

The (F)Laws of Piketty's Capitalism

A Fundamental Approach

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Abstract

The book 'Capital in the Twenty-First Century' by the French economist Piketty about the inequality of income and wealth distribution is already quite a while in the spotlights. Throughout his book he uses two formulas which he has named 'the first fundamental law of capitalism' and 'the second fundamental law of capitalism'. With his reasoning he tries to show that, with these laws in place, he is capable to explain inequality phenomena with respect to the income and wealth distribution. Without going into the significance of his reasoning and conclusions, we will show that the use of the laws, the way he does, is fundamentally wrong. We suggest alternative formulas and a new approach. The inequality $r > g$ is in our opinion not a meaningful equation with respect to inequality.

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1. Introduction

The book 'Capital in the Twenty-First Century' by the French economist Piketty (2013) about the inequality of income and wealth distribution is already quite a while in the spotlights. Let me start by saying that his work is impressive with regard to the years of hard work to collect and structure these historical data. He conveniently responds to the sentiment with the words inequality (Stiglitz, 2012) and Capitalism (Marx), but he is forgiven for that. Throughout his book he uses two formulas which he has named 'the first fundamental law of capitalism' and 'the second fundamental law of capitalism'. With his reasoning he tries to show that, with these laws in place, he is capable to explain phenomena, that are occurring and have occurred in the economy and are in his well-documented archive, with respect to the income and wealth distribution. As an example I mention the return of capital, 'capital is back', and therefore there is a fair chance that inequality will increase. But here's the rub. I do not deny the phenomena as collected by Piketty and I assume that the facts are as observed. Without going into the significance of his conclusions, we will show you that the use of the laws and his reasoning, the way he does, is fundamentally wrong.

First we will show the problem with the two fundamental law introduced by Piketty.

Then we derive formulas for the capital to income ratio of a national economy for which we will discriminate between the different kinds of capital and derive formulas for each ratio separate, trying to make the relevant parameter choices visible. We will argue that there is no special role for demographic growth, compared to per capita growth, for the comeback, if at all, of capital (the ratio).

Piketty's statement, if the rate of return on capital r is greater than the growth of the economy, $r > g$, this will imply a high chance for inequality to occur and eventually that the economy or more specific capitalism is in trouble, does not hold. We will argue that the return on capital has little to nothing to do with the growth rate of the economy from a fundamental point of view, though it can pave the way to make a choice for a higher or lower investment rate, increasing or decreasing the capital to income ratio.

We will show that there is no logical theoretical reason that a high capital to income ratio on national or private level implies a higher chance on inequality. The other way around there is possibility that inequality can harm the economy in the sense the GDP will be lower than desired.

Analyses

The first law gives the relationship between the capital portion α of income Y , the return r on capital K and capital-income ratio β ,

$$\alpha = r\beta \tag{1}$$

with $\beta = \frac{K}{Y}$

The definition of capital is not the same everywhere. If α is the gross return, expressed in income, then r is the gross return rate on capital K , expressed in K . I prefer to use capital of firms here, but in principle you may express it in every quantity you like. It is also used as wealth for a private individual, in this case including his financial wealth. The trouble arise as soon as you will couple capital to income generating power as is done in a production function, then you better limit yourself to the factors of production over which entrepreneurs can decide and with which they generate gross return on capital, i.e. K_F .

For now I will use capital as in the total of real equipment, infrastructure, etc., but I will generalize that to financial capital as well as soon as that is appropriate.

This brings us to the second law which says that the ratio between capital and income is determined by the net savings rate of income \tilde{s} divided by the real growth rate g of income Y . In the long run

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

That is of course odd. As g decreases towards zero than the ratio β will keep on increasing at constant \tilde{s} . Krusell (2014) already showed that you avoid this behavior if you use, as usual is done in a simple growth model, the gross savings rate s . Then the capital-income ratio is

$$\beta = \frac{s}{(g + \delta)} \quad (3)$$

where δ is the depreciation ratio of capital.

So it seems that one ratio can be infinite and with the other formula calculated is limited. You will probably be surprised if I tell you that both formulas really are correct. Krusell showed how to derive the formula of Piketty and that in itself is also correctly done, but the implicit assumption that the natural coupling of depreciation disappears is not realistic. There comes a time when the depreciation will exceed the gross savings. With g goes to zero the formula is not realistic when you assume \tilde{s} to be constant, for example, but I will come back to that later.

