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Capital and Labor

The Factor Income Composition of Top Incomes in the United States, 1962–2006

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Abstract

This paper finds that capital and labor incomes in the United States have become more closely associated since the 1980s. This contributed to the well-known increase in the top 1 percent's share of total income, exacerbating rising inequality in capital incomes and earnings. The paper shows that the trend in the association is U-shaped, as the recent increase contrasts with a tendency toward a weakening association until the 1980s. The paper uses data derived from tax records, studies the asymmetries in the association, tests for robustness to alternative income definitions, and discusses the potential role of declining top marginal tax rates.

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Capital and Labor:

The Factor Income Composition of Top Incomes in the United States, 1962-2006

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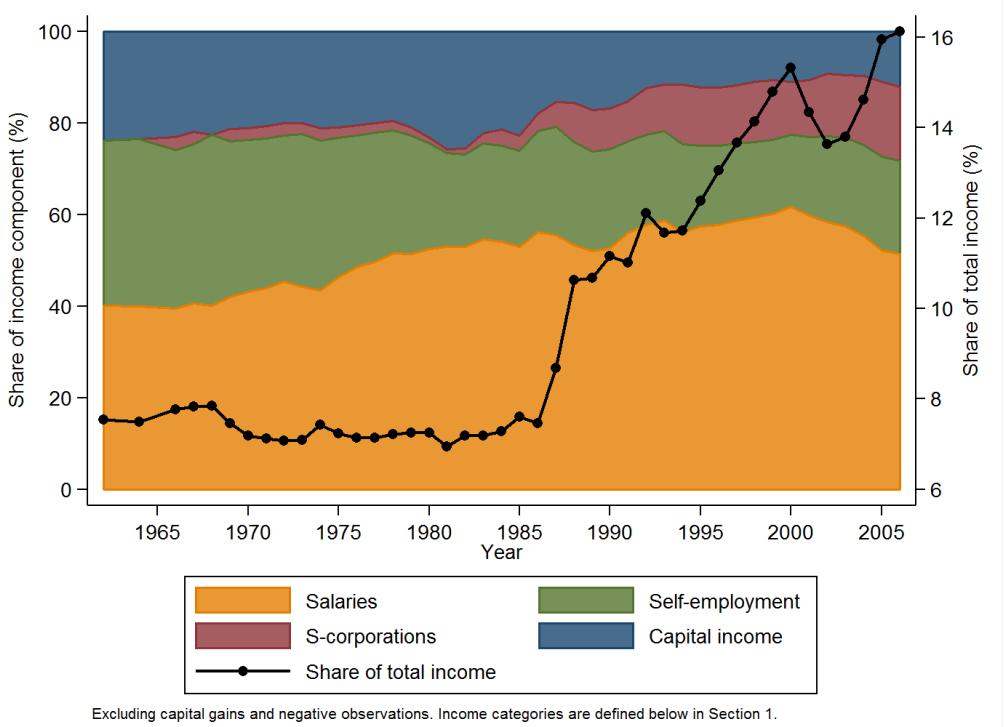
Introduction

Recent literature has documented the increase in income inequality at the very top of the distribution (e.g. Atkinson and Piketty, 2007, 2010; Alvaredo et al., 2017). Between the mid-1980s and the mid-2000s, the income share of the top 1% in the US approximately doubled, while around the same time their share of income from capital declined, and salaries and self-employment incomes became more important (Figure 1, also see Piketty and Saez, 2007a). These changes in the income composition have been even more pronounced over the long-run, with the share of income from capital among the top 1% dropping from close to 50% in the 1920s to less than 20% in the 2000s (Piketty and Saez, 2003, 2007a). Such an increase in the labor share at the top could arise from a change in the association between labor and capital, or because the share of tax units in the top who receive only capital income declines while there remain separate classes of laborers and capitalists. As part of the "hypermeritocratic society" (Piketty, 2014), the inequality in the wage distribution has increased substantially (Piketty and Saez, 2007a), providing support for the second channel. At the same time, tax units increasingly have income from both capital and labor (Wolff and Zacharias, 2009), and pure rentiers have virtually disappeared (Atkinson, 2009).

While the literature (e.g. Piketty and Saez, 2007a) has focused on the distribution of total income, as well as the distributions of capital and labor income separately, the association between the two income sources has received little attention. To extend the existing literature, this paper examines the association between capital and labor incomes at the top of the US income distribution. Using data based on US tax returns, we can directly measure the association. In a classical society, capitalists are at the top of the capital distribution and bottom in the wage distribution, i.e. the correlation between capital and labor incomes is negative. On the other hand, this correlation is generally positive (but less than one) in modern economies (Piketty, 2014). Our paper also links the study of the functional (capital v. labor) and the personal (rich v. poor) income distributions. For

Figure 1: Top 1% income share and composition



Excluding capital gains and negative observations. Income categories are defined below in Section 1.

classical economists, there was a clear mapping between these two types of distribution, with capitalists being rich and workers poor (Milanovic, 2017). With many people having income from more than one source (Atkinson, 2009), and the increasing inequality within capital and labor incomes (Lydall, 1968), this mapping is more complicated in modern economies.

We find that the association between capital and labor incomes increased between 1985 and 2006. Tax units at the top of the distributions of capital and labor incomes are increasingly the same people. There is some evidence of a U-shaped pattern - the association became weaker from 1966 to 1985 and then started increasing. The turning point comes after a fall in top marginal tax rates, which suggests that the rising association may be explained by high earners accumulating savings (i.e. future capital incomes) during a period of low top marginal tax rates. The association is found to be asymmetric in some parts of the distribution, with four-fifths of the top 1% of earners being among the top quintile of capital incomes, compared with only two-thirds of the top 1% capitalists being in the top quintile of earnings. That is, top wage earners are very likely to also receive high capital incomes,

while capital incomes and rentiers have not disappeared from the top. This asymmetry is not found at the top of the distribution (top 5% and upwards). Our results are robust to treating negative incomes and capital gains differently, and to how we allocate income from self-employment and closely-held corporations to capital and labor.

