Capital in the Twenty-First Century by Thomas Piketty
'Wealth of Data, Poverty of Theory'

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Abstract

Thomas Piketty's book, *Capital in the Twenty-First Century*, provides a monumental database for the history of capitalism. But the author's interpretation of these data is based on an inconsistent theoretical framework that constantly oscillates between two definitions of capital: either capital as accumulated drawing rights on the value created; or capital as a factor of production in the neoclassical tradition. Capital as a social relation is forgotten and the history of capitalism appears as an accounting mechanism.

Keywords

Piketty – capital

Thomas Piketty's book *Capital in the Twenty-First Century* has rightly been welcomed: it provides a monumental source of data on the history of capitalism and offers information that will be essential for all those economists who want to study its dynamic in the medium and long term. Piketty thus follows in the footsteps of such authors as Angus Maddison[1] and Pierre Villa.[2] We should also thank him for making all of these materials freely available.[3]

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1 See the Maddison Project, available at <http://www.ggdc.net/maddison/maddison-project/home.htm>.
2 See his Séries longues macroéconomiques, available at <http://gesd.free.fr/villadoc.pdf>.
3 All the data are available at the website <http://piketty.pse.ens.fr/en/capital21c2>, which also provides a copious methodological appendix.

In this work we find data on income inequality across the world, and it would be no exaggeration to say that the 'Piketty group' (including people such as Anthony Atkinson and Emmanuel Saez) has supplied a significant part of the arguments raised by recent social movements (the *indignados*, Occupy Wall Street, and such like) and even one of their watchwords: 'We are the 99 percent!'

The following comments will be no less critical for that reason, however, since Piketty's theoretical framework is not at the same level as his wealth of data. In order to demonstrate this, we will above all be examining the two fundamental laws of capitalism that Piketty uses in order to read his data. The central line of march of this investigation is the idea that Piketty incoherently mixes up two definitions of capital, both as a 'factor of production' and as the whole ensemble of 'drawing rights' on income.

First Fundamental Law of Capitalism: The Share of Profit

This first law establishes the relation among capital's share of income – α – the mean rate of return on capital – r – and the capital/income ratio, which Piketty denotes with the Greek letter β. Thus we have $\alpha = r \times \beta$.

Piketty himself specifies that this is not really a law, but an accounting identity. As an accounting identity must, by definition, always be true, we need some minimal theoretical framework that allows us to decide how we should read it, that is, in order to give it some sense of causality. *A priori*, it would seem more natural to write this relation the other way around, as a definition of the rate of capital return, or, to put it another way, the profit rate. We would relate profit to capital, thus $r = \alpha/\beta$.

This is what Marxist theory does (and so do the classics of political economy): the amount of profit depends on the rate of exploitation, and it is thus related to capital in order to determine the profit rate. In the formula $r = \alpha/\beta$ the share of profit α is a good indicator of the rate of exploitation, and β corresponds to what Marx calls the organic composition of capital. In sum, even (and above all?) in the twenty-first century, capital works like this: the capitalists seek to maximise profit rates by exploiting waged labour as much as possible, at the same time as avoiding the capital that is accumulated weighing too heavily on the profitability of capital. In any case, it seems reasonable enough to think that the rate of return on capital is a result of the production process, and not something that is determined externally, as some sort of guaranteed profit rate that just needs to be applied to capital. Such a representation would

be absurd, since merely to accumulate capital would suffice for drawing further profits from it.

Piketty's inversion is thus problematic from a theoretical point of view, free though he may be to formulate an accounting identity one way round or the other. Of course, the share of profit is, indeed, an essential variable in determining inequality, which is, at root, Piketty's subject of inquiry. But the formulation of his first 'law' suggests that this share of profit depends on the evolution of the profit rate r and on the capital/income ratio β. But if this is the case, how is capital's rate of return to be determined other than by comparing the amount of profit to the amount of capital that is engaged? We risk going round in circles, here: if we calculate r on the basis of α, then we cannot calculate α starting with r, and still less draw a 'fundamental law of capitalism' on this basis.

