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Increasing capital income share and its effect on personal income inequality

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Increasing capital income share and its effect on
personal income inequality

Branko Milanovicⁱ

Piketty's $r > g$ implies an increase in capital-output ratio and in the share of capital income in net output. But it still does not guarantee the increase in personal income inequality. We derive the conditions for the "pass-through" of the rise in the share of capital income to greater personal income inequality. They have to do with the concentration of income from capital and its association with higher overall income. A key way to breaking the "transmission" into higher personal inequality is to diversify ownership of capital ("people's capitalism").

1. Methodological contributions of Piketty's "Capital..."

When discussing "Capital in the 21st century" we need to distinguish between its analytics and methodology, its recommendations, and its forecasts. One can agree with analytics without agreeing with the recommendations, or the reverse. The methodology introduced by "Capital...", because it seems to fit quite well the likely evolution of the rich world in the decades to come, and more importantly because it provides a novel way to look at economic phenomena, is probably the most significant contribution of the book. It will affect not only how we think of income distribution and capitalism in the future but also how we think about economic history, from the Ancient Rome to pre-revolutionary France. (In effect, we can already see some of these developments).

The most important methodological contribution of Piketty's book is his attempt at the unification of the fields of economic growth, functional income distribution and personal income distribution.ⁱⁱ In the standard Walrasian system, the three are formally related, but in the actual work in economics they were generally treated separately, or some were even simply left out. Functional income distribution was studied much more by Marxist economists. Neoclassical economists tended to assume that capital and labor shares were broadly fixed. This view changed only fairly recently and we are now witnessing an upsurge of interest in the topic (Karabarbounis and Neiman 2013; Elsby, Hobijn and Şahin 2013). Piketty's emphasis on the rising share of capital income contributed to this efflorescence.

Personal income distribution tended to be studied almost as divorced from the rest of economics because in a Walrasian world agents come to the market with the already given endowments of capital and labor. Since the original distribution of these endowments is not the subject of economics (narrowly defined), personal income distribution was assumed to be whatever the market generates. But in "Capital.." the movements in the capital-income ratio, driven by "the fundamental inequality" or "central contradiction of capitalism", namely $r > g$ (return on capital greater than the growth rate of overall income)ⁱⁱⁱ, lead to the rising share of capital income in net product and this in turn leads to a greater inter-personal inequality.

This paper concentrates on the last point—implicitly taken for granted: greater share of capital is associated, it is thought almost implicitly, with a rising inter-personal inequality. This view is understandable because during most of economic history people with high capital income were also people with high overall income. Therefore, a greater share of net product going to capitalists came to be associated with greater inter-personal inequality.

In a recent paper, investigating the association between higher capital shares and income inequality over the long run (going back, in some cases to the mid-19th century), Bengtsson and Walderström (2015), find, in a country fixed-effect setting, that the correlation has typically been positive and fairly strong. For the entire sample of 15 advanced economies, they find that, on the average, each percentage point increase in the capital share was associated with 0.86 point increase in (the log) of top 1% income share. When other controls are introduced, the size of the coefficient is reduced, but it remains positive and statistically significant. Jacobson and Occhino (2012) similarly find that for the United States, a one percent increase in the capital share tended to increase Gini by between 0.15 and 0.33 percent.

Francese and Mulas-Granados (2015) use more recent 1970s-2010 Luxembourg Income Study micro data from 43 countries, and decompose the overall change in disposable income Gini into its accounting components: concentration coefficients of labor and capital, labor and capital shares, and changes in taxation and social transfers. Unlike Bengtsson and Walderström (2015), they find a negligible impact of higher capital share, and conclude that most of the increase in disposable income Gini was driven by the rising concentration of wages. They complement the decomposition analysis by a regression on a sample of 93 countries, for the period 1970s-2013, of capital (labor) share on Gini. Once controls are introduced, labor (capital) share is insignificant (p. 15).

So the link between greater capital share and increased inter-personal inequality is not as simple and unambiguous as it seems. Even when the positive relationship between the two exists, the strength of that relationship varies.

The paper is organized as follows. Section 2 discusses in general the link between the rising share of capital in net income (Piketty's α) and Gini coefficient

of inter-personal income inequality. Section 3 looks at this relationship in three ideal-typical societies: socialist, classical capitalist, and “new” capitalist. (The terms are defined there). Section 4 presents the empirical analysis of the relationship using 138 harmonized household surveys from 17 advanced economies. Section 5 discusses policy implications.

It may be useful, even before we embark on the study of the relationship between α and Gini, to indicate why this is important. The increase in α is not, by itself, a “problem” if it does not lead to an increase in inequality between individuals. In effect, when the underlying distribution of capital is egalitarian, an increase in α may cause a decrease in inter-personal inequality or leave it unchanged. Hence, even for the proponents of strong egalitarianism, the increase in capital share cannot be a problem as such. It becomes a “problem” only because in most of real-world situations the underlying distribution of capital assets is extremely skewed. The realization of this fact leads me, in the prescriptive part, to argue in favor of equalization of ownership of assets amongst individuals. This provides a realistic agenda for fighting inequality and is especially relevant for the rich societies where rising wealth/income ratio implies that, unless the return on capital decreases sufficiently, a greater share of national net product will be received by asset-holders. Thus we have a choice between acquiescing in the rising inter-personal inequality, trying to reduce it through taxation, or working on the deconcentration of asset ownership.

Focusing on the distribution of assets is, in my opinion, a more promising policy than Piketty’s emphasis on taxation of capital. But regardless of whether one tool is better than the other, they are two complementary ways to address rising inequality in the ever more affluent societies (that is, in societies with a rising K/Y ratio).

2. Going from functional to personal income distribution

The main link between the functional and personal income distribution is provided by the relationship $r > g$. But in order to lead to a rising inter-personal inequality it needs however to satisfy the three following requirements.^{iv v}

First, r must be overwhelmingly used for investment, and not for consumption. Clearly, if all of r was simply consumed by capitalists, the K/Y ratio in the next cycle will remain unchanged, and dynamically there would be no increase in either $\beta = K/Y$ or in the share of total income derived by capital (α). This is the point on which Debraj Ray in his critique of “Capital...” has strongly insisted.^{vi} Ng (2015) makes the same point. It is indeed a formally correct argument, but misses the entire point of what capitalism and capitalists are. If capitalists were interested solely in consumption, in spending most of their income on what Adam Smith nicely termed “baubles and trinkets”, the process would play out as Ray imagines. But capitalists are precisely capitalists because they do not consume all surplus, are interested in expanding the scope of their operations, and thus in investing all or most of r . The assumption of saving rate out of r being close to 1 is not only well-founded in the precedents from theoretical economics (in modern times, from Kalecki 1942, Solow 1956 and Kaldor 1957, and obviously all the way back to Ricardo and Marx) but is equally well-founded in the empirical behavior of the rich, and in what are the central features of capitalism as a system.^{vii viii}

But the rising β and even a rising α do not ensure by themselves transmission into greater inter-personal inequality. For this to happen, concentration of capital income has to be very high. Working with only two factor incomes, that of labor and capital, for the overall inequality of personal income to go up, the requirement is that the more unequally distributed source has to grow relatively to the less unequally distributed source. With capital income, this condition is relatively easily satisfied since in all known cases, the concentration of capital income is greater than the concentration of labor income. In the US, for example, Gini of income from capital (calculated across household per capita incomes) is in excess of 80, while similarly calculated Gini of labor income is around 40. The situation is identical in other countries. This is simply a reflection of the well-known heavy concentration of capital assets and of the fact that about

a third of Americans have zero net capital assets, and hence draw no income from ownership.

