



## Discussion Papers

### Faculty of Management Science and Engineering

ISSN 2198-2015

Hagen Krämer<sup>1</sup>

## Inequality dynamics with different saving ratios

A necessary amendment of the Piketty condition  
 $r > g$  for increasing wealth concentration

### Abstract

In this paper it is argued that Piketty's "fundamental laws" and the "central force of divergence" will hold independently of any economic paradigm. Therefore, neo-classical growth and distribution theory is not a necessary building block for Piketty's theory of increasing wealth inequality. However, certain additional conditions must hold, if " $r > g$ " is to result in a rising unequal wealth distribution. The paper focuses on different saving ratios between two groups and shows that the dynamics of wealth inequality depends on two main conditions: First, wealthy households must have a higher saving ratio than poor households. Second, depending on certain parameters, the saving ratio of the rich must be high enough to generate a dynamic process in which wealth is becoming ever more concentrated.

A threshold for the saving ratio of the rich is then calculated and the model is tested with empirical values. The finding is that the threshold value is rather high in Germany (not so much in the US and UK). In Germany, the empirical values for saving ratios of the top 10% or top 1% are much lower than the necessary threshold values for rising wealth disparity. Several studies found saving ratios of the top 10% and for the top 1% in Germany to be 17% and 38%, resp. However, taking into consideration Piketty's specific definitions for capital and for savings, it is not totally implausible that these thresholds will be met in reality. This is true in particular for the second half of this century when  $g$  is forecast to be much lower than today.

### Key words

Wealth distribution, income distribution, inequality dynamics.

<sup>1</sup> Karlsruhe University of Applied Sciences, Moltkestraße 30, D-76133 Karlsruhe.  
hagen.kraemer@hs-karlsruhe.de



**Imprint**

**Number: 1/2015**

**Editor:**

**Faculty of Management Science and Engineering**

**Karlsruhe University of Applied Sciences**

**Moltkestraße 30**

**76133 Karlsruhe**

**Germany**

<http://www.hskarlsruhe.de/fakultaeten/w/lehreundforschung/veroeffentlichungen/diskussionsbeitraegederfakultaetfuerwirtschaftswissenschaften.html>

**ISSN 2198-2015**

## 1 Introduction

For a long time the inequality of income and wealth has hardly been addressed in economic research. Piketty's "Capital in the Twenty-First Century" is a work that places the development of economic inequality in its many facets in historical perspective. It covers important macroeconomic questions on the long-term dynamics of growth and long-term development of income and wealth, as well as their mutual relation in a historical context. This is undoubtedly an important and relevant book. However, it also raises a number of questions and problems. One of the problematic issues in Piketty's book is the fact that he does not specify the central (mathematical) inequality which he has identified as the crucial condition for the development of inequality (of income and wealth) clearly enough. I am referring to the *Piketty condition*  $r > g$ , which has meanwhile become quite famous and, according to Piketty, causes the concentration of income and wealth to increase in the long term if the return on capital ( $r$ ) is larger than the rate of growth of the economy ( $g$ ).

Piketty mentions at different points in the book that the condition for the increase in inequality was merely that  $r$  has to be *significantly* larger than  $g$ . He writes for example: "[...] the crucial point is that a strong  $r - g$  inequality automatically leads to extreme concentration of wealth" (Piketty 2014a: 480)<sup>1</sup>. This is combined with reference to the empirical fact that in all countries wealth is concentrated more strongly than income and that therefore a sufficiently large difference between  $r$  and  $g$  was responsible for the development of wealth inequality. One reason for Piketty's reference to the necessity of a "strong inequality  $r - g$ " is that not all capital income is reinvested. Taking into account that a part of capital income is used for consumption, the inequality  $r > g$  is modified to  $s_K r > g$  (with  $s_K$  being the saving ratio of capital income). Piketty is well aware of this quasi self-evident specification, he clearly shows this at several points in his book (for example Piketty 2014: 351, 361).<sup>2</sup>

As this article aims to show, there are however additional conditions to a positive difference between  $r$  and  $g$  and taking into account the saving ratio of capital income which must be met, for it to lead to an "automatic" increase in the concentration of income and wealth. Many comments in the book indicate that Piketty is well aware of the additional conditions. Predominantly, however, he only mentions the simplified inequality  $r > g$ . One of the reasons for this could be that Piketty wanted, in a popular and memorable way, to get his message across of a threateningly looming path towards a "patrimonial society" in which un-

---

<sup>1</sup> Author's translation from the German edition. The sentence is missing in the English edition of Piketty's book.