We examine the association in two ways. We begin by decomposing the top 1% income share by factor incomes, which is frequently done with standard inequality measures, but has not been applied to top income shares. The inequality in total income is decomposed into the labor share in total income, the top 1% share within the distributions of capital and labor incomes, and the alignment coefficient, which captures the association. The alignment coefficient, like the Pearson correlation coefficient, is affected by monotone transformations in the marginal distributions. In the second part of the paper, we thus use a rank-based measure of association that is more general and invariant to such transformations. Specifically, we analyze the association matrices between labor and capital, which are a discrete approximation to the copula density and equivalent to transition matrices in the study of economic mobility. The literature on mobility also provides us a test of increasing association based on cumulative association matrices.

This remainder of the paper is structured as follows. Section 1 describes the data. In Section 2, we develop and estimate a decomposition of top income shares by factor incomes. Section 3 reports the results from the association matrices. Section 4 concludes and discusses how the changes in the association may be related to top marginal tax rates. The Appendix provides additional results and several robustness checks.[1]

1 The data

We use the Statistics of Income public use files (PUF) by the US Internal Revenue Service over the period 1962 to 2006, which are (nearly) annual public-use samples based on federal

[1] A discussion of our US results after the mid-1990s in comparison with Norway can be found in an unpublished note by Aaberge et al. (2017).

income tax returns.[2] The data are based on a random sample of tax records filed during a particular calendar year. Importantly for our analysis, high-income returns are over-sampled, and we use the appropriate sampling weights to adjust for this. Following Piketty and Saez (2007a) and the literature using tax records more generally, the unit of analysis is a tax unit as defined under US tax law. We thus include singles and married couples without adjusting for differences in tax unit size.[3] Not every tax unit files a tax return; historically there were high exemption levels and income taxes only applied to the most affluent taxpayers. We ignore the non-filing issue in this paper because we would have to make an arbitrary assumption about the income composition of the non-filers. Furthermore, this is unlikely to affect our results, since the fraction of filers is quite high and stable over the period of analysis (94% on average, compared with 9% before World War II). The PUFs are subject to some adjustments, especially at the top, that try to minimize the risk that individual taxpayers can be identified (Winglee et al., 2002). As a result, an observation in the PUF never contains all the information on a tax return, and may include information from other returns. Further information is provided in Appendix A.3, where we also show some robustness checks.

Income is defined as (taxable) gross market income, as reported on federal income tax returns.[4] We follow Piketty and Saez (2007b), Piketty et al. (2018) and Saez and Zucman

[2]Like other papers using these data (e.g. Saez and Zucman, 2016 or Piketty et al., 2018), we exclude the micro data for 1960, since it contains fewer tax return variables. There exist no PUFs for 1963 and 1965. More information on these data is available at http://users.nber.org/~taxsim/gdb/.

[3]Our results are robust to including only tax units that have two adults. Between the 1960s and 2000s, the average tax unit size declined from 2.6 to almost 2 persons. The proportion of married tax units declined by 10pp in the whole population but slower at the top of the distribution (Saez, 2004). Lakner (2014) shows that the trend in top shares is robust to accounting for tax unit size. Piketty et al. (2018) also find very similar trends for tax units and adults. Tax units tend to be smaller than households; Hungerford (2010) estimates 75% of households to have one tax unit, and another 17% to have two tax units.

[4]We exclude any income that is not taxable (e.g. non-taxable fringe benefits such as health insurance), since it is not reported on the tax return. Imputing such non-taxable incomes from the US Current Population Survey does not have a large effect on top income shares (Bivens and Mishel, 2013; CBO, 2012). We also exclude non-market or transfer income such as Social Security and unemployment insurance benefits. Since the PUFs do not capture all tax liabilities (e.g. exclusion of state and local taxes), we focus on *gross* incomes, like Piketty and Saez (2007a) and most of the literature on top incomes. It is also unclear how to split total federal income taxes between capital and labor without additional imputations. Finally, our analysis uses income that is observed from tax records (like Piketty and Saez, 2007a), which does not match national income (like Piketty et al., 2018) or macro totals in the financial accounts (like Saez and Zucman, 2016) (also see Figure A.5).

(2016) to construct income components from the raw data that are comparable over time. We define labor income as the sum of wages and (taxable) pensions.[5] Self-employment income is the sum of sole-proprietorship (Schedule-C) and partnership income. In the baseline, capital income is defined as the sum of dividends, (taxable) interest, rents, estate income, royalties, and profits from S-corporations.[6] Because negative incomes can result in top shares for the distribution of capital or labor income that are greater than one, we drop observations which are negative in labor, self-employment or capital income.[7] Self-employment income reflects returns to both human and physical capital, so it needs to be split between labor and capital. In the baseline, we allocate two-thirds of self-employment income to labor and one-third to capital. While these weights are arbitrary, they are similar to earlier literature, close to factor shares found in national accounts (Gollin, 2002; Feldstein, 2008; Elsby et al., 2013; Karabarbounis and Neiman, 2014), and intermediate compared with more extreme weights considered in the robustness checks (Appendix A.5).[8] Table 1 presents summary statistics for the baseline income definition. The number of observations is 87,000 per year on average.

In Appendix A.5, we show that our results are robust to several alternative income definitions. First, instead of dropping negative observations, we set them to zero (similar to Saez and Stantcheva, 2017). Second, we include capital gains, which are an important income source at the top. The tax data only report realized capital gains, which are lumpy because realizations respond to changes in the tax code or asset prices. An accruals-based approach changes the timing of capital gains in the short run, but the long-run trend remains

[5]Stock options are taxed as wage income when they are exercised.

[6]S-corporations are businesses with few shareholders that are taxed at the personal instead of the corporate level. Including S-corporation profits with capital is similar to CBO (2012), and tries to address the shift of corporate income to the personal sector following the Tax Reform Act of 1986 (TRA86) (see below). Since we only include income that is taxable at the personal level, our definition of capital income excludes undistributed corporate profits.

