Inequality and economic theory: has Piketty's *Capital in the 21st century* changed anything?

Paper for symposium on "Inequality: causes and consequences"
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We live in an age of overhyped PR language, where every book tries to promote itself as a No 1 bestseller. That general trend to overselling everything and everyone has made it hard to get a sense of where Piketty's book *Capitalism in the Twenty-first Century* falls – plenty of commentators have labelled it the economics book of the decade, a game-changer, even (from Larry Summers, who is no lightweight) a Nobel Prize on the way[1]. Robert Solow's (excellent and not to be missed) review is headlined bluntly: 'Thomas Piketty is right'[2]. Nevertheless I approached the book with mild scepticism asking what, exactly, is new here?

Start with things we knew before the book. The empirical data on trends in inequality which have turned the Kuznets Curve on its head[3] are an enormous achievement from decades of hard slog by dedicated researchers, headed by Piketty and his collaborators, but they have been in the public arena for quite a while now – Piketty and Saez on US income distribution since 2003[4]; Piketty's work on French distributional data since 2001 for readers of French[5] and since 2003 in English[6]; international comparative studies of top incomes in a series of publications between 2006 and 2011, including the major Atkinson/Picketty/Saez long-run study contrasting Anglo and Continental

1 Larry Summers, "The inequality puzzle", *Democracy Journal* Summer 2014 p.92: "Even if none of Piketty's theories stands up, the establishment of [the fact that widening inequality is not attributable to different skills and abilities in the labour market] has transformed political discourse and is a Nobel Prize-worthy contribution". Summers goes on to put Piketty's "theory of natural economic evolution under capitalism" alongside Darwin's idea of evolution, Ricardo's notion of comparative advantage, or Keynes's conception of aggregate demand".

2 Robert Solow, "Thomas Piketty is right: Everything you need to know about 'Capital in the twenty-first century'" *The New Republic* 22 April 2014, http://www.newrepublic.com/article/117429/capital-twenty-first-century-thomas-piketty-reviewed.

3 Simon Kuznets produced pioneering work on quantitative long-run economic history and discovered that twentieth-century economic growth up to the 1950s had gone hand in hand with a major reduction in income inequality, reversing what he took to be the disequalising tendency of early industrial development. His Kuznets Curve hypothesis (Simon Kuznets, "Economic Growth and Income Inequality." *American Economic Review*, 45(1): 1–28, 1955) argued that the end state of capitalist development, after getting through an inequality hump, would be an economy with relatively equal distribution. Piketty's data show instead a U-shaped curve with inequality rising sharply since Kuznets produced his hypothesis.

4 Thomas Picketty and Emmanuel Saez, "Income inequality in the United States, 1913-1998", *Quarterly Journal of Economics* 118(1): 12-39, February 2003; first published as NBER Working Paper 8467 in 2001.

5 Thomas Piketty, *Les hauts revenus en France au Xxe siècle: Inegalites et redistributions 1901–1998*. Paris: Grasset.

6 Thomas Piketty, "Income Inequality in France, 1901–1998." *Journal of Political Economy*, 111(5): 1004–42, 2003.

European economies.[7] This work has been part of the wider research programme of "Big Data" collection in economic history following on the work of Angus Maddison and the Kravis-Heston-Summers team behind the Penn World Tables. The data is certainly the launching pad for the book, and it's useful to have it compiled in one place. But the observations that income and wealth inequality has been rising for a couple of decades, that the top 1% have been gaining hugely, and that corporate CEO incomes have gone into the stratosphere for reasons that seem unclear to most, have been common currency in popular as well as professional discourse for a decade now.

Nor are Piketty's policy suggestions in Part 4 of the book new ones in themselves – wealth taxes, inheritance and gift taxes are all well-established ideas (even though they have been eclipsed since the 1980s in countries like New Zealand where the neoliberal tide has run most strongly). As Piketty demonstrates, these taxes played a major (though not sole) role in creating and sustaining the egalitarian era of the mid twentieth century. In putting them back at the top of the policy agenda for the next century Piketty has plenty of company. Taxes on capital gains, on narrowly-defined capital itself, and on wealth in general, have been in the mix of policy discourse everywhere – including in the New Zealand tax task force of 2010 where Gareth Morgan was the (minority) cheerleader for a wealth tax, and in Labour Party policy on capital gains tax since 2008. These things may not be "politically feasible" right now, but they have been in the past and will be again – the facile dismissal of Picketty's suggestions by the Right is predictable but not well-grounded.

None of this, however, is what Picketty's book is really about if you are reading it from the standpoint of professional economists raised in mainstream economic theory, familiar with the history of economic thought, and grappling with the increasingly complex field of mathematical growth theory and the accompanying econometric findings. In that world, Picketty's book is a bombshell. For what it's worth, my own judgment is that we are looking at a Kuhnian scientific revolution[8] – an intellectual breakthrough that provides a unifying theory to suck up and incorporate a huge pile of the accumulated puzzles and frustrations from the past half-century's work in mainstream economic theory to do with economic growth in the long run. Picketty's findings and ideas may be of comfort to the heterodox and the Left critics of capitalism, but his work is not located in the heterodox fringe. It is squarely confronting mainstream economic theory on its own ground, and its theoretical victories are surgically and rigorously won. Piketty's new paradigm redraws the economic research landscape.

