THE CRITIQUE OF CAPITAL IN THE TWENTY-FIRST CENTURY: IN SEARCH OF THE MACROECONOMIC FOUNDATIONS OF INEQUALITY

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Thomas Piketty's *Capital in the Twenty-First Century* proposes a critical analysis of the dynamics of capital accumulation. The book has several objectives: to present the historical dynamics of capital and its distribution up to the early twenty-first century; to offer a prospective analysis of these dynamics up to the end of this century; and, finally, to discuss policy measures that would make it possible to avoid the future it lays out.

This book is undoubtedly the key treatise on political economy from the first part of this century. The author revives an obsolete format, as academic economists generally prefer publications in scholarly journals while reserving the book format for popularization. He reveals the mechanisms pushing towards convergence or divergence in the distribution of wealth, and emphasizes the widely underestimated power of divergence: if the return on capital (r) exceeds economic growth (g), which has almost always been the case historically, then it is virtually inevitable that inherited wealth will dominate built-up wealth and the concentration of capital will reach extremely high levels.

Thomas Piketty thus seeks the foundations of inequality ($r > g$) in macroeconomics, whereas the usual suspects are found at the micro-economic level. As we shall see, this macro-foundation of the micro-economy is not entirely convincing, and the facts described by Thomas Piketty can be interpreted with a different causality in which it is extra-economic constraints and scarcity rent that explain the dynamics of inequality, and hence the relationship $r > g$. This different interpretation of the same phenomena has consequences for public policy. According to our interpretation, an *ex post* capital tax, if necessary, can only be a second-order choice: first the constraints of scarcity have to be removed and property rights and the respective rights of owners and non-owners must be redefined.

An ambitious work on political economy

The book is at the level of its high ambitions: it addresses a crucial issue; it draws on a very substantial statistical work that sheds new light on the dynamics of distribution; and it makes public policy proposals without trying to hide behind a distinction between positive and normative economics. Thomas Piketty thus combines the approach of the great classical authors (Smith, Ricardo, Marx, Walras) with impressive empirical resources that were not accessible to his illustrious predecessors. He attempts to integrate a theory of functional distribution between wages and profits

and a theory of individual distribution (especially among owners of capital) within the framework of a model of growth (Milanovic, 2013).

Like others who have gone before us, we must acknowledge the work Piketty has done, including its quality, its originality, its engagement and its breadth. Thomas Piketty shows that by quantifying, that is to say, by coming up with suitable concepts and then measuring them, as Desrosière (2008) liked to define measurement, people can be helped to understand the world in which they live and thus develop a greater awareness of its injustice. But any explanation requires defining the object to be measured. This is where Thomas Piketty's work begins. He thus dispenses with the Gini coefficient, on the grounds that the conclusions drawn from the way it changes are too vague and it lacks the power to clarify the share owned by the wealthiest 1 percent. He creates instead – and we will come back to this – an ambiguous, multisided social category that, sometimes changing, especially over long periods (the wealthiest), brings his measurements to life and shows societies for what they really are. This quantification also goes up against the conventional practices of national accounts, which are very cautious when it comes to inequality. In practice their measure of inequality relies mainly on large population surveys, collecting information about people's situation and cross-checking it with tax data. This methodology is useful for calculating median incomes, since the median individual is determined with an abundance of observations. But Thomas Piketty and his co-authors (in particular Facundo Alvaredo, Anthony Atkinson and Emmanuel Saez) have made an incredible effort with respect to inequality. Using tax data, their sampling of high incomes is much better. By calculating the share of national income captured by high-earners, they bring to light what lay in the shadows or was misunderstood. Once again, at the end of the twentieth century, the rich have a very large share of the wealth – in fact, such high levels are unprecedented since World War Two. And, with some important reservations, this holds true in all countries. Thomas Piketty's methodology, which draws on tax data, makes it possible to go well back in time (tax and wealth data have been collected for a long time) and relies on robust measurements (the data were collected where the money was). For instance, the statistics published on high-earners in the United States, in particular on the share held by the richest 1 percent, have fuelled a longstanding debate in the United States about inequality and its foundations (see McCall 2013).

There is deep pessimism in Piketty's description of a society of rentiers who are taking over the workings of democracy, who are turning laws and administrations to their advantage, who are accumulating whatever they can, all of which is leading towards a social explosion. Thomas Piketty here adopts the posture of Jean-Pierre Dupuy in his work from 2002, *Pour un catastrophisme éclairé* ("For an enlightened catastrophism"). For Dupuy, what he calls "projected time" must bring together the past, the present and the future: we need to realize that the catastrophe is already upon us, which spurs action so that, paradoxically, *the catastrophe does not take place* .