[7]This affects on average 7.5% of the (weighted) sample, due to negatives in self-employment (4.9% of self-employment incomes are negative) and/or capital income (3.0% of capital incomes are negative). The median total income of the excluded observations is similar to the 70th percentile. Using the same dataset, Auerbach and Hassett (2002) also drop observations with negative adjusted gross income.

[8]Johnson (1954) attributes 65% of non-farm entrepreneurial income to labor. Kaymak and Poschke (2016) include 64% of entrepreneurial income with labor income. Piketty et al. (2018) allocate 70% of non-corporate business income to labor.

Table 1: Summary statistics

	1966	1970	1980	1985	1990	2000	2006
Overall mean	37,095	39,871	38,455	38,536	40,682	49,330	49,582
Top 5%: mean	147,774	153,513	151,149	156,166	200,505	297,669	310,457
Top 5%: threshold	88,910	96,650	98,188	100,965	108,510	135,043	136,985
Top 1%: mean	288,018	286,433	278,975	293,308	453,733	755,730	799,571
Top 1%: threshold	170,001	174,502	166,212	164,912	205,199	300,179	314,160
Top 0.5%: mean	379,552	373,430	368,796	402,933	666,268	1,152,718	1,217,897
Top 0.5%: threshold	234,381	233,496	218,958	211,241	294,606	444,401	479,634
Number observations	73,606	73,949	122,446	68,743	67,727	114,160	114,662

Note: All mean and threshold incomes refer to sum of income components, and are expressed in 2006 USD. Excluding capital gains and negative observations. CPI data are taken from Saez (2013).

similar (Larrimore et al., 2016). Third, we report results for two alternative ways of splitting income from self-employment and closely-held businesses: (a) We show that our results are robust to including 54% of S-corporation profits with labor income instead of allocating them entirely to capital income.[9] As Figure 1 shows, this pass-through income has become increasingly important at the top (also see Cooper et al., 2016).[10] Using evidence from firm owner deaths, Smith et al. (2017) estimate that 54% of S-corporation profits at the top represent labor income. (b) Our conclusions are also robust to moving in the opposite direction and allocating a greater share of self-employment income to capital. Following Saez and Zucman (2016), we include all of self-employment income (as well as S-corporation profits) with capital, instead of only one-third in the baseline.

2 Decomposition by factor incomes

We begin the analysis with a decomposition of top income shares by factor incomes. This is a formal derivation and the first empirical application of the decomposition by Atkinson (2007), who builds on Meade (1964). It is closely related to factor income decompositions of

[9] Wages that the owner-manager of the S-corporation pays herself would have already been included in wage income.

[10] S-corporation filing status became more attractive following TRA86, which reduced the top personal tax rate below the corporate tax rate (Slemrod, 1996; Auerbach and Slemrod, 1997). Since then, the incentives to file as an S-corporation or a C-corporation have remained similar (Smith et al., 2017).

other inequality measures (Shorrocks, 1982; Lerman and Yitzhaki, 1985; Milanovic, 2017). Like these decompositions, inequality in total income is decomposed into three elements: The share of each factor in total income, the inequality in the distribution of income from each of the factors, and a term capturing the association between the incomes from different factors and total income.

The income share of top quantile i can be written as $S_i = \frac{Y_i}{Y}$, where Y is total income in the data and Y_i denotes total income of tax units with income greater or equal to y_i, the threshold income (e.g. the 99th percentile in the case of the top 1% income share). For any individual j, total income y_j is derived from M components, such that $y_j = \sum_{m=1}^{M} x_{j,m}$. Defining $\widetilde{X_{i,m}} = \sum_{j=1}^{N} x_{j,m} \times \mathbb{1}\{y_j \geq y_i\}$, the top income share can be written as

$$S_i = \sum_{m=1}^{M} \frac{\widetilde{X_{i,m}}}{Y} = \sum_{m=1}^{M} \frac{X_m}{Y} \frac{X_{i,m}}{X_m} \frac{\frac{\widetilde{X_{i,m}}}{X_m}}{\frac{X_{i,m}}{X_m}} = \sum_{m=1}^{M} \frac{\mu_m}{\mu} S_{i,m} A_{i,m} \tag{1}$$

, where $X_m = \sum_{j=1}^{N} x_{j,m}$ is the total income from factor m, and $X_{i,m} = \sum_{j=1}^{N} x_{j,m} \times \mathbb{1}\{x_{j,m} \geq x_{i,m}\}$. The first term in the final expression is the share of total income derived from income source m. $S_{i,m} = \frac{X_{i,m}}{X_m}$ denotes the share of total income from factor m that accrues to the top quantile i of recipients of income from factor m, e.g. the share of capital income going to the top 1% of capitalists. It thus captures inequality in the marginal distribution. Atkinson (2007) refers to the final term as the "alignment coefficient", which captures the extent to which the rankings under income from factor m and total income coincide. It is defined as $A_{i,m} = \frac{\widetilde{S_{i,m}}}{S_{i,m}}$, where $\widetilde{S_{i,m}} = \frac{\widetilde{X_{i,m}}}{X_m}$ is the share of total income from factor m received by the top quantile i of *total* income recipients.[11] The alignment coefficient lies between 0 and 1 since shares are non-negative and $S_{i,m} \geq \widetilde{S_{i,m}}$.[12] If top income recipients

[11] Following Shorrocks (1982), $\widetilde{S_{i,m}}$ may be called the "pseudo share". It is different from $S_{i,m}$ because observations are ranked according to total, not factor, income.

[12] After canceling out the incomes of tax units who are in the top quantile i of both income from factor m and total income, we can write

$$S_{i,m} - \widetilde{S_{i,m}} = \frac{\sum_{j=1}^{N} x_{j,m} \times \mathbb{1}\{x_{j,m} \geq x_{i,m} \cap y_j < y_i\}}{X_m} - \frac{\sum_{j=1}^{N} x_{j,m} \times \mathbb{1}\{x_{j,m} < x_{i,m} \cap y_j \geq y_i\}}{X_m} \geq 0$$

(according to total income) receive no labor income, $\widetilde{X_{i,l}} = 0$ and $A_{i,l} = 0$. On the other hand, if everybody in the top quantile i of the total income distribution is also found in the top quantile i of the distribution of labor income, then $\widetilde{S_{i,l}} = S_{i,l}$ and $A_{i,l} = 1$.