So to students who over the years have plowed with me through courses in growth theory, development economics, and history of economic thought, my message is: drop everything, get your hands on Piketty, and read two passages of economic theorising at the very highest level: Chapter 5 on pages 164-198, the asides on Marx and Harrod-Domar on pages 227-232, and pages 353-368.

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7 Piketty, Thomas, and Emmanuel Saez, "The Evolution of Top Incomes: A Historical and International Perspective" *American Economic Review*, 96(2): 200–205, 2006; Anthony B. Atkinson and Thomas Piketty (eds) *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, Oxford and New York: Oxford University Press 2007; Anthony Atkinson, Thomas Piketty and Emmanuel Saez "Top incomes in the long run of hstory", *Journal of Economic Literature* 49(1): 3-71, 2011.

8 Thomas Kuhn, *The Structure of Scientific Revolutions*, 1962.

Then follow the links into the endnotes, the technical appendices[9], and Piketty's still-unpublished working papers of the past few years[10].

Before I turn to those sections in more detail, let me lay out some preliminary bits of the landscape for non-economists.

Income and wealth distribution

The distribution of society's total annual income, and the ownership of its stock of total wealth, are old topics in economics, though anyone attending mainstream courses in economics in the past couple of decades could be forgiven for not knowing this.

The wealth of nations, as Adam Smith summarised matters, lies in their productive capacity and the resulting annual flow of produced goods and services that is available to meet the needs of the population. The issue immediately arises of how various groups within the population obtain and exercise claims to appropriate (a verb) shares of that annual flow. Economists generally think of the distribution of income as some sort of shifting equilibrium – but the nature of that equilibrium, and the income distribution that flows from it, differs greatly from theory to theory. Without exhausting the possibilities one can think, for example, of

- An unchallenged ruling class appropriating for itself the maximum share consistent with sustainability of the economy per se (obviously the mass of the population have to be kept alive in order to produce)[roughly speaking this is the ricardian and marxian position];
- The outcome of a contest amongst contending class forces, reflecting the balance of market power they are able to wield [the neo-ricardian view];
- A mutually advantageous bargain amongst free and equal participants in the productive economy in which each player is paid its just share on the basis of its productive contribution [the neoclassical view].

Matters are complicated by the issue of what motivates human behaviour, since people on the one hand pursue their self-interest but on the other hand are social beings who exhibit sympathy for others. (Adam Smith wrote a separate book about each of these sets of motives[11] but left only bits of a unifying theory.) Most economic theories of distribution have focused on self-interest, which leads to models in which each group of social actors try to maximise their share of the product subject to whatever constraints prevent them from taking everything. "Sympathy" then enters later via redistribution – for example through welfare-state taxes and transfers – after the primary claims on national income have been exercised.

9 http://piketty.pse.ens.fr/files/capital21c/en/Piketty2014TechnicalAppendix.pdf . (Don't get sidetracked to http://piketty.pse.ens.fr/files/capital21c/en/Piketty2014FiguresTablesLinks.pdf which is just the book's charts and tables.)

10 Especially Thomas Piketty and Gabriel Zucman, "Capital is back: Wealth-Income ratios in rich countries 1700-2010", http://piketty.pse.ens.fr/files/PikettyZucman2013WP.pdf and http://piketty.pse.ens.fr/files/PikettyZucman2013Book.pdf which has its own set of technical appendices accessible through http://piketty.pse.ens.fr/fr/capitalisback .

11 *The theory of moral sentiments* (1759) about sympathy, and *The wealth of nations* (1776) about sel-interest.

In the setting of a market economy where all individuals exercise economic freedom (as distinct from, e.g. slavery and serfdom) the organisation of production and the assignment of primary rights to appropriate the product are often closely linked but are not the same thing[12]. This distinction will become important when we turn to Piketty, but is generally submerged in the two general classes of distributional models offered by the economic mainstream, often labelled "classical" and "neoclassical".

The Classical story

In classical models production is organised, and all revenue from sale of the product is initially collected, by capitalists who own the productive enterprises and the produced means of production. Out of this revenue the capitalist-entrepreneurs pay as little as possible to those who supply them with the two other essential productive inputs – labour and land – and take all surplus revenues over and above these inescapable payments of wages and rent as their profit. Profit is thus clearly distinguished from rent, and Classical economists following Ricardo[13] explained the rate of profit mainly by explaining how wages and rent were determined, assuming that output was at the maximum attainable with given resources.

Ricardo set out the equilibrium distribution in three steps as follows.