The historical dynamics of capital and its distribution

The book's primary objective is to analyze the historical dynamics of capital and its distribution among individuals, based on international comparisons over a very long period. The analysis thus goes back to the eighteenth century for the United Kingdom and France. Piketty takes a quantitative approach that focuses on two features: the importance of capital in the economy (as measured by the ratio of capital stock to national income) and its level of concentration.
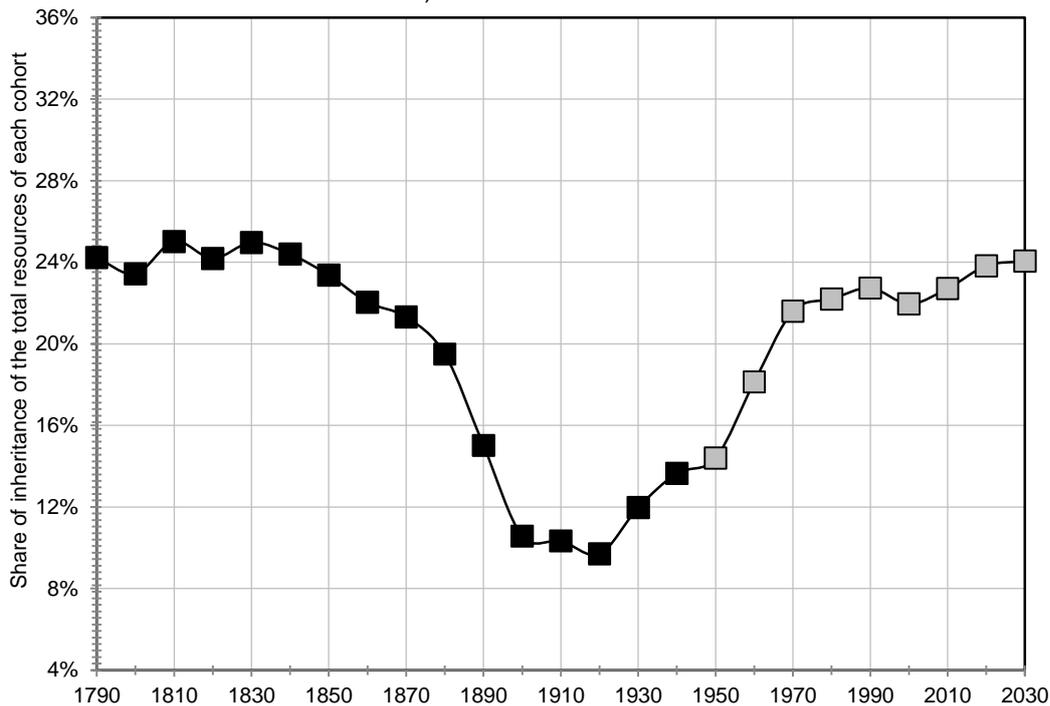
Thomas Piketty concludes that big capital has come back in force in the rich countries following the shocks of the twentieth century. He explains this by a basic law of capitalism: $\beta = s/g$ where β is the capital/income ratio, s is the savings rate and g is the economy's rate of growth. This is a long-term law in the sense that, if the capital/income ratio is different from the level s/g, it will then tend to re-approach this asymptotically. This is true so long as s clearly reflects the flows associated with capital (*i.e. s* is savings net of depreciation and increased by capital gains). For Piketty, the return of capital in the 21st century is not a matter of chance: it is rather the delayed mechanical consequence of a high savings rate and a low growth rate.

As for the concentration of capital, the author notes that capital has always been much more concentrated than income, and that the share of capital held by the poorest 50 percent has always been marginal: even in the least unequal countries – the Scandinavian countries in the 1970s-1980s – the poorest 50 percent held only 10 percent of the capital while receiving 35 percent of the income from work (p. 216). He explains the wealth divergence by the relation $r > g$ where r is the private return on capital (after taxes). If over the long term the return on capital surpasses growth, then capital will tend to become more concentrated: "The entrepreneur inevitably tends to become a rentier, more and more dominant over those who own nothing but their labour. Once constituted, capital reproduces itself faster than output increases. The past devours the future." (p. 504).

The prospective dynamics of capital: forecasting or "enlightened catastrophism"?

In addition to a retrospective analysis of the dynamics of capital, the book presents a prospective analysis of the importance and distribution of capital over the next century. The future the author describes is grim: the mechanisms already at work could lead to "a race between supermanagers and rentiers, to the detriment of those who are neither". The graphs showing the situation of generations up to the 2030 generation illustrate this enlightened catastrophism (Figure 11.9).

Figure 11.9. The share of inheritance in the total resources (inheritance and work) of cohorts born in 1790–2030

Note: Inheritance represented 25% of the wealth of the nineteenth century generations but barely 10% for those born in 1910-1920 (who tended to inherit in 1950-1960). Sources and data series: see piketty.pse.ens.fr/capital21c. This graphic has been changed from the original.

Thomas Piketty presents an inverted Kuznets (*i.e.* U-shaped) curve: following the destruction of capital (due to the two world wars and the 1929 Depression), capital, and the inequality it implies, initially declines in importance, especially because of strong economic growth, and then, as growth slows, we see capital and inequality build up again. Here, contrary to the famous Kuznets curve, we are moving inexorably towards a society of rentiers. In Figure 11.9, the part depicting the post-1950s is prospective, as the generations born thereafter have not yet (fully) received their inheritance. The positions for the 1960s and 1970s generations are not yet observations, but the trends on which this graph is based – the capital stock, the savings rate and the slowdown in potential growth – are already at work.

In addition to the use of distribution tables with breakdowns by decile, centile and thousandth to illustrate his point, the author uses numerous references to nineteenth-century novels. These describe a society in which it is far easier to rise into the top 1 percent by getting your hands on an inheritance than by years of work, and, according to Thomas Piketty, there is a risk that we might see this situation return. This could be called "Rastignac's dilemma", after the character in Balzac's *Le Père Goriot,* and is illustrated by a graph showing the standard of living achieved by the most well-off heirs compared to that of the highest-paying jobs for the generations born from 1790 to 2030 (p. 347): based on the author's calculations and hypotheses, the standard of living achieved by the most well-off 1 percent of heirs is greater than that achieved by the 1 percent of top earners for all generations, except those born between 1890 and 1970. Thomas Piketty, who was born in 1971, thus shows that the world has already changed for those born in the 1970s and 1980s. For this generation, inheritance will be significantly more important than for their parents' generation, a fact that is already being reflected in differences in access to homeownership.

Box 1: The return of Rastignac?