Piketty says about this formula, and I quote:

This formula, which can be regarded as the second fundamental law of capitalism, reflects an obvious but important point: a country that saves a lot and grows slowly will over the long run accumulate an enormous stock of capital (relative to its income), which can in turn have a significant effect on the social structure and distribution of wealth.

Let me put it another way: in a quasi-stagnant society, wealth accumulated in the past will inevitably acquire disproportionate importance.

The return to a structurally high capital/income ratio in the twenty-first century, close to the levels observed in the eighteenth and nineteenth centuries, can therefore be explained by the return to a slow-growth regime. Decreased growth—especially demographic growth—is thus responsible for capital's comeback.

The basic point is that small variations in the rate of growth can have very large effects on the capital/income ratio over the long run.

This reasoning is wrong, because there is more or less assumed that at lower growth g the capital-income ratio β continues to increase, as appears from the formula at constant net savings ratio \tilde{s} . The mistake that has been made here is that the growth rate g and the saving ratio \tilde{s} are interlinked for that part of K related to companies. This phenomenon which is violated is known as saving paradox, known to every economist, although often neglected. As an example I can mention the book *Debunking Economics* of Steve Keen where in Chapter 14 he made the same kind of fundamental mistake and also in several of his articles (de la Fontejne, 2014-1). To eliminate the difference in the formulas (2) and (3), use $\tilde{s} = s - \delta \frac{K}{Y}$ and solve for the ratio $\frac{K}{Y}$. Piketty is aware of these differences too (Piketty and Zucman, 2014), but strange enough, he is using this formula anyhow.

Piketty is convinced that only growth can compensate for the difficulty Marx saw in capitalism, and I quote:

The dynamic inconsistency that Marx pointed out thus corresponds to a real difficulty, from which the only logical exit is structural growth, which is the only way of balancing the process

of capital accumulation (to a certain extent). Only permanent growth of productivity and population can compensate for the permanent addition of new units of capital, as the law $\beta = \frac{s}{g}$ makes clear.

Otherwise, capitalists do indeed dig their own grave: either they tear each other apart in a desperate attempt to combat the falling rate of profit (for instance, by waging war over the best colonial investments, as Germany and France did in the Moroccan crises of 1905 and 1911), or they force labor to accept a smaller and smaller share of national income, which ultimately leads to a proletarian revolution and general expropriation. In any event, capital is undermined by its internal contradictions.

But in fact it is just the other way around, if there is no technological growth then there is no need for the production factor capital to grow, as we will show. Although it must be said that in a growing economy redistributing and sharing seems to be much easier, a changing ratio is not a logical consequence of the formula presented, nor is it proven that the capital to income ratio β will keep on rising and even then it is not clear whether it can be a cause for inequality.

2. Alternative formulas for the capital to income ratio

In order to make clear the consequence we split fixed capital K into a part capital of firms K_F , a part capital of households K_{HH} and a part capital of government K_{Gov} .

Please take as an example an economy without international transactions, then savings are equal to investment. From a macroeconomic point of view the sum of the financial assets equals zero and we only have to deal with real property. We suppose that this economy has a desired size mainly determined by the technological status quo and is growing. Using eq. (3) we write the ratio for firms to be equal to

$$\beta_F = \frac{K_F}{Y} = \frac{s_F}{g + \delta_F} \quad (4)$$

where $s_F = \frac{S_F}{Y}$ the part of savings S_F in income Y . The resulting consumption quote is

$$c = 1 - s_F = 1 - (\delta_F + g) \frac{K_F}{Y} \quad (5)$$

If we also have a growth n of the population it is not allowed to leave it out, because the savings used for investment is lowering c , in the same way as growth g . In this case n is included in g .

And, of course, this is in agreement with standard Solow growth models.

For the capital-income ratio of households we also use the gross savings rate formula

$$\beta_{HH} = \frac{K_{HH}}{Y} = \frac{s_{HH}}{g + \delta_{HH}} \quad (6)$$

where s_{HH} is to be chosen $0 < s_{HH} < c$, because the savings s_{HH} is limited to what consumers and government can spend on consumption and is reducing that consumption.