- First labour must be fed – for otherwise it will starve and will cease to exist and be available. Employers therefore must pay a wage just sufficient to maintain the number of workers required. If the wage rises above this bare subsistence population will increase and the excess supply of labour will push the wage back down as workers compete for the available jobs; the fall must be sufficient to reduce the labour supply back to its equilibrium level. If the wage falls below subsistence, population falls and workers become scarce, forcing capital-owners to compete for them, driving the wage back up. This was the "iron law of wages".
- Second, the owners of land must be persuaded to make it available to capitalists, but as production expanded it would drive rents up as land became more scarce relative to capital and labour. In a growing economy with fixed natural resources, therefore, rent incomes would command a growing share of the product.
- To balance the books, capitalists would receive all the rest of the economy's income – whatever had not gone to wages and rent – as their profit.

Because Ricardo was writing in the early nineteenth century before the great outward surge of European colonisation of temperate-zone frontiers, he laid heavy stress on the constraint posed by scarce natural resources. As the residual claimants to the product, capitalists would do well while land remained abundant, but would face a steady squeeze on their rate of profit as the economy grew with a growing stock of capital. At some stage the profit rate would fall to a level at which capitalists would no longer find it worthwhile to invest in further expansion, and the economy would then become stationary.

12 I was alerted to the distinction long ago by one of my geography teachers, Harvey Franklin; see his "Systems of production, systems of appropriation", *Pacific Viewpoint* 6(2), 1965.

13 David Ricardo 1772-1823, *Works and Correspondence* 11 vols ed. P Sraffa, 1961.

Three decades later the next great Classical, Marx, observed a world in which land scarcity had ceased to be a central concern. With expanding frontiers in the settler lands enabling agricultural and mineral commodities to flow back into Europe, rents on European land were effectively capped by the import prices charged by competing suppliers of primary commodities. Hence Marx focused on the two-way split between capital and labour. Again profit was whatever capitalists had remaining of their income after paying their labour force, but Marx's story differed radically from Ricardo's in that the equilibrium between profit and wages was shifting and ultimately unsustainable. At any moment capitalists might succeed in extracting from the productive process a certain amount of surplus – that is, output produced by labour over and above the cost of wages. But as the amount of capital per worker increased, Marx argued, its marginal product must fall and the profit rate be driven down unless workers were exploited more vigorously; the combination of a falling profit rate and growing worker resistance would ultimately doom the entire capitalist system because it was not capable of a stationary state. Translating Marx's expectation using Piketty's much gentler language, the theory was that a rising rate of exploitation "would not be tolerated".

Neither Ricardo's nor Marx's predictions worked out, but the logical structure of the classical model of distribution remains intact. Ricardo was too gloomy about the supply of natural resources - which exploded with nineteenth-century globalisation and the settlement of "new lands" – and about technology which raised total output ahead of any tendency of capital to run into diminishing marginal product. Marx was awake to the new land frontiers[14] but also underestimated the power of technological progress to continually expand the surplus available which could not only sustain profits but also open the way for wages to rise, masking feasible a social-democratic vision.

As I shall argue in a moment, Piketty's model absorbs and transforms the classical approach – while unifying it with key elements of the neoclassical story.[15]

Neoclassical distribution and growth theory

For the neoclassicals, each factor of production receives a "just" reward equal to its marginal product, and competitive market forces impersonally allocate the product on that basis. Labour thus receives its marginal product, which implies that wages should rise with labour's productivity. Capital also receives its marginal product, so the profit rate will not fall over time unless the marginal product falls – and technological progress keeps pushing up the productivity of all factors of production. Rent, as in Ricardo, is determined by the value of scarce resources at the margin, but most modern neoclassical growth and distribution theory abstracts from land and focuses on the labour/capital split.

Early neoclassicals gave the marginal-productivity theory a strong moral gloss to distinguish it from the tendency of classical models to open the way for socialist notions (such as overcoming

14 I discussed this in "A Comparative World-Systems Analysis of Settler Colonies in the Hispanic and Anglo Realms", *Journal of New Zealand Studies* 11: 11-34, 2011, pp.16-17.

15 On pages 227-229, for example, Piketty encapsulates Marx within his model and explains why with no underlying "structural rate of growth" Marx could not identify an equilibrium capital-labour ratio at which the rate of exploitation could stabilise; hence Marx's analysis logically entailed an unlimited rise in the capitalists' share of income until the system broke.

the exploitation of labour by expropriating capital and placing the means of production under worker control.) Thus John Bates Clark wrote in 1899[16]

> The welfare of the labouring classes depends on whether they get much or little; but their attitude towards other classes – and therefore, the stability of the social state – depends chiefly on the question whether the amount they get, be it large or small, is what they produce. If they create a small amount of wealth, and get the whole of it, they may not seek to revolutionise society; but if it were to appear that they produce an ample amount and get only a part of it, many of them would become revolutionists, and all would have the right to do so.