<sup>2</sup> In that regard, the objections of Sinn (2014) and Homburg (2014) which insinuate that Piketty obviously forgot this condition and his claim of a rising inequality could not be true due to this alone, go nowhere.

---

earned incomes (e.g. inheritance and rents) become increasingly important and threaten the social and democratic cohesion. He obviously succeeded.

There could be another possible reason for Piketty not naming the decisive and concrete conditions for the creation of inequality dynamics specifically either in his book or in his preliminary theoretical publications: A central condition which at best is hinted at in the book is that different saving ratios for different groups within the population must exist, so that under certain further conditions long term inequality dynamics in income and wealth can result. That Piketty does not address this further might simply be linked to the fact that he presents his so-called fundamental laws and his central force of divergence based upon the theoretical framework of the neoclassical growth and distribution theory.<sup>3</sup> In this model usually some simplifications are made which result, for example, in not differentiating between two different groups (“the rich” and “the poor”) with differing saving ratios. As this paper tries to show in the next section, this however is one of the essential preconditions for the creation of an endless inegalitarian spiral.<sup>4</sup> Moreover, the magnitudes of the saving ratios and the respective share of the total income, respectively the total wealth which the groups have, are of decisive importance. This paper shows that the mechanism of unequal wealth accumulation “discovered” by Piketty can be developed without recourse to the neoclassical theory. Depending on the constellation of certain parameters an ever greater concentration of income and wealth can indeed occur. The paper ends with a critical appraisal of Piketty’s work and some reflections on (economic) policy measures.

---

<sup>3</sup> On his theoretical background see as well Piketty/Zucman (2014) and Piketty/Zucman (2015).

<sup>4</sup> Similar to the idea presented below Saez/Zucman (2014, pp. 27) consider different saving ratios of poor and rich households as one of the decisive factors behind an unequal wealth accumulation.

## 2 Dynamics of wealth inequality

### 2.1 Piketty's laws of inequality

In his book "Capital in the Twenty-First Century" Piketty introduces two so-called "fundamental laws of capitalism". He also identifies a "fundamental force of divergence" for income and wealth distribution.

In the "first fundamental law", the share of capital income ( $P$ ) of the national income ( $Y$ ) is denoted  $\alpha$  and defined as the product of the return on capital ( $r$ ) and the ratio of total net capital ( $K$ ) and national income ( $Y$ ). Piketty denotes the resulting capital-income ratio with  $\beta$ :

$$\alpha = P/Y = rK/Y = r\beta \quad (1)$$

Piketty looks at the long term. In this case it concerns equilibrium *steady-state growth paths* where relevant variables either grow constantly or certain relations of these variables remain stable. The concept of steady-state paths is not limited to neoclassical models. In this respect, the use of such a concept does not automatically bind to a specific economics paradigm. The differences in the various theories come about mainly because views diverge on what the cause-and-effect relationships between the model variables are. A central line of conflict between neoclassical economists and Keynesians, for example, lies in the direction of effect between saving and investment. Keynes assumed that investment decisions are autonomous and thus determine the amount of savings in an economy. Neoclassical economists see this reversed.

For Piketty the saving ratio is also an independent variable (probably, as usual in the neoclassical framework, determined by the autonomous savings decisions of households). The long-term growth of the economy is determined on the supply side by the growth of the (working) population and the autonomous growth rate of labor productivity. The capital-income ratio adapts to this in the long term. In the long-term equilibrium of supply and demand (*steady state*), according to the "second fundamental law",  $\beta$  converges against the relation of macroeconomic saving ratio ( $s$ ) and the nominal growth rate of national income ( $g$ ):

$$\beta = s/g \quad (2)$$

Piketty derives from his empirical data that historically the return on capital ( $r$ ) was almost always greater than the growth rate of national income ( $g$ ). This means that wealth tends to rise faster than labor income if the owners of wealth save a sufficient share of their income. Under certain conditions, a growing capital-income ratio ( $\beta$ ) results and thus a growing share of capital income in national income ( $\alpha$ ), which together with other requirements ultimately implies a greater income inequality. Of central importance is Piketty's assumption that the

---

growth rate ( $g$ ) will decrease in the future, while the saving ratio will remain more or less constant. In the long run  $\beta$  converges against another equilibrium value in a new steady state.

