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Capital In the 21st Century: A Review

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Abstract

This paper reviews Thomas Piketty's Capital in the Twenty-First Century. Piketty's Capital seeks to bring the issue of inequality back to the centre of social analysis and to encourage discussion about the evolution of wealth and inequality with a view to inform policy. The book uses data stretching as far back as the 1700's. The main thesis of the book is that capitalism automatically generates inequality and wealth concentration since the rate of return on capital always exceeds the growth rate of income. To resolve this problem, the book proposes a progressive tax on wealth and income. I show that Piketty's book is based on a misunderstanding of classical political economy, particularly Marx. Piketty's view of the development and phases of capitalism is inadequate. His tax proposals, though progressive, will not resolve the inequality problem. Lastly, his conclusion that modern economic growth made it possible to avoid the Marxist apocalypse is not borne out by his data.

Keywords: Capital, inequality, wealth concentration, falling rate of profit.

1. Introduction

Thomas Piketty's Capital in the Twenty-First Century has captured the imagination of many scholars, policymakers, students, etc. Its main objectives are to put the issue of inequality at the centre of social analysis and policy discussion and to open a democratic debate about the evolution of wealth and inequality, informed by data. The book is based on data stretching as far as the 1700s, which shows the evolution of capital, income and the split between capital income and labour income.

The main thrust of the book is that capitalism automatically generates wealth concentration and inequality because the rate of return on capital is greater than the growth rate of income ($r > g$). The implication of this is that capital tends to increase relative to income (i.e. the capital-income ratio denoted by β in the book, tends to increase) which, in the long run, is not sustainable. This increase in the capital-income ratio leads to a fall in the rate of return on capital, which leads to a slowdown in economic growth. In order to avoid this "Marxist apocalypse", Piketty proposes a redistributive tax on profits and wealth (or capital), within the context where the economy is dominated by the forces of private property and competition.

It should be clear from the start that Piketty does not want to abolish capitalism. He proposes "deep structural reforms" that will not fundamentally alter the dominance of private property relations. In this regard, Piketty follows the line of a great heritage of reformers which includes Keynes and the social democrats. However within social democracy, Piketty's solutions are more on the right social democratic spectrum rather than the left. The left social democrats at least had the courage to observe that the tendency of capitalism towards crisis cannot be resolved without some degree of state-ownership of capital. In Piketty, none of this is mentioned. Instead, he proposes a series of taxes and social spending ostensibly designed to arrest the tendency of β to rise.

In this review, I show that Piketty has a misunderstanding of the classics, particularly Ricardo and Marx, about whom he makes claims in his book. Piketty casts doubts on the scientific status of Marx's Capital by stating that Marx, driven by the political agenda he articulated in the Communist Manifesto, made "hasty pronouncements from which it was difficult to escape" (Piketty, p.10). He also makes unfounded claims that Marx, together with Ricardo and Malthus, talked about inequality "without citing any sources whatsoever". This is to justify the point Piketty made earlier that, in relation to inequality, all along there has been "debate without data" (p.2).

In order to distinguish his book from Marx's, Piketty seems compelled at each stage, when he refers to Marx, not to forget mentioning how, despite Marx's brilliant intuitions, he nevertheless was, "in a way", wrong. This type of approach to intellectual predecessors, might be useful, only if it does not fraudulently present the views that it critiques. Unfortunately, Piketty creates a fraudulent Marx (and Ricardo) that he criticises. In addition, instead

of giving genuine credit to Marx for having used income tax statistics long before Kuznets, Piketty decides to ignore Marx and gives credit to Kuznets. I argue that Piketty does not have to unnecessarily criticise Marx in order to enhance the intellectual contribution of his book. Instead creating the positive links between his work and that of the classical political economists would enhance his book, especially when read as a supplement to Marx's Capital, because of the richness of the data he uses.

Thus, in this review, I will focus on a) Piketty's relation to classical political economy, b) his view on the origins and phases of capitalism, c) his laws of capitalism and how they are related to Marx's "laws of motion" of capitalism, d) his tax policies and the proposals emenating from Marx. Piketty's definition of capital of course differs from Marx's, who defined capital as the means of production which are set in motion by a labourer who does not own them, with the sole purpose of producing profit for their owner, who is not expending labour to set these means of production in motion. For Piketty, capital is "the sum total of all nonhuman assets that can be owned and exchanged in some market". In this case, assets in working class households (e.g. furniture), which can be exchanged in the second-hand markets are also capital. This of course raises problems with Piketty's construction of the capital variable.

2. Piketty and classical political economy

2.1 Piketty on Ricardo

Before going into the detail of Piketty's analytical framework, it is important that I do some house-keeping regarding the historical foundations of the ideas contained in Piketty's book. In his "Introduction", Piketty makes a number of claims regarding Malthus, Ricardo and Marx, which are dubious. These claims potentially damage the contribution that Piketty would have made to the study of Political Economy, as he transits from neoclassical theory to classical political economy. I will at this point limit myself to the claims he makes regarding Ricardo and Marx, but more about Marx.

On Ricardo, Piketty gives a short outline of the Ricardian growth model, elements of which can be found in Pasinetti (1977) or even Samuelson (1978). Piketty claims that: "Ricardo had no way of anticipating technological progress of industrial growth in the years ahead" (p.6). Let me point out that Ricardo

in many places does talk about technological progress. His analysis however, assumes a given state of technology. Just like anyone who draws a graph assumes "other things constant". The effects of technological progress would be to shift the Ricardian production function upwards.

If we look at Ricardo's chapter 2 On Rent, he provides some detailed analysis of the effects of the application of new technologies on rent in agriculture. He goes on to say: "It is undoubtedly true that the fall in the relative price of raw produce, in consequence of the improvement in agriculture...would naturally lead to increased accumulation; for profits of stock would be greatly augmented...But improvements in agriculture are of two kinds: those which increase the productive powers of the land and those which enable us, by improving our machinery, to obtain produce with less labour" (p.54).