2.1 Results

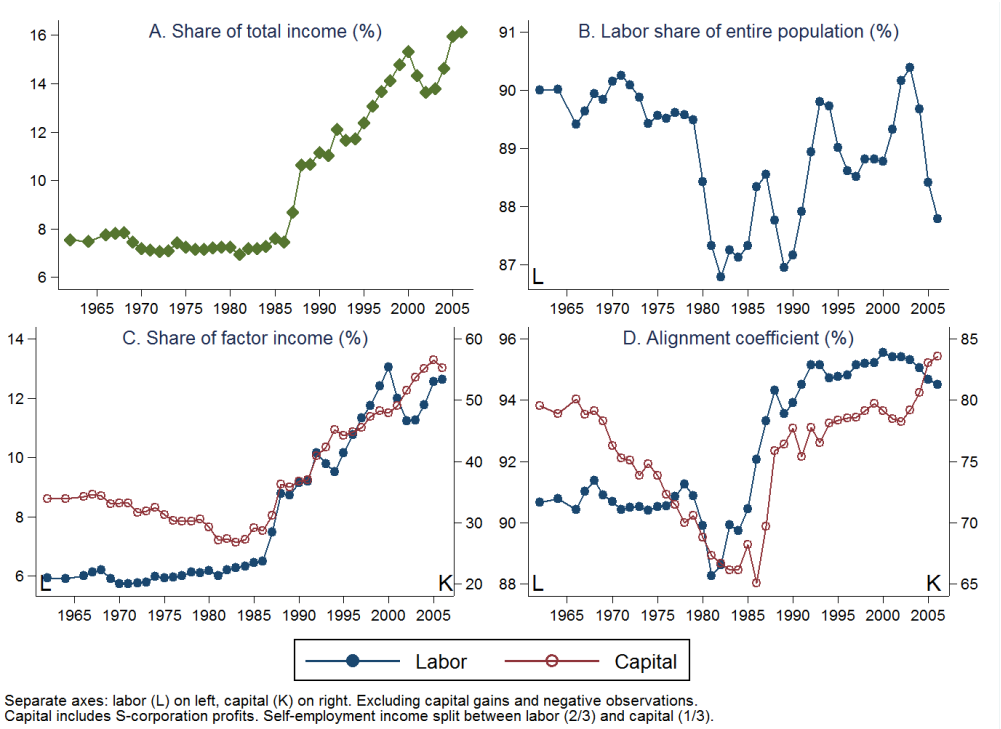
Figure 2 shows the results of the factor income decomposition for the top 1%. Panel A shows S_1, the top 1% share of total income, which roughly doubled over this period (as was already shown in Figure 1). While we estimate the top share at a somewhat lower level than Piketty and Saez (2007a), the two series track each other very closely, as discussed in Appendix A.4. The remaining three panels of Figure 2 refer to the different components of the decomposition: The labor share (B); the share in total labor (capital) income of the top 1% of labor (capital) income recipients (C); and the alignment coefficients (D). The results for the top 5% and top 0.5% are shown in the Appendix (Figures A.1 and A.2). In almost all our results, the 1980s mark a turning point, which coincides with the sweeping changes to the US federal income tax introduced by the Tax Reform Act of 1986 (TRA86).[13] Tax reforms may lead to re-timing or accounting responses (Slemrod, 1992), which can explain short-run fluctuations but they are unlikely to account for the long-term trends that we analyze in this paper (Alvaredo et al., 2013). Furthermore, it is reassuring that our results are robust to alternative income definitions (see Appendix A.5), such as the inclusion of capital gains, an important channel of tax avoidance (Piketty et al., 2014).

The labor share in total income (panel B) fluctuated between 87% and 90%, with no clear trend. At around 75%, Piketty et al. (2018) find a much lower labor share over this period, which is also approximately constant. Piketty et al. estimate a higher capital share because they include capital incomes that are not reported on personal tax returns, such

This is weakly positive because in the first term all $x_{j,m}$ are at least as big as the cut-off level $x_{i,m}$, while in the second term they are strictly less than $x_{i,m}$.

[13] As we already discussed, TRA86 brought the personal top marginal income tax rate below the corporate rate, thus providing incentives to move income from the corporate to the personal income tax base (Auerbach and Slemrod, 1997). TRA86 also raised tax rates on capital gains by including all realized capital gains in taxable income (Slemrod, 1996).

Figure 2: Decomposition by factor income of the top 1% income share



as imputed rents for owner-occupiers, dividends and interest paid to pension funds, and corporate retained earnings.

The inequality in labor incomes, as measured by the top 1% share, increased very similarly to the inequality in total income, although the top labor share remains at a slightly lower level. The share of labor income going to the top 1% of earners approximately doubled, from 6% in the 1960s to 12% in the 2000s (panel C, left axis). These results mimic the estimates by Piketty and Saez (2007a), who impute for non-filers and also present independent evidence on executive compensation.[14] Capital incomes are distributed much more unequally than either labor or total income, as one would expect (Piketty, 2014). The top 1% share of capital incomes fell until the 1980s, then increased similarly to labor and total income, but continued to rise in the 2000s. The top 1% of capitalists now account for more than half of capital incomes, compared with around 30% in the 1980s (panel C, right axis). These results

[14]Saez and Veall (2007) find that in Canada top wages increased similarly to the US without the same changes in fiscal policy, suggesting that the US increase was real, not simply an accounting response due to changes in the tax code.

follow a very similar trend to the taxable capital income shares reported by Saez and Zucman (2016), who allocate all self-employment income to capital (also see Appendix A.5).[15]

The alignment coefficient for labor income declined slightly from 91% to 88% in the late-1970s, before rising to 95% in the 2000s (panel D, left axis).[16] For capital income, the alignment coefficient is lower and follows a U-shaped pattern; it declined from almost 80% in the 1960s to 65% in the 1980s, before rising to 83% by the end of the period.[17] A value of 83% for the capital alignment coefficient means that 83% of total capital income of the top 1% of *capitalists* goes to tax units who are also in the top 1% of *total* income. Given that the top 1% capitalists receive 55% of capital income (panel C), this implies that 46% of all capital income goes to tax units who are in the richest 1% (this is $\widetilde{S_{1,c}}$ above). The same statistic was 20% of all capital income in the mid-1980s. These estimates suggest that over the last 20 years capitalists are increasingly also at the top of the income distribution. Labor income has an even stronger association with total income: Around 95% of labor income of the top 1% of earners is received by tax units that are also in the richest 1%, compared with 83% for capital.[18] We will examine this asymmetry in the association in more detail below.