There is a good reason why Piketty looks at this question backward: while he proposes to write the history of a social relation that allows a small section of society to appropriate a growing share of the national income, in practice he fails to bring to centre stage the social factors at work in the permanent struggle over the division of wealth. Of course, Piketty does emphasise that 'this upward trend is consistent not only with an elasticity of substitution greater than one but also with an increase in capital's bargaining power vis-à-vis labor over the past few decades'.[4]

He could thus have chosen two types of explanation: a technological explanation ('an elasticity of substitution greater than one') and a social one ('an increase in capital's bargaining power'). But all the developments of a theoretical nature are in reality based on a purely technological reading, which is possible only by assuming a neoclassical framework where **r** is not a result but a property of capital: its marginal productivity.

What Measure of Capital?

Piketty defines capital as 'the sum total of nonhuman assets that can be owned and exchanged on some market'.[5] This very extensive definition includes 'all forms of real property (including residential real estate) as well as financial and professional capital (plants, infrastructure, machinery, patents and so on)

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4   Piketty 2014, p. 221.

5   Piketty 2014, p. 46.

used by firms and government agencies'.[6] Indeed, as Piketty himself notes, 'To simplify the text I use the words "capital" and "wealth" interchangeably'.[7] This choice may perhaps simplify his exposition, but it introduces a permanent theoretical confusion.

In order to demonstrate this, we will begin with a sort of 'statistical inquiry' into this first 'fundamental law', in order to identify a central difficulty that concerns the way in which capital is valorised. For simplicity's sake, we will consider the case of France over the period 1978–2010, for which the data on holdings[8] and fixed capital[9] are available from Insee. They allow us to calculate different estimates of capital. Many definitions are possible: when we look at holdings, we could consider the entire economy, or just companies outside of the financial sector. In each of these fields, we will *a priori* choose to consider only non-financial assets as 'productive'. A further distinction could be made, depending on whether or not we take into account 'non-produced assets', essentially corresponding to improved land, which we will designate with the term 'land'. This gives us four definitions of capital:

A   non-financial assets of the national economy
Ap   non-financial assets of the national economy, other than land
AE   non-financial assets of non-financial companies
AEp   non-financial assets of non-financial companies, other than land

These measurements of capital differ from Piketty's definition of 'capital', but it is precisely the impact of these differences (to which we will return) that we ought to evaluate. These four estimates are then related to GDP – which is an acceptable measure of national income, such as Piketty defines it – and compared to the analogous series obtained by Piketty relating private capital to national income (Graph 5.3 in his book).

Between 1978 and 2012 our ratio A, the most global one, rose from approximately four to seven times GDP. This order of magnitude is compatible with Piketty's results: curve 'A' is reasonably close to the 'Piketty' curve in our own Figure 1. But this is already a lot less true when we compare this latter to the 'Ap' curve that excludes 'land' from the definition of the national economy's non-financial assets.

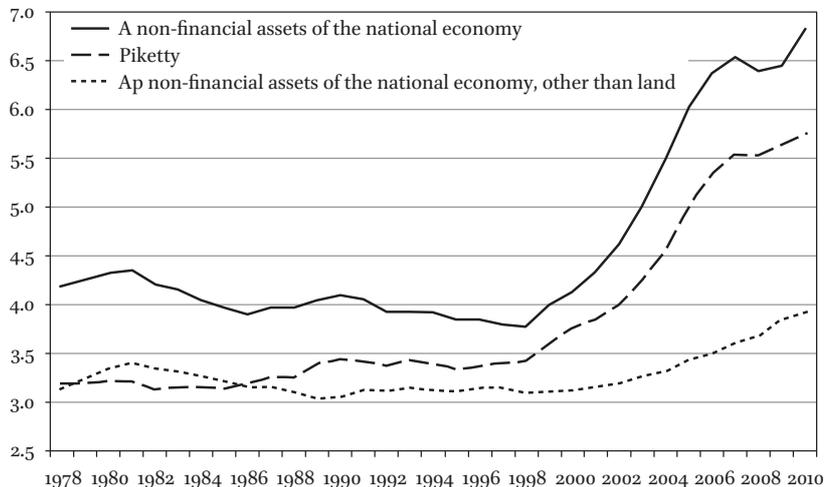
6   Ibid.