The same holds for the capital-income ratio of the government

$$\beta_{Gov} = \frac{K_{Gov}}{Y} = \frac{s_{Gov}}{g + \delta_{Gov}} \quad (7)$$

where s_{Gov} is to be chosen $0 < s_{Gov} < c' = 1 - s_F - s_{HH}$, because s_{Gov} is limited to what consumers and government can spend on consumption and is reducing that consumption, resulting in a consumption quote $c'' = 1 - s_F - s_{HH} - s_{Gov}$.

In total this results for the capital-income ratio in

$$\beta_t = \beta_F + \beta_{HH} + \beta_{Gov} = \frac{K_F}{Y} + \frac{K_{HH}}{Y} + \frac{K_{Gov}}{Y} = \frac{s_F}{g + \delta_F} + \frac{s_{HH}}{g + \delta_{HH}} + \frac{s_{Gov}}{g + \delta_{Gov}} \quad (8)$$

Taking into account this limitation on savings we see that the trouble with dividing by zero is eliminated and the ratios are limited. This means that for a closed economy the national fixed capital to income ratio is limited and so is the national wealth to income ratio, which has the same value, because net financial assets are zero.

Piketty claims:

Decreased growth—especially demographic growth—is thus responsible for capital's comeback.

The basic point is that small variations in the rate of growth can have very large effects on the capital/income ratio over the long run.

In our formula we do not see this extreme sensitivity in growth g . Although, we do not deny that due to the dynamics on the short and medium term there might be even large effects, which is also caused by the very long reaction time of the system dynamics to stabilize. In particular you cannot discriminate between demographic growth and technical growth, so there is no specific role for demographic growth regarding capital's comeback.

So far the formulas are independent of the choice of a production function. E.g. if we take a Cobb-Douglas production function with constant returns to scale and α the coefficient of the production factor K_F , $g = s_{HH} = s_{Gov} = 0$ and equilibrium on all markets, then we calculate the boundary values for c to be

$$1 - \alpha < c < 1 \quad (9)$$

At the boundaries the profit of firms is zero and the maximum profit is at $c = 1 - \alpha^2$. For a more detailed explanation and stability analysis see De la Fontejne (2012).

Example 1: Let $\alpha = .3$ and the depreciation $\delta_F = .05$, then at maximum profit $c = 1 - \alpha^2 = .91$, $s_F = \alpha^2 = .09$ and the ratio β_F results in $\beta_F = \frac{1-c}{\delta_F} = 1.8$

If $s_F = .08$, $s_{HH} = s_{Gov} = .05$, $\delta_{HH} = \delta_{Gov} = .01$ and $g = .015$, then $\beta_F = 1.23$, $\beta_{HH} = \beta_{Gov} = \frac{s_{HH}}{g + \delta_{HH}} = 2.00$ and the total ratio is $\beta_t = 5.23$ (see fig. 1 for different values for s_F and s_{HH}).