The third requirement is that the association between capital-rich and overall income-rich people be high. A simple high concentration of a given income source will not guarantee that that source contributes to inequality. Unemployment benefits have a Gini which is generally in excess of 90 (since most people receive no unemployment benefits during any given year), but since recipients of unemployment benefits are generally income-poor, an increase in the share of unemployment benefits in total income reduces income inequality. Technically, the third requirement is (in the case of Gini coefficient with which we work here) expressed in the form of a high correlation between rankings according to capital income and rankings according to total income. Put simply, this requirement means that people who receive large capital incomes should also be rich. Empirically, this requirement is easily satisfied in most countries.

It is thus precisely because we tend to take as given

- (1) high saving out of capital income,
- (2) high concentration of assets, and
- (3) high correlation between one's drawing a large capital income and being rich

that we tend to see the transmission from a rising capital income share into an increasing inter-personal inequality as a foregone conclusion. But this is not always so, or at least the strength of that transmission is variable. We move to a more formal derivation of the relationship.

We know that total income Gini can be decomposed into inequalities contributed by each income source, in our case capital (c) and labor (l) as in (1):

$$G = s_l R_l G_l + s_c R_c G_c \quad (1)$$

where s_i = share of a given income (i -th) source, R_i = correlation ratio between the source and total income, G_i = Gini coefficient of an income source, and G = overall income Gini. R_i in turn is equal to the ratio of two correlation coefficients (ρ 's), namely, between income source and recipients' ranks (from the poorest to the richest) according to total income, and between income source and recipients'

ranks according to income source itself. For capital income, the correlation ratio can be written:

$$R_c = \frac{\text{covar}(r(y), c)}{\text{covar}(r(c), c)} = \frac{\rho(r(y), c)\sigma_{r(y)}\sigma_c}{\rho(r(c), c)\sigma_{r(c)}\sigma_c} = \frac{\rho(r(y), c)}{\rho(r(c), c)} \quad (2)$$

Notice that if people's ranks according to total income and income from capital coincide, $R_c=1$. In all other cases, $\rho(r(y), c) < \rho(r(c), c)$ and $R_c < 1$. For unemployment benefits mentioned above $R_i < 0$.

For the rising share of capital income (s_c)^{ix} to increase overall income Gini, we need therefore to have two "transmission" tools, Gini coefficient of capital income (G_c) and R_c , positive and high. ^x

The rest of the paper will deal with these two "transmission" tools. Equation (2) gives the definition of R_c , which I also call "elasticity of transmission" between the change in capital share and change in personal income inequality. The definition of G_c is a standard one, with the Gini coefficient calculated across the entire distribution but with individuals ranked by their amount of capital income (rather than by total income as we normally do in calculations of overall income Gini). Note that every Gini point increase in the concentration of capital income will be translated into $R_c s_c$ Gini point increase in total income Gini. Similarly, as the share of capital in total income increases by a percentage point, Gini will go up by $R_c G_c - R_i G_i$.

3. Transmission of higher capital income share into personal inequality: three social systems

It is useful to consider three ideal-typical social systems and to observe how they “transmit” an increased share of income from capital into personal income distribution.

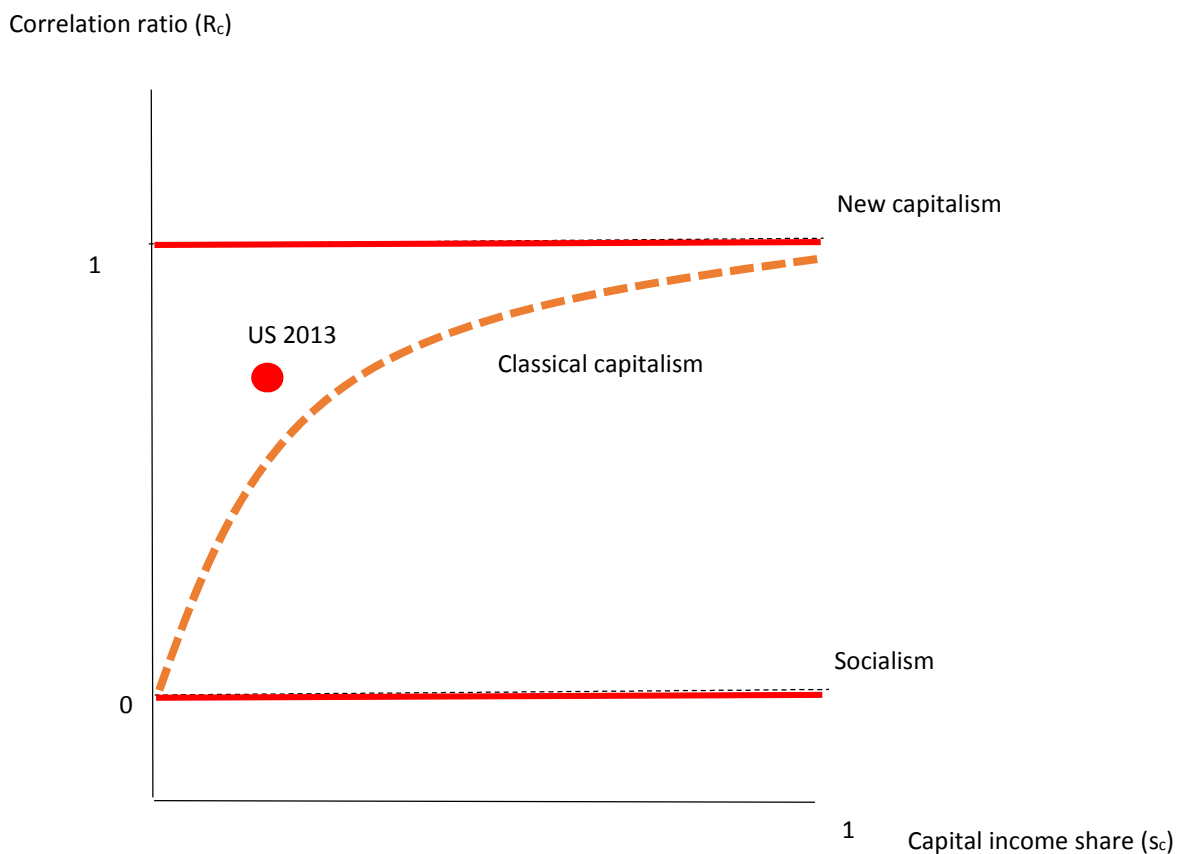
Socialism. We assume that in socialism returns from capital are distributed equally per capita. This could happen in two ways: all capital can be state-owned and the returns from it can be distributed equally among members of a community, or every member can have the same amount of (privately-owned) capital on which she receives the same return.^{xi} A variant of that is a “social dividend” proposed by James Meade in the 1970s and 1980s (see e.g., Meade, 1986) and more recently the “minimum inheritance” idea proposed by Tony Atkinson (2014). They differ however from our ideal-typical socialism in that under the latter all capital income is distributed equally per capita whereas in Meade and Atkinson’s schemes only a part of national income from capital is thus distributed.

Now, $r > g$ will not be “transmitted” into greater inter-personal inequality because $G_c = 0$. In such a society, we can write income of an individual i (y_i) as $y_i = l_i + \bar{c}$ where labor income (or more realistically, log of labor income) l is distributed normally with the mean \bar{l} and standard deviation σ_l : $l: N(\bar{l}, \sigma_l)$ and income from capital is a constant \bar{c} . R_c will be equal to zero because the correlation between the ranks according to total income and amounts of capital income will be 0 and the numerator of (2), $\rho(r(y), c)$, will be equal to zero.