7   Piketty 2014, p. 47.

8   <http://www.insee.fr/fr/themes/theme.asp?theme=16&sous_theme=5.4.2>

9   <http://www.insee.fr/fr/themes/theme.asp?theme=16&sous_theme=5.2.4>

Thirdly, we can use Insee's series of data on net capital at current prices. We will distinguish the total capital K from Kp, which we get by excluding the capital counted in the field 'real estate activities'. We have a configuration analogous to that which we saw earlier: curve 'K' begins rising from 2000 but much less so than does the 'Piketty' curve, while the curve 'Kp' fluctuates within narrow limits (Figure 3).

FIGURE 1   *Capital/income ratio for the whole economy*

In the second place, we can make the 'Piketty' curve more easily comparable to the curves that represent only non-financial companies, through a change of scale. Until 1998, the 'Piketty' and 'AE' curves remain somewhat parallel to one another, but then they diverge, with the Piketty curve rising much faster. Finally, when we take out land, the 'AEp' curve varies very little compared to the others (Figure 2).
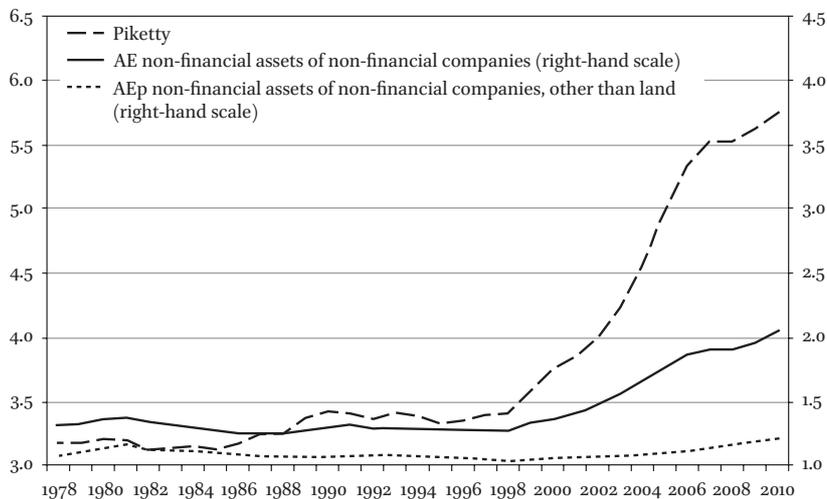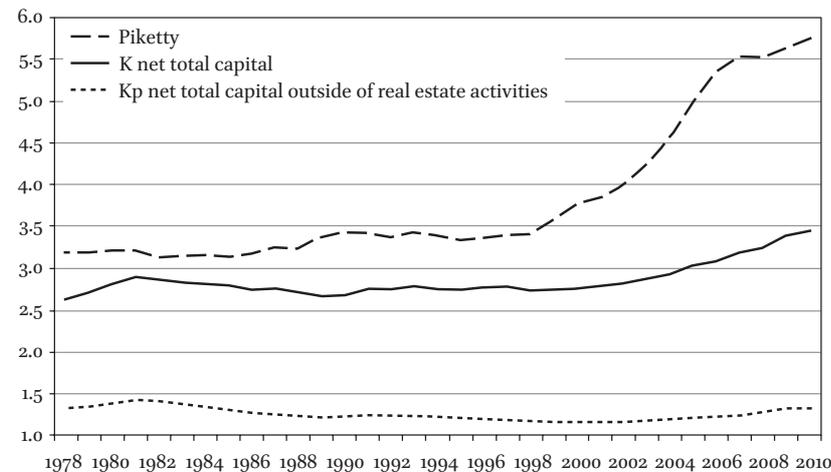
FIGURE 3   *Capital/income by fixed capital*

The differences that we see among these various indicators partly result from the means of capital evaluation[10] and the development of the price of land. Here we again find a result that we already discussed in a previous contribution.[11] As we showed then, when it comes to non-financial companies, total capital and capital 'other than land' began to diverge starting from the end of the 1990s. Over the period 1998–2008, the value of non-produced assets (land) multiplied by a factor of 4.7 while that of produced assets (fixed capital other than land) multiplied by a factor of 1.7 and capital 'other than land' grew more or less in step with gross added value (Figure 4).