The effects of these improvements on land, are to reduce rent and therefore, these improvements are "injurious" to the landlords (See Ricardo, p.55). It therefore follows that Ricardo was fully aware that persistent technological progress would progressively lower the price of agricultural raw produce in the long run and this process leads to a progressive reduction of rent on land. This, from a Ricardian point of view, explains Piketty's finding of "the collapse in the value of farmland".

Lastly in relation to Ricardo, we have to mention that Ricardo was very much concerned about the effects of technological progress on income distribution and on the conditions of the various classes (landlords, capitalists and labourers). While he initially thought technological progress lifts all boats, he later recanted his views on the matter by writing chapter 31 On Machinery. In that chapter, Ricardo shows that technological progress tends to injure the workers. It is interesting that Piketty, in his basic solution to the social crisis of capitalism proposes, on the basis of Solow's 1956 neoclassical theory, that policymakers must raise the growth rate on the basis of "durable technological progress", as if such progress is class-neutral. I will return to this issue in section 4 below.

2.2 Piketty on Marx

On Malthus, Ricardo and Marx, Piketty has this to say: "Malthus, Ricardo, Marx and many others had been talking about inequalities for decades *without citing any sources whatsoever...now for the first time, objective data were*

available..." (p.13). Yet, Piketty later states that: "Marx was also an assiduous reader of British parliamentary reports from the period 1820-1860...He also used statistics derived from taxes imposed on profits from different sources, which showed a very rapid increase in industrial profits in Britain in the 1840s. Marx even tried–in a very impressionistic fashion, to be true, to make use of probate statistics in order to show that the largest British fortunes had increased dramatically since the Napoleonic wars" (p.229).

Let us leave aside the fact that Piketty himself tries hard to shut down Marx's use of statistics, how does Piketty then claim that Marx proceeded in his analyses of inequality "without citing any sources whatsoever", if at the same time Marx was "an assiduous reader of British parliamentary reports"? This contradiction in Piketty's approach to Marx, reveals Piketty's pre-conceived ideological bias against Marx's analysis. This is a problem for Piketty's whole book, whose methodology, he claims, proceeds "by patiently searching for facts and patterns and calmly analysing the economic, social and political mechanisms that might explain them, [in order to] inform democratic debate and focus attention on the right questions. It can help to redefine the terms of the debate, unmask preconceived or fraudulent notions, and subject all positions to critical scrutiny" (p.3). How do we take this claim seriously if Piketty himself fraudulently cites other authors, especially Marx?

Let me demonstrate that Piketty is incorrect in his claim that Marx did not cite any sources of data whatsoever. In Capital I, Chapter 25, Section 3, Marx uses income tax statistics from 1853 to 1864 as part of "illustrations of the general law of capitalist accumulation", the law of progressive concentration of wealth in the hands of the few. He reports that "The increase of profits liable to income tax...in Great Britain from 1853 to 1864 amounted to 50.47%...that of the population during the same period to about 12%...The augmentation of the rent of land subject to taxation...amounted for 1853 to 1864 to 38%" (Capital I, p.607).

Contrary to Piketty's claim that Marx talked about inequalities for decades "without citing any sources whatsoever", Marx provides citations of his sources for these statistics. One source is the various reports of the Commissioners of Inland Revenue, which he mentions in the footnotes of the pages I cite here. There are numerous citations of sources that Piketty could have benefited from, to augment his series, had he read Marx. In addition, Marx cites other authors of his day to illustrate and to argue his points.

Marx proceeds to show that "the accumulation of capital was attended at the same time by its concentration and centralisation" (p.608). He uses statistics from agriculture, from 1851 to 1861, to demonstrate his law: "from 1851 to 1861 the number of farms of less than 100 acres had fallen from 31 583 to 26 597, so that 5 016 had been thrown together into larger farms. From 1815 to 1825 no personal estate of more than £1000 000 came under the succession duty; from 1825 to 1855, 8 did...The centralisation will however be best seen from a short analysis of the Income Tax Schedule D, in the years 1864 to 1865...."

Marx refers to a certain Mr John Bright, who asserted that "150 landlords own half of England", and says that this assertion has never been refuted. In subsequent pages, Marx refers to the statement by the "Registrar-General of the British people" who said: "Rapidly as the population has increased, it has not kept pace with the progress of industry and wealth". Marx cites the source of this statement to be the "census of England and Wales" (p.591). Marx further cites the contradictory speeches by William Gladstone and one Professor Fawcett.

Though I cannot claim that Marx was the first to use income tax statistics as a method to illustrate inequalities, it is very obvious that Kuznets owes a lot to those who came before him, including Marx. Marx used income tax statistics and other sources almost 100 years before Kuznets. These statistics, as Marx consistently cites, come from Income Tax Schedules, and they are therefore official statistics of his time.

It is therefore problematic for Piketty to claim, regarding Kuznets's 1953 book, that: "Now, for the first time, objective data were available...What is more the work of compilation was extremely well documented: the weighty volume that Kuznets published in 1953 revealed his sources and methods in the most minute detail, so that every calculation can be reproduced". I do not find Marx to have not done the same as Kuznets, reading his data in Chapter 25 of Capital I, for example, unless Piketty claims that the sources that Marx cites are fraudulent or not objective. Furthermore, Marx's calculations are fairly basic and straightforward, contrary to what Piketty implies.

It would therefore seem that Piketty made claims about Marx without having read him. This is not the best way to inform democratic debate about such an important issue as inequality. It would therefore be advisable, in the next

edition of his book, for Piketty to withdraw these statements about Ricardo and Marx. This would not lower the value of the book, but enhance it.

3. Piketty on the rise of capitalism and imperialism

In p.7, Piketty discusses the context within which Marx and Ricardo wrote: "The most striking fact of the day was the misery of the industrial proletariat. Despite the growth of the economy, or perhaps in part because of it, and because, as well, of the vast rural exodus owing to both population growth and increasing agricultural productivity, workers crowded into urban slums". The trouble with this sort of statement is that it is not consistent with historical evidence. Piketty claims that, at the dawn of capitalism, workers crowded into urban slums because of the rural exodus that was caused by population growth and increasing agricultural productivity. He ignores the fact that the rural population was forcibly removed from the land to make way for the rise of the capitalist farmers and industrial capitalists.