The same result obtains if we distribute capital randomly across individuals, regardless of their labor income. In that case, G_c will be positive, and individual income becomes $y_i = l_i + c_i$ where now both labor income (or log of labor income) and capital income are normally distributed with $l: N(\bar{l}, \sigma_l)$ and $c: N(\bar{c}, \sigma_c)$ but are basically uncorrelated. The “transmission” will again fail because there would be no clear association between being a capitalist and having a higher overall income. R_c may be positive or negative (it will just depend on how the lottery of capital incomes gets correlated with the distribution of labor incomes) but it would be very small in the absolute amount.^{xii}

In any case, the transmission from greater share of capital to inter-personal income distribution will be weak: nil or quasi nil across any value of s_c . This is shown in Figure 1 by the line denoted “socialism” which we draw to be almost undistinguishable from $R_c=0$ for all values of s_c . Basically—and this is key—we have full independence of personal income distribution from the rising share of capital in net output. The former is “insulated” from the latter.

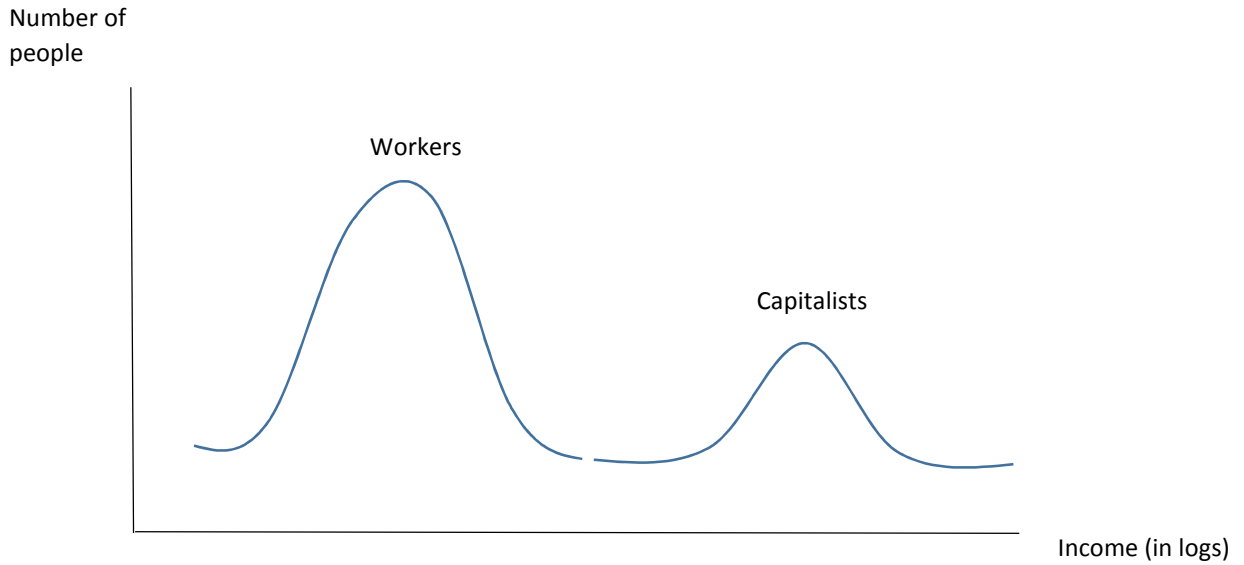
Figure 1. Transmission of rising capital share into inter-personal inequality



Classical capitalism. We consider next classical capitalism where ownerships of capital and labor are totally separated, in the sense that workers draw their entire income from labor and have no income from the ownership of assets, while the situation for the capitalists is the reverse. Moreover, we shall assume that all workers are poorer than all capitalists. This gives us, as shown in

Figure 2, two social groups, non-overlapping by income level. When the groups are non-overlapping, Gini is exactly decomposable across the recipients (see equation 3), and this simplifies the relationship between Gini calculated across income sources and Gini calculated across the recipients.

Figure 2. Social structure of classical capitalism (simplified)



In general, Gini calculated across recipients belonging to groups i ($1,2,\dots,r$) is equal to

$$G = \frac{1}{\mu} \sum_{i=1}^r \sum_{j>i}^r (\bar{y}_j - \bar{y}_i) p_i p_j + \sum_{i=1}^r p_i s_i G_i + L$$

where μ = overall mean income, \bar{y}_i = mean income of i -th group, p_i = population share of i -th group, s_i = share of i -th group in total income, and L = the overlap term that is generally calculated as a residual and is positive when there are recipients from the mean-poorer group who are richer than (overlap with) some recipients of a mean-richer group. Since in our case all workers are poorer than all capitalists, L disappears and the expression for the Gini simplifies:

$$G = \frac{1}{\mu} (\bar{y}_k - \bar{y}_w) p_k p_w + p_k s_k G_k + p_w s_w G_w =$$

$$= s_k p_w - s_w p_k + p_k s_k G_k + p_w s_w G_w = s_k(p_w + p_k G_k) + s_w(-p_k + p_w G_w) \quad (3)$$

where we use subscripts w for workers, and k for capitalists.

Overall inequality, whether calculated across income sources or across recipients, must be the same, so (3) must be equal to (1), and thus

$$\begin{aligned} s_c(p_w + p_k G_c) + s_l(-p_k + p_w G_l) &= s_l R_l G_l + s_c R_c G_c \\ s_c(p_w + p_k G_c - R_c G_c) + s_l(-p_k + p_w G_l - R_l G_l) &= 0 \end{aligned} \quad (4)$$

where we make use of the fact that the share of labor income (s_l) is exactly the same as the share of income received by workers (s_w) and the share of capital income is equal to the share of income received by capitalists, $s_c = s_k$. Similarly, $G_k = G_c$ and $G_l = G_w$. Annex 1 shows further manipulations of the relationship. At the end we obtain a positive and concave relationship between s_c and R_c (as shown in Figure 1 by the curve denoted “classical capitalism”). The transmission from an increased capital share into a higher inter-personal inequality increases in s_c but does so at the diminishing rate. It asymptotically tends toward 1 when s_c approaches unity.

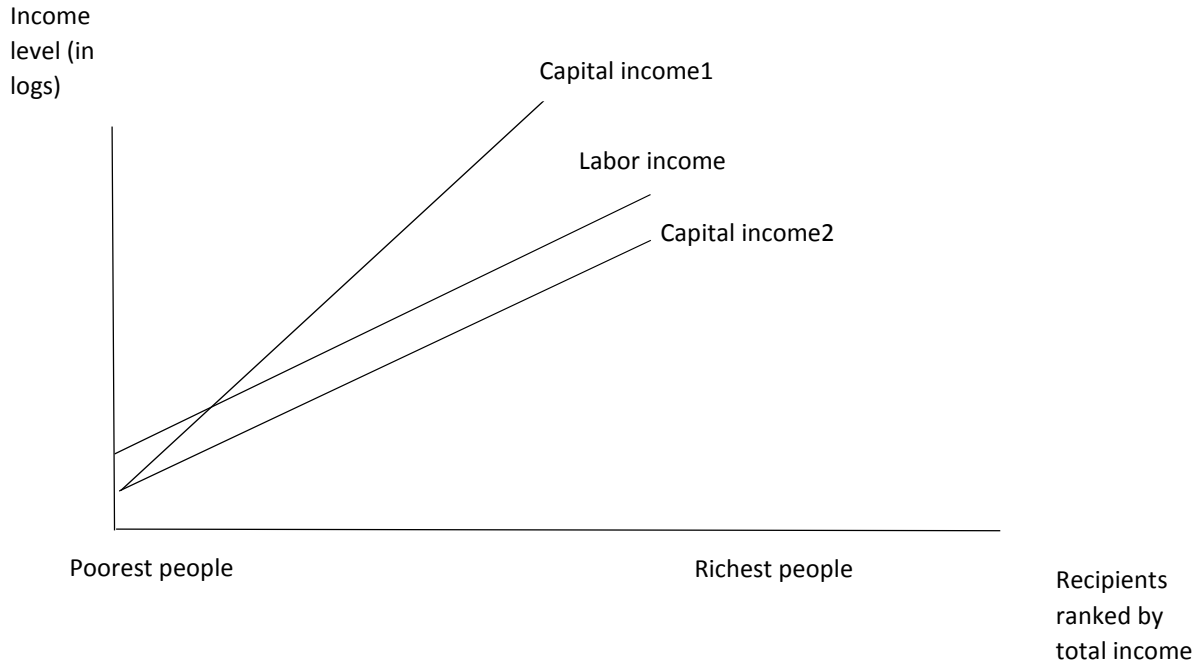
Some intuition will help explain the result. Suppose that classical capitalism is such that there is only an infinitesimally small number of capitalists (at the extreme, just one person) and that all other individuals are workers so that both s_k and s_c are low.^{xiii} By assuming a sole capitalist we also assume that he/she is the richest person in the community (but not so extravagantly rich to drive s_c very high). The correlation coefficient in the numerator of R_c , $\text{cov}(r(y), c)$, will be low because ranks according to total income, running from 1 to 100, will not be correlated with the amount of income from capital. We shall have two vectors, that of ranks [1 2 3.....n] and that of capital income [0 0 0 0....K] where K=total capital income (received by one person only). Now, the denominator of R_c will be obtained from a correlation between a vector where the ranks for all recipients but the top will be the same (since they all have the same, nil, amount of income from capital), that is between a vector such as $\left[\frac{1}{(n)/2}, \frac{1}{(n)/2} \dots n\right]$, and [0 0 0..K]. Such a correlation will be much higher (actually, equal to 1) and the ratio between the two correlation coefficient will thus be low. We can illustrate it with a numerical example. Let $n=100$ and K any random number but which we selected