These different ways of evaluating capital have repercussions for our estimates of profit rates. In turning the fundamental law no. 1 the other way around, we calculate the profit rate as the relation between the share of profit and the ratio of capital to GDP. The two evaluations based on the size of Kp

FIGURE 2   *Capital/income ratio for non-financial companies*

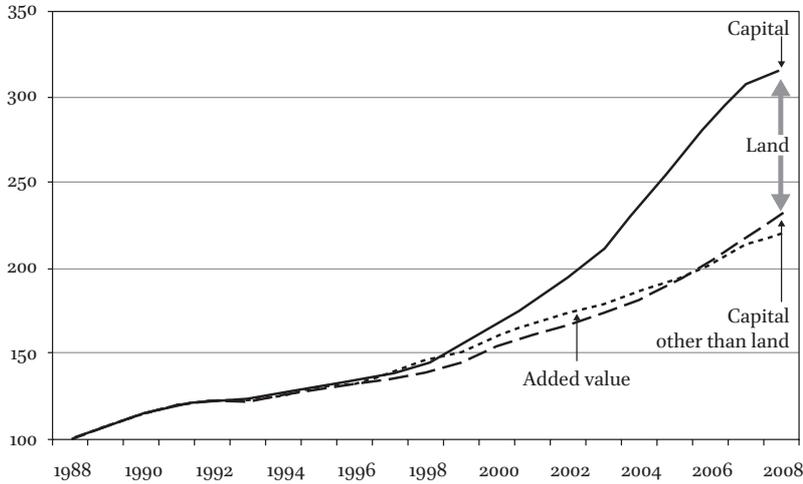10   Husson 2013.

11   Husson 2011.

FIGURE 4 *Capital and added value*

(the capital in the whole economy outside of real estate activities) and AEp (the non-financial assets other than 'land' of non-financial companies) give a similar picture. Normally we see strong recovery between 1982 and 1989, a less rapid rise up until 1998, and then a downward tendency that, evidently, accelerated with the advent of the crisis (Figure 5).
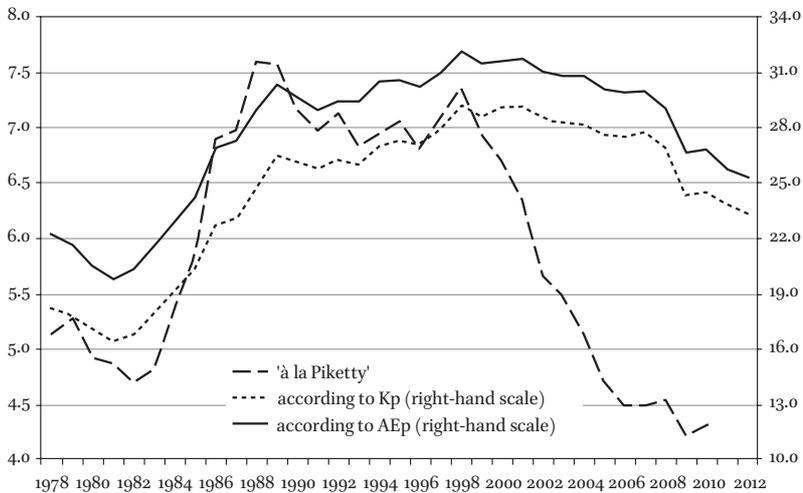

FIGURE 5 *Three evaluations of the profit rate*

Conversely, the 'Piketty' curve gives a sharp drop in the profit rate starting in 1998: in 2005 it even reaches a lower level than it had right at the start of the 1980s. This reading of the dynamic of French capitalism is, in reality, an artefact that results from his exaggerated estimate of capital.