Piketty almost exclusively emphasizes the condition  $r > g$  as a prerequisite for dynamics of inequality to evolve. This has caused a number of critical comments in the debate on his theory. However, at various points Piketty himself refers to the fact that an indispensable condition for increasing wealth concentration is that the recipients of capital income have to save, that is reinvest, a larger part of their income.

The fact that the return on capital is distinctly and persistently greater than the growth rate is a powerful force for a more unequal distribution of wealth. For example, if  $g = 1$  percent and  $r = 5$  percent, wealthy individuals have to reinvest only one-fifth of their annual capital income to ensure that their capital will grow faster than average income. (Piketty 2014: 361)

With such a difference between  $r$  and  $g$ , as illustrated by Piketty in his example, owners of wealth with a saving ratio of slightly more than 20 percent is sufficient to allow capital income to grow faster than labor income. In addition, increasing income and wealth concentration can only occur when wealth is distributed unevenly across all households. Because in fact Piketty sees this as a given, these two conditions alone suffice for him to derive a trend towards growing inequality.

It can be shown, however, that a positive difference between  $r$  and  $g$  is not crucial for a growing inequality of wealth.<sup>5</sup> Rather, it is relevant that the earners of high incomes and the owners of great wealth have a sufficiently higher saving ratio than people with low incomes and wealth. This has already been pointed out by different authors. As will be shown below, it is necessary to additionally take into account the particular starting level of the shares of income and wealth respectively. Under clearly definable conditions, a dispersion of wealth and income then increases further. The decisive factor is the saving ratio of the rich. Only if they save and accumulate enough, will the growth of capital income be higher than the growth of total income.

---

<sup>5</sup> Ray (2014: 5) puts it in a nutshell: „Piketty’s Third Law has been known to economic theorists for at least 50 years, and no economic theorist has ever suggested that it ‘explains’ rising inequality. Because it doesn’t. [...] You need something else to get at rising inequality.“

## 2.2 A specified Piketty condition for the increase of inequality

To show this, the fundamental mechanism of wealth divergence is now presented in an expanded Piketty model. Concretely in the following the question of which conditions must be met for an increased wealth concentration to occur is explored. First the representation of Aspromourgos (2014) is followed, which shows a relevant specification of the conditions under which a tendency for an increasing wealth inequality results. On the one hand, Piketty's deliberations are amended in that two groups are presumed which are defined by different shares in total income as well as in total wealth. With Pasinetti (1962) the consideration that workers also receive return on capital has entered the theory of distribution. If one further takes into account that capitalists can also receive labor income, it seems reasonable to create two groups which are not defined by their function in the production process, but rather according to their shares of income and wealth respectively.

Therefore society is split into the smaller group of "the rich" and the larger group of the rest of the population, which for the sake of simplicity will be referred to here as "the poor". Rich is defined here as rich in wealth.<sup>6</sup> Here we are not considering wealth increases due to capital gains nor the possibility that wealth can be destroyed through wars or economic crises. Additionally – and not unimportantly – wealth or capital gains taxation is disregarded for the time being.

The rich and the poor save different amounts of their respective incomes. It is plausible to assume and has many times been shown empirically that the saving ratio of the rich ( $s_R$ ) is higher than the saving ratio of the poor ( $s_A$ ) (cf. for Germany for example Brenke/Wagner 2013, Fichtner et al. 2012)<sup>7</sup>. The part of the total *income* ( $Y_t$ ), labor plus capital income, which the rich have at the beginning of the observation period, is denoted as  $a$ . The part of total *wealth* ( $K_t$ ) which the rich have at the beginning of the period is accordingly referred to as  $b$ .<sup>8</sup> The savings of the rich are given by  $s_R a Y_t$ . The growth of the wealth of the rich in the observation period can be described as follows:

$$s_R a Y_t / b K_t = s_R (a/b) / \beta_t \quad (3)$$

<sup>6</sup> This definition was selected because wealth and the wealthy are the focus of Piketty's attention. The congruency of the group of those rich in wealth with those rich in income is far from 100 percent, but it is high and increasing. Atkinson (2014: 31 f.) indicates that in 2000 in the US about half of the people who belonged to the top 1 percent of income receivers, also belonged to the top 5 percent of the receivers of capital income and compares: "The degree of association increased between 1980 and 2000" (ibid.). cf. also Piketty (2014: 321 and 334).