to be 100. The correlation in the numerator is 0.17, that of the denominator 1. Hence $R_c = \text{cov}(r(y), c) = 0.17$.

Consider now the other extreme where classical capitalist society is composed mostly of capitalists and an infinitesimally small number of workers so that s_c approaches unity. It is clear that person's rank according to capital income will entirely (or almost entirely) coincide with his rank according to total income, and $\text{cov}(r(y), c) \approx \text{cov}(r(c), c)$ and thus $R_c \approx 1$. In other words, there would be practically no difference between total and capital income since at the limit they are the same. This makes the two correlation coefficients almost the same and their ratio $R_c \approx 1$.

New capitalism. We assume that new capitalism differs from the classical capitalism in that all individuals receive income from both capital and labor. Thus, instead of the two sharply delineated groups, workers with income $(l_i, 0)$ and capitalists with income $(0, c_i)$, we have for all individuals positive labor and capital incomes (l_i, c_i) . We assume further that the amounts of both labor and capital income received increase monotonically as we move toward (total income-) richer individuals. A poor person's income would be for example $(2, 1)$, middle-income person's $(7, 3)$ and rich person's income $(24, 53)$.

Figure 3. Labor and capital income across recipients in new capitalism (simplified)



Monotonic increases of labor, capital and total income (such that if $y_j > y_i$ then we must have $l_j > l_i$ and $k_j > k_i$) ensure that the ranks according to capital, labor and total income are the same. Thus, $R_c=R_l=1$. This is why in Figure 1 we draw the “transmission” function for new capitalism at $R_c=1$ throughout.

However two elaborations of this situation are possible. For example, we can have a situation illustrated in Figure 3 by *labor income* and *capital income2* lines: the proportions of labor and capital income stay constant throughout the distribution, that is, both amounts of capital and labor increase by the same percentage as we move from poorer to richer recipients. A person’s income can be written as $y_i = \zeta_i(\bar{l} + \bar{c})$ where ζ_i increases in i , indicating that everybody receives a specific portion of both overall labor and capital income. In other words, as we move up along income distribution, we move from income that can be written as (2,1) to (10,5) to (200,100) etc., where every individual receives twice as much of labor income as of capital income, but the absolute amounts of both differ. Obviously, richer people receive more of both. In that case (let’s call

it, “new capitalism 2”), Gini of both labor and capital will be the same and the Gini coefficient of total income can be written as

$$G = s_l \bar{G} + s_c \bar{G} = \bar{G} \quad (5)$$

When $r > g$ and the share of capital income goes up overall inequality is unaffected. Thus, in the “new capitalism 2” where everybody (poor and rich alike) has the same composition of total income (e.g. everybody’s total income is composed of e.g. 70% of labor income and 30% of capital income), a rising share of capital income does not get transmitted into an increased inter-personal inequality. Note that happens because the rising capital share leaves Gini of capital income unchanged (and Gini of capital income is the same as Gini of labor income). In socialism, this happens because $G_c = 0$.

A more realistic version of the new capitalism (named “new capitalism 1”) is the one where the proportion of capital income increases as person becomes (total-income) richer. This can be written (in a continuous case) as $\frac{d(\frac{c}{l})}{dy} > 0$ with $\frac{dc}{dy} > 0$ and $\frac{dl}{dy} > 0$ ensuring that absolute incomes from both capital and labor are higher for richer individuals.^{xiv} The relationship $\text{cov}(r(y), c) = \text{cov}(r(c), c)$ then still holds since the rankings according to total income and the ranking according to capital income coincide and thus $R_c = 1$, but now an increase in the capital share pushes the overall Gini up. This happens because capital income (depicted by *capital income1* line in Figure 3) has a greater Gini than labor income and as the share of a more unequally distributed source increases, so does the overall Gini. The actual increase in Gini will be $G_c - G_l$.

New capitalism represents a strong departure from the model of classical capitalism.^{xv} Every individual receives both labor and capital income, and in principle (if their shares were the same across the distribution), we could obtain the same outcome as in socialism, namely full orthogonality of personal income distribution from the rising share of capital income. This however seems unlikely as rich countries today are in effect closer to “new capitalism 1”, where the share of capital income is greater for the rich households.

Under “new capitalism 1” the transmission from increased capital share into greater inter-personal inequality may be as strong as in classical capitalism. Suppose that $s_c = 0.3$ and that it increases to 0.35. Under classical capitalism with

R_c (say) around 0.6, these 5 additional percentage points of net income received by capitalists will increase the overall Gini by about 3 points. Under the “new capitalism 1”, the increase will be $(G_c - G_l)$ times 5. The $G_c - G_l$ gap is empirically about 0.3-0.5 (0.8-0.9 minus 0.4-0.5), so the Gini increase may be 1.5-2.5 points. The new capitalism may be just marginally more successful than classical capitalism in checking the spill-over from the rising capital share into a greater inter-personal inequality.

4. Transmission of higher capital income share into personal inequality: empirical results

How does the transmission of higher capital income into personal inequality, summed up in the elasticity parameter, look empirically in the advanced capitalist economies? I use a sample of 138 standardized household surveys produced by Luxembourg Income Study (LIS) covering 17 capitalist economies over the period 1969-2013 and calculate all the relevant statistics (Gini coefficients, concentration coefficients, correlation ratios for capital and labor income; see Luxembourg Income Study Database, 2014). The number of surveys by country ranges from 12 for Canada, and 11 for the United States to 5 for Switzerland and Greece. For almost all countries, the most recent surveys are from 2010 or 2013. The list of surveys is given in Annex 2.

One has to keep in mind however that despite the best efforts at harmonization conducted by LIS, the amount of capital incomes is in many cases probably underestimated. This is due to the fact that the original surveys out of which LIS data are built underestimate capital income, both because the rich (who receive a high share of income from capital) refuse to participate in surveys, or rich respondents, when participating, underestimate their capital income. For example, LIS data for the United States give an average share of capital income (exclusive of capital gains) in total market income of 7 percent which is about 2/3 of the value obtained from fiscal sources.^{xvi} Despite that, comparisons of US data obtained from LIS and from fiscal sources show very close correspondence between the values of the Gini coefficient for capital income and correlation ratios (R_c), the two factors that determine the transmission. The latter therefore is likely to be very similar whether calculated from household surveys or from fiscal sources (see Table 1).