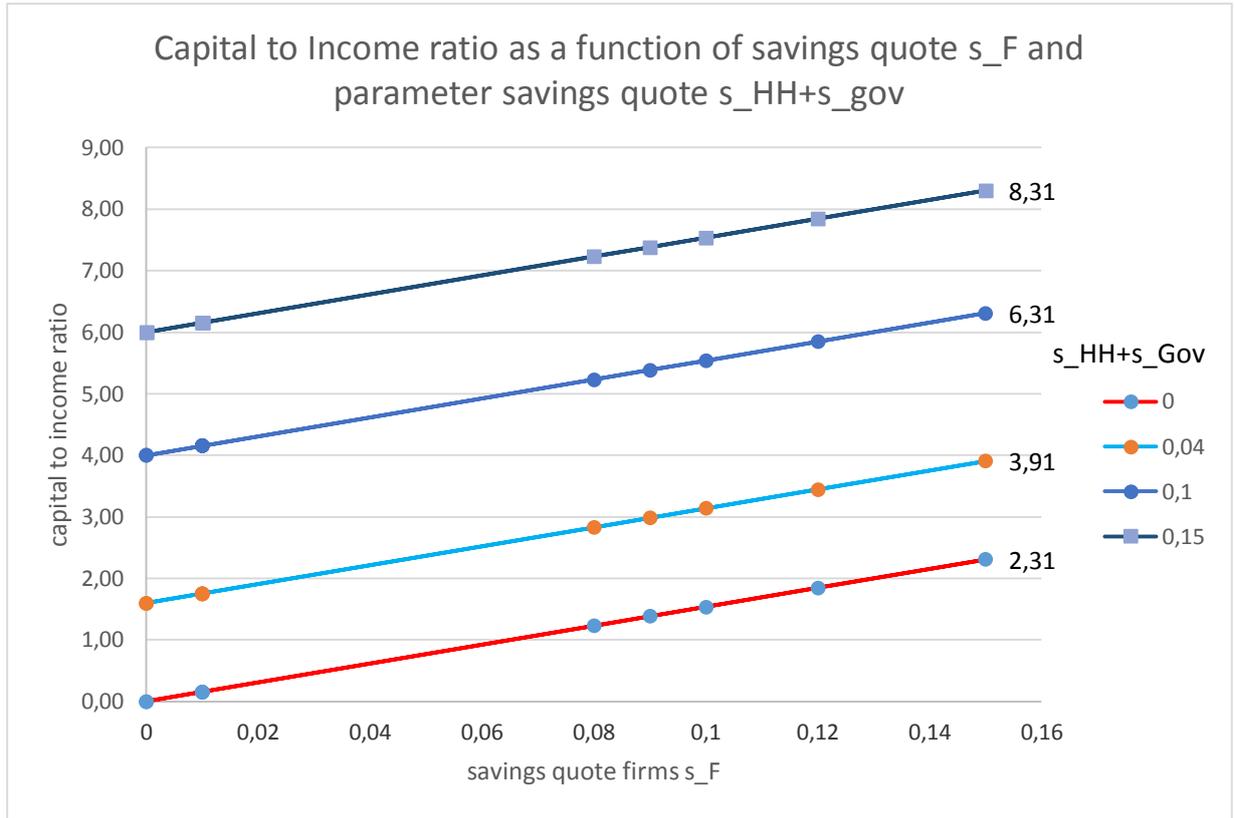


Fig. 1 Capital to income ratio as a function of the savings quote s_F and parameter s_{HH} , the other values the same as in example 1.

You might have the impression that savings quote can be chosen freely, but in case of s_F we can show that it is very likely that s_F depends on g . E.g. consider again a Cobb-Douglas production function then under optimal condition capital K_F is growing at the same speed as Y , leaving the ratio unchanged (de la Fontejjne, 2012).

From eq. 5 we derive $c_1 = c(g = 0) = 1 - \delta_F \frac{K_F}{Y}$ which results in

$$\frac{K_F}{Y} = \frac{(1-c_1)}{\delta_F} \quad (10)$$

This means that with eq. 4

$$s_F = (g + \delta_F) \frac{K_F}{Y} = \frac{(g + \delta_F)}{\delta_F} (1 - c_1) \quad (11)$$

The total ratio for a closed economy will become

$$\beta_t = \frac{(1-c_1)}{\delta_F} + \frac{s_{HH}}{g + \delta_{HH}} + \frac{s_{Gov}}{g + \delta_{Gov}} \quad (12)$$

Example 2: Values for Dutch situation in 2012 are close to $c_1 = .015$, $\delta_F = .05$, $\delta_{HH} = .015$, $\delta_{Gov} = .03$, $s_{HH} = .07$, $s_{Gov} = .045$ and $g = .015$ then the corresponding $s_F = .12$, $\beta_F = 1.70$, $\beta_{HH} = 2.33$, $\beta_{Gov} = 1.00$ and $\beta_t = 5.03$ (see fig. 2 for different values for c_1 and s_{HH}).