<sup>7</sup> The saving ratios for groups of households which are rich or poor with regard to income (not with regard to wealth) are given. There is no data available on the saving ratios depending on wealth groups.

<sup>8</sup> Note that the shares  $a$  and  $b$  can of course change over the course of time.

The growth of the wealth of the poor on the other hand results from:

$$s_A(1 - \alpha)Y_t/(1 - b)K_t = s_A[1 - a]/(1 - b)]/\beta_t \quad (4)$$

The growth of the wealth of the rich is higher than the growth of the wealth of the poor if:

$$s_R(a/b)/\beta_t > s_A[(1 - a)/(1 - b)]/\beta_t \quad (5)$$

respectively, if:

$$s_R/s_A > [b/(1 - b)] * [(1 - a)/a] \quad (6)$$

$s_R > s_A$  is an empirically verified fact. A whole series of different values for  $a$  and  $b$  fulfill the inequation (6).<sup>9</sup> If equation (1) is now substituted into equation (3) one receives:

$$s_R a Y_t / b K_t = s_R (a/b) r_t / \alpha_t \quad (7)$$

In the next step one finally arrives at the decisive *inequation for rising inequality*. The wealth of the rich grows faster than total income if:

$$s_R (a/b) r_t / \alpha_t > g_t \quad (8)$$

Rearranged to give the saving ratio of the rich:

$$s_R > \alpha_t * (b/a) * (g_t / r_t) \quad (9)$$

Inequation (9) basically defines the threshold value for a growing inequality. This threshold is surpassed if the saving ratio of the rich is larger than the expression  $\alpha_t * (b/a) * (g_t / r_t)$ .

There is now an entire selection of theoretical possibilities for fulfilling this inequation. First for simplicity's sake the assumption is made that  $r_t = g_t$ . Under this condition inequation (9) simplifies to:

$$s_R > \alpha_t / (a/b) \quad (10)$$

The threshold value for a growing inequality is only exceeded if the saving ratio of the rich is larger than the expression  $\alpha_t / (a/b)$ .<sup>10</sup>

<sup>9</sup> Aspromourgos (2014) assumes that  $a > b$ , which would mean that the share of income of the rich is typically larger than their share in wealth. However in reality this is normally not the case, since as a rule assets are even more concentrated than incomes. In Aspromourgos (2015) this assumption is corrected, meaning he rightly assumes  $b > a$ . This is also in accordance with Piketty's findings (cf. Piketty 2014: 322).

<sup>10</sup> According to Taylor (2014) the condition for an increasing concentration of wealth is simply that the saving ratio (of the entire economy) is larger than the profit share. Since the issue studied in this case however is the conditions for the stronger wealth increase among the group of the rich, the ratio of  $a$  to  $b$  is also relevant. For the case that  $a$  is smaller than  $b$ , the threshold value of the saving rate from which inequation (10) is fulfilled is accordingly higher.



### 2.3 Saving ratio and inequality dynamics – a simple empirical comparison

Using a simple plausibility consideration, in which the respective empirical values for the variables in inequations (9) and (10) are used to calculate the threshold value of the saving ratio of the rich, this condition will now be further reviewed. For this, the empirical values are used which are provided by Piketty himself, as far as available.

Referring to "the rich", as a first step one assumes that they correspond to the richest ten percent of households (top 10 percent). Then, for example, in Germany currently (Piketty's most current values relate to the year 2010) around 36 percent of total income flows to this group (see Piketty 2014, figure 9.7).<sup>11</sup> The variable  $a$  therefore has a value of 0.36. On the other hand, the wealthiest ten percent of households in Germany own about 66 percent of total wealth (see Grabka/Westermeier 2014). Thus, the variable  $b$  is assigned the value 0.66. Accordingly,  $b > a$  and the ratio  $a/b$  is about 0.55.