3 Rank-based measure of association

The association measure that we have used so far, the alignment coefficient, is not independent of monotone transformations in the marginal distributions. For example, a doubling of all labor incomes would tend to change the ranking in the distribution of total income, and thus affect the alignment coefficient through $\widetilde{S_{i,m}}$. Only a rank-based measure of associa-

[15] In their main results for wealth, Saez and Zucman include other assets that do not generate taxable incomes, e.g. primary housing. The top 1% share of wealth has increased less than the top 1% share of taxable capital income.

[16] When all of self-employment income is included with capital, the labor alignment coefficient is much lower and increasing during most of the period (Figure A.6).

[17] The U-shape is also visible for alternative income definitions (Figure A.6). It is less pronounced when capital gains are included, although this is largely due to a spike in capital gains realizations before TRA86.

[18] The labor alignment coefficient tends to exceed the capital coefficient also for other income definitions (Figure A.6). The exceptions are a few years when capital gains are included, and early in the period when all self-employment income is included in capital.

tion is invariant to all monotone transformations in the marginals (Dardanoni and Lambert, 2001). In the remainder of the paper, we use an analytical framework based on the copula function, which offers a clean separation of the joint distribution of labor and capital into the marginal distributions and a rank-based measure of the association.[19] Our rank-based association measure is also more general because it considers the entire distribution, while the alignment coefficient for say the top 1% is determined only by whether observations cross the 99th percentile.

Total income is a two-dimensional vector $X = (L, K)$, where L denotes labor income and K refers to capital income. By Sklar's Theorem (Nelsen, 2006), there exists a copula function C_X such that $H_X(l, k)$, the joint distribution function of X, can be written as

$$H_X(l, k) = C_X\{F(l), G(k)\} \tag{2}$$

where $F(l)$ and $G(k)$ are the marginal distribution functions of labor and capital income. The density of the joint distribution is obtained by differentiating with respect to l and k

$$h(l, k) = f(l)g(k)C_{FG}\{F(l), G(k)\} \tag{3}$$

where $C_{FG}\{F(l), G(k)\}$ is the copula density. The joint density can thus be expressed as the product of the marginals, and the copula density, which is a rank-based measure of the association. The association matrix between labor and capital, shown in Table A.1 for 2006, is a discrete approximation to the copula density (Bonhomme and Robin, 2009).[20] The bins are defined in terms of ranks, splitting the distributions of labor and capital income into eight quantile groups: The bottom 50% ($\leq$ P50), the next 10% (P50-P60), the next 20%

[19] Copula functions have been widely used in actuarial science to describe multidimensional risks. In economics, they have been used to study the joint distribution of income and wealth (Kennickell, 2009; Jäntti et al., 2015), the horizontal equity of the tax system (Dardanoni and Lambert, 2001), income mobility by considering the dependence over time (Bonhomme and Robin, 2009), and multi-dimensional inequality and poverty (Atkinson, 2011; Ferreira and Lugo, 2013; Decancq, 2014).

[20] Parametric copulas tend to impose symmetry. Since the association between capital and labor is asymmetric, we will adopt a non-parametric approach and use association matrices directly.

(P60-P80), the next 10% (P80-P90), the next 5% (P90-P95), the next 4% (P95-P99), the next 0.5% (P99-P99.5) and the top 0.5% (>P99.5).[21]

The association matrix is equivalent to transition matrices used to study economic mobility. Following Atkinson (1981), who examines transition matrices, we can test whether the degree of association between labor and capital has increased. Consider the following two association matrices A and A^*

$$A = \begin{array}{c|ccccc} & \cdots & \text{j}-1 & \text{j} & \cdots \\ \vdots & \ddots & \vdots & \vdots & \iddots \\ \text{i}-1 & \cdots & p_{i-1,j-1} & p_{i-1,j} & \cdots \\ \text{i} & \cdots & p_{i,j-1} & p_{i,j} & \cdots \\ \vdots & \iddots & \vdots & \vdots & \ddots \end{array} \qquad A^* = \begin{array}{c|ccccc} & \cdots & \text{j}-1 & \text{j} & \cdots \\ \vdots & \ddots & \vdots & \vdots & \iddots \\ \text{i}-1 & \cdots & p_{i-1,j-1}+\gamma & p_{i-1,j}-\gamma & \cdots \\ \text{i} & \cdots & p_{i,j-1}-\gamma & p_{i,j}+\gamma & \cdots \\ \vdots & \iddots & \vdots & \vdots & \ddots \end{array}$$

where i and j are particular quantile groups (of labor and capital), $p_{i,j}$ is the frequency in the association matrix, and $\gamma > 0$. A^* is obtained from A by a correlation-increasing (or "diagonalizing") switch, which adds γ to the diagonal elements and subtracts it from the off-diagonal elements. This switch increases the weight on the diagonal, such that A^* exhibits a stronger association between labor and capital, but it leaves the marginal distributions unchanged. Let α and α^* be the survival association matrices of A and A^*, which are obtained by cumulating the association matrices from above. Table A.2 shows the survival association matrix observed for 2006. These are the survival copulas for a discrete distribution (Dardanoni and Lambert, 2001).[22] Taking the difference between α^* and α yields the following result (see Appendix A.1 for intermediate steps)

[21] Table A.1 shows that 0.14% of observations were both in the top 0.5% of the labor and the top 0.5% of the capital income distribution. This is greater than 0.0025%, which would be the frequency if the two variables were independent, but less than 0.5%, the frequency with perfect association.