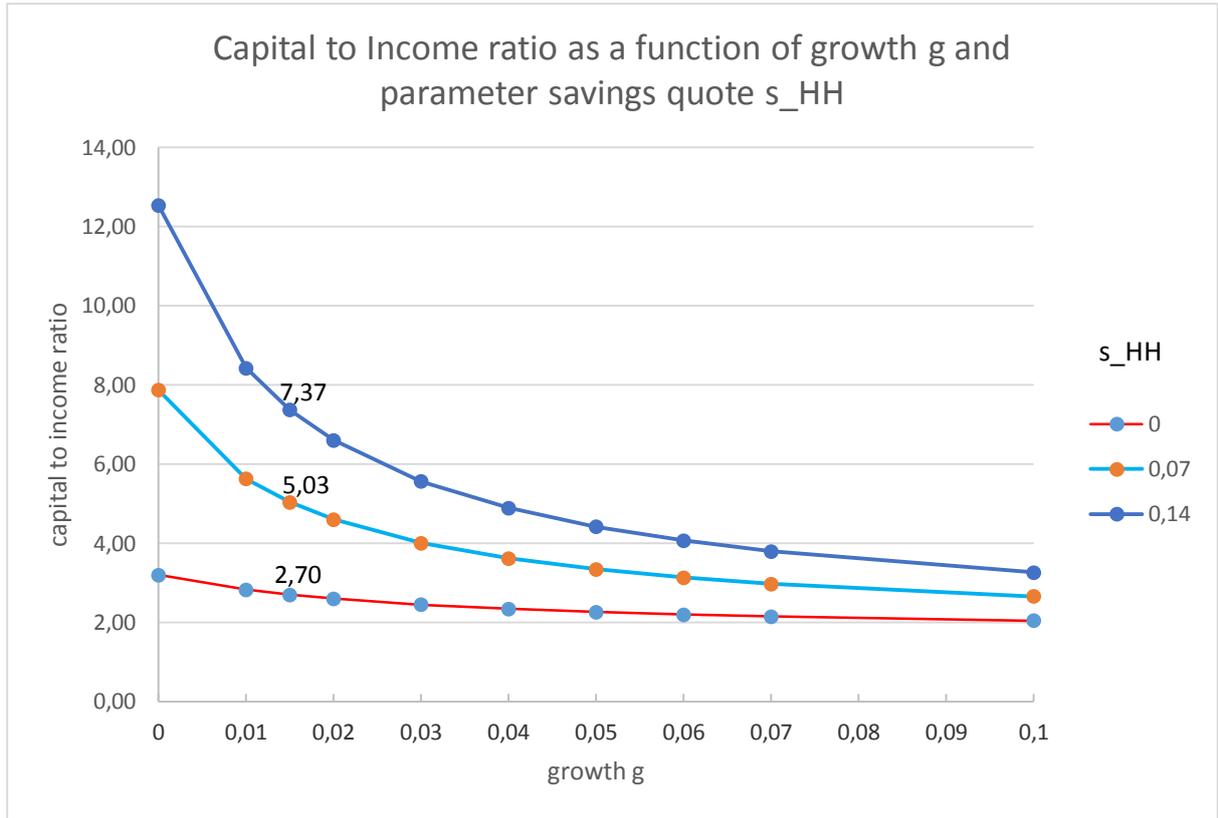


Fig. 2 Capital to income ratio as a function of g and parameter s_{HH} , the other values the same as in example 2.

It is plausible that an optimal value for K_{Gov} in relation to the economy is equal to a certain part γ of K_F . This means that

$$\beta_{Gov} = \gamma \beta_F \quad (13)$$

and the governmental savings quote

$$s_{Gov} = \gamma \frac{(g + \delta_{Gov})}{\delta_F} (1 - c_1) \quad (14)$$

Additionally if the economy is not closed we have to add the ratio of external capital β_{for} . In The Netherlands this is a substantial part, $\beta_{for} = .87$ and for the world it is a zero sum game.

In total the capital to income ratio for an economy will change to

$$\beta_t = (1 + \gamma) \frac{(1 - c_1)}{\delta_F} + \frac{s_{HH}}{g + \delta_{HH}} + \beta_{for} \quad (15)$$