When using the values from the empirical example of Germany, in order to determine the threshold value of the saving ratio, i.e.  $a = 0.36$  and  $b = 0.66$  and for the profit ratio  $\alpha_t = 0.32$  (see Piketty 2014, figure 6.5), the wealth of the rich grows faster than total income if the so-defined group of the rich saves around 59 percent of their income. Such a high saving ratio can be found at most in the upper tail of the distribution, not on average in the top decile. However, it should be remembered that this value for the saving ratio of the rich has been derived under the assumption that  $r = g$ . The more the growth rate of capital ( $r$ ) exceeds the growth rate of total income ( $g$ ), the smaller the saving ratio necessary to cause a disproportionate increase in wealth.

To further investigate Piketty's assumption about the increasing concentration of wealth in the future, we use the values of  $r$  and  $g$  predicted by him for the rest of this century. Piketty divided this period into the two sub-periods 2012-2050 and 2050 to 2100. If  $r = 4.3$  percent and  $g = 3.3$  percent, as Piketty assumes for the period 2012-2050 (see Piketty 2014, figure 10.9), the corresponding saving ratio, necessary to meet the inequation (9) is around 45 percent, which is still quite high.<sup>12</sup>

Table 1 shows the comparison of the corresponding threshold values for saving ratios in the US and in the UK. These are lower than the value for Germany. The main reason for this is that the shares the top 10 percent in the US and in the UK have in total income (labor plus capital income) are higher (USA: 47.9 percent, UK: 41.6 percent) than in Germany (36.1 percent).

<sup>11</sup> The individual values on which the figures are based were taken from the technical appendix to Piketty (2014): <http://piketty.pse.ens.fr/files/capital21c/en/xls>.

<sup>12</sup> In Piketty (2014) these values of  $r$  and  $g$  correspond to the global average. For a developed economy like Germany both values should probably be set lower. As Piketty does not specify on this and as the difference between  $r$  and  $g$  is crucial, Piketty's values were used as given.

Table 1: Threshold values for the saving ratios of the rich (top-10-percent)

	Germany		USA		UK	
	2012–2050	2050–2100	2012–2050	2050–2100	2012–2050	2050–2100
$a$	36.1	50.0*	47.9	60.0*	41.6	55.0*
$b$	66.0**	72.0*	71.5	80.0*	70.0	73.0*
$\alpha$	32.0	38.0*	29.0	35.0*	27.0	33.0*
$r$	4.3	4.3	4.3	4.3	4.3	4.3
$g$	3.3	1.5	3.3	1.5	3.3	1.5
$s_R$	44.9	19.1	33.2	16.3	34.9	15.3

Source: The parameter values ( $a$ ,  $b$ ,  $\alpha$ ,  $r$  and  $g$ ) are – if available – taken from Piketty (2014). \* estimate, \*\* Grabka/Westermeier (2014). Percentage values.

Empirical values for saving ratios by household groups in Germany are well below the value of 45 percent derived above for  $s_R$  in Germany. Brenke/Wagner (2013: 114) calculate an average saving ratio of 17 percent for the top decile based on data from the German Socio-Economic Panel (SOEP).<sup>13</sup>

In the period 2050-2100 in Germany following the above assumptions, however, a saving ratio amounting to just over 19 percent is enough to satisfy inequation (9). The main reason for this is that, according to Piketty's speculation, the economic growth rate of 3.3 percent will fall to only 1.5 percent on average in this period, while the return on capital ( $r$ ) will remain unchanged. Assuming that, at the beginning of the period in 2050, the shares of  $a$  and  $b$  will be at a higher level than currently, this results in a threshold value for Germany of the saving ratio of the top 10 percent of about 19 percent. In the US, the threshold value will decrease to roughly 16 percent and in the UK to about 15 percent. Assuming similar saving ratios for the top decile in all countries, the modified Piketty condition for an increasing concentration of wealth is not clearly met, at least on the basis of the deliberations made so far.