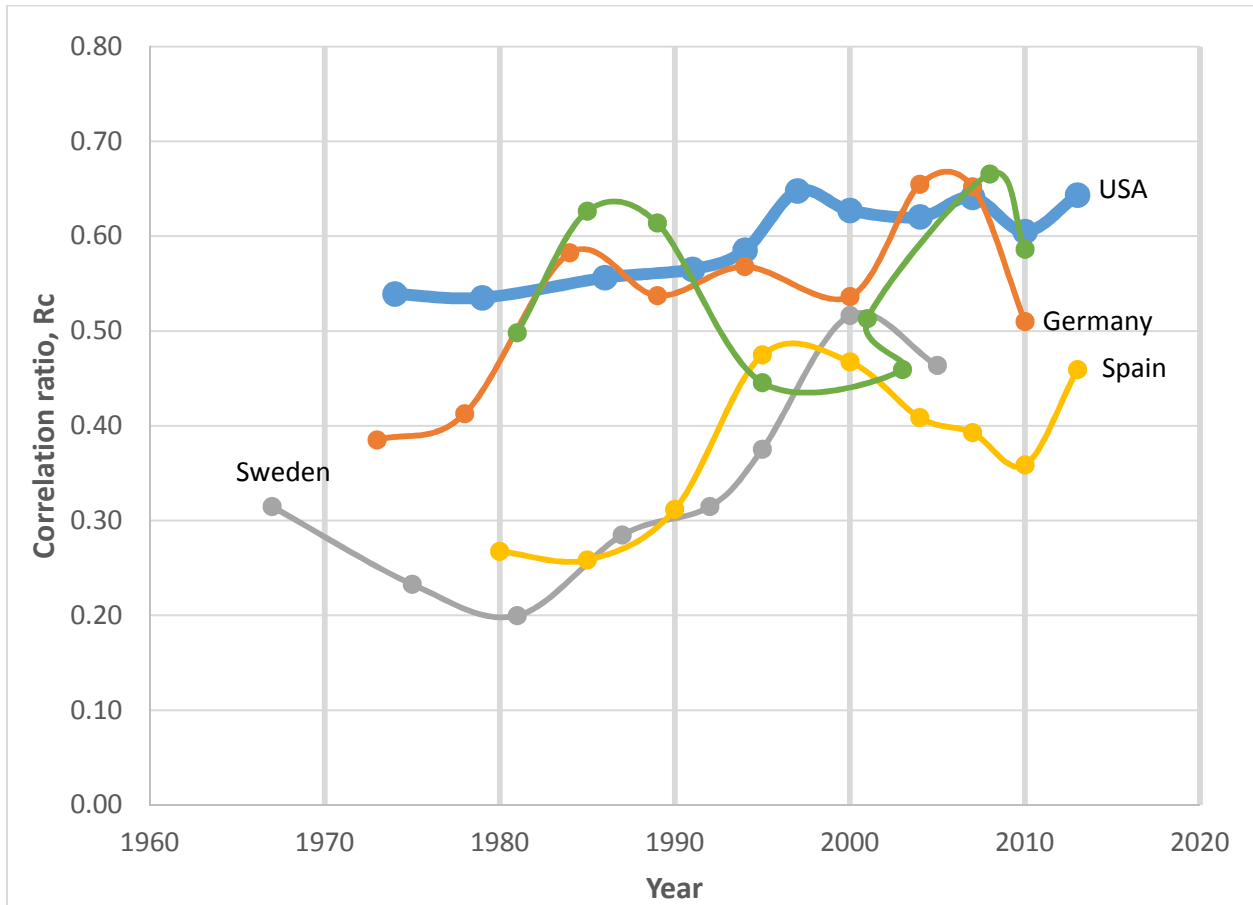
Table 1. Comparison of LIS survey and fiscal data for the United States

	2000		2004	
	Surveys	Fiscal	Surveys	Fiscal
Inequality of market income without capital gains (in Gini points)	53	55	54	55
Capital income share in market income (in %)	7	11	6	10
Gini of capital income (in Gini points)	90	92	92	94
Capital correlation ratio, R_c	0.63	0.76	0.64	0.78

Note: Calculations from household surveys are based on household per capita income; calculations from fiscal data are based on fiscal units (which are very close to households). The fiscal series ends in 2005. For comparison, I choose the two most recent years for which I had both survey and fiscal data. Source: LIS household surveys based on US Current Population Surveys: my own calculations. Fiscal data: personal communication by Christoph Lakner.

Figure 4 shows the data on the elasticity (R_c) over time for four advanced economies. In addition to the United States, I selected Germany as an example of a continental-corporatist welfare state, Sweden as a prototypes of a Scandinavian welfare state, and Spain as an advanced Mediterranean welfare state. The results show the US with a rather high elasticity throughout. US elasticity steadily increases, passing from 0.54 in the late 1970s to 0.64 in 2013. Most interesting however is Sweden where the elasticity was in the mid-1970s as low as 0.2 but increased to 0.5 by 2000. This parallels the well-known increase in income, and especially wealth, inequality in Sweden (see OECD, 2015, Piketty 2013, p. 549). German elasticity also increased significantly, from 0.4 to the peak of 0.65. Finally, Spanish elasticity went up as well, from less than 0.3 in the 1980s to just short of 0.5 in 2010. There was in these four cases, a clear upward trend over the past thirty years. In addition, the gaps between countries' elasticities in the early 2010s are smaller than they were in the 1970s. We shall find very similar results for the whole sample of 17 countries.

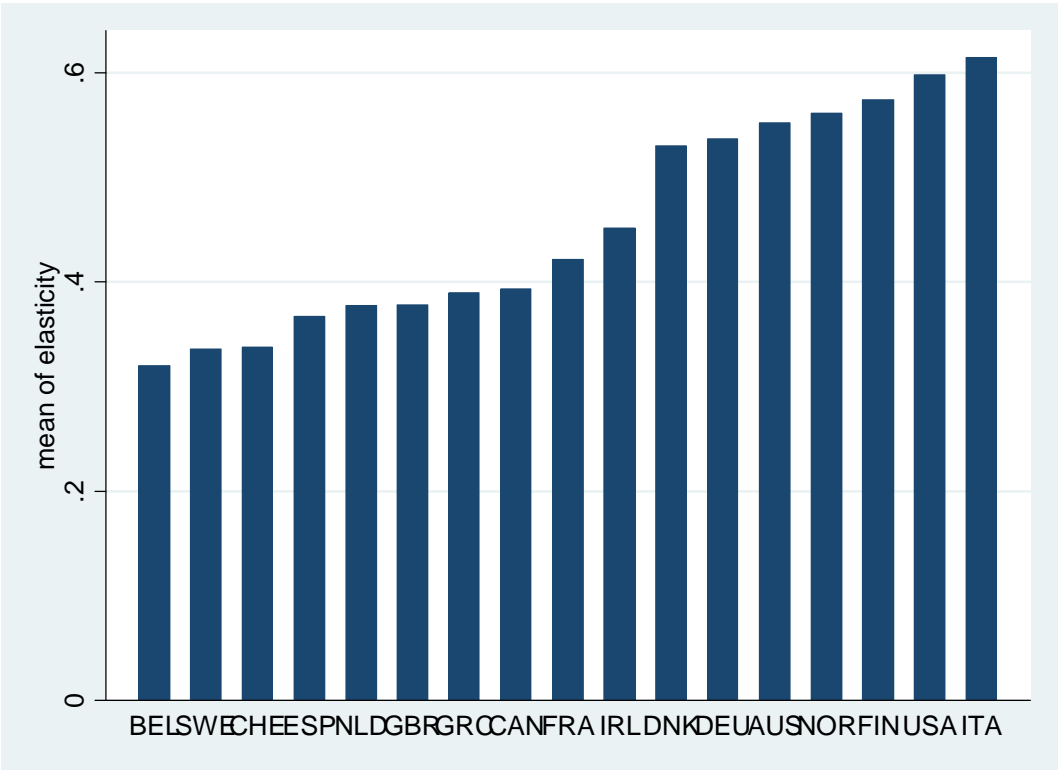
Figure 4. Elasticity of inter-personal income Gini to changes in capital income share; four advanced economies 1967-2013



Source: calculated from household-level data available from Luxembourg Income Study (see Annex 2). All underlying variables normalized by household size, that is expressed in per capita terms.