This model of an economy in which reward is tied directly to productive contribution at the margin remains the core of neoclassical economists' defence of prevailing market outcomes even in the face of the recent escalation of CEO salaries – but the implication that these must reflect some special productive contribution due to the special skills and talents of these individuals has become increasingly difficult to sustain, and is one central "puzzle" confronting mainstream theory which Piketty's model resolves.

Hicks' *Theory of Wages*[17] developed the idea of the wage as a mutually-advantageous bargain between worker and employer in which the forces of competition would ensure that the worker received simultaneously full compensation for the disutility of labour and the full value of the marginal product; but in the second edition Hicks acknowledged that the second part of this would break down if employers exercised market power (monopsony) in which case the wage would be less than the marginal product; this put a considerable hole in neoclassical distribution theory.

The key feature of neoclassical theory is that the great aggregates amongst which the national product is divided up do not exist as concrete social formations, but only as abstractions. The big totals are just the sums of millions of individual decisions, each one representing a self-interested agent maximising self-interest subject to the constraint of the competitive market price of whatever each individual is selling. The moral justification is that under competitive conditions the market acts as de facto moral arbiter of primary distribution – and if human sympathy is outraged by the results, the redistributive machinery of taxes and transfers is always there to bring the after-tax distribution of disposable income into line with whatever social norms prevail.

The neoclassical project of analysing economic growth in terms of disembodied macroeconomic aggregates has thrown up a series of "puzzles" with which growth economists have been grappling in ways that are immediately reminiscent of Thomas Kuhn's model of the conditions that prevail in the lead-up to a scientific revolution:

- The neoclassical paradigm instinctively expects market forces to have an equalising effect, which is encapsulated in the term "convergence": the incomes of different economic entities are expected to come closer together as growth proceeds. Econometrically this is confounded by the evidence that divergence is a major part of

[16] John Bates Clark, *The Distribution of Wealth*, New York: Macmillan, 1899, p.4.
[17] London: Macmillan, 1932, second edition 1963.

the real-world growth story, leading to an essentially ad-hoc appeal to institutional differences as the root cause of observed inequality across the global economy

- The typical neoclassical model is inhabited not by actual individuals, nor by classes of people, but by disembodied aggregates (capital, human capital, labour) or by so-called "representative agents" who magically dispose of all these aggregates under a single decision-maker. Implicitly, in other words, the ownership of all means of production is fully socialised in the hands of the representative agent; the unstated distributional implication is one of complete equality, if the agent were to be decomposed into the actual individual inhabitants of the economy. This is a difficult story to sell to real-world poor labourers, and means that neoclassical growth theory has not been able to engage effectively with the great distributional issues of our time.
- Ongoing growth is not explained by the neoclassical production function. Once a long-run equilibrium capital-labour ratio has been established, Solow's neoclassical economy grows at a rate determined from outside the model, by population growth and technical progress, neither of which can be explained within the model. Desperate attempts to incorporate some explanation for technical progress have led to a huge class of so-called "endogenous growth models" which are ingenious, complex, highly mathematical, and look suspiciously like pre-copernican epicycles
- Econometric estimation of the standard Cobb-Douglas production function produces the "wrong" shares for capital and labour, leading to a whole research field trying to nail down the invisible "human capital" that hypothetically fills the gap.
- In the only case where the mainstream's favoured infinite-horizon intertemporal-optimisation representative-agent growth model considers more than one owner of capital, the mathematics throw up a cumulative concentration of all wealth in the hands of one agent. (This happens in the open-economy version where the representative agent of one country must interact with those of other countries; the most "patient" country – the one with the lowest cost of capital - ends up owning the entire world, with the rest as its economic subjects.) This result is puzzling, relative to neoclassical instincts.

In short, mainstream growth theorists have known for some time that they have a problem bridging the gap from their abstract models to the real world without losing the social-justice story that has been their main selling point.

Piketty's approach

Piketty starts by separating production from appropriation of the product, and he focuses on appropriation – that is, on the direct distribution of the product between competing claimants. Production, he takes for granted, will simply roll along, growing at a pace determined by population growth and technological progress, and since nobody knows where technological progress comes from exactly, it can be left to look after itself, subject to the proviso that some of the working population must be the entrepreneurs who adopt the innovations made possible by technology.

Going directly to Ricardo's opening question of how the product is distributed, Piketty divides the population into two groups: those that have wealth and those that have none. Wealth in general he labels "capital", in line with the usage of the term by Jane Austen and Balzac before it acquired the neoclassical sense of a directly productive input. Thus to own "capital" is to be in possession of anything that brings with it the entitlement to collect a flow of income that is not directly and continually tied to human effort (that is, to labour)[18]. In this definition of capital a piece of land (whether rural or urban) ranks along with a government bond, a company share, a cash hoard, a private loan contract, and anything else that (i) can be exchanged for any goods and services the owner wishes to acquire, and (ii) provides an ongoing income (a rent) that is reasonably certain in the sense of being attached, via a well-specified property right, to the asset that is owned.