Capital-Labour Substitution and the Fall in the Share of Wages

This statistical detour (even if it might be a little tiresome) does allow us to emphasise certain considerations with significant implications for interpreting the respective shares of profits and wages. The data that Piketty has produced show that the tendency for the share of profit to increase relative to wages has been very strong in the so-called advanced countries since the beginning of the 1980s (Figure 6). In Piketty's schema, this tendency for the share of profit to rise – and the concomitant fall in the share of wages – is based on both a rise in the profit rate r and an increase in the capital/income ratio β, such that it does not depend directly on wages.
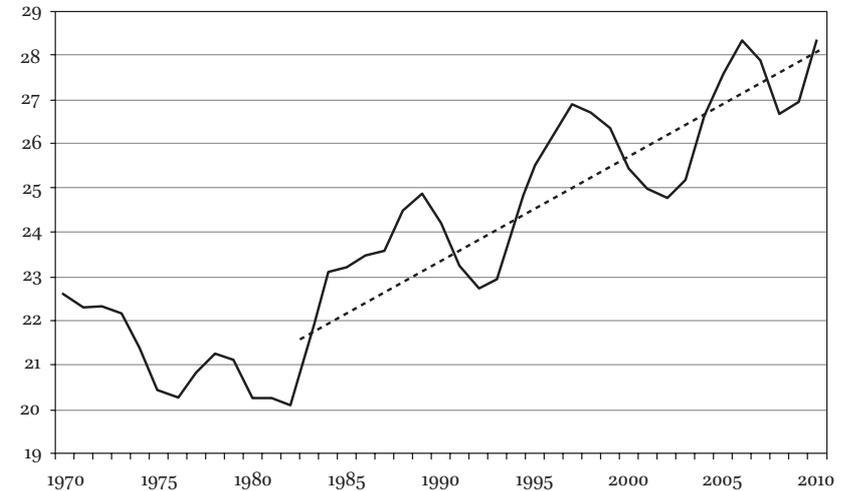

FIGURE 6 *The capital share in rich countries, 1970–2010*
EUROPE AND THE UNITED STATES (ARITHMETIC MEAN). SOURCE: PIKETTY, TABLE 6.5

However, any fall in the share of wages is completely equivalent (would this be another new 'fundamental law' of capitalism?) to wages rising less quickly than labour productivity. For Piketty, a fall in wages' share of national income expresses, on the contrary, the substitution of capital for labour. We here find an old argument that consists of saying the following: if production employs more capital and less labour, then isn't it logical, after all – if we consider capital and labour as 'factors of production' – that the share of capital has increased? In reality this is only true if the elasticity of substitution is superior to 1 – and this is the explanation that Piketty prefers.

There is, however, a more simple causal schema that could be summarised as follows: the rate of unemployment weighs on the relation of forces between capital and labour, such that wages rise less quickly than labour productivity, which leads to a fall in the share of wages. All mainstream economists seek to make this social explanation disappear, to the profit of a technological one.[12] And Piketty marches in lock-step with them. In a recent presentation[13] he summarised his model as follows: 'Whether a rise in β also leads to a rise in capital share $\alpha = r\,\beta$ depends on the K-L elasticity of substitution: if $\sigma > 1$, then $r = F_K$ declines proportionally less than $\beta\uparrow$, so that $\alpha = r\,\beta$ rises = exactly what happened since 1970s–80s'. Now, the hieroglyph F_K designates the marginal productivity of capital (defined in physical quantities); or, to put it another way, it is a 'technical' attribute of the capital stock, of capital return.

But in thus passing his fundamental law of capital no. 1 through the mill of neoclassical theory,[14] Piketty introduces further confusion. This accounting identity, which he baptises as a 'law', effectively concerns measurements in 'value', that is, in euros, whereas neoclassical theory uses measurements of 'volume'. Piketty has not managed to build any passage from the one to the other, and indeed it would be theoretically and empirically impossible for him to do so given his skewed and ambiguous estimates of capital.

Moreover, he does not provide any arguments to stand up his thesis according to which a substitution elasticity superior to 1 could explain the continual decrease in the share of wages. He says that 'On the basis of historical data, one can estimate an elasticity between 1.3 and 1.6' and returns to this point in his technical appendix. We could expect to see some references to studies that establish this result, but Piketty does not do so, instead confining himself to saying that 'the available data indicate that capital's share of income increased in most rich countries between 1970 and 2010 to the extent that the capital/

income ratio increased', which is consistent 'with an elasticity of substitution greater than one'.[15] His theoretical schema is thus compatible with an elasticity greater than one, including that between 1.3 and 1.6, but he does not at all establish this, and his theory remains at the level of hypotheticals.