Figure 5 shows the average elasticity by country, ranked in increasing order. Italy, United States and Finland have the highest elasticities of around 0.6; at the other extreme are Belgium, Sweden and Switzerland with the average elasticities of just under 0.35. Note that the period over which these elasticities are calculated is not identical across countries (the first data point for the United States goes back to 1979, for Greece to only 1995) nor is the number of observations per country the same.

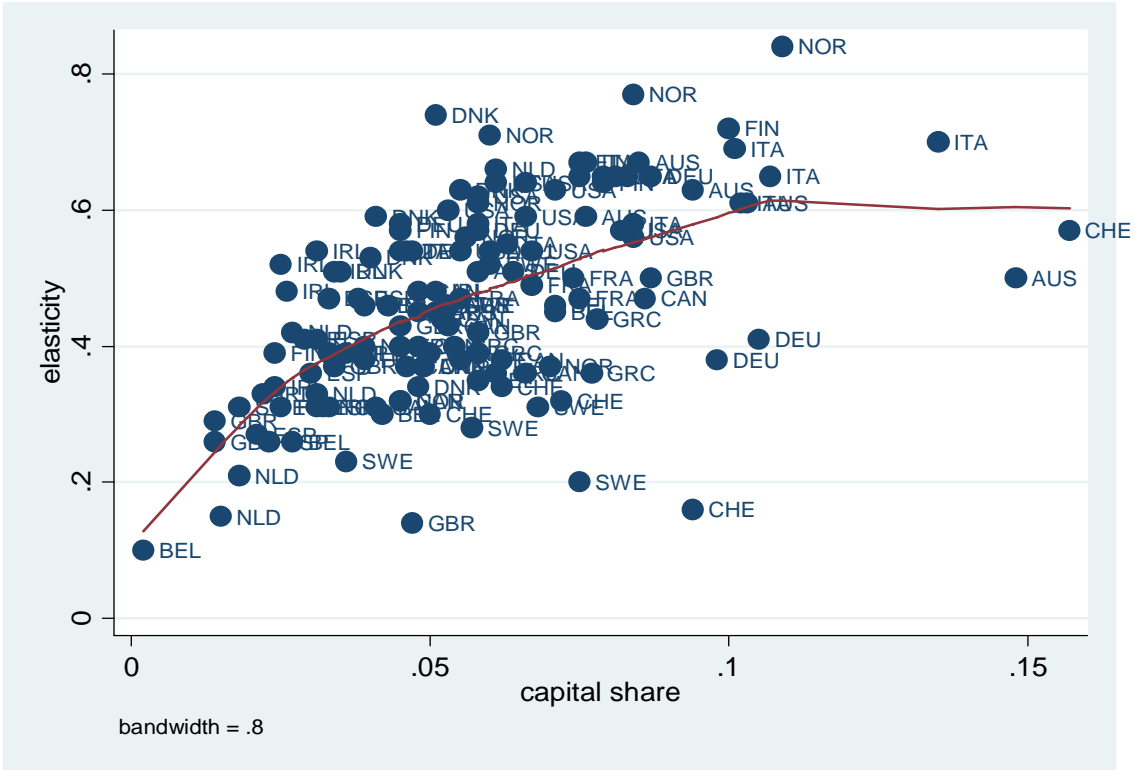
Figure 5. Average elasticity over the past approximately 40 years, by country



Countries are ranked by mean elasticity. BEL=Belgium, SWE=Sweden, CHE=Switzerland, ESP= Spain. NLD = Netherlands, GBR = Great Britain, GRC = Greece, CAN = Canada, FRA = France, IRL= Ireland, DNK = Denmark, DEU = Germany, AUS = Australia, NOR = Norway, FIN = Finland, USA = United States, ITA = Italy. Source: see Annex 2.

Figure 6 shows the scatterplot of elasticities obtained from 138 surveys against the capital shares calculated from the same surveys. As implied by our derivation in Section 3, higher capital share is associated with greater elasticity, but the scatterplot shows that the relationship is concave and that after the capital share reaches about 0.12, the elasticity increases by very little or is stable. What this means is that any increase in the capital share (say, by 1 percentage point) will be associated with a greater increase in inter-personal Gini at higher levels of capital share. But once that level is reasonably high, further increases in the capital share will produce about the same effect on inter-personal inequality.

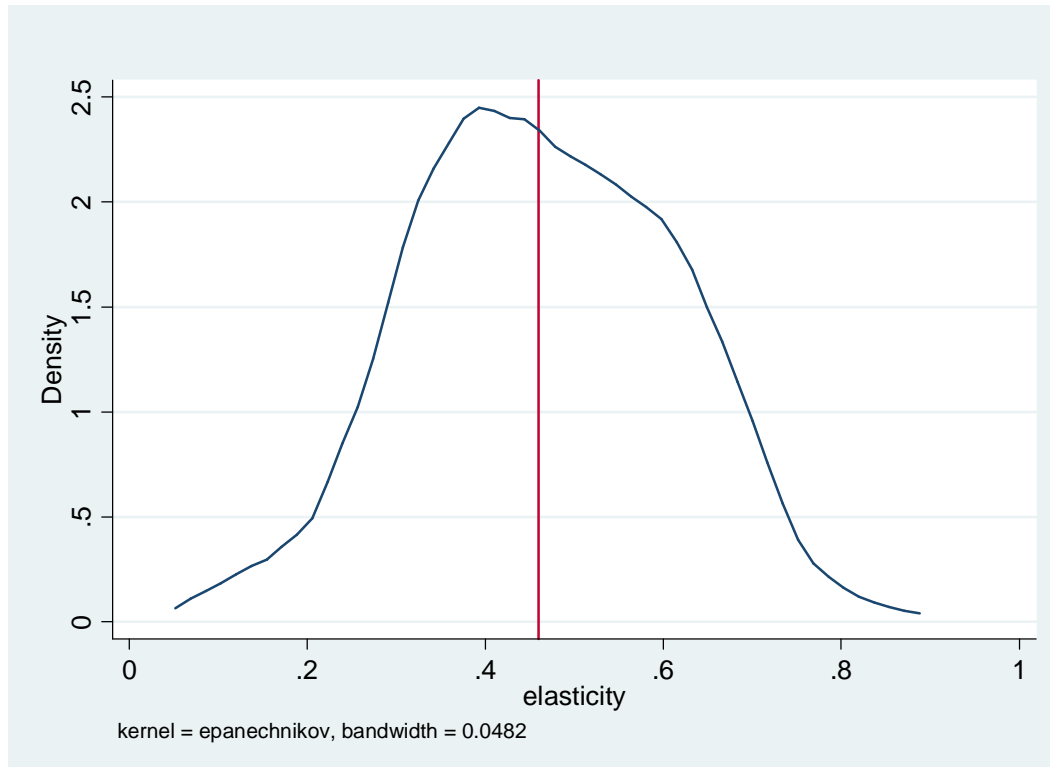
Figure 6. Elasticity with which capital share is “transmitted” into higher interpersonal inequality, and capital share (17 advanced economies, 1967-2013)



Source: calculated from household-level data available from Luxembourg Income Study (see Annex 2). All underlying variables normalized by household size, that is expressed in per capita terms. Non-parametric *lowess* function in Stata with default bandwidth shown. Capital share is expressed as a ratio (0.05=5%). A single country abbreviation appears for all years for which surveys for such a country are available. For the list of country abbreviation see Note to Figure 5.