In Capital I Chapter 26–Chapter 30, Marx details the process of the emergence of the industrial proletariat. It turns out that this process is not as peaceful as Piketty presents it. Marx writes that the history of this process "is written in the annals of mankind in letters of blood and fire" (Capital I, p.669). This process involved the expropriation of the agricultural population from the land, which led to "a mass of proletarians being hurled on the labour market by the breaking-up of bands of feudal retainers" (Capital I, p.672). In this process the state played a central role, through enforcement of legislation that overnight turned the agricultural population into propertyless people, who could only survive by selling their labour-power in return for wages.

Then after the creation of this propertyless class, whose sole means of survival was wage income, the state proceeded to pass legislation which forced down wages. Marx chronicles how this happened in Capital I Chapter 28. He records similar legislation in England, France and the Netherlands. To show that the state was an instrument of the rising capitalist class at the expense of the expropriated, Marx quotes Linguet's reference to Adam Smith in p.689: "Whenever the legislature attempts to regulate differences between masters and workmen, its counsellors are always the masters". It is therefore not true that the rural exodus was driven by population growth and agricultural productivity.

In p.120–122, Piketty discusses the rise and fall of foreign capital. In this context he talks about the effect of colonialism: "In other words, the rest of the world worked to increase consumption by the colonial powers. This may be shocking. But it is essential to realise that the goal of accumulating assets abroad by way of commercial surpluses and colonial appropriations was precisely to be in a position later to run trade deficits...The advantage of owning things is that one can continue to consume and accumulate more without having to work...". Piketty continues to note that in the wake of decolonisation: "both France and Great Britain found themselves with net foreign assets close zero" (p.121). This leaves an incorrect impression that decolonisation wiped out the colonial posessions of France and Britain.

Throughout the book, when he discusses the phenomenon of a fall in British and French foreign assets, Piketty does mention the rise of the US as a global power (see p.155 for example). However, he does not link the entry of the US as a new global power to the changes in the net foreign assets of France and Britain. While it is true that some decolonisation, particularly those similar to China, Korea, Vietnam, later India, parts of Africa, etc. led to genuine nationalisation of colonial property, the decolonisation process led to the emergence of neo-colonialism, where the colonial powers continued to control the economies of their colonies while the colonies look as if they are politically independent.

This mechanism was long foreseen by Lenin in his Imperialism: The Highest Stage of Capitalism: "Since we are speaking of colonial policy in the epoch, of capitalist imperialism, it must be observed that finance capital and its corresponding foreign policy, which reduces itself to the struggle of the Great Powers for the economic and political division of the world, give rise to a number of transitional forms of state dependence. Typical of this epoch is not only the two main groups of countries: those owning colonies, and colonies, but also the diverse forms of dependent countries which, officially, are politically independent, but in fact, are enmeshed in the net of financial and diplomatic dependence. We have already referred to one form of dependence – the semicolony. An example of another is provided by Argentina" (Collected Works 22, p.263).

The post World War II period ushered in a new configuration of power relations within global capital. The US became the leading force, whereas before

this role was played by Britain. As Lenin says, imperialism leads to wars an continual redivision of the world among the global powers. The stake that the US received after World War II was largely taken from Britain and France. This point is made by Nabudere (1978): "When Europe emerged from the second World War it was badly torn up with its economies destroyed...The US came out of the war the strongest capitalist power. Its GNP rose by 100% in five years between 1939 and 1944; what the Alllies were losing by waging the war, the US was gaining. Thus whereas the US gold reserves were $4 billion in 1932, they rose to $20.6 billion in 1958, as compared to the combined gold and dollar reserves of Britain which rose from $0.6 billion to $3.1 billion, in the same period...the US share of world capital exports in 1914 were 6.3%, by 1930 35.3%, and 59.1% in 1960...France and Germany lost ground drastically from 39.5% to 11% and finally to 5.8%" (p.144).

In Part 4 of his book, Nabudere provides more data to illustrate the rise of the US and how it cannibalised asset shares of the European powers after World War II. The story about net foreign assets is very important, especially for developing and emerging market economies. However, the problem with the way Piketty presents the story is that he does not recognise that what he sees as near-zero net foreign assets among the superpowers reflects the redivision of the world among themselves. That is to say, *among themselves*, no one will "consume and accumulate more without having to work" at the expense of someone else. In fact, there is interpenetration of ownership within these superpowers so that, for example, US capital owns colonial posessions through owning French capital. Piketty promises to extend the net foreign asset story and his whole analysis to developing and emerging market countries. I am sure the story will be quite different.

The role of foreign trade and imperialism in mitigating the crises of capitalism within the imperialist centres is well-documented, beginning with Marx in Capital III, Lenin, Luxemburg, Grossmann and many others. What is important is that, while indeed Piketty mentions colonialism and net foreign assets, he does not explain the precise mechanisms through which these phenomena modify the operation of the general law of capitalist accumulation. For example in Capital III, Marx shows that the export of capital is one of the influences that can act to counter the tendency of β to rise. The intensity of the contradictions of capitalism can be diffused and shifted around the globe, away from imperialist centres, through the export of capital. However,

as capital rapidly covers the entire world market, wars of redivision among the super-powers become necessary as one super-power shoves its own contradictions in another's territory. It is in this context, the context where the BRICS are also emerging as an autonomous force in the world capitalist system, also engaged in shoving off its own contradictions to others, that the contradictions of Capital in the Twenty-First Century would be further intensified on the world scale.

4. The laws of motion of capitalism

4.1 Marx's general law of capitalist accumulation and the tendency of the rate of profit to fall

For Marx and the classical political economists such as Ricardo, the subject of political economy is the analysis of the laws of motion of the capitalist system. After a thorough analysis of the process of capitalist accumulation, Marx states what he calls the General Law of Capitalist Accumulation:

"The greater the social wealth, the functioning of capital, the extent and energy of its growth, and therefore, also the absolute mass of the proletariat and the productiveness of its labour, the greater is the industrial reserve army. The same forces which develop the expansive power of capital, develop also the labour power at its disposal. The relative mass of the industrial reserve army increases therefore with the potential energy of wealth. But the greater is this reserve army in proportion to the active labour army, the greater is official pauperism. This is the absolute general law of capitalist accumulation. Like all other laws it is modified in its working by many circumstances..." (Capital I, p.603).