In reality, there is no link between the rate of capital-labour substitution (measured by the variation of capital per head),[16] and the share of profit. Armies of economists of a neoclassical bent have failed to produce any solid results on this score. Indeed, they set themselves an impossible task, as Figure 7 shows: there is no convincing link between the rhythm of capital-labour substitution and the share of profit. In the 1980s it even headed in the 'wrong' direction: in this period, the share of profit massively increased even as the rhythm of capital-labour substitution continually dropped.
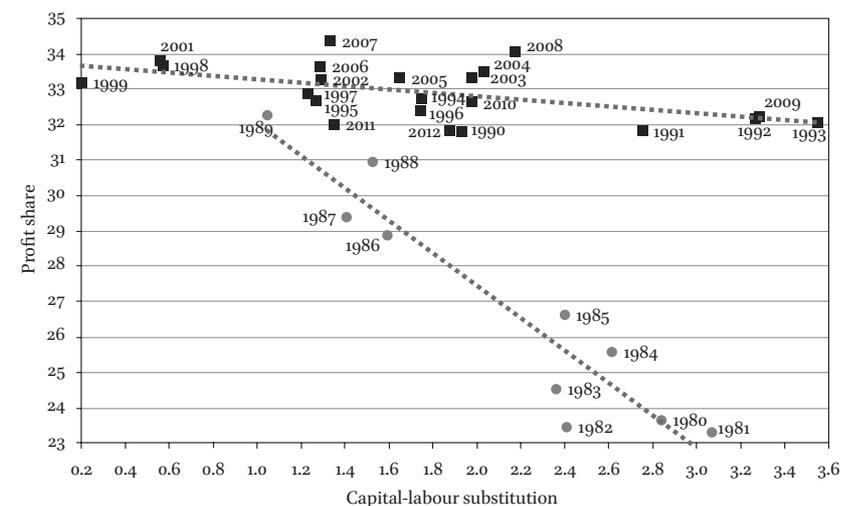

FIGURE 7   *Capital-labour substitution and the share of profit*

The Second Fundamental Law of Capitalism: The Capital/Income Ratio

This law states that the capital/income coefficient β depends on the rate of savings s and the growth rate g. It is a law 'that is valid only in the long run': 'if a country saves a proportion s of its income indefinitely, and if the rate of growth

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12   See Husson 2010.

13   Piketty 2013.

14   See Piketty 2014, pp. 212–34 in particular.

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15   Piketty 2014, p. 221.

16   Source: Ameco. Série Net capital stock at 2005 prices per person employed.

of its national income is g permanently, then its capital/income ratio will tend closer and closer to β=s/g and stabilize at that level'.[17]

This is true precisely on the condition that the rate of savings and the growth rate are fixed and constant. But this proposition is senseless, since Piketty again now reasons in the opposite sense: why is it worth increasing capital if the growth rate is fixed in advance? And can this growth rate be considered independent of the capital stock? Piketty cites the inventors of this 'fundamental law', Harrod[18] and Domar,[19] but their reasoning was quite different, because they were seeking to lay the bases for a theory of growth. They thus formulated the relation in the opposite way to Piketty: g = s/β. And again, it is they who have it the right way round: the growth rate g depends on two things, the economy's propensity to invest s and the capital coefficient β.

This can easily be demonstrated: in labelling capital K and the product Y, and supposing that everything saved is accumulated, then we get s=ΔK/Y. If β=K/Y is constant, then we also get β=ΔK/ΔY and easily find that g=ΔY/Y is equal to (ΔK/Y)/(ΔK/ΔY), or g=s/β. QED.

The important point on which we must insist is that this relation can only be established if we suppose a constant β, whereas Piketty uses this 'fundamental law' to study the variations of β.

It is clear enough that this relation can only be used in the medium term, since β would have a negative value in each recession, when g becomes negative. This fundamental law cannot be used, then, except to compare different periods in a single country's economy, or different countries in the same period. In the Cologne presentation of his book that we mentioned earlier, Piketty gave a numerical example that compared two periods. In the first period, s=10%, g=3% and as a result β=300%. In the second period, the savings rate s remained at 10% but the growth rate g fell to 1.5%, such that the capital/income ratio β doubled and now rose to 600%. And Piketty concluded from this that 'capital is back because low growth is back'. We can clearly see that his line of causality moves from growth to capital, but again this schema makes no sense: if the same investment rate leads to less growth, this must mean that capital's efficiency is diminished, or, to put it another way, that the same investment leads to less return. The capital/product ratio is not deduced from growth, but the other way round.