"Capital", in other words, is not just a physical means of production such as a machine; nor is it an abstract factor of production that is physically embodied in a machine or a building or whatever. Capital/wealth is a social construct, an institutional artefact – a claim on society's income whose value rests simply upon a property right, sustained by the prevailing laws and customs of society, which entitles the owner to step into the marketplace and appropriate a pre-specified slice of the social product.

The divorcing of appropriation from production enables Piketty to sidestep the puzzle of the "Solow residual" of unexplained growth that remains after one has accounted for the measured marginal product of labour and narrowly-defined "capital", and which has been the subject of increasingly complex and metaphysical theories about human capital and endogenous growth. Piketty simply notes as a stylised fact that per capita economic growth in market economies in the long run since the eighteenth century has rolled along at 1-2% a year and that the mainstream attempt to attribute this to particular identifiable factors of production has run into the sand. Adding population growth to the underlying growth residual gives him a figure of 2-3% for the long run typical growth rate of the capitalist economy. This is his parameter g.

Simply taking g as given is not a problem because Piketty's interest is not in how the social product is brought into being, but in what happens to it once it has been produced. Wealth is crucial because so long as their property rights hold good, the holders of wealth get first bite of the cherry, and the rest of us then share out what's left. The size of the elite's bite in each period is predefined by the size of the national wealth portfolio times the ruling rate of return on wealth/capital, which Piketty calls r. Wealth holders in general occupy the role which Ricardo long ago assigned just to landowners: by virtue simply of their ownership and control of legally-enforceable rights to charge others for the ability to operate in the modern economy, the holders of Piketty's capital collect a share of the product that is constrained only by the fact that they don't and can't own everything. Most importantly, they can't own people, and hence they cannot directly own the labour force, without which there is no product.

Here we come to Piketty's other respecification of the economic landscape. "Labour", in his model, is any human effort put into producing things or supplying human needs, whether the worker is a humble cleaner or a company CEO. When labour is highly paid, the relevant individual is able to acquire wealth, and once acquired, that wealth confers the right to collect future rents. Thus an active entrepreneur's income in his or her prime may represent a direct reward to effort, but in old age, living off dividends from his or her shares, and the rentals from acquired real estate, and interest payments on a bond portfolio, "the entrepreneur becomes a rentier". If some or all of the

[18] "[T]he pure return on capital as defined in this book … is… the return that comes simply from owning capital, apart from any remuneration of the labour required to manage it." (Piketty pp.448-449).

accumulated fortune remains at the end of the individual's life and is passed on to heirs, those heirs come into possession of the right to claim future rents, without ever having had to earn that right. They are now members of a patrimonial class of rentiers: people whose income flows from the simple exercise of a property right with no need to exercise active effort in order to secure the income, and who have come into possession of that right by no merit of their own but simply because they belong to what Warren Buffet has called the "lucky sperm club".

When Piketty speaks of a "market economy with private property in capital and inheritance allowed" he is referring to an economy in which the productive effort of the mass of the population is exercised subject always to the overriding claim of wealth owners to collect their rents – unless the social order, and hence the value of wealth claims, is disturbed by untoward events such as taxes, wars, revolutions, and natural disasters .

Now we come to the technical bit. As usual this requires a set of simplifying assumptions, that will have to be relaxed later. Assume for the moment that no shock disturbs the enjoyment of their wealth by the wealthy: no revolutions, no taxes, no wars, no natural disasters. Aassume stability in the holding of wealth, in the sense that in aggregate, those who possess wealth remain content to hold it and live from their rents. (Obviously, if all wealth holders were to panic and try simultaneously to liquidate their holdings in exchange for currently-produced goods and services, the whole house of cards would collapse around them and the value of capital would be driven towards zero[19].)

Now the bundle of assets that makes up the nation's wealth will have a monetary value, determined in the asset markets that enable wealth holders to shuffle their holdings so as to maximise their rents. The market economy is dynamic and ever-changing, which means that over time some assets will shrink in importance in the aggregate portfolio while others gain ground. Thus eighteenth century portfolios were dominated by rural land and the richest people were the owners of great estates. Twentieth century portfolios are dominated by urban real estate, company shares, and other financial assets. But each of these assets has a market value, and adding all these together gives the monetary value of aggregate wealth, which in turn can be compared with the monetary value of the social product over which wealth can exercise its command.

Piketty gets all this into his long-run historical time series by clever choice of a deflator: rather than trying to deflate the monetary value of wealth to some base year, with all the index-number problems that entails, and then convert various countries' data to a single currency via some exchange rate, he works with the ratio of money wealth to money income at current values, which he calls β. Thus wealth in any given year is measured in years of national income, which at one stroke solves measurement problems that could otherwise have sunk the whole enterprise.

Using years of national income as the unit of measurement produces a simple equation (an identity that must always be true by definition) for the share of rents in total national income:

$$\alpha = r\ x\ \beta$$

[19] Piketty flirts with essentially this proposition towards the bottom of p.359. It's familiar from Keynes's analysis of financial markets.