Marx further states the law as follows: "The higher the productiveness of labour, the greater is the pressure of the labourers on the means of employment, the more precarious therefore, becomes their condition of existence...this law rivets the labourer to capital more firmly than the wedges of the Vulcan did Prometheus to the rock. It establishes an accumulation of misery, corresponding with accumulation of capital. Accumulation of wealth at one pole is, therefore, at the same time accumulation of misery, agony of toil slavery, ignorance, brutality, mental degradation, at the opposite pole..." (Capital I, p.604).

The implication of this law to the long run prospects of the capitalist system are detailed by Marx in Capital III, Part III: The Law of the Tendency of the Rate of Profit to Fall. This law, as Marx explains, states that the capitalist mode of production "produces...a continuously rising organic composition of the total capital. The immediate result of this is that the rate of surplus value, at the same or even a rising, degree of labour exploitation, is represented by a continually falling general rate of profit...The progressive tendency of the general rate of profit to fall is, therefore, just *an expression peculiar to the capitalist mode of production* of the progressive development of the social productivity of labour" (Capital III, p.213).

These two versions are just expressions of one and the same phenomenon, in other words, the law of the tendency of the rate of profit to fall is just another expression for the general law of capitalist accumulation. Let me now turn to Piketty's claims about Marx regarding the laws of capitalism.

4.2 Piketty on Marx on technological progress

Piketty repeats the fraudulent claim that Marx ignored technological progress. In his introduction, he says: "Like his predecessors, Marx totally neglected the possibility of durable technological progress, and steadily increasing productivity, which is a force that can to some extent serve as a counterweight to the process of accumulation and concentration of private capital" (p.10).

On the basis of this false premise, Piketty then says: "My conclusions are less apocalyptic than those implies by Marx's principle of infinite accumulation and perpetual divergence (since Marx's theory implicitly relies on a strict assumption of zero productivity growth over the long run" (p.27). Piketty repeats this claim in his discussion of Marx's law of the tendency of the rate of profit to fall, in this instance he relies on Solow's 1956 model (see his acknowledgement in p.228).

Now Solow's model is based on the Cobb-Douglas production function, which assumes constant income shares. This production function has been amply shown by radical scholars to be no more than a national accounting identity (see Shaikh, 1974). Solow's theory says long run growth is determined by the growth rate of productivity and the growth rate of the population. Yet in the same breadth, Piketty criticises the Cobb-Douglass production function,

for its assumption of constant factor shares (see p.217–220). These contradictions in Piketty's book, this double-speak, should be understood within the context of Piketty's attempt to transit from Solow to Marx.

I will now demonstrate that Piketty's conclusion about the long run dynamics of the capitalist system must therefore be rejected, because they are based on a false premise. If we read Marx's Chapter 25 of Capital I, we repeatedly encounter statements that link the rise in capital intensity to the increase in productivity. For example, Marx approvingly cites Adam Smith as follows: "Once given the general basis of the capitalistsic system, then, in the course of accumulation, a point is reached at which development of the productivity of social labour becomes the most powerful lever of accumulation".

I will not go into the many quotations, but I simply invite the reader to read Section 2 and Section 3 of Capital I Chapter 25. I also refer the reader to the above quotations from Marx regarding the general law of capitalist accumulation and the law of the tendency of the rate of profit to fall. Marx makes numerous statements about durable technological progress, without which the general law of capitalist accumulation would not operate. In fact, without technological progress, the capitalist system simply generates an accumulation cycle around a stable unemployment and labour share, as first modelled by Goodwin (1967).

Piketty seems not to have read Marx because, for Marx, long-term, durable technological progress is the same as rising organic composition of capital, or capital intensity. Marx does not cease to take the opportunity to explain that rising capital intensity of production in turn raises labour productivity. Therefore a steady rise in capital intensity (Piketty's β), drives labour productivity and it is this type of productivity growth that creates a long-term structural crisis for the capitalist system. For example, as I mentioned above, he says: "The progressive tendency of the general rate of profit to fall is, therefore, just *an expression peculiar to the capitalist mode of production* of the progressive development of the social productivity of labour" (Capital III, p.213). As any reader of Marx will know, what really tends to drive the rate of profit down is rising capital intensity that is a function of capitalist accumulation itself.

The whole point of this critique of Piketty is that Piketty has failed to see that Marx actually formalised "endogenous growth theory". Capital ac-

cumulation raises capital intensity and hence long run labour productivity growth (Solow's g_A). This in turn leads to the long run tendency of the rate of the rate of profit to fall and hence, to the fall in the long run growth rate of the capitalist economy. Maito (2014), has shown this to be the case empirically, using Piketty's own data.

4.3 Piketty's laws and the neoclassical contradiction

What Piketty presents as "laws of capitalism", are in fact the theory of accumulation found in the works of classical political economists such as Ricardo, Marx and the Cambridge growth theorists such as Robinson, Kaldor and Pasinetti (see Shaikh, 1992). Piketty's laws are formulas whose left and right hand sides can be interchanged. However, classical political economists had a theory of causation of the variables that Piketty discusses in his book. In short, one "law" is an equilibrium condition that says investment equals savings and the other is simply a definition of the rate of profit.