Thomas Piketty summarizes Vautrin's speech to Rastignac in *Le Père Goriot* in "Rastignac's dilemma": if you want to have a comfortable income and position in society, there is no alternative but to marry wealth. Work does not build empires, but cunning can be used to seize them. One could take a look at other analyses of Balzac's descriptions of society, but let's stick to this one. Rastignac's ambition (or the one ascribed to him by Vautrin) is to obtain an income that, to "live well", would require some 20 times the average income. This ambition evokes an observation attributed to Agatha Christie: "When I was young I never expected to be so poor that I could not afford a servant, or so rich that I could afford a motor car". In this era, wealth mainly meant an ability to employ a large number of servants. The more servants you had, the wealthier you were. Implied in this was, of course, a very unfair, almost polar society: on the one hand, those whose income allowed them to employ domestics; on the other, those who couldn't afford this and had the income of a domestic (whether a servant themselves or in an equivalent job). This is the kind of society that prevailed in Europe during the eighteenth and early nineteenth century (Branko Milanovic, 2009). Piketty describes the return of this kind of dilemma today, since once again the very rich have a significant fraction of the national income and only inheritance or marriage makes it possible to climb into society's upper echelons. If someone's ambition is to reach these top ranks, there can be little doubt about Thomas Piketty's reasoning (even though heirs seem to have less presence in wealth rankings than they used to). If one's goal is simply to "live well" (which does not exhaust Vautrin's ambitions for Rastignac), then the appearance of an intermediate class between the poorest and richest changes the dilemma. For today, the "good life", as summarized by Agatha Christie, no longer involves having an army of domestics but rather an ability to purchase goods (or services) produced in conditions of high productivity (cars).

The dilemma can be posed as a calculation of one's expected standard of living. Consider the following income distributions:

1. Early nineteenth century: those with an income (from work) equal to the subsistence income (SI), *i.e.* the "poor", represent 90 percent of the population; the population with 50 times the SI, the "rich", represent 1 percent; and the population with 4 times the SI (because of work), *i.e.* the "working middle class", account for the rest, so 9 percent.

2. Early twenty-first century: the richest 1 percent earn 800 times the SI, the 95 percent in the middle-income classes earn 20 times the SI, and the poorest 4 percent earn 3 times the SI.

The income share of the richest in scenarios 1 and 2 is equal (28 percent). The average income in scenario 2 is 15 times higher than that in 1 (which corresponds approximately to the increase in per capita income between the early nineteenth century and the early twenty-first). The expected job income (for the poor and middle classes) is the same relative to the expected income from marriage (and depends on rich people's share of total income). In this example, measured in the work of the poorest strata, the very rich are richer in distribution 2 than in distribution 1. But if we calculate the relative expectation of income in addition to subsistence income (which indicates a type of comfort, or almost equivalently, amounts to considering the decreasing marginal utility of income), then it is no longer evident that in distribution 2 it is worth seeking a fortune. The expected job income beyond the subsistence income in the early nineteenth century distribution is 0.55 times the income expectation of an heir. In the modern distribution, the ratio is 2.4. Finding an heiress to marry is

certainly one way to gain access to a considerable fortune and a historically unprecedented standard of living, but there is little likelihood of being able to marry an heiress. The earnings from a life of work are lower, but in modern times are well above a subsistence income. This average outcome can be relatively easily appreciated and corrected for probabilities, so that Rastignac, who had only slim hopes in the nineteenth century, would face a very different choice in the twenty-first.

Vautrin's advice is of course not so simplistic. Finding an heiress does not just amount to finding your future spouse at random from the population. The effort involves work that increases the likelihood of success, provided that someone has a certain talent. But the exercise presented above is similar in nature. Vautrin wanted a destiny for Rastignac other than being the husband of a rich wife, and the path followed by Rastignac was more ambitious. Perhaps, even today, cynicism in love is a component of careerism.

Escaping the coming catastrophe: a capitalism without capitalists?

In the final section, the author discusses policy measures that could help to avoid this future. He proposes a progressive tax on capital with a broad tax base (with no exemptions, including business assets) and on the largest scale possible (if possible global, and if not then European). This solution would make it possible to benefit from the advantages of capitalism, including entrepreneurial innovation, but without its flaws, when the entrepreneur turns into a rentier. In other words, the ideal Piketty is seeking is "a capitalism without capitalists" (p. 125) – as France experienced after the war – without controls on capital (the Chinese model holding little attraction (p. 468), that is to say, an entrepreneurial capitalism where the winners' positions would regularly be called into question.

Should we accept the macroeconomic foundations of inequality?
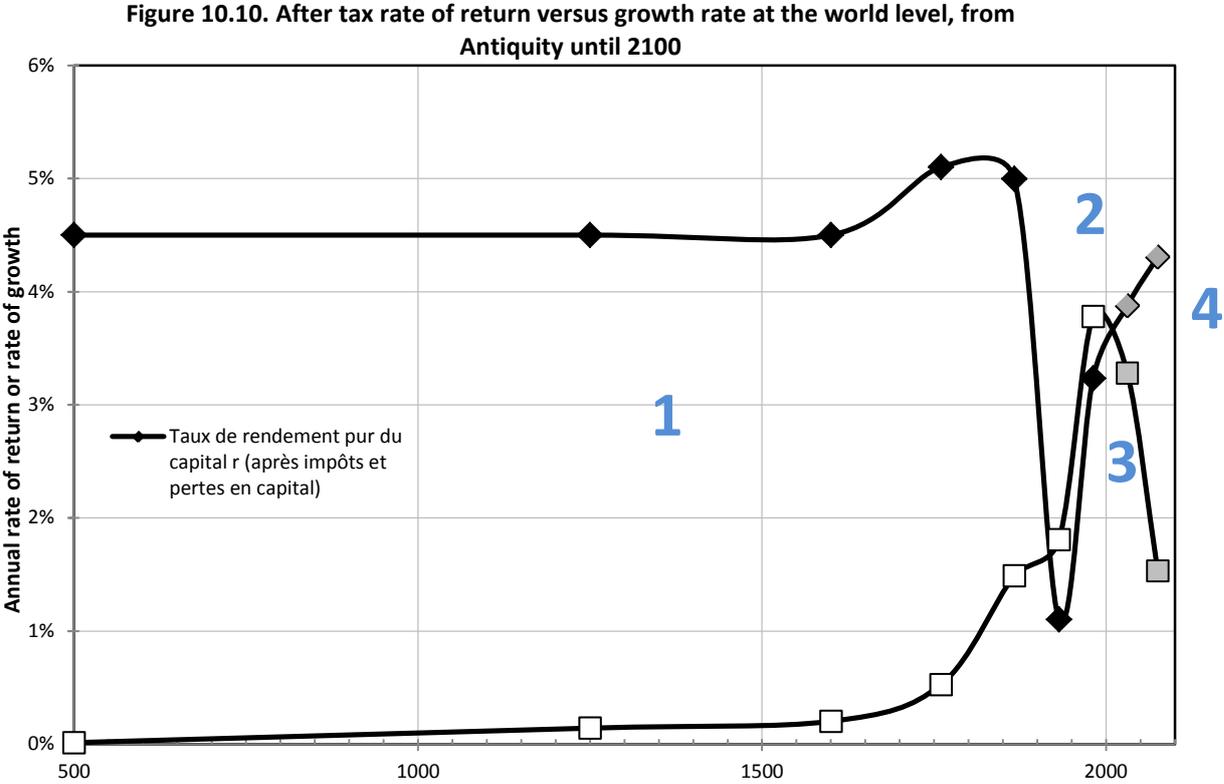
$\beta = s/g$: what direction of causality ?