Most elasticities are between 0.3 and 0.6 with both the median and the mean elasticity of 0.46 (implying a fairly symmetrical distribution of elasticities). The distribution of elasticities is shown in Figure 7.

Figure 7. Distribution of elasticities (R_c) in advanced capitalist economies



Source: calculated from household-level data available from Luxembourg Income Study (see Annex 2). Straight line drawn at mean elasticity of 0.46.

How is elasticity related to the capital share? In other words, can we estimate the relationship shown in Figure 6 parametrically? Table 2 shows the regression results for several specifications. In the simplest linear specification where elasticity is regressed on capital share and time only, we find a steep slope on capital share of about 3, and a statistically significant positive coefficient on time. This former means that, on average, each percentage point increase in the capital share is associated with an increase of elasticity of almost 3 points: for example, if the capital share increases from 0.05 to 0.06 (from 5% to 6%), the elasticity increases from 0.4 to 0.43. The positive sign on the *time* variable implies that the transmission function has recently become stronger. Perhaps more

realistic (in light of the pattern in Figure 6) is a quadratic formulation, and indeed we find a significant quadratic term in regression 2. Another alternative is a country fixed effect regression which allows for heterogeneity between the countries (reflected in the country-specific intercepts). The coefficient on the capital share is quite similar (2.68) to what we have obtained in the simple pooled regression. The coefficient on time remains strongly positive. Finally, specification (4) repeats the squared capital share formulation, now in country fixed effects, with basically unchanged results. We can draw two conclusions from this exercise: first, a rising capital share is associated with increasing (but concave) transmission into personal inequality, and second, the relationship has recently become stronger.

Table 2. Regression results: elasticity of transmission and capital share
Dependent variable: elasticity

	Pooled regressions		Country fixed effects (unbalanced panel)	
	1	2	3	4
Capital share	2.95 (0.00)	5.81 (0.00)	2.68 (0.00)	4.99 (0.00)
Squared capital share		-20.69 (0.01)		-15.81 (0.03)
Time	0.005 (0.00)	0.004 (0.00)	0.004 (0.00)	0.004 (0.00)
Constant	-9.19 (0.00)	-8.45 (0.00)	-7.84 (0.00)	-7.17 (0.00)
Adjusted (or within) R ² (F-value)	0.41 (48)	0.43 (36)	0.43 (45)	0.45 (32)
Number of observations	138	138	138	138
Number of countries			17	17

Note: *p*-values between parentheses. *Time* is measured by the year when the survey was conducted (see Annex 2).

We can now compare the elasticities from real life to those that we obtained earlier from our four ideal-typical social systems (Table 3). This enables

us to see better where, compared to different ideal types, do modern capitalist economies lie. Great Britain in 1969, Netherlands in 1987, Switzerland in 1982, and Sweden in 1981 had elasticities smaller or equal to 0.2 and were quite close to the socialist model. One-half of all observed elasticities fall between the values of 0.36 and 0.57 (with the median, as we have seen, of 0.46). This level of elasticity corresponds, within our ideal-typical world, to an intermediate position between socialism and classical or new capitalism 1. Countries with the highest elasticities, which are Nordic countries in the years after 2000 and Italy in 1998 and 2000, have values above 0.7 and are thus closest to the classical or new capitalism 1, and furthest from socialism. ^{xvii} The US is close to these countries with its highest elasticity value of 0.65, reached in 1997, and its most recent 2013 elasticity at 0.64, just slightly below the previous peak.

How much Gini will increase will depend not only on the elasticity but also on other parameters like Gini of labor and capital income and the correlation ratio for labor (R_l). However, these parameters, and especially Ginis for labor and capital income do not differ greatly between the countries and we can make an easy approximation: the average Gini for labor income in our sample is 0.5 and the average Gini for capital income is 0.9. Taking these values and the average correlation ratio for labor, gives us an estimated increase of 0.16 Gini point for each point increase in the capital share (see Table 3).

Table 3. Elasticity of transmission of rising share of capital income into personal income inequality

Economic system	Elasticity	Gini change
“New capitalism 1” (with $G_c > G_l$)	Around 1	$G_c - G_l$
Classical capitalism	<1	$R_c G_c - R_l G_l$
“New capitalism 2” (with $G_c = G_l$)*	1	0
Rich countries today	0.51	$R_c G_c - R_l G_l = (0.51)(0.9) - (0.6)(0.5) = 0.16^*$
Socialism	Around 0	Around 0 or negative **

* The mean R_c in the period after 2000 is 0.51; I also take the average values for other variables.

** Since Gini of labor income is supposed to be positive ($G_l > G_c = 0$).

5. Policy Implications

The implication of this analysis is that the way the rising share of capital income gets transmitted into greater inter-personal inequality varies between different social systems in function of the underlying asset distribution. We are used to implicitly making the assumption that capital incomes are very concentrated and that the association between being capital-rich and overall-income rich is very close. Both of these assumptions are reasonable given the empirical evidence. Indeed, as we see in the ideal-typical world of new capitalism, the increase in s_c almost directly translates into a higher Gini (because Gini of capital income is much greater than Gini of labor income). In the classical capitalism, this is also true once the share of capitalists becomes sufficiently high. But in a socialist world rising s_c does not imply rising inter-personal Gini; in effect, given our assumption of equal per capita distribution of capital assets, it implies a reduction in income inequality. Similarly, in new capitalism 2 where every individual receives an equal share of her income from asset ownership, a rising capital share does not affect inter-personal income distribution.

This carries, I think, clear lessons for the rich societies in particular. The definition of rich societies is that they have high K/Y (β) ratios. As currently advanced societies become even richer, the $r>g$ dynamic will lead to the rising beta and alpha. One way to ensure that this does not spill out into increased income inequality is through taxation, as advocated by Piketty, but another way—perhaps a more promising one or at least complementary—is to reduce the concentration of ownership of capital and thus of income from capital.

In the framework discussed here, reduced G_c will also reduce the association between (high) capital income and (high) overall incomes. Thus both G_c and R_c would be reduced and an increase in capital share will have a small or even a minimal effect on personal income distribution. Ultimately if $G_c=G_l$, it may have no effect on overall income Gini at all.

In turn, this means that much greater attention should be paid to policies that would redistribute ownership of capital and make it less concentrated. In principle, there are two kinds of such policies: one would be giving greater importance to ESOPs (Employee Stock Ownership Plans) and similar plans that

would give a capital stake to workers who currently have none. A well-known Swedish trade union plan whereby companies would issue special shares to go into a fund which would support workers' pensions was recently "resuscitated" by Taylor, Ömer and Rezai (2015, p. 23). This approach however runs into the well-known problem of non-diversification of risk, where individuals' income depends entirely on working in a given company. This is indeed the case for most people today who have only labor incomes, so having both labor and capital income coming from the same company, it could be argued, does not expose them to more risk than they presently experience. While this may be true, it begs the question of why such pro-labor ownership would be introduced if it does not manifestly improve the situation of those who currently hold no capital assets. It therefore seems to me that this approach, while valuable, runs quickly into some limits.