For an estimate of the private capital-income ratio you can deduct the total governmental capital to income ratio from β_t . Financial net capital of the government is $K_{NFA_{Gov}}$, expressed as a fraction of income Y , then

$$\beta_{NFA_{Gov}} = \frac{K_{NFA_{Gov}}}{Y} \quad (16)$$

The final capital for income ratio for the private sector becomes the sum of eq. 15 and eq. 16

$$\beta_{priv} = \beta_t - \beta_{Gov} - \beta_{FAGov} \quad (17)$$

If c_{Gov} is the governmental consumption quote, then the consumers quote will result in

$$c''' = c - s_F - s_{HH} - s_{Gov} - c_{Gov} \quad (18)$$

Continuing our example 2 with $\gamma = .59$, $\beta_{NFA_{Gov}} = \frac{K_{NFA_{Gov}}}{Y} = -.42$ and $\beta_{for} = .87$ we calculate $\beta_t = 5.90$ and $\beta_{priv} = 5.43$

For the capital to income ratio for the households we deduct the total capital to income ratio of firms from β_{priv} . Financial net capital of companies is K_{NFA_F} , expressed as a fraction of income Y , then

$$\beta_{NFA_F} = \frac{K_{NFA_F}}{Y} \quad (19)$$

Be aware that the financial liabilities K_{NFL_F} of companies in the National Accounts includes equity of shares in third parties hands.

$$K_{NFA_F} = Liabilities + part\ of\ equity \quad (20)$$

The final capital to income ratio for households become

$$\beta_{HH} = \beta_{priv} - \beta_F - \beta_{FA_F} \quad (21)$$

In the consumer sector of this economy there will be, of course, additional debt and deposit positions, but it will sum up to zero outside the consumers sector. These additional debt and deposit positions can of course be an additional source of inequality. Moreover, we assume a financial world, which will take care for all necessary financial flows, in a Stock Flow Consistent way and with institution and mechanism for lending, borrowing, redistribution, inflation control, debt control, unemployment control, etc., in place.

Piketty (2014, fig III) showed the capital to income ratio of the UK from 1700 till 2010. Another way of explaining these dramatic changes over time is as follows. In 1700 a large part of K_F was land with depreciation rate equal to zero, allowing the capital to income ratio β_F to become fairly high. In the same picture we see the rest domestic capital to be slightly increasing from 1970 to 2010, meaning that $\frac{(1-c_1)}{\delta_F}$ is slowly increasing. On the other hand housing capital is strongly increasing, which means an attitude change towards a higher savings rate s_{HH} or a lower growth rate g , which is the main reasons for the increase in national wealth, because a dramatic change in δ_{HH} is not very likely. It will also be clear for the same reason that I cannot agree with the following statement of Piketty, and I quote:

In any event, it is important to point out that no self-corrective mechanism exists to prevent a steady increase of the capital/income ratio, β , together with a steady rise in capital's share of national income, α .

Moreover we think that a corresponding decline of r will withhold entrepreneurs to do business stopping the increase of the capital/income ratio β .

3. Criterion return rate on capital greater than growth rate of economy

Based on the previous formulas one cannot conclude that there will arise any form of inequality within consumers on purely macroeconomic grounds, even if it does happen.

At least you will need to differentiate between subgroups within households.

The following statement by Piketty is an attempt to it, I assume, and I quote:

If, moreover, the rate of return on capital remains significantly above the growth rate for an extended period of time (which is more likely when the growth rate is low, though not automatic), then the risk of divergence in the distribution of wealth is very high.

This fundamental inequality, which I will write as

$$r > g \tag{22}$$

(where r stands for the average annual rate of return on capital, including profits, dividends, interest, rents, and other income from capital, expressed as a percentage of its total value, and g stands for the rate of growth of the economy, that is, the annual increase in income or output), will play a crucial role in this book. In a sense, it sums up the overall logic of my conclusions.

In these words I believe to see a Marxian way of thinking, where the capitalists/firms/rich are opposite to the workers/poor. I have already shown that it is advisable to clearly distinguish between firms and capitalists (de la Fontejne, 2014-2). Capitalist and worker are then both in the consumer group and you have to distinguish at least these two groups to show any kind of inequality.

A second point is that r is meant as gross return on total capital, but that does indicate absolutely nothing for what is done with this profit. From a monetary point of view nothing can be saved in a closed economy, because savings equal investments. A large part of r has to be redistributed to the economy and has to be spend by the consumer. There can only be savings by making investments. This means that in this case $r > g$ has no meaning in relation to inequality. And precisely this is Piketty's most important point:

In a sense, it sums up the overall logic of my conclusions.