The prospective aspect of the book relies on two relationships that explain, first, the importance of capital ($\beta = s/g$), and second, its concentration ($r > g$). While not an accounting equation, the relation $\beta = s/g$ introduced above is what is called a long-term relation: when an economy deviates from this relationship, there is a tendency for it to come back.

Nevertheless, a direction of causality needs to be added, that is, to define among s, β and g what is determined by the technical-social context, and what is deduced from structural parameters. By defining a direction of causality, it is also possible to bring up other structural parameters and convert this equation into a relation between magnitudes that are determined elsewhere. For instance, it might be thought that savers have a wealth goal (they target a β) and that, for a given growth g, they adjust their savings rate s to achieve this goal. The empirical data do not seem to confirm this type of causality: for example, according to this model, a sharp increase in housing prices should result in a steep fall in the savings rate, as the wealth objective is being achieved through capital gains. However, in France, for example, no fall in savings due to an increase in property prices was observed. As a first approximation, it seems that in fact s/g determines β rather than the

contrary (as the formula $\beta = s/g$ implicitly presumes): households set a savings rate (s) and the capital/income ratio flows from this *via* the long-term relationship $\beta = s/g$.

A return to normal ($r > g$) or the new normal ($r \approx g$)?

What do we know about the relation between r and g? Thomas Piketty draws on historical data to show that, apart from the twentieth century, r has always been (significantly) higher than g. But is the twentieth century the exception, or the new normal? To answer this question, it is necessary to have a theory that can be used to link r and g. The theoretical debate on this question is examined too quickly in the book, thus leaving a flank open to the criticism that it is too empiricist (see Husson, 2014). Thomas Piketty makes the relation $r > g$ the "central contradiction of capitalism", but the discussion of the theoretical foundations for this takes only a few pages. Ultimately, the forecast that r will exceed g throughout the twenty-first century is based merely on the empirical observation illustrated in Figure 10.10 (p. 565): since the end of antiquity, r has always been higher than g.

Figure 10.10. After tax rate of return versus growth rate at the world level, from Antiquity until 2100

Note: the rate of return on capital (after taxes and capital depreciation) has fallen below the growth rate in the twentieth century, and could rise above it again in the twenty-first century. Sources and data series: see piketty.pse.ens.fr/capital21c. The graphic has been modified from the original, in particular with regard to the time scale.

This graphic supports the idea of a return to normalcy, with the period 1913-2012 (during which $g > r$) being considered an exception to the historically consistent trend of $r > g$. As concerns the growth rate, there are good reasons to think that this period was indeed exceptional, and that – unless a source of abundant, low-cost clean energy is found – there will be no repeat from 2013 to 2112. But what about r ? Are returns on the order of 4-5 percent "natural"? Is the level of 3 percent used for the forecasts an optimistic minimal benchmark? While Piketty discusses these theoretical elements in order to explain the relative stability of a return on capital of about 4-5 percent, he does

not fully put his confidence in the theoretical models, explaining the relation between r and g by the time preference for the present. Ultimately, Thomas Piketty comes down on the side of the stability of r for historical reasons: "the rate of return on capital r depends on many technological, psychological, social, and cultural parameters, which together seem to result in a return of roughly 4-5 percent" (p. 309).

Thomas Piketty places more confidence in an empirical argument based, in our opinion, on a rather unreliable measure and uses a stylized fact that is not very robust to derive a law that should be robust. Indeed, measuring the rate of return in ancient times is a perilous exercise. The return on capital is well known for a few elements of capital, but is not based, as in modern times, on a precise accounting analysis. It is at best anecdotal, covering capital goods that are subject, first, to a strong selection bias (survivorship bias: we measure returns only on capitals that have succeeded), and second, to a strong valuation bias (capital is measured not through valuation in the financial markets, but from what the owner of the capital manages to extract as rent). A farmer's rent defines the return on a landowner's capital, but the rent is probably not a price that conveys much information other than the owner's power over his farmer. The literature is rich with lessons about these relationships and the weight of tradition in measuring these values, and consequently the poor reliability we can assign them. The value of inheritances is thus generally calculated as the rent divided by a return of 5 percent, which is considered a natural performance, and these inheritances are not the subjects of markets with numerous exchanges. It is therefore possible that the stability of the return flows simply from common valuation practices in a world of shallow financial markets. Note that a few studies have tried to determine the implicit return on capital for investments in, for example, agriculture. It seems that this return can be very low or even negative (Anagol et al., 2013).

Beyond the measurement issues, and while accepting the set of data evaluated by Thomas Piketty, in order to decide between the alternatives of a return to normalcy or a new normal it is useful to discuss four specific periods (indicated on the reproduced graphics).