If we apply this law to the 1970–2010 period, using Piketty's data (from his Table 5.1) we get the breakdown displayed in Table 1 below. We can see relative similarities between France and Germany, whereas the United States is

strikingly different: it has more growth with much less savings, and, consequently, a capital coefficient β only half the level of these other countries. To put it another way, capital seems to be twice as 'efficient' in the United States as in Germany or France:

TABLE 1   *Calculations of β*

	s	g	β=s/g	β*
USA	7.7%	2.8%	2.8	2.4
Germany	12.2%	2%	6.1	3.0
France	11.1%	2.2%	5.0	2.8

If we instead look at data given by the European Commission,[20] then we get very different results, however: yes, the capital/product ratio is still lower in the United States, but the difference is far lesser (see column β* in the table above, and Figure 8). To put it another way, when we base ourselves on direct sources, the second fundamental law does not work – and this doubtless reflects the imprecisions that result from the measurement of capital and the accumulation of capital using the s coefficient.
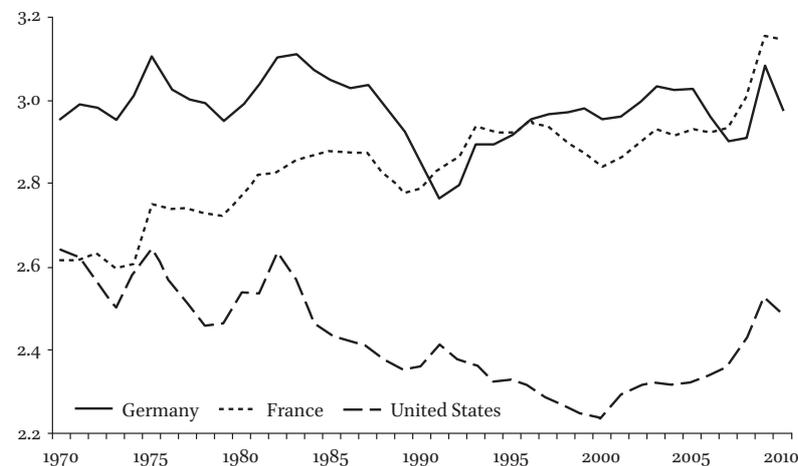

FIGURE 8   *Capital/income ratio*

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17   Piketty 2014, p. 168.
18   Harrod 1939.
19   Domar 1947.

20   From the European Commission's Ameco database, 'Net capital stock per unit of gross domestic product at constant market prices'.

What Analysis of the Trajectories of Capitalism?

Over the last five years, capitalism has plunged into a serious crisis. So it is legitimate to ask whether Piketty's theoretical apparatus affords a useful reading of this crisis; indeed, a reading that situates itself within a more long-term perspective embracing the last three decades as a whole, or, to put it another way, the neoliberal phase of capitalism.

However, we do not get this, because the two 'laws' that Piketty deploys can lead only to essentially descriptive periodisations. There is, however, a very abundant literature on capitalism's 'long cycles' or 'long waves', of which he does not make use.

For want of a theoretical framework, these periodisations are rather precarious. This is particularly blatant in the case of France after World War II. Piketty explains the development of the share of profit in national income as follows: 'the wage-profit split has gone through three distinct phases since World War II, with a sharp rise in profits from 1945 to 1968 followed by a very pronounced drop in the share of profits from 1968 to 1983 and then a very rapid rise after 1983 leading to stabilization in the early 1990s'.[21]

It is enough to take a look at Figure 9 to see that this commentary does not at all correspond to the history of French capitalism. We have here produced a graph of the equivalent Insee data to make sure that it looks comparable to the 'Piketty' curve, which it does. But firstly, it is mistaken to write that there was a 'sharp rise in profits from 1945 to 1968'. The sharp growth took place between 1945 and 1950: the whole following period, from 1950 to 1974, was characterised by a share of profits fluctuating at around 31%, without any marked tendency. Secondly, neither was there a 'very pronounced drop in the share of profits from 1968 to 1983': this fall began with the recession of 1974–5, and profit's share of national income actually rose between 1968 and 1974. This double error tells us rather a lot about the risks of an untheorised periodisation: Piketty wipes away the 'Fordist' quarter-century, characterised by relative constancy in the share of profit, and disconnects its ultimate fall from the mid-1970s recession.