Thus if wealth is equal to one year's annual income and r=5% then the share of each year's income to which wealth-holders lay claim is 5%. If wealth is five years' income then the rent share is one quarter (25%). If wealth is ten times income then the rent share is 50%.

At this point non-economists may be tempted to push straight on to the notion that if wealth is twenty times income then 100% of the nation's income will go to the wealth-holders and nothing at all to the rest.[20] Under a pure socialism that might work – if wealth were equally held by all members of the population then distributing 100% of income would leave nobody destitute. But in a capitalist economy with private ownership of wealth and inheritance, the extreme situation of 100% going to the capitalists is self-evidently not feasible – there has to be some limit to the process. Where then would the accumulation of capital (rent-earning wealth) run up against a limit?

Recall that in Ricardo, capital accumulation is held in check by the need to feed the workers and pay the landlords; and if we combine Ricardo's rentiers and capitalists into a single group as Piketty does, this boils down to feeding the workers. To take 100% of the product would kill the goose that lays the golden eggs of rent. But the credibility of the iron law of wages lies far in the past and something better is needed today. Here is where Piketty's big innovations come in.

Piketty assumes a stable "rate of return on capital", of about 4-5%, which is higher than the long-run growth rate. This inequality $r > g$ he treats as an empirically-observed fundamental law of capitalism. Just as g of around 2% is just what we see in the data, similarly the rent yield from wealth is not derived by Piketty by any logical deduction from first principles. He does not entirely dismiss[21] the a-priori psychological theory of time preference: individuals are impatient and discount the future, and this discount rate represents the return required to persuade them that assets are worth holding. But while the intuition behind this "cannot be entirely wrong", time preference cannot be the whole story of r. "To my way of thinking", Piketty says, "the inequality $r>g$ should be analysed as a historical reality dependent on a variety of mechanisms and not as an absolute logical necessity."[22] Throughout all the history he has managed to look at, "in practice… there appears never to have been a society in which the rate of return on capital fell naturally and persistently to less than 2-3 percent, and the mean return we generally see (averaging over all types of investments) is generally closer to 4-5 percent (before taxes)."[23]

(There is, by the way, a well-known circularity between the rate of return on a capital asset and that asset's market value. For a given stream of cash income, the discount rate can determine the capital value, or the capital value can determine the rate of return, but not both. James K Galbraith has suggested[24] that Piketty's analysis falls foul of this trap, which played a key role in the

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20 There are plenty of proverbs that toy with this. "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath" (Matthew 25:29); or "the rich get richer and the poor get poorer".

21 See p.359.

22 Piketty p361.

23 PIketty pp.358-9

24 James K. Galbraith, "*Kapital* for the 21st century?", *Dissent* Spring 2014, http://www.dissentmagazine.org/article/kapital-for-the-twenty-first-century . Galbraith's hostile review contains a number of important criticisms of Piketty but suffers from a mistaken [in my view] interpretation of Piketty's concept of capital as a physical entity that serves as a factor of production, rather than as a stock of rent entitlements underpinned by social institutionas. Not only does this

"Cambridge controversies" of the 1960s; but I think this is wrong if one thinks of the current value of capital as a sum inherited from the previous period - hence exogenous in the present - and the current rate of return as the expected flow of rent on this sum. If the expectation doesn't work out, something will change going through to the next period; but it is not correct that today's capital value is determined by today's expected rate of return. In effect Piketty is breaking the logical circle by treating capital value and the rate of return as exogenous, with the cashflow to be claimed then being determined from the other two.)

We now have three key elements of Piketty's model: *r, g* and β. One more has to be added: the savings rate. In common with the Solow neoclassical growth model Piketty assumes the savings rate is exogenous, which means it can be set by assumption at a variety of levels corresponding to different rates of accumulation of wealth/capital. Empirical data suggests 12% plus or minus a few percentage points is a reasonable order of magnitude for the net savings rate (after accounting for depreciation).

Now to put it all together.

The capital/income ratio β is familiar from growth economics. When measured using the mainstream version of "capital" (namely the neoclassicals' hypothesised physical factor of production) it is the capital-output ratio of Harrod's famous growth equation, which became the Harrod-Domar growth model

$$g = \frac{s}{\beta}$$

What Harrod was doing back in 1939 was arguing that the capital-output ratio was fixed (the average ratio equalled the marginal) which meant that the growth rate of the economy was determined by the savings rate. Subsequent writers looked at making the capital-output ratio more variable, with capital and labour substitutable for each other, and in 1956 Solow's neoclassical growth model introduced the idea of steady-state growth in which the economy's growth rate *g* was exogenously determined by the rate of technical progress, while the capital stock (and hence the capital/output ratio) settled endogenously to an equilibrium size determined by the savings rate. (In the steady state with zero technical progress, gross savings just equal depreciation plus population growth, ensuring reproduction of the steady-state economy on a growing scale. With technical progress, savings net of depreciation provide for the capital stock to grow in line with population and technical progress.) This means the Harrod equation can be rewritten, as Piketty does (p.231), as