A more promising approach may be to focus on wider share ownership divorced from one's workplace. This could be done through various incentives that would encourage small shareholdings, and penalize heavy concentration of assets. Indeed, Piketty's suggestion of a progressive wealth tax could be combined with implicit and explicit subsidies to those who hold small amounts of wealth. ^{xviii}

In rich societies whose capital-output ratio will tend to rise, the share of capital income in net income may be expected to go up as well.^{xix} If so, efforts should be directed toward ensuring that this inevitable upward movement in the K/Y ratio does not produce unsustainable levels of income inequality. A way to achieve this is to equalize as much as possible individuals' positions at the pre-distribution stage, or to put it in terms introduced in this paper, to move away from "new capitalism 1", which is in many ways similar to the actually-existing capitalism today, and get closer to "new capitalism 2". This involves primarily lesser concentration of capital assets, but also (a topic which I did not discuss here) more equal access to education and deconcentration of the returns to skills.

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Annex 1. Derivation of the transmission function in the case of classical capitalism
(with two non-overlapping income classes)

$$\begin{aligned}
 s_c(p_w + p_k G_c - R_c G_c) &= -s_l(-p_k + p_w G_l - R_l G_l) \\
 s_c(p_w + p_k G_c - R_c G_c) &= -(1 - s_c)(-p_k + p_w G_l - R_l G_l) \\
 s_c(p_w + p_k G_c - R_c G_c) &= -(1 - s_c)(A) \\
 s_c(p_w + p_k G_c - R_c G_c - A) &= -A \\
 -s_c R_c G_c &= -s_c(p_w + p_k G_c - A) - A \\
 s_c R_c G_c &= s_c(p_w + p_k G_c - A) + A \\
 R_c G_c &= (p_w + p_k G_c - A) + \frac{A}{s_c} \\
 R_c &= \left(\frac{p_w - A}{G_c} + p_k \right) + \frac{A}{s_c G_c} \\
 \frac{dR_c}{ds_c} &= -\frac{A}{s_c} \frac{1}{G_c^2} > 0
 \end{aligned}$$

Since $A = -p_k + p_w G_l - R_l G_l = -(1 - p_w) + p_w G_l - R_l G_l = p_w(1 + G_l) - 1 - R_l G_l$ will tend to be negative. In one extreme case when $p_k \rightarrow 1$ this would be clearly the case. In the other extreme case when $p_k \rightarrow 0$, $A = G_l(1 - R_l) \rightarrow 0$. This last case is clearly irrelevant because it implies that there are no capitalists at all. But for all sensible situations where $0 < p_k < 1$, $A < 0$.

The second derivative is

$$\frac{d^2 R_c}{ds_c^2} = \frac{2A}{s_c} \frac{1}{G_c^3} < 0$$

All symbols are as explained in the text.

Annex 2. List of LIS Surveys used

Country	Years
Australia	1981 1985 1989 1995 2001 2003 2006 2010
Belgium	1985 1988 1992 1995 1997 2000
Canada	1971 1975 1981 1987 1991 1994 1997 1998 2000 2004 2007 2010
Switzerland	1982 1992 2000 2002 2005
Germany	1973 1978 1984 1989 1994 2000 2004 2007 2010
Denmark	1987 1992 1995 2000 2004 2007 2010
Spain	1980 1985 1990 1995 2000 2004 2007 2010 2013
Finland	1987 1991 1995 2000 2004 2007 2010
France	1978 1984 1989 1994 2000 2005 2010
Great Britain	1969 1974 1979 1986 1991 1994 1999 2004 2007 2010
Greece	1995 2000 2004 2007 2010
Ireland	1987 1994 1995 1996 2000 2004 2007 2010
Italy	1986 1987 1989 1991 1993 1995 1998 2000 2004 2008 2010
Netherland	1983 1987 1990 1993 1999 2004 2007 2010
Norway	1979 1986 1991 1995 2000 2004 2007 2010
Sweden	1967 1975 1981 1987 1992 1995 2000 2005
United States	1974 1979 1988 1991 1994 1997 2000 2004 2007 2010 2013

ⁱ Graduate Center City University of New York and Luxembourg Income Study. I am grateful for comments by Heather Boushey, Brad DeLong, Christoph Lakner, Salvatore Morelli, Eric Nielsen, Marshall Steinbaum, and other participants at the conference in Bellagio, December 2015.

ⁱⁱ The terms “personal” and “inter-personal” income distribution will be used inter-changeably.

ⁱⁱⁱ p. 57 French edition. “The central contradiction of capitalism” is the title in the Conclusions of “Capital...”

^{iv} A slightly different approach to this issue is adopted by Atkinson 2009, see especially pp. 10-11.

^v I assume here a model of homogeneous capital. Piketty (2016, p. 8), probably reacting to the critiques (e.g. Stiglitz, 2015 and several other follow-up papers) that have pointed out that it is the heterogeneous nature of capital, more particularly the role of housing, that is responsible for the rise in the capital-income ratio, prefers now multi-sector models of capital accumulation. Such models allow relative prices of various capital goods to vary differently and, as in the case of rising real estate prices, to drive the observed K/Y ratio. They also do not depend on the greater than unitary elasticity of substitution between capital and labor to generate an increasing capital share. While that approach certainly has the advantage of being more realistic, it fails to provide the powerful and focused simplicity of the one-sector model.

^{vi} See Ray (2014a, 2014b).

^{vii} For this point see Milanovic (2014) critique of Debraj Ray’s critique of Piketty.

^{viii} In his two recent papers, Piketty (2015, 2016) addresses this point explicitly. He allows for capitalists’ consumption out of r but notes that a family needs only to “reinvest a fraction g/r of its capital income..to ensure that its capital stock will grow at the same rate...as the...economy” (Piketty 2016, p. 3). Obviously, any greater saving will increase the capital stock and make capital’s income share in net product go up. Both papers also deemphasize, compared to the book, the importance of the $r > g$ relationship in explaining the increase in income inequality, but see its role as having mostly to do with the long-run level of wealth inequality: “[s]pecifically, a higher $r-g$ gap will tend to greatly amplify the steady-state inequality of wealth distribution” (Piketty, 2016, p. 3).

^{ix} s_c is the same as Piketty’s α .

^x The condition is $R_c G_c > R_l G_l$.

^{xi} In its implications, this is similar to the situation where capital is privately-owned but the return on capital is assessed at confiscatory (100 percent) tax rates and the proceeds are distributed equally per capita. Obviously, endowments of capital will not be equalized, but income from capital would. I owe this idea to Christoph Lakner.

^{xii} We implicitly assume that the amount of randomly distributed capital income is equal to the usual share of capital income in total net income (say, up to 30%). Obviously, if randomly distributed capital dwarfs labor income then it could happen that people who have randomly “drawn” large allotment of capital income become also total income rich. In that, rather extravagant case, R_c could be high, and indeed even approach 1.

^{xiii} Obviously, having just one capitalist (low s_k) does not ensure that s_c will be also low: it could be that that sole capitalist is so rich that the capital share is high. In the rest of this intuitive discussion, I assume however that the two move broadly together.

^{xiv} For the evidence on new capitalism, see Atkinson and Lakner (2014) who show an increasing association of high labor and capital income in the United States during the past half century. Such a society is also evoked by Piketty (2013; Chapter 7, p. 416 in French edition).

^{xv} These features of “new capitalism” are similar to the point repeatedly made by Piketty that the post-War period is distinguished by the emergence of a property-owning middle class even if its share of capital ownership has remained relatively small (see Piketty, 2013, pp. 410, 552).

^{xvi} Personal communication by Christoph Lakner.

^{xvii} Note that we cannot judge how close they come to “new capitalism 2” because under “new capitalism 2” R_c would be still 1 although the transmission link between greater capital income share and inter-personal inequality is severed.

^{xviii} Piketty notices the need for complementarity between taxation and redistribution policies in general and the need to change forms of governance of private capital. He closes the last chapter of his book by stating that “without a real right to intervene in corporate decision-making (including seats for workers on the company’s board of directors), [financial] transparency (brought about by taxation of wealth) is of little use” (p. 570).

^{xix} Assuming some stickiness in the rate of return.