More importantly though, while Piketty flirts with classical growth theory, his resort to neoclassical theory in order to avoid the fundamental Marxist conclusion about the future of capitalism creates a contradiction in his analytical framework. Specifically, his assertion that $g = g_A + g_n$ leads his apparatus to fall apart, because this assumption implies that capital intensity is constant in the long run, a view that is not borne out by his own data. Let us get on with Piketty's laws, which are as follows:

$$\alpha = r \times \beta \quad (1)$$

$$\beta = \frac{s}{g}, \quad (2)$$

where α is the capital share of income, r is the rate of profit on capital, s is the savings rate, g is long run growth rate of the economy and $\beta = K/Y$ is the capital output ratio. I want to add to these Solow's neoclassical "law" of capitalist growth, upon which Piketty relies:

$$g = g_A + g_n \quad (3)$$

where g_A is the growth rate of productivity, what Piketty calls "durable technological progress", and g_n is the growth rate of the labour force. It follows naturally that, upon replacing g using eq.(3), we get:

$$\beta = \frac{s}{g_A + g_n} \tag{4}$$

Piketty's doubts about Marx's apocalypse can be seen in eq.(4). In this equation, β need not rise indefinitely because g_A (and g_n) can rise, thereby depressing β. In a way, Piketty concludes, "Marx was wrong". However, note that Marx, in Capital I Chapter 25, rejects the view that g_n poses a limit to capitalist accumulation, because rising capital intensity progressively generates a surplus-population (the reserve army of the unemployed). To see the validity of Marx's theory, just picture an economy with a rapid growth of the labour force without capital accumulation–the results would be heightened poverty and unemployment, not rising economic growth, contrary to the suggestions of the basic neoclassical model upon which Piketty relies.

I will now show that Piketty's laws express an equilibrium condition and a definition, there are no two laws, as he claims. Less so are these "laws of *motion* of capitalism" Also, there is a contradiction in his analytical framework. To do this, I will revert to Marx and the classics. According to Marx and others, the rate of capital accumulation is determined by the rate of profit, because capitalists invest profits. Like Piketty I, for now, abstract from depreciation. Therefore:

$$\dot{K} = s_c P, \tag{5}$$

where K is the capital stock, $\dot{K}$ is the change in the capital stock, P is aggregate profits, and $0 < s_c < 1$ is the savings propensity of the capitalist class. Eq.(5) says that capitalist investment equals capitalist savings. Now, let α be the share of profits in national income. It follows that $P = \alpha Y$, where Y is national income. Eq.(5) can be stated as:

$$\dot{K} = s_c \alpha Y, \tag{6}$$

Dividing by K both sides we get the rate of capital accumulation to be:

$$g_k = \frac{s_c \alpha}{\beta}, \tag{7}$$

where $g_k = \frac{\dot{K}}{K}$. Eq.(7) is an equilibrium condition which says investment equals capitalists' savings. The contradiction in Piketty's analytical framework should by now be clear. Eq.(7) reveals that Piketty's s equals $s_c\alpha$ and his g equals g_k. He is back to the balanced growth path of Solow that he criticises. Worse, if $g = g_k$ then β should be constant in the long run. This is not borne out by Piketty's own data. What his data reveals is the tendency of β to rise, and this rise is interrupted by wars, crises, and revolutions, or what Shaikh (1992) refers to as "exogenous extraeconomic factors" (see the disruption in the upward trend in β that occurred between 1914 and 1970, e.g. figure 4.8, p.154).

Thus, by resorting to neoclassical theory, Piketty effectively sets β to be constant in the long run. His analytical framework is inconsistent with his data because it means that the growth rate of wealth equals the growth rate of income. Under this condition, there is no long run historical tendency towards increasing wealth concentration in capitalism. Yet, Piketty's book is concerned with capitalism's automatic generation of "arbitrary and unsustainable inequalities" (p.1).

Furthermore, from Marx and the classics, we know that the rate of profit is *defined* as:

$$r \equiv \frac{P}{K}. \tag{8}$$

However, since $P = \alpha Y$, it follows that:

$$r = \frac{\alpha}{\beta} \tag{9}$$

That is why Piketty's "two laws" are simply an equilibrium condition and a definition, because Piketty assumes that in the long run $g = g_k$. While

he acknowledges that: "The formula $\alpha = r \times \beta$ is a pure identity. It can be applied to all societies in all periods of history, by definition" (p.52), Piketty does not explain how such an "identity", which can apply in all modes of production, becomes a law that is specific to the capitalist mode of production. Although Piketty further confuses an "identity" with a "definition", his reasoning that this formula should be regarded as a law is, at best, conceptually very weak.

Now, having revealed Piketty's "laws" for what they really are, I now proceed to state them in the terms of classical political economy, assuming for now that $g = g_k$, as:

$$\beta = \frac{s_c \alpha}{g} \tag{10}$$

$$\alpha = r \times \beta. \tag{11}$$

It is quickly obvious that, upon substituting out α using eq.(11), the following equation obtains:

$$g = s_c r, \tag{12}$$

which is well-known in Marxist and post-Keynesian literature. Since s_c is less than 1, it follows that in the long run $r > g$. This shows that had Piketty fully engaged with some Marxist and post-Keynesian literature, it would have been fairly obvious that capitalism structurally reinforces the concentration of wealth in the hands of those who already have it and the rest of society will never catch up even if they accumulate all their incomes at the rate g. His explanation of $r > g$ in p.350–361 is not convincing. For example he claims that one reason for $r > g$ in traditional societies is because "these were low growth societies". This begs another question. Looking at his Figure 10.10 in p.356, why is it that $g > r$ in the era of wars, revolutions and economic crises? The answer to this question lies in Marx's exposition of the law of the tendency of the rate of profit to fall.

Now, only under "socialism", i.e. $s_c = 1$ (which means capitalists are not consuming, and therefore dead), do we have the maximum growth rate where

$g = r$ (Pasinetti, 1962). Note that although Pasinetti's "socialism" is superior to capitalism, it is nevertheless different from the concept that is more aligned to Marx's, which explicitly incorporates the role of state-ownership of the means of production. Having said this, I must point out that in fact $r > g$ as the condition for rising wealth concentration does not accurately capture Marx's view. As I will show below, Marx's long run path of capitalist development in fact assumes that $g_k > g$, that is to say, $s_c r > g$.

5. Marx's law of the tendency of the rate of profit to fall through rising β

Let me turn to Marx's theory. Piketty is worried about Marx's law of rising β, which produces an apocalypse and he wants to avoid it within an economy dominated by the "forces of private property and competition" (p.532). Now, two things must happen to avoid Marx's law from eq.(7). One thing is that α must fall. However this means the profit share must fall in favour of workers (this is a move to the left, towards some kind of social democracy). Another thing is to raise the growth rate of long term productivity g_A. Piketty argues for both. The reduction of α will be done through tax and the raising of g_A will be done through "diffusion of knowledge", education, policy and so forth. However, Piketty is unaware that in capitalism g_A is driven by rising capital intensity in the long run, as pointed out by Marx.