Table 2 shows the threshold values arising from inequation (9) for the saving ratios of the top 1 percent in the three selected countries. Klär/Slacalek (2006) calculate a saving ratio of 38 percent for the top 1 percent in Germany.<sup>14</sup> The threshold value for the saving ratio of the top 1 percent is around 54 percent and is thus also not achieved here. For the USA and the UK the corresponding threshold values are significantly lower at about 38 to 39 percent, but also not near the saving ratio which the highest percentile in Germany had in 2005. This means that the actual saving ratios in Germany are below the respective threshold values, so

<sup>13</sup> It can be assumed that the saving ratio among recipients of top incomes within the tenth decile is considerably higher. Empirical data on median values for the top decile are not available. However, it is not plausible to assume that even this saving ratio is above 45 percent.

<sup>14</sup> Calculation based on the data of the sample survey of income and expenditure (EVS) for the year 2005. Very high incomes are generally not included in the EVS.

that the share of wealth of the rich (both defined as the top 10 percent as well as defined as the top 1 percent) in Germany would not increase.

Table 2: Threshold values for the saving ratios of the rich (top-1-percent)

	2012–2050		
	Germany	USA	UK
$a$	11.2	19.8	14.7
$b$	24.4*	33.8	28.0
$\alpha$	32.0	29.0	27.0
$r$	4.3	4.3	4.3
$g$	3.3	3.3	3.3
$s_R$	53.5	38.0	39.5

Source: The parameter values ( $a$ ,  $b$ ,  $\alpha$ ,  $r$  and  $g$ ) are – if available – taken from Piketty (2014). \*estimate (average for Europe). Percentage values.

The calculations of threshold values for the necessary saving ratios of the rich presented in the table above lead to the conclusion that the mechanism of wealth divergence alleged by Piketty does in fact only occur under conditions at present deemed unrealistic. If one follows the results, on the one hand, the development of inequality would start rather in the second half of the century, when the growth rate ( $g$ ) will have decreased significantly. On the other hand, probably only a relatively narrowly defined group of the rich would experience the relative increase in their wealth compared to total income. It appears more likely that the richest 0.1 percent of households have such a high saving ratio that lies above the critical threshold for dynamics of inequality.<sup>15</sup>

However, verifying theoretical models with empirical values is generally faced with the difficulty that the respective variables in theory and in reality rarely correspond (the so-called adequation problem). In the present case the saving ratio is particularly affected.<sup>16</sup> Aspromourgos (2014) explicitly warns against equating Piketty's saving ratio with an empirical saving ratio.<sup>17</sup> If, despite that, one compares empirically determined saving ratios with those from Piketty's model, the following points must be taken into account, which tend to support Piketty's assertion of an increasing unequal wealth distribution:

<sup>15</sup> In Germany, 0.1 percent corresponds to approximately 39,900 households.

<sup>16</sup> Piketty defines his saving ratio as net saving ratio, i.e. after deduction of capital depreciation (see, for example, Piketty 2014: table 5.3). Depreciation in Germany between 1970 and 2010 accounted on average for more than half of gross savings.

<sup>17</sup> “[...] to employ this  $\beta$ , together with measures of  $g$ , to infer an empirical saving ratio is strictly invalid. Piketty's  $s$ , at best, will be an aggregate measure of saving plus capital gains, relative to income.” (Aspromourgos 2014: 4).

1. The information on savings in the SOEP, whence the empirical saving ratios previously used for Germany mainly originate, have some systematic bias. For one thing, high incomes and hence high savings are insufficiently covered. It is to be assumed that the average saving ratio of the top 10 percent and of the top 1 percent, and the still higher income quantiles are considerably higher than expressed by the existing data.
2. Secondly, in the SOEP the accumulation of wealth is not fully taken into account. This is significant in the context of this study because Piketty's capital and wealth definition also includes real estate, accounting for about half of national economic assets. Due to the special phrasing with which the SOEP asks about the amount of (monthly) savings, the households do not see repayments for real estate loans, which represent financial asset accumulation, as savings.<sup>18</sup> Since slightly more than half of German households do not own real estate, especially the saving ratio of the richer real estate-owning households is underestimated. In addition, annually accrued capital income, such as dividends, is not adequately taken into account by this type of question. Of these, the rich households benefit disproportionately, so their savings are also underestimated for this reason.<sup>19</sup>
3. As Piketty emphasizes at various points, the rich achieve a higher return on their capital than average. Therefore, a higher return on capital should be used for the rich than the average of 4.3 percent specified by Piketty.<sup>20</sup> If, for example, one assumes a return on capital for the top 10 percent of 6 percent, the threshold value of the saving ratio of 45 percent in Germany, is, *ceteris paribus*, reduced to about 32 percent. For the top 1 percent, it drops correspondingly from 54 percent to about 38 percent.
4. Piketty (2014: pp. 176) points out that part of the formation of savings takes place in companies. Retained profits of companies have a considerable volume in some countries. In the US, companies contributed at least 40 percent of total private savings in the period from 1970 to 2010, in Germany just under a quarter (ibid.: table 5.2). Behringer/Theobald/van Treeck (2014) estimate shares of top incomes, which take into account retained profits of enterprises and are therefore significantly