More fundamentally, Piketty does not build his reading on the historical tendencies of labour productivity. And yet capitalism's very dynamism is based on its ability to take advantage of productivity gains. Of course, labour productivity does appear as one element of the growth rate, but this latter is in practice taken to be an exogenous variable, with the effect that productivity tendencies are considered as a given, independent of capital accumulation.

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21 Piketty 2014, p. 227.

FIGURE 9 *The share of profit in enterprises' added value*

This is demonstrated by Piketty's forecasting exercise, which postulates a growth rate of 1.2% for the wealthiest countries over the 2012 to 2100 period, and up to 5% for the rest of the world.[22] He then applies his second law in order to calculate the capital/income ratio, given a savings rate of 10%. But in this purely arithmetical calculation there is no reflection on what determines productivity, and still less on the sustainability of such growth rates from an ecological point of view.

As Robert Boyer has emphasised,[23] this exercise 'clearly reveals the fragile nature of the theoretical grounding of the book'. Given all this, it is hardly a total surprise that in Piketty's work we do not find the slightest insight into the current crisis. He even relativises the significance of rising inequality, which it would be 'altogether too much' to identify as 'the sole or even primary cause of the financial crisis of 2008 or, more generally, of the chronic instability of the global financial system'.[24]

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22 Piketty 2014, p. 100.
23 Boyer 2014.
24 Piketty 2014, p. 298.

Conclusion: The Absence of a Theory of Capital

Other criticisms could be raised, for example Piketty's highly questionable reading of Marx[25] or the inequality r> g, which is presented in his conclusion as the 'central contradiction of capitalism': that is to say, because capital return is superior to growth rates, apart from in exceptional periods. On this point, we can turn to Boyer,[26] according to whom 'In fact the reasons why r is greater than g are either trivial and tautological or unsatisfactory in theoretical terms'.[27]

Ultimately, the essentials of our critique concern Piketty's definition of capital. We have seen that this is a very wide definition, including housing, land, equipment, financial equity (bonds, shares, and so on) and intellectual property. Branko Milanovic[28] has emphasised that 'Capital as defined by Piketty is more akin to what is often called wealth',[29] and that Piketty 'rejects the distinction between wealth used in "unproductive" and "productive" activities . . . Any asset that enables its owner to receive a return, including the implicit return on housing, is capital'.[30]

At root, the whole problem is that this definition is not compatible with neoclassical theory, which needs a physical quantity of capital. From this point of view, it is telling that Piketty has not grasped the significance of the debate 'between the two Cambridges', which he reduces to a controversy over the volatility of growth, which, according to him, 'did more to cloud economic thinking than to enlighten it'.[31] This fascination with neoclassical theory, which Bernard Guerrien has already identified in another work of Piketty's,[32] results in an almost total ignorance of the conflicts over the distribution of national income. Piketty's analytical framework is essentially mechanical, and, however much he denies it, in hock to the 'caprices of technology'.[33] As Boyer kindly

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25   On this point see Petit 2013. By comparison, we would have expected that a Marxist like François Chesnais would have taken a less accommodating view in his reflections on Piketty's book (Chesnais 2013).

26   Boyer 2014.

27   Indeed, for this configuration to be achieved it is enough that not all the profit is accumulated. In combining the two 'fundamental laws', we get $r/g=\alpha/s$. To put it another way, r is only superior to g if α is superior to s.

28   Milanovic 2013, p. 3.

29   This is particularly striking in Piketty and Zucman 2013.

30   Milanovic 2013, p. 3.

31   Piketty 2014, p. 232.

32   Guerrien 2010.

33   Piketty 2014, p. 234.

put it, 'the theorization proposed fails to match the wealth of observations recorded'.[34]

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34   Boyer 2014.