Piketty claims that: "Marxist analysis emphasizes the falling rate of profit– a historical prediction that turned out to be quite wrong, although it contains some interesting intuition" (p.52). I have mentioned that Marx's theory of long term productivity growth implies that long-term productivity growth is completely determined by the growth rate of capital intensity. To formalise Marx's theory of the rate of technological progress in a simple way, we use the following equation:

$$g_A = \theta \left(g_k - g \right), \tag{13}$$

where $\theta > 0$. Note that eq.(13) is a statement of "endogenous growth theory", there is no other "exogenous" factor that drives long term productivity than the rise in capital intensity; all technological progress expresses, and finds expression, in the rising capital intensity of production. Technological

progress is therefore tied to "the constant generation of the surplus population", whose function is to keep wages "in a rut that corresponds to the wants of capital" (Capital I, p.689). It is not a class-neutral process. The growth rate of output is determined by the rate of technological progress and the rate of capital accumulation. Therefore we have:

$$g = g_A + \gamma g_k, \tag{14}$$

where $0 < \gamma < 1$. Substracting g_k from both sides of eq.(14) and substituting g_A away using eq.(13) we have the following relation:

$$(g_k - g) = \left(\frac{1-\gamma}{1+\theta}\right) g_k \tag{15}$$

Let $\widehat{\beta} = (g_k - g)$ denote the growth rate of capital intensity. Eq.(15) can then be written as follows:

$$\frac{\dot{\beta}}{\beta} = \psi g_k, \tag{16}$$

where $\psi = \left(\frac{1-\gamma}{1+\theta}\right)$. Eq.(16) is the law of motion for β, which states that the growth rate of capital intensity is determined by the rate of capital accumulation. As long as the rate of capital accumulation is positive, capital intensity will rise and this, according to eq.(9) will lead to a fall in the rate of profit. Upon introducing the rate of depreciation in eq.(7), I write the law of motion for capital intensity to be:

$$\dot{\beta} = \psi \left(s_c \alpha - \delta \beta\right) \tag{17}$$

What comes out of this is a dynamic law for the evolution of β, which under capitalism always implies that $\dot{\beta} > 0$, i.e. β must be persistently rising, as long as $(s_c \alpha - \delta \beta) > 0$. Note that, as pointed out by Marx in Capital III, p.236, the effect of depreciation δ on capital accumulation moderates the rise

in β, and hence, as I will show, δ moderates the fall in the rate of profit. Indeed, at a certain stage in the increase of β, write-offs, write-downs and destruction of capital are ways in which the capitalist system raises δ, but these serve more to decrease β so that the rate of profit recovers. It should be noted though that rising depreciation chokes off the system by narrowing the gap $(s_c\alpha - \delta\beta)$. So, it is the sudden reduction in β that really leads to the recovery.

Nevertheless, in relation to depreciation, Marx explains in Capital III, p.252 that: "It is evident, however, this depreciation of old capital could not occur without a struggle", as one capitalist seeks to shift the losses to another. This never-ending struggle makes β to continue to rise and δ to be suppressed; the rate of profit continues to fall. Ultimately, the capitalist system reaches a point where $\dot{\beta} = 0$. At that point $(s_c\alpha - \delta\beta) = 0$ and all growth ceases. At what point will the capitalist system absolutely enter a crisis? Put another way, at what level of the rate of profit does the capitalist system grind to a halt?

In Capital III p.251, Marx states this condition as follows: "There would be absolute overproduction of capital as soon as additional capital for the purposes of capitalist production=0". In other words, at this point, $g_k = 0$. He elaborates this point to show that this is equivalent to saying that the growth rate of the volume, or mass, of profits is zero (Shaikh, 1992). So the absolute crisis of capitalism occurs when $r_c = \delta/s_c$, where r_c is the rate of profit at the point of absolute overproduction of capital. As the capitalist system approches this point (and perhaps surpasses it), economic crises, wars, repressions, revolutions etc. would take place, as we observe from Piketty's own data.

Eq.(17) is precisely Marx's law of rising capital intensity, which is different from Piketty's eq.(2), which Piketty incorrectly calls "dynamic" (see for example Piketty, p.187 and p.228). Eq.(17) is truly a "law of motion" of capitalist accumulation, a law of motion β. It is not a static equilibrium relation between β and other variables. In his formulations however, Piketty abstracts from depreciation, i.e. $\delta = 0$. Solving for eq.(17), having abstracted from depreciation, to follow Piketty's logic, I obtain:

$$\beta = \beta_0 + \psi s_c \alpha t, \tag{18}$$

where t denotes time and β_0 is the constant of integration. Eq.(18) directly implies a falling rate of profit. To see this, substitute out β from eq.(8), using eq.(18) to get:

$$r = \frac{\alpha}{\beta_0 + \psi s_c \alpha t}. \tag{19}$$

In the spirit of Shaikh (1992), the denominator $(\beta_0 + \psi s_c \alpha t)$ approaches infinity as time progresses, while α fluctuates between 0 and 1 because it is the profit share in total income. These dynamic processes lead to an inexorable fall in the rate of profit brought about by the increase in productivity, which Piketty incorrectly claims is absent in Marx's theory. The crucial parametric assumption in Marx's theory which links the law of rising β to the law of the tendency of the rate of profit to fall is that $0 < \gamma < 1$. This parametric assumption is an established empirical regularity.

Given that α is limited to fluctuate between 0 and 1, we can assume that it is constant in the long run (an illustrative assumption made by Marx in Capital III, part III). However to avoid the unnecessary criticism of this, let us put $\alpha = 1$, so that capitalists take all the income as profits (which is unrealistic). Then it is obvious that r will fall at an approximate rate $\psi s_c \alpha$. I have thus shown that, as Maito correctly observes, "profitability in capitalism tends to fall despite, or even with, productivity increases. This is a basic conclusion of Marx´s Capital. And the evidence...not only refutes Piketty´s arguments but other authors, really a huge majority even within Marxism".