[22] Given our interest in the top tail of the distribution, it makes sense to consider the *survival* copula. Similar to the expression above, the joint survival function can be written as $\widehat{H_X(l,k)} = \widehat{C_X}\{\widehat{F(l)}, \widehat{G(k)}\}$, where $\widehat{C_X}$ is the survival copula, and $\widehat{F(l)} = 1 - F(l)$ and $\widehat{G(k)} = 1 - G(k)$ are the survival distributions (or complementary cumulative distribution functions) (Nelsen, 2006).

$$\alpha^* - \alpha = \begin{array}{c} \\ \vdots \\ \geq \mathrm{i}-1 \\ \geq \mathrm{i} \\ \geq \mathrm{i}+1 \\ \vdots \end{array} \begin{array}{cccccc} \cdots & \geq \mathrm{j}-1 & \geq \mathrm{j} & \geq \mathrm{j}+1 & \cdots \\ \ddots & \vdots & \vdots & \vdots & \iddots \\ \cdots & 0 & 0 & 0 & \cdots \\ \cdots & 0 & \gamma & 0 & \cdots \\ \cdots & 0 & 0 & 0 & \cdots \\ \iddots & \vdots & \vdots & \vdots & \ddots \end{array} \tag{4}$$

Therefore, if the difference between the survival association matrices in years $t+1$ and t is everywhere positive, labor and capital incomes have become more closely associated between those years, thus moving away from a class model, where one class is at the top of the labor distribution and the other at the top of the capital distribution.[23] This is a test of first-order dominance, which will be sufficient for this paper. To go beyond first-order dominance, one would need to place additional restrictions on the social welfare functions, effectively giving a different weight to the association in different parts of the distribution (Atkinson, 1981; Aaberge, 2009; Aaberge et al., 2017).

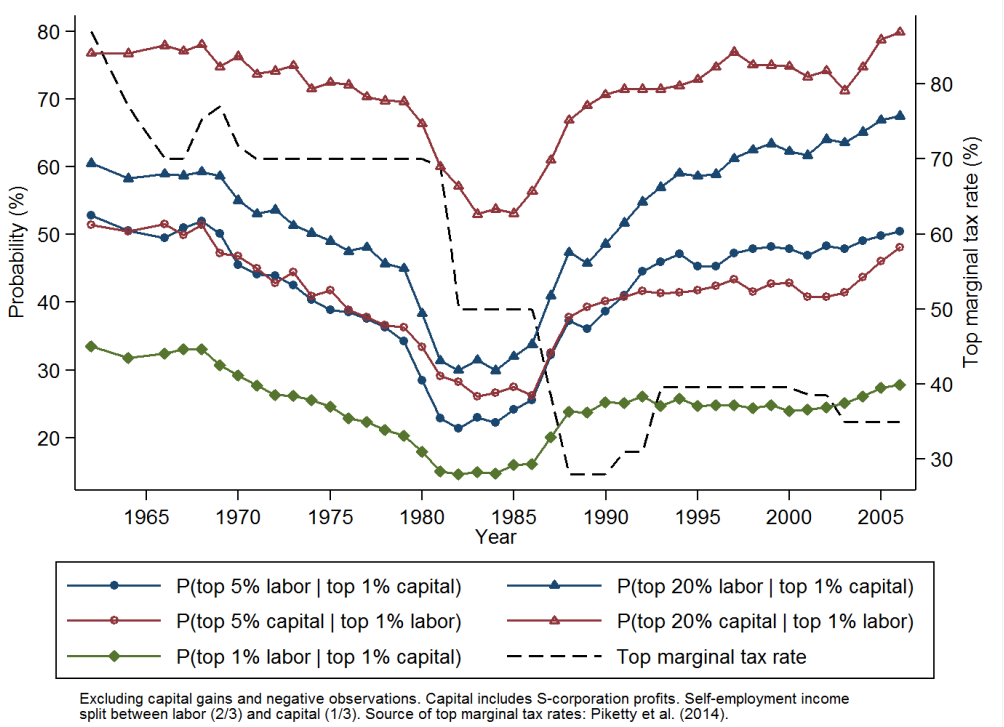
3.1 Results

We begin by examining the long-run evolution of some statistics from the association matrix before testing for first-order dominance for selected years. Figure 3 shows several conditional probabilities that are obtained from the survival association matrix.[24] The figure exhibits a distinct U-shape over this 40-year period, with a decline during the initial 20 years and a rise in the 20 years leading up to 2006. For instance, in the 1960s tax units that were among the top 1% earners were among the top quintile of capitalists with an 80% probability. This number fell to less than 60% by the early-1980s, before again approaching 80% in the 2000s.

[23] Decancq (2014) derives dominance criteria for continuous copula functions that are equivalent to the discrete case considered here.

[24] For instance, Table A.2 shows that in 2006 0.8% of tax units were both in the top 20% of capital incomes and the top 1% of labor incomes. In other words, of those tax units that were among the top 1% earners, 80% were also among the top quintile of capitalists, which is shown in Figure 3.

Figure 3: Long-run changes in the distribution conditional on top 1%



In other words, the first 20 years showed a declining association between labor and capital incomes, which has largely been reversed by now. This U-shaped pattern is also found for the top 5% and the top 0.5% (Figures A.3 and A.4), as well as the alternative income definitions (Figure A.7).

For some parts of the conditional distribution, Figure 3 also confirms the asymmetry that we have found in earlier results. Top labor earners are more likely to also be among the top capital incomes, compared with top capital income recipients being at the top of the labor distribution: Of the top 1% of capitalists, only around two-thirds are within the top quintile of earners, compared with 80% of the top 1% earners being in the top quintile of capitalists. However, this asymmetry is not present at the very top, since the results for the top 5% (as opposed to the top quintile) are more similar across labor and capital. These results are confirmed when we condition on the top 5% or the top 0.5% (Figures A.3 and A.4), and when we use alternative income definitions (Figure A.7). In any case, these estimates

suggest a high degree of association: If the top 1% of earners had randomly been assigned capital incomes, 20% of them would be among the richest quintile of capitalists, compared to the observed 80%.