$$\beta = \frac{s}{g}$$

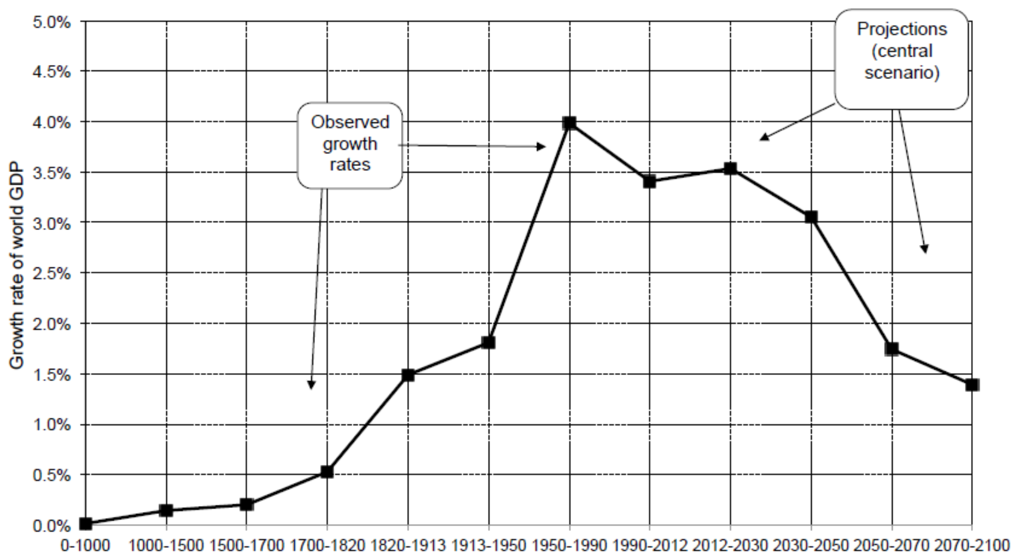
which is the equilibrium condition that must hold when the economy is in the steady-state growth equilibrium of the Solow model, with *s* here representing savings net of depreciation – that is, the part of the gross savings rate that is relevant for growth.

unnecessarily try to drive a wedge between Piketty and Marx; it leads to a misinterpretation of Piketty's comments about the Cambridge controversies on.

On pages 168-170, in the standard mainstream fashion, Piketty looks at the dynamics driving the capital/income ratio. Suppose the national savings rate net of depreciation is 12% of income and the growth rate of income is 2%. Then the equilibrium capital stock is six years of income. This equilibrium is stable in the sense that so long as the savings rate and growth rate stay constant, the capital/income ratio β will either be six income-years or will be moving towards that value. A net savings rate of 12% of income means that 0.12 income-years of wealth are being added to wealth each year, and if wealth is less than 6 income-years this means it will be growing faster than income – for example if wealth is 5, then it will be growing at a rate of 0.12/5 = 2.5%>2% so the capital/income ratio will be rising. If wealth is above 6 income-years – say 7 – then it will be growing at 0.12/7=1.7%<2% so the wealth/income ratio will be falling.

What does this say about the long-run tendency of the modern developed economies? Well, 2% is an optimistic projection for long-run growth in the coming century (Piketty p.101 Figure 2.5):

Figure 2.5. The growth rate of world output from Antiquity until 2100



The growth rate of world output surpassed 4% from 1950 to 1990. If the convergence process goes on it will drop below 2% by 2050. Sources and series: see piketty.pse.ens.fr/capital21c.

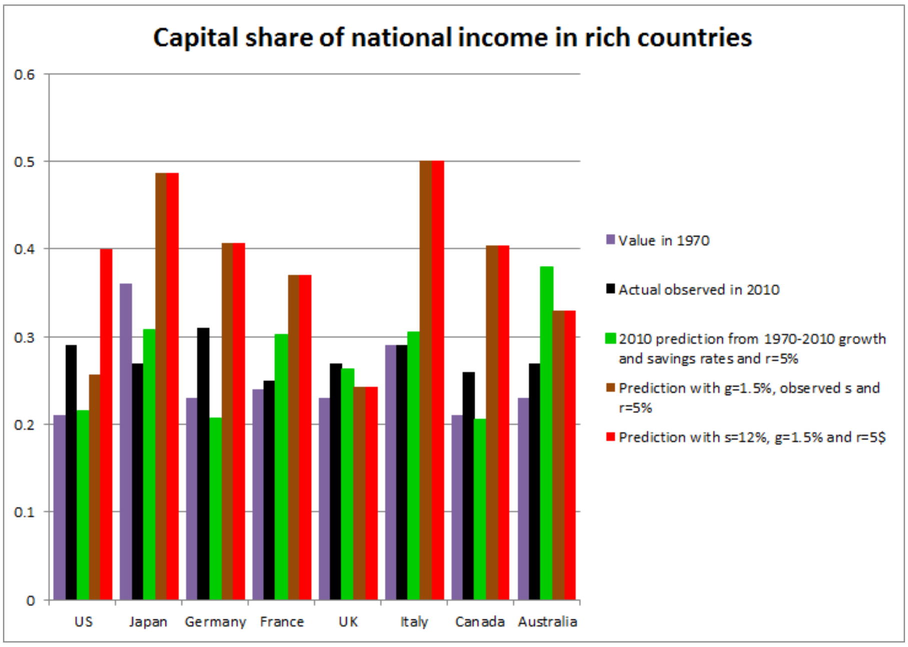
And net savings in rich countries run between 8% and 15% with 12% a representative figure (Piketty p.178 Table 5.3):