---

<sup>18</sup> The relevant question is: "Do you usually have money left over at the end of the month that you can put aside for larger purchases, emergencies, or to build savings? If so, how much?" (TNS Infratest Sozialforschung 2012: question 52).

<sup>19</sup> Comparisons of DIW, however, have shown that the saving ratio of the SOEP does not deviate very strongly downward of the saving ratio of the national accounts in the long-term average. (cf. Fichtner et al. 2012: 5 f.).

<sup>20</sup> Piketty (2014: pp. 431) deems average interest rates from 6 to 7 percent realistic. However, this only applies for extremely great wealth. He gives the return on capital of the richest twenty millionth respectively hundred millionth of the population. The latter would today be some 225 adults worldwide.

higher. They assume that companies are predominantly owned by richer households. According to this assumption, the saving ratios of the rich households would also be significantly higher than the saving ratio which can be calculated based on SOEP data.

Not considered so far is that, according to Piketty: (2014: pp. 377), the concentration of wealth will be exacerbated in the future by a growing volume of inheritances and reduced household sizes. Capital gains have also not been included. These influencing factors could not be treated in the previous model, although they tend to loosen the otherwise close relationship between savings and wealth accumulation in favor of rich households.

In light of all these factors the probability of Piketty's notion of the dynamics of wealth divergence being set into motion is much higher. Whether it actually arises depends on the parameters above. Furthermore, even if they do occur, the dynamics of wealth and income inequality are not an undisputable law, as it is sometimes referred to (cf. e.g. Paqué 2014). Critical to the accumulation of capital is in fact the return on investment after taxes which has been left out up until now. If  $t$  is a proportional tax rate on capital income, inequation (9) can be amended to:

$$s_R > \alpha_t * (b/a) * [g_t / (1 - t)r_t] \quad (11)$$

The higher the taxation, the greater, other things being equal, the saving ratio has to be so that an unequal wealth accumulation develops. To illustrate this with an example using the values for Germany from table 1: Setting the tax rate at 25 percent increases the threshold value of the saving ratio for the period 2012 to 2050 from 45 percent to 60 percent and for the period 2050-2100 from 19 percent to about 25 percent. This is the core of Piketty's argument: If the government wants to prevent an increase in the concentration of income and wealth, it could for example select the appropriate taxation of capital income and wealth.

### 3 Conclusions

There are strong indications that the end of the full employment phase which began in the 1970s in many industrialized countries affected the balance of power and thus the primary distribution to the detriment of employees. The decline in the wage share, which commenced around this time in these countries, is an indicator that the distribution of market income is influenced by historical and political factors. In addition, labor-saving technological progress, globalization and liberalization also made it more difficult for employees to achieve wage increases in line with productivity gains. In his book it becomes repeatedly clear that Piketty is, in principle, aware of the importance of exercising societal power for distribution issues (e.g. Piketty 2014: 223, 255).

In this sense it is clear that the increase in inequality cannot be explained mono-causally. Therefore Piketty's formula  $r > g$  should not be interpreted as the sole condition for a growing concentration of income and wealth. This dispersion in the recent past has been caused mostly (not only, but especially in the US) by the enormous increases in the labor income at the upper limit (top manager incomes). The positive difference  $r - g$  is a principal driving force for the inequality of wealth and income distribution, which, according to Piketty was relevant some time ago and which may once again become decisive in the future. However,  $r > g$  was certainly never intended as a "world formula" by Piketty. He repeatedly points out that no determinism exists in shaping income distribution, but rather that it is decisively influenced by political factors. In his rather important book, he describes relevant ways to connect alternative approaches for explaining growing inequality.

