics of Piketty", mimeo (forthcoming in the *Journal of Economic Perspectives*).
http://web.standford.edu.

Kaldor, N. (1956) "Alternative Theories of Distribution", *The Review of Economic Studies*, 23: 83-100.

King, M. (2014) "Review of *Capital in the Twenty-First Century* by Thomas Piketty"
http://www.telegraph.co.uk.

Konczal, M. (2014) "Studying the Rich".
http://www.bostonreview.net/books-ideas.

Koopmans, T.C. (1965) "On the concept of optimal economic growth", in *Study Week on the Econometric Approach to Development Planning*, Amsterdam: North-Holland: 225-287.

Kotlikoff, L. (2014) "Will the rich always get richer", *PBS Newshour*.
http://www.pbs.org/newshour.

Krugman, P. (2014a) "Why We're in a New Gilded Age", *The New York Review of Books*, May 7, 2014 Issue.
http://www.nybooks.com.

Krugman, P. (2014b) "Piketty and Pareto", *The New York Times*, April 25, 2014.
http://krugman.blogs.nytimes.com.

Krusell, P. and T. Smith (2014) "Is Piketty's 'Second Law of Capitalism' Fundamental?"
http://aida.wss.yale.edu.

Kunkel, B. (2014) "Paupers and Richlings", London Review of Books, Vol. 36 No 13·3 July 2014.
http://www.lrb.co.uk.

Kurz, H.D. and N. Salvadori (1993) "Von Neumann's growth model and the 'classical' tradition", *The European Journal of the History of Economic Thought*, 1:1 Autumn 1993.

Mankiw, N.G. (2014) "How Inherited Wealth Helps the Economy", *The New York Times*, June 21, 2014.
http://www.nytimes.com.

Metcalfe, J.S. (1998) *Evolutionary Economics and Creative Destruction*, The Graz Schumpeter Lectures, London: Routledge.

Milanovic, B. (2014) "The Return of 'Patrimonial Capitalism': A Review of Thomas Piketty's *Capital in the Twenty-First Century*", *Journal of Economic Literature*, 52(2), 519-534.

Naím, M. (2014) "The Problem With Piketty's Inequality Formula".
http://www.theatlantic.com.

Neumann, J.v. (1945) "A model of general economic equilibrium", *Review of Economic Studies*, 13: 1–9.

Palley, Thomas I. (2014) "The Accidental Controversialist: Deeper Reflections on Thomas Piketty's *Capital*".
http://www.tomaspalley.com.

Passinetti, L. (1962) "Income Distribution and Rate of Profit in Relation to the Rate of Economic Growth", *Review of Economic Studies* 29: 267-279.

Piketty, T. (2014) *Capital in the Twenty-First Century*, Cambridge MA: The Belknap Press of Harvard University Press.

Piketty, T. and E. Saez (2012) "A Theory of Optimal Capital Taxation", Working Paper 17989, National Bureau of Economic Research, Cambridge MA.

Piketty, T. and G. Zucman (2014) "Capital is Back: Wealth-Income Ratios in Rich Countries 1700-2010", forthcoming in *Quarterly Journal of Economics*.

Piketty, T. and G. Zucman (2014) "Wealth and Inheritance in the Long-Run", forthcoming in the *Handbook of Income Distribution* (North-Holland, volume 2).

Ray, D. (2014) "Nit-Piketty. A comment on Thomas Piketty's *Capital in the Twenty-First Century*".
http://www.econ.my.edu.

Rognlie, M. (2014) "A note on Piketty and diminishing returns to capital".
http://www.mit.edu.

Rowthorn, R. (2014) "A Note on Thomas Piketty's *Capital in the Twenty-First Century*".
http://tcf.org.

Sala-i-Martin, X. (2014) "Piketty y 'Capital en el Siglo XXI'".
http://salaimartin.com/randomthoughts.

Salvadori, N. (ed.) (2003) *The Theory of Economic Growth. A 'Classical' Perspective*, Cheltenham (UK): Edward Elgar.

Solow, R. (1956) "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics* 70: 65-94.

Solow, R. (2014) "A review of *Capital in the Twenty-First Century*".
http://www.newrepublic.com.

Stiglitz, J.E. (2012) *The Price of Inequality: How Today's Divided Society Endangers Our Future*, W.W. Norton.

Stiglitz, J.E. (2014) "Democracy in the Twenty-First Century"
http://www.project-syndicate.org.

Summers, L.H. (2014) "The Inequality Puzzle", *Democracy Journal*, Issue 33, Summer 2014.
http://www.democracyjournal.org.

Taylor, L. (2014) "The Triumph of the Rentier? Thomas Piketty vs. Luigi Passinetti and John Maynard Keynes", paper presented at a Structuralist Symposium on Thomas Piketty's Capital in the Twenty-First Century, Schwartz Center for Economic Policy Analysis, The New School for Social Research.
http://www.economicpolicyresearch.org.

Wolf, M. (2014) "A more equal society will not hinder growth", *Financial Times*, April 23, 2014.
http://www.ft.com.

Wren-Lewis, S. (2014a) "Capital in Piketty's capital".
http://www.pieria.co.uk.

Wren-Lewis, S. (2014b) "Perverting Piketty".
http://www.pieria.co.uk.