Let us now return to Piketty's explanation of Marx's "principle of infinite accumulation". Piketty says, about Marx: " In fact, his principal conclusion was what one might call the "principle of infinite accumulation," that is, the inexorable tendency for capital to accumulate and become concentrated in ever fewer hands, with no natural limit to the process. This is the basis of Marx's prediction of an apocalyptic end to capitalism: either the rate of return on capital would steadily diminish (thereby killing the engine of accumulation and leading to violent conflict among capitalists), or capital's share of national income would increase indefinitely (which sooner or later would unite the workers in revolt). In either case, no stable socioeconomic or political equilibrium was possible" (p.9).

I have shown that indeed capitalist accumulation implies an increasing β, i.e. concentration of capital. As a mathematical ratio β has no natural limit. However in Marx's view, as an expression of the development of the productive forces, the increase in β has limits and those limits are imposed by the relations of production, which are captured by the expression $(s_c\alpha - \delta\beta)$. That is why Marx says: "The real *barrier* of capitalist production is *capital itself*" (Capital III, p.250). In addition, in Marx's model, capital's share cannot increase indefinitely, because as a share, it fluctuates between 0 and 1, and if indeed it increases, there is an upper limit of 1. Piketty's interpretation of Marx is therefore incorrect.

Given the above results, it is clear that Piketty's claim that long run durable technological progress can serve as a counterweight to Marx's law of the tendency of the rate of profit to fall does not hold. This is so because technological progress under capitalism is determined by the growth of capital intensity of production.

6. Piketty's solution versus Marx's solution

One of the most cited of Piketty's solutions to arrest the persistent increase in β is to levy a tax on income, capital and consumption (p.494). Clearly, these are meant to be redistributive, i.e. shifting income, wealth and consumption to the poor from the rich. The problem with Piketty's taxes is that they are not meant to abolish the social domination of "the forces of private property and competition" (p.532). As I will show below, these taxes will not solve the fundamental crisis of the capitalist system as long as private property dominates.

6.1 A tax on profits

6.1.1 Piketty's solution

Let us implement Piketty's tax on income, in this instance the tax is levied on profits. Note that, from eq.(7), having introduced depreciation, the rate of capital accumulation would be:

$$g_k = -\delta + s_c(1 - \tau_p)r. \quad (20)$$

where $0 < \tau_p < 1$ is the tax rate on profits. The impact of this tax rate is to lower g_k the growth rate of capital so that the gap $g_k > g$ narrows. However the problem is that, as long as capitalists control the accumulation process within the economy, this policy intervention implies that the long run growth rate will slow down, since the rate of capital accumulation is dominated by the forces of private property. I have mentioned in section 5 that β must be persistently rising as long as $(s_c\alpha - \delta\beta) > 0$. Piketty's tax on profits amounts to reducing the expression $[s_c\alpha_c(1-\tau_p) - \delta\beta]$, in order to arrest the increase in β. However, the tax rate hastens the arrival of the crisis.

In addition, since the rate of profit tends to inexorably fall, the policy intervention that Piketty suggests also means that:

$$r_c = \frac{\delta}{s_c(1-\tau_p)}. \tag{21}$$

Thus, while Piketty's solution narrows the gap $g_k > g$, it brings forward the crisis point. That is to say, the capitalist system quickly enters the crisis because the crisis rate of profit is higher, and it slows down the speed at which the rate of profits falls. The speed at which the rate of profit falls would be $\psi s_c\alpha(1-\tau_p)$. Piketty's solution therefore does not resolve the Marxist apocalypse precisely because it still "relies on the forces of private property and competition".

6.1.2 Marx's solution

Let us, as an alternative introduce a more radical, Marxist solution. Here, the state participates directly in the process of capital accumulation, having confiscated part of private property. From a Marxist point of view, it is not enough for the state simply to take ownership of the means of production from private owners. What is crucial is that, upon nationalising, the state has to plan so as to keep β constant. This is what Marxists mean when they talk about the "control of the development of the productive forces".

The distinction between state socialist ownership and private capitalist ownership therefore is that under state socialism $\dot{\beta} = 0$, without a crisis. Therefore, part of g_k is controlled by the state to the extent that the state itself

owns the means of production. In this case, the rate of technological progress becomes:

$$g_A = \theta\left[(1-\phi)\left(g_k^p - g^p\right) + \phi g_A^g\right], \tag{22}$$

where g_k^p is the rate of accumulation of private capital, g^p is the growth rate of private sector output, g_A^g is the rate of technological progress in the state-owned sectors, ϕ is the share of state capital in total capital and $(1-\phi)$ is the share of private capital in total capital. One can think of ϕ as "the degree of nationalisation" of capital. The first term inside the square bracket is technological progress due to private capitalist accumulation and the second term is due to state capital accumulation. The latter is determined through state policy to be g_A^g.

Note that within the state-owned sectors, the state keeps its capital intensity constant, so that $(g_k^g - g^g) = 0$. This implies that $(g_k - g) = (1-\phi)\left(g_k^p - g^p\right)$. Using this fact eq.(15) becomes:

$$(g_k - g) = -\left(\frac{\theta\phi}{1+\theta}\right) g_A^g + \left(\frac{1-\gamma}{1+\theta}\right) g_k \tag{23}$$

Stating the law of accumulation in terms of β I obtain:

$$\frac{\dot{\beta}}{\beta} = -\psi\left(\frac{\theta\phi}{1+\theta}\right) g_A^g + \psi\left(\frac{1-\gamma}{1+\theta}\right) g_k, \tag{24}$$

To see clearly the role of socialist state-ownership, substitute out g_k using eq.(20) and express the rate of profit in terms of eq.(9) to get:

$$\dot{\beta} = -\psi\left[\left(\frac{\theta\phi}{1+\theta}\right) g_A^g + \delta\left(\frac{1-\gamma}{1+\theta}\right)\right]\beta + \psi\left(\frac{1-\gamma}{1+\theta}\right) s\alpha. \tag{25}$$