Epoch 1: Peasant society (0-1000AD): $g \cong 0$

If there is no growth ($g \cong 0$), then net savings in productive capital is zero ($s \cong 0$): the absence of growth reflects the fact that there is little or no technical progress, little or no accumulation of productive capital. There are two possible explanations for an absence of savings. First, the marginal productivity of capital can be zero [$F'(k) = 0$]: if there is no accumulation of capital, this is simply because technical knowledge is too low to accumulate more capital productively. Second, the productivity of capital may be positive but less than or equal to the rate of preference for the present (θ) for the owners of capital. In the standard economic model presented in the book, if $g \cong 0$, $r > g$ is explained entirely by the preference for the present θ: we then have $r = \theta$[4]. In this scheme, even though the interest rate exceeds growth, there is no net positive savings for the productive capital because the owners of the capital prefer to consume and the additional capital has a return[5] that is inferior to the marginal utility of consumption that it procures and so is consumed immediately. In

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[4] In a more general model of growth, where growth is not nil, we would have $r = \theta + \sigma.g$ where σ accounts for the intertemporal elasticity of the utility function.
[5] The return is the interest rate applied to capital. It is also the marginal utility (of the discounted stream) of future consumption that would be made possible by the savings of one production unit.

this theoretical universe, capital is accumulated so long as it has a sufficient return. This neoclassical theory is ahistorical: it is unable to explain the final equilibrium and the concentration of capital except by assuming initial endowments, without explaining by what means, consistent with the theory, these initial endowments might have taken place. The relation $r > g$ supposes that those who own the capital can consume $r - g$ *ad vitam aeternam* without additional work or savings (r is the interest rate after tax, including inheritance tax). The question is how *Homo economicus* could have found himself in a feudal economy with on one side the capital owners (the landowners) who live from their capital income, neither working nor using additional savings, and on the other side the workers (peasants) who agree to pay a rent *ad infinitum* without any hope of acquiring property.

In fact, the initial ownership of the land and the maintenance of ownership with $r > g$ in a feudal-type economy can be explained only by force or fraud or in any case by extra-economic coercion. It is not $r > g$ that turned entrepreneurs into rentiers (there are no entrepreneurs in a society that is not growing), but the establishment of a feudal society that allows the extraction of an eternal rent ($r > g$). In a world where to produce enough food what is needed is unskilled labour on the one hand and scarce capital (land) on the other, wages in a highly competitive labour market will be established at the marginal productivity and the Malthusian trap closes when the wage is equal to the subsistence level. A surplus then arises, which is captured by the owners of the scarce resource who fix the return (or value, depending on convention) of the capital.

Up to now we have used the concept of productive capital. The neoclassical theory of growth justifies the accumulation of capital through its participation in the process of producing a well-aggregated good consumed by all. This framework does not shed much light on matters of the distribution of the goods or wealth. In particular, the feudal era is characterized by the accumulation of relatively unproductive goods that are of little use to the median individual. The surplus captured by a small number (the owners of the land or beneficiaries of rent), when not consumed in its entirety, can only be accumulated, but not in productive assets (with decreasing marginal profitability) or in new land (which cannot be accumulated). The surplus collected is thus spent in the form of ostentatious goods, non-productive (that is to say, they do not participate in expanding output), whose value is positive because they are a source of utility for the class of owners who cherish them (chateaux and other luxuries). The accumulation of these goods can go on *ad nauseam*, materializing the unequal distribution of the surplus. The valuation of these goods can be derived by dividing the annual surplus captured by the owners by an interest rate set by convention at 5 percent. One can go further and assume that the economic income procured by these goods (the imputed rent of the chateau) is also equal to this conventional interest rate. But the argument is then tautological: the consistency of the return (5 percent) is due to the use of a constant conventional interest rate for valuing the goods and the economic income procured by the goods that are not directly productive. In microeconomic terms, this can be justified in the absence of a "corner solution": if all the individuals consume and / or possess, to at least a small extent, all the goods, then their prices should reflect the marginal utility that they provide. But this is not true in the feudal era where only the rich have the chateaux, and they possess them because they cannot consume more of other goods (the marginal utility of consuming wheat is already zero for the lords).

In this case, the asymptotic law is interpreted quite differently from the thesis of *Capital in the Twenty-First Century*. There is almost no growth, there is almost no technical progress and it is impossible to accumulate land. The marginal profitability of accumulable productive capital is ultimately equal to the preference for the present, the return on productive as well as unproductive

capital is set at 5 percent, and its value (the coefficient β) is derived from the annual surplus divided by the unconsumed 5 percent (the net savings in productive and unproductive capital). There is then no relationship between savings and growth or between g and β: one depends on the function that interlinks the factors of production, the other relates the *value* of the assets (or wealth) to that of the output, and expresses, not the conditions of production, but the valuation (somewhat arbitrary) of the goods. In the end, it is not because $r > g$ that capital is concentrated, but rather it is because productive capital is not accumulable and is concentrated that $r > g$.