We test for first-order dominance between 1966, 1985 and 2006, capturing the two 20-year periods that we have just described.[25] The differences between the survival association matrices is shown in Table 2, where we have highlighted the negative cells. We do not find dominance between 1985 and 1966, since there are both positive and negative differences between the two survival association matrices (panel a). At the top of the distribution, 1966 appears to dominate 1985, suggesting a fall in the association, consistent with what we observed above. The period between 1985 and 2006 presents a stark contrast of increasing association (panel b); the survival association matrix in 2006 lies everywhere above the 1985 matrix. In other words, over the same period as the top 1% income share doubled, tax units increasingly occupied similar positions in terms of earnings and capital income. Viewed over the entire period from 1966 to 2006 (panel c), the results also point towards increasing association, although the differences are smaller and there are some small negative values (all less than 0.05 in absolute value). These dominance results are robust to using alternative income definitions (see Appendix A.5).

[25] We have chosen 1985 instead of 1986, because 1986 may be affected by the anticipation of TRA86, which was announced in 1986 and became effective in 1987. However, the results are robust to choosing 1986.

Table 2: Difference in survival association matrices (in percentage points)

(a) 1985 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	0.68	**-1.59**	**-1.05**	**-0.95**	**-1.08**	**-0.23**	**-0.09**
Top 40%	1.11	**-1.15**	**-0.96**	**-0.87**	**-1.06**	**-0.25**	**-0.09**
Top 20%	0.67	**-0.78**	**-0.94**	**-0.75**	**-0.77**	**-0.27**	**-0.10**
Top 10%	0.33	**-0.42**	**-0.82**	**-0.71**	**-0.65**	**-0.26**	**-0.10**
Top 5%	0.10	**-0.30**	**-0.66**	**-0.59**	**-0.53**	**-0.25**	**-0.10**
Top 1%	**-0.01**	**-0.06**	**-0.25**	**-0.26**	**-0.24**	**-0.16**	**-0.08**
Top 0.5%	0.00	**-0.02**	**-0.11**	**-0.13**	**-0.13**	**-0.08**	**-0.06**

(b) 2006 compared with 1985

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.78	2.05	2.53	2.08	1.43	0.35	0.18
Top 40%	1.87	2.11	2.55	2.08	1.41	0.37	0.18
Top 20%	1.35	1.63	2.03	1.57	1.07	0.36	0.18
Top 10%	0.58	0.92	1.41	1.17	0.80	0.31	0.16
Top 5%	0.22	0.50	0.96	0.81	0.59	0.26	0.15
Top 1%	0.03	0.07	0.27	0.26	0.21	0.12	0.09
Top 0.5%	0.01	0.03	0.12	0.13	0.11	0.05	0.05

Description: Share of tax units who were in the top 0.5% of both labor and capital increased by 0.05pp between 1985 and 2006.

(c) 2006 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	2.46	0.47	1.49	1.13	0.35	0.13	0.09
Top 40%	2.98	0.96	1.59	1.20	0.35	0.12	0.09
Top 20%	2.02	0.86	1.09	0.82	0.30	0.09	0.08
Top 10%	0.91	0.50	0.60	0.46	0.14	0.05	0.06
Top 5%	0.32	0.20	0.30	0.22	0.06	0.01	0.05
Top 1%	0.02	0.01	0.02	0.00	**-0.03**	**-0.05**	0.01
Top 0.5%	0.01	0.01	0.01	0.00	**-0.02**	**-0.03**	**-0.01**

Note: Bold cells: Value of survival association matrix is lower in final year (e.g. 2006) than initial year (e.g. 1985).

4 Conclusion

This paper has studied the association between capital and labor incomes at the top of the distribution using tax return data. This helps to understand the driving forces behind the rise in the top 1% income share, that has been documented before (Piketty and Saez, 2003). We find that capital and labor incomes have become more closely associated between 1985 and 2006, such that top capitalists and top earners are increasingly the same people. This rising association has contributed to the well-known increase in the top 1% income share, exacerbating the effects of rising inequality within capital incomes and earnings. In contrast, the 20 years leading up to 1985 saw a tendency towards a declining association, thus resulting in a U-shaped pattern. The association is asymmetric in some parts of the distribution, as a top earner is almost guaranteed to also be among the richest fifth of capitalists, while a sizable share of top capitalists fall into the bottom four-fifths of earnings. The association is more symmetric for richer quantiles, such as the top 5%. Our conclusions are robust to alternative treatments of negative incomes and capital gains, and how profits from self-employment and closely-held businesses are split between capital and labor.

The reversal from declining to increasing association coincided with a strong fall in the top marginal income tax rate in the US (dotted line in Figure 3). The top marginal rate declined from 91% in the early 1960s to 28% in 1986, and remained below 40% for the rest of the period. Lower taxes at the top raise the reward to bargaining more aggressively for higher pay, and therefore may explain the rapid rise in (gross) salaries at the top, which account for a large share of the increase in top income shares (Bakija et al., 2012; Alvaredo et al., 2013; Piketty et al., 2014).[26] Lower taxes may also account for the increasing association: When top marginal tax rates are low, tax units can save a greater share of their wages, thus accumulating more capital income over time.[27] This explanation assumes high saving

[26]The decline in top marginal tax rates is not the only possible explanation for these patterns (also see Alvaredo et al., 2013). Other explanations may include a superstar theory together with a globalized economy (Atkinson, 2008), the spread of performance-based pay (Lemieux et al., 2009) and the role of the financial industry (Kaplan and Rauh, 2010; Philippon and Reshef, 2012).

[27]Saez and Zucman (2016) discuss the effect of increasing top incomes and high savings rates for wealth

rates and only limited mobility at the top of the wage distribution, which is confirmed by the empirical evidence.[28] Our finding of an asymmetric association in some parts of the distribution also fits a model in which high earners accumulate capital incomes out of labor income.