### Bibliography

- Aspromourgos, T. (2014): Thomas Piketty, the future of capitalism and the theory of distribution: a review essay. *Centro Sraffa Working Papers* 7, Oktober, <http://www.centrosraffa.org/public/bbc90001-bb13-4313-955c-fd9e0ea2df62.pdf>
- Aspromourgos, T. (2015): Thomas Piketty, the future of capitalism and the theory of distribution: a review essay. *Metroeconomica* 66(2) (forthcoming).
- Atkinson, A. B. (2014): Public economics in an age of austerity. The Graz Schumpeter Lectures No. 11. Routledge: Abingdon/New York.
- Behringer, J./Theobald, T./van Treeck, T. (2014): Einkommens- und Vermögensverteilung in Deutschland: Eine makroökonomische Sicht. *IMK Report* 99. IMK: Düsseldorf.
- Brenke, K./Wagner, G. G. (2013): Ungleiche Verteilung der Einkommen bremst das Wirtschaftswachstum. *Wirtschaftsdienst* 93(2), 110–116.
- Fichtner, F./Junker, S./Schwäbe, C. (2012): Die Einkommensverteilung: Eine wichtige Größe für die Konjunkturprognose. *DIW Wochenbericht*, DIW Berlin, 79(22), 3–10.

- 
- Grabka, M./Westermeier, C. (2014): Anhaltend hohe Vermögensungleichheit in Deutschland. *DIW Wochenbericht*, DIW Berlin, 81(9), 151–164.
- Homburg, S. (2014): Critical Remarks on Piketty's 'Capital in the 21st Century'. *Discussion Paper* 530, Universität Hannover.
- Klär, E./Slacalek, J. (2006): Entwicklung der Sparquote in Deutschland: Hindernis für die Erholung der Konsumnachfrage. *DIW Wochenbericht*, DIW Berlin, 73(40), 537–543.
- Paqué, K.-H. (2014): Der Historizismus des Jakobiners. Anmerkungen zu dem Buch „Capital in the Twenty-First Century“ von Thomas Piketty. *Perspektiven der Wirtschaftspolitik* 15(3), 271–287.
- Pasinetti, L. L. (1962): Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth. *The Review of Economic Studies* 29(4), 267–279.
- Piketty, T. (2014): *Capital in the 21st Century*. Harvard University Press, Cambridge.
- Piketty, T. (2014a): *Das Kapital im 21. Jahrhundert*. C.H. Beck: Munich.
- Piketty, T./Zucman, G. (2014): Capital is back: wealth-income ratios in rich countries 1700–2010. *Quarterly journal of economics* 129(3), 1155–1210.
- Piketty, T./Zucman, G. (2015): Wealth and Inheritance in the Long Run. In: Atkinson, A./ Bourguignon, F. (eds.): *Handbook of Income Distribution*, vol. 2, Amsterdam et al.: Elsevier, 1303-1368.
- Ray, D. (2014): Nit-Piketty: A comment on Thomas Piketty's Capital in the Twenty-first Century. *Discussion Paper*, New York University, <http://www.econ.nyu.edu/user/debraj/Papers/Piketty.pdf>
- Saez, E./ Zucman, G. (2014): Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data, *CEPR Discussion Paper* 10227, October.
- Sinn, H.-W. (2014): Thomas Pikettys Weltformel. *Frankfurter Allgemeine Sonntagszeitung*, 11.5.2014, No. 19, 29.
- Taylor, L. (2014): The Triumph of the Rentier? Thomas Piketty vs. Luigi Pasinetti and John Maynard Keynes. Institute for New Economic Thinking, The Institute Blog, <http://ineteconomics.org/sites/inet.civactions.net/files/Lance%20Taylor-Piketty%20Paper.pdf>
- TNS Infratest Sozialforschung (2012): *Living in Germany. Survey 2012 on the social situation of households. Household questionnaire*, TNS Infratest Sozialforschung: Munich.