Epoch 2: Industrial revolution and disappearance of land rent: $r \cong g$

In the period 1913-2012, it is possible to interpret the fact that $r \cong g$ as the (delayed) consequence of the Industrial Revolution and the deepening of the financial markets, which brought about the disappearance of the scarcity rent of land and led to a different assessment of the value of capital. According to this interpretation, the relation $r \cong g$ is not exceptional but the new normal, provided however that the post-industrial economy of the twenty-first century follows the same rules as the industrial economy of the twentieth century.
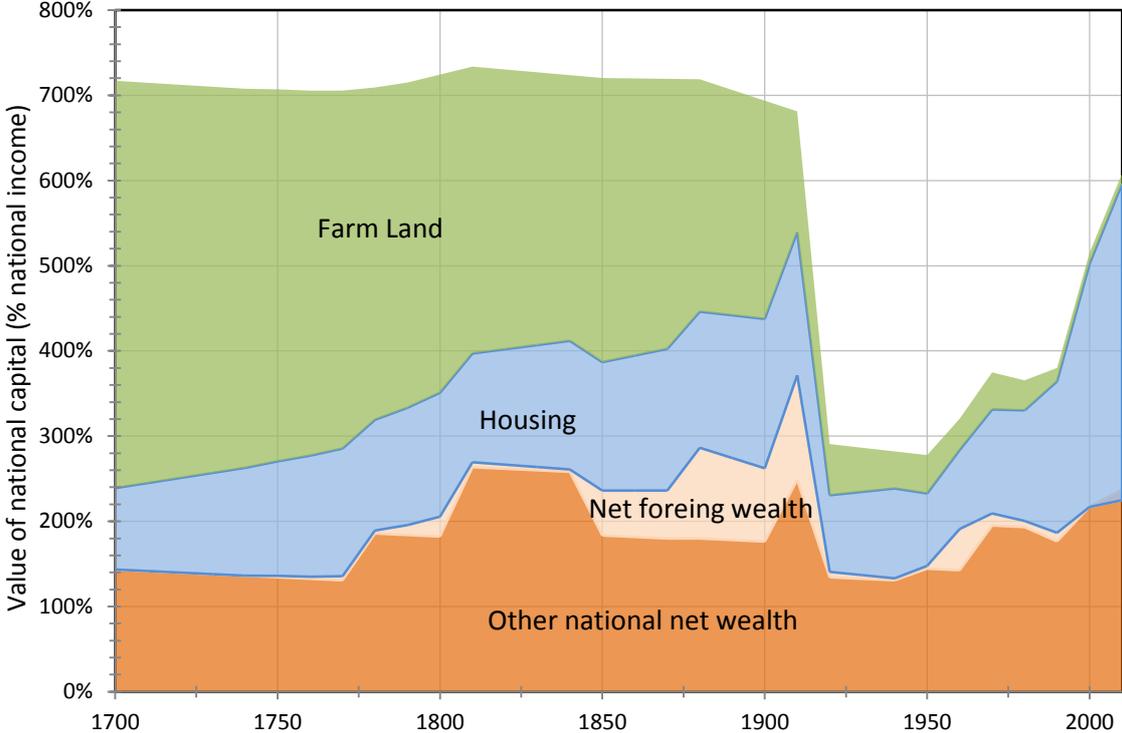
In chronicling the lives of the Crawley family and their numerous servants in an English mansion, the *Downton Abbey* series illustrates the consequences of industrialization and the decline of the British aristocracy. In 1912, when the series begins, the Crawley family, like the lords of the feudal period, still live without working and have a multitude of domestic servants. But already the capital needed to sustain Downton Abbey no longer comes from the capital accumulated by the family dynasty, but from the marriage of Robert Crawley, Earl of Grantham, to a rich American heiress. Risky financial investments subsequently lead to the squandering of the family fortune, which pushes the Crawley couple to try to convince their daughters to marry wealthy industrialists in order to save the estate and carry on tradition. The Crawley girls are torn between family loyalty and a desire for emancipation that makes them want to move with the times. In this new world, it is not unthinkable to renounce the family legacy and marry a former chauffeur for the estate whose livelihood depends on his labour: the world of Rastignac is already past (see Box 1). Finance has now come to dominate the valuation of wealth, and the rule governing the possession of capital and the position it reinforces and symbolizes in society is liquidity rather than stability. In short, the world is no longer unchanging, but in motion. Thomas Piketty's decision to refer to Jane Austen (and to some extent Balzac) allows him to escape from other accounts that would have illustrated the changes in nineteenth and twentieth century society. Elizabeth Gaskell's novel *Wives and Daughters*: *An Everyday Story*, published between 1864 and 1866, half a century after *Pride and Prejudice* and 30 years after *Le Père Goriot*, describes the declining social status of landowners, pushed to seek other sources of income and forced to sell their land to face the economic pressures of the rapidly changing world of agriculture.[6]

It is interesting to note that in Figure 10.10, 1912 lies exactly at the end of the historical period during which r has always been much greater than g. Based on the reasoning of *Capital in the Twenty-First Century*, this should be the high point for the owners of capital. And yet, at this point

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[6] We would like to thank Anne Lévita and Myriam Boussahba-Bravard for the light they shed on the nineteenth century, its history and its literature.

the decline of the British aristocracy is already well advanced. The cause is known: land ownership had been the leading component of social status for too long, while its economic value was collapsing. Competition and mechanization were redefining the rules of the game as well as social relations. Landowners were no longer the masters because land was becoming an increasingly less scarce resource. The collapse in the value of property is well illustrated, for France, in Figure 3.2 (Figure 3.1 for England leads to the same conclusions): by 1920 farm land, whose value amounted to 300 percent of the national income in 1880, was worth at most 50 percent. It is also interesting to break down capital: it can be seen from the figure that the collapse of capital from 1880 to 1950 was due almost entirely to the collapse in the price of farmland. It was therefore not the wars or the 1929 crisis that explain the collapse of capital in the early part of the twentieth century, but the Industrial Revolution.

Figure 3.2. Capital in France, 1700-2010

Note: National capital was worth almost 7 years of national income in France in 1910 (including one invested abroad). Sources and data series: see piketty.pse.ens.fr/capital21c. The graphic was modified from the original, and in particular the time scale is linear and the order of the series was changed.

Returning to *Downton Abbey*, at first the marriage made it possible to trade titles against fortunes from industry and finance, but this strategy could only be a temporary expedient. This highlights a blind spot in *Capital in the Twenty-First Century*: the issue of the heterogeneity of r within the 1 percent itself (the book insists on an r that rises with wealth, see Box 2), especially when capital gains or losses are taken into account. In the early twentieth century, industrialization re-shuffled the cards. The "200 families" of 1936 are not (all) the descendants of the old regime's landowners: the fortunes come mainly from banking and industry. The Schlumberger brothers were engineers whose company had only two employees in 1926. Louis-Dreyfus founded his company in 1851 at the age of 18. Banque Lazard was created in 1848, the Schneider Company in 1836, and Peugeot in 1810. The Rothschilds were probably the oldest dynasty. Mayer Rothschild (born Mayer Bauer) founded the German branch of the bank in 1770. The French branch was set up by his son James in 1815.

Fortunes were made and unmade during the Industrial Revolution. For the median individual, this dynamic mattered little: there are always rich people and the rich are always very rich. But the restructuring taking place was deep.

Box 2: Unequal returns depending on the amount of wealth?