Table 5.3. Gross and net saving in rich countries, 1970-2010			
	Gross private savings (% national income)	Minus: Capital depreciation	Equal: Net private saving
U.S.	18.8%	11.1%	**7.7%**
Japan	33.4%	18.9%	**14.6%**
Germany	28.5%	16.2%	**12.2%**
France	22.0%	10.9%	**11.1%**
U.K.	19.7%	12.3%	**7.3%**
Italy	30.1%	15.1%	**15.0%**
Canada	24.5%	12.4%	**12.1%**
Australia	25.1%	15.2%	**9.9%**

A large part of gross saving (generally about half) corresponds to capital depreciation; i.e. it is used solely to repair or replace used capital.

Sources: see piketty.pse.ens.fr/capital21c

With 2% growth and 12% net saving the equilibrium capital stock is six years of income. If *r* =5% then this implies that rents will take 30% of income, leaving 70% for the non-wealth-owning population. Piketty's numbers suggest that the 2010 actual values are within coo-ee of this:



Here Japan, Germany and Italy are the high-saving economies and the US and UK are the low savers. The long-term outlook hinges crucially on these savings rates. Raising the US savings rate to 12% from its observed 7.7%, for example would drive the predicted capital share up to 400%. Simple message: any policies that drive up the savings rate in a low-growth environment lead to a higher capital share of income.

The policy implications

Having got an idea of what drives the long-run capital share of income we next ask how in detail the income going to capital is distributed within the population. Here Piketty adds another observation: the richest people with the largest chunks of capital get the highest rate of return – possibly double what the low-level wealth holders can get. What that means is a self-reinforcing spiral with a rising share of the capital share going to the 1% at the very top of the wealth pyramid. From this come Piketty's suggestion that simply leaving the logic of the free market economy to work without restraint will produce a society with a super-rich patrimonial elite owning a growing share of the total wealth, and accruing the political power to go with their dominant position. The key to this is $r>g$ combined with increasing returns to scale in wealth. (Larger fortunes get higher rates of return because they can be managed more easily as well as more aggressively.) The obvious way to halt the trend towards oligarchy is to bring r down without doing too much damage to g, while offsetting in some way the special advantages of the super-rich. Here is where a progressive wealth tax comes in. If r is 5% and the wealth tax is a flat 2% per year this brings the after-tax r down to 3%. If diminishing returns to capital in the long run pull the pure rate of return down to 4% then the 2% tax brings after-tax r down to 2%. This narrowing of the gap between r and g radically slows down the rate at which top wealth and hence top incomes can grow, and thus forestalls the concentration of wealth, income and power. That's what the capital tax is about – not a punitive assault of the rich but simply a way of keeping the endogenous dynamics of the market economy under control for the benefit of democracy. Making the tax progressive then offsets the other force leading to concentration of wealth: the economies of scale enjoyed by the super-rich.

What if there is no capital tax imposed? Then, Piketty argues, the resulting social order will become one that "is not tolerated". It is unclear what determines the limits of social toleration, which is of course another social construct. The patrimonial elite of super-rich individuals may in fact be able to purchase, or gain by persuasion, the consent of the mass of the population, in which case no revolutionary prospect would open up. Piketty does not develop this theme but it hangs over the book as a giant question mark.

If (i) Piketty is right about the underlying distributional laws of capitalism and (ii) his wealth tax proposal is not politically feasible, then the alternative to a consolidated oligarchic order eventually would have to be another round of expropriation of wealth – "euthanasia of the rentier" – by some means other than his tax suggestions. Piketty does not pose as a successor to Marx, but the policy implications of his theories become more radical to the extent that his proposed moderate remedies are rejected as impractical.

We are here running in reverse through the historical origins of the welfare state. Recall that the welfare state arose from the social-democratic proposition that taxes and transfers could ameliorate the condition of the mass of the population sufficiently to forestall the revolutionary outcomes envisaged by nineteenth-century Marxian socialists. This worked for the twentieth century. But as the welfare state comes under frontal assault from the forces of the neoliberal Right, the Piketty model paints a trajectory towards radical upheaval. A lot hinges, therefore, on whether his theory stands up to the inevitable flood of new research and testing that will keep graduate students in economics occupied for a good time to come.