To my opinion this does not sum up to logic at all.

A third point is that r is calculated with respect to domestic capital, which is a rather arbitrary choice in my opinion. I prefer, as mentioned earlier, to use capital K_F . With $\alpha = .3$, the rate of return on capital will rise from $r = .05$ to $r = .17$, because of the change in the capital to income ratio, thus losing the connection with the value of g . If you realize that c_1 and s_{HH} can be chosen arbitrary, within limits, then it will be clear that the criterion $r > g$ cannot have a special meaning with regards to investment and capital to income ratio. And as a final argument, if $g = 0$ and $r = .17$ there still can

exits an economy, but again a growth per capita due to technological progress is much nicer to deal with. From the firms point of view we require at least $r_F > \delta_F$, with $r_F = \frac{\alpha}{\beta_F}$, to make profit.

A fourth point of concern is the definition of return on capital. In order to make the definition more general and suitable for all economy sectors, subsectors or individuals it is better to discriminate between the capitals of those sectors, e.g. the way we did, and if you do so to subtract for interest, etc. paid on liabilities. At some point in his book Piketty is using his equation for individual wealth, calculating a net (of spending) rate of return and he is comparing that rate with the growth rate of the economy. Also in this case we don't feel very comfortable, but because the formulation is not precise enough we will skip that part.

The inequality $r > g$ is often used in governmental debt sustainability analyses to show that we are not dealing with Ponzi scheme and/or explosive debt levels, with r the real interest rate, but in the mentioned case, as pointed out, r is not a real net growth level.

If we look at the short-term and long-term trend of fig. 5.3 of Piketty then we see a volatile capital-income ratio in the short run, caused by bubbles and wars, but the long-term trend is upwards. The latter may be due to technological progress or another choices for c_1 and s_{HH} . Once you have eaten enough bread, you can choose whether you want to spend an increasing proportion of your income to bricks or health care, to name but one example. In the one case the ratio increases and in the other case it does not.

4. Savings and capital to income ratio at the individual level

So far we discussed savings and capital to income ratios at the national, the private, the firms and the consumers level. We now will look into the individual level within the consumers group. As an opening to an alternative way of thinking I'll invite you to the following thought experiment. Suppose we take two consumers groups, consumer group C_A has more capital than group C_B , which differences are the result of differences in income, savings, interests, dividends, spending, taxes, etc. It is obvious that if one of these groups has a net saving rate \tilde{s} greater than growth g then this group will become unsustainable rich. Members of these groups may even switch positions from rich to poor and vice versa. It all depends on their behavior and possibilities as a consumer.

Suppose within consumers we have additional financial capital distribution K_{FAA} and K_{FAB} for the two groups C_A and C_B due to savings for pension, mortgages for houses, etc. Let e.g. the interest rate be r_C and the net saving rate \tilde{s}_{C_A} and \tilde{s}_{C_B} .

$$K_{FA_{C_A}} = -K_{FA_{C_B}} \quad (23)$$

$$\beta_{FA_{C_A}} = -\beta_{FA_{C_B}} \quad (24)$$

and

$$\tilde{s}_{FA_{C_A}} = -\tilde{s}_{FA_{C_B}} \quad (25)$$

which means that there will be no influence on consumption due to these savings.

The capital income ratio is

$$\beta_{FAC_A} = \frac{\bar{s}}{g} \quad (26)$$

The total ratio for consumers C_A and C_B is determined by splitting β_{HH} into a part for C_A and a part for C_B and to calculate

$$\beta_{t_{C_A}} = \beta_{HH_{C_A}} + \beta_{FAC_A} \quad (27)$$

and

$$\beta_{t_{C_B}} = \beta_{HH_{C_B}} + \beta_{FAC_B} \quad (28)$$

The question then is, can the capital to income ratio indeed grow without limit when the growth g will go to zero, as eq. 18 is suggesting, and how can it, apart from inequality itself, effect the real economy and particularly, can it cause unemployment, which is one of the most important things in society to avoid.