Inequalities in the returns to or increases in wealth are more important for the dynamics of capital than the average rate of return r. The law $r > g$ has little foundation in *Capital in the Twenty-First Century* and the growing relationship, mentioned on p. 714 and the following, between the level of wealth and the return is not very convincing. Harvard is better endowed than Yale and has a superior return. If it is the level of wealth that leads to a superior return, why don't small universities pool their capital into a big fund and then share the profits? Why not create a large French sovereign wealth fund that would borrow under the signature of the French State and lure away the Harvard managers? One interpretation is that it is not the level of wealth that provides access to high returns, but rather the informational rent. If Harvard does better than a sovereign fund or a smaller university, it is not due to economies of scale in management or to the ability to attract the world's best manager. It is rather Harvard's very privileged position in relation to the current and future world of business that enables it to identify opportunities offering high returns. American universities have business schools that produce the start-ups of tomorrow, law schools that develop business law, and science and engineering departments that innovate, so they form high-level managers, accompany them, and integrate them into alumni networks, ensuring their access to these returns through a very sophisticated form of clusters and private equity. They perform on an even larger scale what the best investment and finance banks do (sometimes working with the banks). But opportunities for high-yield investments are limited, and the recipe cannot be generalized for just any level of investment. The capacity for accumulation depends largely on the part that these high-yield investments play in the overall return and on the ability of the more affluent to capture these high returns on an ongoing basis. The simple model below develops this idea.

Let k_h be high-yield capital; k_l low-yield capital. Let r_h, r_l be their respective returns with $k = k_l + k_h$; $r.k = r_h.k_h + r_l.k_l$; if k_h is a fraction λ of k, with $x = \frac{P_r}{k}$ and P_r the wealth of the rich, and assuming they accumulate all that they gain:

$$dP_r = r_h.\lambda.k + r_l.(x - \lambda).k \; si \; P_r > k_h$$

Assume $dk = r.k$; then:

$$dP_r = d(k.x) = x.dk + k.dx = x.r.k + k.dx = r_h.\lambda.k + r_l.(x - \lambda).k$$

This gives

$$x.r + dx = r_h.\lambda + r_l.(1 - \lambda) - (1 - x).r_l$$

We then have:

$$dx = (r - r_l).(1 - x)$$

For $x^* = 1$ and $r > r_l$, $dx = 0$. There is thus stability in the portion of the total wealth held by the rich only if it is held in full by the rich. If λ tends to 0, r tends to r_l and dx tends to 0. The share of capital held by the rich is thus asymptotically constant and can take any value (up to infinity).

In summary, if high-yield capital forms a constant share of capital and if the rich always have priority access to high-yield capital, then the rich end up owning everything. If this share can decrease or if

those who capture the highest returns are not always the same, then they will not *necessarily* own everything. Harvard could have limited opportunities to capture exceptional returns of a few tens of billions of dollars, and may never exceed this size. Harvard will still be the richest university, but could nevertheless become increasingly small, relatively speaking. Harvard could also be replaced in the future by another university, because it might have missed a series of innovative sources of wealth. The Peugeot family saw its capital melt away, while Liliane Bettencourt inherited a growing capital. The mechanisms that lead to unequal returns, the extent of this inequality, the ability to reproduce or not, are all therefore crucial for understanding the stability of the capital distribution. Economic policies can modify conditions (loss of rents, competition, definition of property), which opens up possibilities other than the taxation of capital or socialism.

Epoch 3: 1990-2010: the return of land rent?

While the collapse of capital between 1880 and 1950 was due almost entirely to a collapse in the price of agricultural land, the restructuring of capital between 1970 and 2010 can largely be explained by housing. With respect to real estate capital, while the increasing number of square meters built and improvements in housing quality cannot be ignored, there is also no doubt that the sharp increase in housing values between 1990 and 2010 was due to a price effect associated with the rise of a "housing bubble". In Figure 3.2, the stability of the value of "other domestic capital" is striking – so much so that one might conclude with Matthew Yglesias (2014) that land rent is back ("The Return of Land Prices"): it has been radically transformed, however, from an agrarian rent to an urban rent. In a world where the population is becoming completely urbanized and cities are becoming crucial for access to value creation (see Krugman, 1998), the distance to the centre of a large globalized city could become the key that locks in the distribution of capital (see Timbeau 2013a). This is also the mechanism through which a surplus, linked to urban land scarcity, is recreated so as to allow owners to extract rent that is productive, and no longer agricultural. The fact that r has been greater than g since 1990 can then be explained by the rise of this urban rent. In this interpretation, rent (defined as the exploitation of a scarcity value) would again be the cause of $r > g$, and not the consequence. It is thus not the accumulation of capital that concentrates wealth, as the return on capital is sufficient to do this. It is other mechanisms that lead to the concentration of capital, which are built on ownership and the organization or exploitation of a scarcity. These mechanisms explain the intergenerational transition and a high return. They permit ratios of β that can vary broadly without the need to appeal to elasticities of substitution between productive capital and labour that are greater than 1. Indeed, the ratio between the value of the capital and the output flows only from the ability to extract a rent. The capital is not necessarily productive, in the sense that an increase in its value (an increase of β) does not mean new production opportunities. Capital in this case simply expresses the power of some, through their property, over others.

Epoch 4: Capital in the twenty-first and twenty-second centuries, or how can the rich maintain $r > g$?

Thomas Piketty assumes that in the twenty-first century r will remain higher than g. The exploitation of new forms of scarcity rent such that r exceeds g should not be underestimated. These exist already in embryonic form: the renewal of land rent due to a robust housing bubble (Timbeau, 2013a); patents; monopolies resulting from a network effect with rising returns or informational rent (Intel, Microsoft, Google, Facebook); the scarcity of raw materials; etc. The finiteness of the planet will require that many people share new scarcities, such as rights to pollute or emit greenhouse gas emissions. The value of these rarities and the ways they are initially allocated or exchanged mean that issues of ownership and value are not merely local, but also global.