In eq.(25), s and α are the savings rate and the profit share respectively, for the whole economy. In this setup, the condition $(s\alpha - \delta\beta) > 0$ can

exist without the economy experiencing a rising β as long as the degree of nationalisation ϕ is sufficiently large and the state sufficiently sets g_A^g. It follows that for β to be constant, i.e. $\dot{\beta} = 0$, the state can, by controlling g_A^g and ϕ, set:

$$\beta = \frac{(1-\gamma)\, s\alpha}{\theta\phi g_A^g + \delta\,(1-\gamma)} \tag{26}$$

Lastly, note that state socialism does not require write downs, writes offs and the destruction of capital in order to recover the profitability of the system. Even if $\delta = 0$, the fact that $\phi > 0$ implies that the system can be stabilised as long as the state ensures that g_A^g is positive. In other words, the state must ensure that it contributes to technological progress, of course in a way that is not tied to capital intensity as in the capitalist case. Otherwise, once the state behaves in a capitalist way, the dynamic of rising capital intensity will set in motion a falling rate of profit and crisis. Similarly, setting $\phi = 0$ through privatisation would simply lift β and set in motion the general law of capitalist accumulation.

Note that in the above analysis, I have not included progressive taxation yet. This is not to say that such taxation is not important. What I intend to show is that such a tax is inadequate to address the dynamic of capitalism towards increasing wealth concentration and crisis, if it is not complemented by the more powerful measure of state socialist ownership of the means of production.

6.2 A tax on capital?

Piketty also proposes a tax on capital in order to arrest the growth of wealth. However a tax on capital will simply modify capital intensity so that there is $\widetilde{\beta} = (1-\tau_c)\beta$. This form of tax, alters the rate of capital accumulation to be:

$$g_k = -\delta(1-\tau_c) + \frac{s_c\alpha}{(1-\tau_c)\beta} \tag{27}$$

The rate of capital accumulation rises as τ_c, the tax rate on capital, increases. The policy does not interfere with the law of capitalist accumulation, which is altered to be:

$$\frac{\dot{\beta}}{\beta} = \psi \left[-\delta(1-\tau_c) + \frac{s_c \alpha}{(1-\tau_c)\beta} \right], \tag{28}$$

Therefore, the tax on capital will simply accelerate the growth of β and hasten the fall in the rate of profit, thereby bringing the economy faster into a crisis. Once again, the policy of setting $\phi > 0$, i.e. of nationalisation and at the same time ensuring that $g_A^g > 0$ in a manner that is not related to capital intensity offers a superior outcome.

Once again, this is not to say that Piketty's proposal should not be supported. Indeed such a proposal is progressive. Nevertheless, as before, unless this proposal is complemented with the more powerful measure of state socialist ownership of the means of production, it is likely to lead to crisis.

7. Conclusion

There is no doubt that Piketty's Capital in the Twenty-First Century has raised the discussions about the progress of wealth and inequality to a higher level. This is encouraging particularly because Piketty is an author that is well-known in the dominant paradigm in the economics profession. Piketty is modest to admit upfront that the "answers contained herein are imperfect and incomplete" (p.1). This must be welcomed. Indeed, social science, particularly economics, can learn a lot by examining the wealth of data that Piketty and his colleagues have assembled for humanity to learn better ways of organising its societies in a manner that is equitable.

However, there are claims that Piketty makes about Ricardo and Marx that can potentially damage the ability of his book to open a genuinely democratic and sustained debate about inequality. While claiming that these authors present interesting insights and intuitions, he at the same time cancels them out by grossly misrepresenting their views. This practice, which is found throughout his book, weakens the book as a potential source of ideas that can inform policy and theoretical developments within the academy.

At another level, the content of Piketty's analysis is flawed. This must be taken within the context where Piketty had already, in p.1 of his book, admitted that his solutions are imperfect and incomplete. His view of the genesis of capitalism flies in the face of well-documented historical facts, found in his predecessors book: Capital. Likewise, his periodisation of capitalism through the evolution of β, while very useful, fails to see changes in the poles of hegemony within the imperialist powers. For example, he does not link the "decrease" in British and French net foreign assets to the rise of the US as a global power. In this connection, he has no concept of neo-colonialism.

I have attempted to show that Piketty's proposed tax policies to regulate capital so that the Marxist apocalypse is avoided, though very progressive, are not sufficient. In some instances, as in the tax on capital ownership, these policies can accelerate the capitalist crisis. I have shown that, as long capital accumulation is controlled and dominated by the forces of private property, a positive rate of capital accumulation implies an increase in the centralisation and concentration of capital and hence, a persistent fall in the rate of profit, even if a tax is in place. Such a fall in the rate of profit, ultimately results in a crisis where the capitalist system absolutely grinds to a halt and capital is destroyed.

Only in the case of state socialism, i.e. where the state owns a substantial portion of the means of production and it regulates technical progress in a manner that is not related to capital intensity, does the economic system avoid the crisis that is so well articulated by Marx. Nevertheless, in so far as part of the economy remains in private hands, the privately-owned part will face a gradual fall in the rate of profit, which will necessitate that the socialist state gradually raises its ownership towards 100% in order to limit the crisis emanating from private capitalist ownership.

In this review, I have not taken up the issue of economies that are dominated by imperialism and how imperialist economies use these to postpone the crisis of profitability. Nevertheless, the model of Marxist crisis that I have put forward above provides straightfoward implications for economies dominated by imperialism. For example, the outflow of profits from those economies modifies the model so that $(s_c\lambda\alpha - \delta\beta) > 0$ is required for increased growth, where $(1-\lambda)$ is the share of profits that are repatriated to the imperialist centre. Consequently, economies that are dominated by imperialism require

a high α, i.e. high rates of exploitation and hence high levels of income inequality, in order for them to sustain high rates of capital accumulation. Otherwise, these economies are more crisis-prone and will tend to experience low growth rates than their imperialist counterparts. Once again, this observation shows that the "nationalisation of the economy", i.e. the limits to foreign ownership, are important to sustain accumulation in these economies.

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