When a financial asset is created (deposit) then the counterpart is a financial liability (debt). Even if we assume that money is created endogenously it is limited due to budget constraints, bank requirements and restrictions or downward pressure by means of the interest rate of the central bank. Suppose we have, at a certain moment in time, a feasible and sustainable redistribution, then a higher interest will eventually limit interest payments due to violations or budget constraints. Another way of looking at a growing deposit is to wonder what the debtors did with all that money. There are only two ways of spending it. One is to consume, but then the other group have to consume less since we assume an optimal size of the economy. This has no effect on the economy as we argued before. The other possibility is to buy existing goods, e.g. houses, but then it is limited to the total of real assets as calculated in the ratio β_t , because what more can you buy. Even with rapid rising real assets prices it is in the end limited, because it has a relation to the rebuilt value. Another way of limiting deposits is by restricting debt to the limit where there is a limited risk for not meeting the payback obligations including interest and by demanding a down payment when buying a house and ensuring that the house itself can serve as a collateral.

An overall more holistic reasoning is that in a certain growing economy the earning power of that economy is limited and so are the real assets produced by that economy and that will restrict the capital to income of no matter which group in society, because beyond every debt there has to be enough collateral or payback capacity. And in fact that's all what matters.

We conclude that in all cases the capital to income ratio is limited for fundamental and natural reasons.

We now turn to whether debt can harm the real economy. In most cases there is a severe built up in debt before crises and we know that an extreme austerity program is not the most optimal strategy to go, because of the negative impact on growth. From the historical data it is also clear that it will take a long time to recover from high debt levels.

If an external debt has become too high, then interest rate might go up and may even lead to a vicious circle if you need to refinance the interest too, because of a lack of earning power, in which case it is easy to understand that it will lead to an unsustainable situation.

In case we built more houses in a certain period, for which we need mortgages, then it will take normally at least 20 to 30 years to reduce those specific debts, which also illustrates the time dynamics of debt.

Another point Piketty is referring to is the focus on mathematics and models by economist, and I quote:

To put it bluntly, the discipline of economics has yet to get over its childish passion for mathematics and for purely theoretical and often highly ideological speculation, at the expense of historical research and collaboration with the other social sciences. Economists are all too often preoccupied with petty mathematical problems of interest only to themselves. This obsession with mathematics is an easy way of acquiring the appearance of scientificity without having to answer the far more complex questions posed by the world we live in. There is one great advantage to being an academic economist in France: here, economists are not highly respected in the academic and intellectual world or by political and financial elites. Hence they must set aside their contempt for other disciplines and their absurd claim to greater scientific legitimacy, despite the fact that they know almost nothing about anything. This, in any case, is the charm of the discipline and of the social sciences in general: one starts from square one, so that there is some hope of making major progress.

In France, I believe, economists are slightly more interested in persuading historians and sociologists, as well as people outside the academic world, that what they are doing is interesting (although they are not always successful).

Also Keen in his book, 'Debunking Economics' has a similar remark. To put it into perspective, let's not focus only on historical data, because there is a lack in theory, in order to model only what has been. We are convinced that the theoretical part of our understanding of economy can be improved a lot.

5. Conclusion

We cannot agree with Piketty's first and second law of capitalism and present alternative formulas. We did not find such a strong impact from the growth of the economy to the capital to income ratio.

The capital to income ratio on a national or private sector base does depend on a more or less free choice, within limits, of the consumption quote at zero growth and the savings quote of households. The ratio also depends on the depreciation rates and economy growth.

We found the capital to income ratio to be limited in all cases by the earning power of the economy. A direct effect is, that in the end, there does not exist such a thing as diminishing return on investment due to extreme growing of capital. We like to point out that we prefer to restrict the term return on investment with respect to capital used as a factor of production, on the national, the private sector and firm level.

As soon as we also deal with financial assets and liabilities then we have to take inflation into account too, to calculate the long term capital to income ratio. In this paper we did not do so.

Piketty's book contains a lot of interesting data, which we did not evaluate nor criticize because it would be beyond the scope of this paper and beyond our ability.

The inequality $r > g$ is in our opinion not a meaningful equation with respect to inequality.

6. Acknowledgement

This paper is part of a study to reduce unemployment in a sustainable way whilst keeping governmental debt within sustainable limits and improve prosperity. In our opinion this is one of the most important things to achieve in society from a macro economic and from a participation society point of view. We are convinced we can provide a feasible solution to this problem as part of a sustainable society.

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