And beyond that? By the twenty-second century or earlier, it is likely that one day intelligent robots will be developed that will themselves manufacture and repair other robots, and which will take care of household chores and hard work. So what will become of the capital-labour ratio at that point? Much will depend on whether or how owners of patents and raw materials are paid. Two futures are possible: one where everyone has access to robots (as in the Swedish series *Real Humans*), in which the question of the accumulation of the optimal amount of capital is trivial (one robot can make all the other robots) and in which the abundance that robots produce will benefit everyone. Human labour, when it cannot be substituted by a robot's labour, would have a value. Beyond that, human labour would come to an end. The other version of the future is bleaker. Robots' output would be reserved for their owners and protected by patents and intellectual property rights. Rare materials (steel, components), the space for solar power plants (a new form of land rent) and the pollution rights that have been accumulated through trading, would all limit the number of robots that could be built or used in production. The ownership of rarities would determine the *de facto* standard of living, consumption and power. In this world, an important task of the robots would be to protect the property rights of the few, which evokes for example the American films *Robocop* and *Elysium*[7].

Capital intensity and the value of wealth

In his book Thomas Piketty uses the terms "capital" and "wealth" (*patrimoine*) interchangeably. In this approach, the accumulable productive capital (machinery, buildings, etc.) is not distinguished from non-productive capital (chateaux) and non-accumulable capital (land). There is also no effort to distinguish volume from price or physical capital from drawing rights. Capital is assumed to be homogeneous; it is comprehended by its estimated total market price or by existing conventions. This approach is consistent with the book's ambition to identify the macroeconomic foundations of the dynamics of inequality.

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[7] The day when robots become intelligent and demand an end to their enslavement will pose new questions. Literature and cinema explore this kind of conflict, from *Frankenstein* to *Terminator* and *Battlestar Galactica* (twenty-first century version), as does Dan Simmons, who creates a striking vision in several of his novels (in particular *Endymion* and *Olympus*). However, despite the complications of a new conscious and intelligent component, soulless machines capable of producing and serving could work to the benefit of both humans and non-humans.

However, it would seem essential to distinguish two aspects of capital: there is on the one hand physical capital, which is a production factor that accumulates, with diminishing returns, and on the other ownership titles that confer a right to draw on current and future income. Property rights relate to both the accumulable physical capital and land ownership but also include all the intellectual property rights, licenses and patents necessary for production under existing law. To take a trivial but current example, taxi licenses in Paris have a total value of 4 billion euros. The establishment of a licensing system, with limited numbers of licenses, and authorization to exchange them for consideration, creates capital value *ex nihilo* without adding any physical capital to the economy (Allègre, 2013). The value thereby created justifies intermediaries to finance and exchange these property titles. Two economies are possible, both with the same productive capital. One assigns a value to the licenses entitling the holder to operate a taxi and gives work to the bankers taking the taxis. In the other, the taxis are worth the cost of the productive capital, which is low compared to the capital in the first economy, and pay an environmental tax and do not carry the financial intermediaries.

Conclusion: how can the ideal of capitalism without capitalists be achieved?

Thomas Piketty proposes the establishment of a global tax on capital. However, a tax on capital can succeed only if the goods, services and financial markets work in such a way that the return on capital is the same regardless of the sector: the capital tax would deduct a portion of the returns. It would thus be equivalent to a well-designed tax on capital income. However, in the presence of rent extraction, capital taxation poses a problem: it could be too high in some sectors and too low in others. A tax on capital income (including capital gains) would be preferable because it would be based on economic flows and not on a valuation of capital[8].

But the taxation of capital or income is not an optimal solution in the presence of rent extraction[9]. Instead of taxing capital *ex post*, what is needed is to reduce its importance *ex ante* by first removing all artificial or conventional rarities. For example, in real estate Timbeau (2013a and 2013b) has explained how real estate scarcity is organized in the Paris region (Ile-de-France) and how to overcome this scarcity by building one million houses. More anecdotally, Allègre (2013) explains how to get out of a system of transferable taxi licenses and return to non-transferable licenses (having therefore no capital value). To remove rarities, it is first necessary to define intellectual and other property rights and, more generally, the rights associated with ownership or the lack thereof.

The recent acquisition of Motorola by Google (3rd largest capitalization globally in March 2013) for 12.5 billion dollars, not for its productive capacity or its customers, but for its portfolio of strategic patents, is intended to rebalance Google's position in the legal guerrilla battle that pits it against Apple (1st in capitalization globally), Microsoft (8th) and Samsung (19th). This fight emphasizes the growing importance of intangible capital, especially as the companies use the immaterial character of this capital to situate it, and the associated profit, in tax havens. A redefinition of intellectual

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[8] If capital is valued perfectly (*e.g.* because the flows and future capital gains are clear), then the two are equivalent. If, however, there is uncertainty about the future, the valuation of capital will not be perfect.

[9] Taxing the income of a burglar even at 99% will not achieve the ideal of justice. If income is ill-gotten, then we must address the source of the evil, and in particular not treat ill-gotten gains as properly acquired income.

property rights is particularly legitimate as it is not clear that current legislation favours innovation and leads to improving, for example, the fate of those who have started life less well-off. Finally, in the new economy of networks with increasing returns, the public authorities and popular representatives need to be concerned about dominant positions (Amazon, Ebay, iTunes) and consider Open Source solutions that transform capital into common property (with an economic value but no capital value within the meaning of the national accounts).

How the rights of owners are defined is crucial for determining the importance of capital in a society. From a production standpoint the German economy is no less capitalist than the French economy. However, the value of assets as a share of national income is 50 percent higher in France (600 percent) than in Germany (400 percent). This difference is not the responsibility of the tax system, and there are doubts about the effectiveness and fairness of using such a method. The questions that really matter are: are landlords free to charge whatever rent they want? Can they limit construction around their property? To what extent are workers protected by labour law? To what extent can they influence the managerial decisions taken by a company? In our opinion, it is the answers to these questions that determine the relationship between economic growth and the return on capital as well as capital's weight in an economy. The goal is to prevent the owners of capital from exploiting an advantageous balance of power. In this respect, while it has changed shape, capital in the twenty-first century is much like it was in the late nineteenth century. Dealing with this will require more than a tax on capital.

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