Our paper shed light on the evolution of the association between capital and labor incomes during the last 40 years, when the top marginal tax rate declined strongly. It it unclear how the association will evolve in the future as there are two opposing forces. On the one hand, the high concentration of labor incomes coupled with low top marginal tax rates and high saving rates at the top, is unlikely to go away. On the other hand, we may see a reemergence of rentiers, as the high earners retire, which would reduce the association.[29]

inequality, which is closely related to the distribution of capital incomes. Kaymak and Poschke (2016) present a formal model where a decline in income tax progressivity leads to an increase in wealth inequality.

[28]Saez and Zucman (2016) find high and increasing saving rates for the top 1%. Kopczuk et al. (2010) show that around two-thirds of the top 1% of earners are still there after three years, with little change since the late 1970s.

[29]The average age at the top of the income distribution has increased since the 2000s, after having fallen for 20 years (Piketty et al., 2018).

References

Aaberge, R.: 2009, 'Ranking intersecting Lorenz curves'. *Social Choice and Welfare* **33**(2), 235–259.

Aaberge, R., A. B. Atkinson, S. Königs, and C. Lakner: 2017, 'From Classes to Copulas: Wages, capital and top incomes'. Unpublished note.

Alvaredo, F., A. B. Atkinson, L. Chancel, T. Piketty, E. Saez, and G. Zucman: 2017, 'World Wealth and Income Database: WID.world'. http://topincomes.g-mond.parisschoolofeconomics.eu/, Accessed 24/01/2013.

Alvaredo, F., A. B. Atkinson, T. Piketty, and E. Saez: 2013, 'The Top 1 Percent in International and Historical Perspective'. *Journal of Economic Perspectives* **27**(3), 3–20.

Atkinson, A. B.: 1981, 'The measurement of economic mobility'. In: P. J. Eijgelshoven and L. J. van Gemerden (eds.): *Inkomensverdeling en openbare financiën*. Het Spectrum, Utrecht. Reprinted in A B Atkinson, 1983, Social justice and public policy, Chapter 3, Wheatsheaf Books, Brighton.

Atkinson, A. B.: 2007, 'Measuring Top Incomes: Methodological Issues'. In: A. B. Atkinson and T. Piketty (eds.): *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English-Speaking Countries*. Oxford University Press.

Atkinson, A. B.: 2008, *The Changing Distribution of Earnings in OECD Countries*. Oxford University Press.

Atkinson, A. B.: 2009, 'Factor shares: the principal problem of political economy?'. *Oxford Review of Economic Policy* **25**(1), 3–16.

Atkinson, A. B.: 2011, 'On lateral thinking'. *Journal of Economic Inequality* **9**, 319–328.

Atkinson, A. B. and T. Piketty: 2007, *Top incomes over the twentieth century: a contrast between continental European and English-speaking countries*. Oxford University Press.

Atkinson, A. B. and T. Piketty: 2010, *Top incomes: a global perspective*. Oxford University Press.

Auerbach, A. J. and K. A. Hassett: 2002, 'A New Measure of Horizontal Equity'. *The American Economic Review* **92**(4), 1116–1125.

Auerbach, A. J. and J. Slemrod: 1997, 'The Economic Effects of the Tax Reform Act of 1986'. *Journal of Economic Literature* **35**(2), 589–632.

Bakija, J., A. Cole, and B. T. Heim: 2012, 'Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data'. Working paper, Williams College.

Bivens, J. and L. Mishel: 2013, 'The Pay of Corporate Executives and Financial Professionals as Evidence of Rents in Top 1 Percent Incomes'. *Journal of Economic Perspectives* **27**(3), 57–78.

Bonhomme, S. and J.-M. Robin: 2009, 'Assessing the Equalizing Force of Mobility Using Short Panels: France, 1990-2000'. *Review of Economic Studies* **76**(1), 63–92.

CBO: 2012, 'The Distribution of Household Income and Federal Taxes, 2008 and 2009'. Congressional Budget Office Report 4441.

Cooper, M., J. McClelland, J. Pearce, R. Prisinzano, J. Sullivan, D. Yagan, O. Zidar, and E. Zwick: 2016, 'Business in the United States: Who Owns it and How Much Tax Do They Pay?'. *Tax Policy and the Economy* **30**, 90–128.

Dardanoni, V. and P. Lambert: 2001, 'Horizontal inequity comparisons'. *Social Choice and Welfare* **18**(4), 799–816.

Decancq, K.: 2014, 'Copula-based measurement of dependence between dimensions of well-being'. *Oxford Economic Papers* **66**(3), 681–701.

Elsby, M. W. L., B. Hobijn, and A. Sahin: 2013, 'The Decline of the U.S. Labor Share'. *Fall 2013 Brookings Panel on Economic Activity*.

Feldstein, M. S.: 2008, 'Did Wages Reflect Growth in Productivity?'. *NBER Working Paper* (13953).

Ferreira, F. H. G. and M. A. Lugo: 2013, 'Multidimensional Poverty Analysis: Looking for a Middle Ground'. *The World Bank Research Observer* **28**(2), 220–235.

Gollin, D.: 2002, 'Getting Income Shares Right'. *Journal of Political Economy* **110**(2), 458–474.

Hungerford, T. L.: 2010, 'The Redistributive Effect of Selected Federal Transfer and Tax Provisions'. *Public Finance Review* **38**(4), 450–472.

Jäntti, M., E. M. Sierminska, and P. V. Kerm: 2015, 'Modeling the Joint Distribution of Income and Wealth'. *Research on Economic Inequality* **23**, 301–327.

Johnson, D. G.: 1954, 'The Functional Distribution of Income in the United States, 1850-1952'. *The Review of Economics and Statistics* **36**(2), 175–182.

Kaplan, S. N. and J. Rauh: 2010, 'Wall Street and Main Street: What Contributes to the Rise in the Highest Incomes?'. *Review of Financial Studies* **23**(3), 1004–1050.

Karabarbounis, L. and B. Neiman: 2014, 'The Global Decline of the Labor Share'. *The Quarterly Journal of Economics* **129**(1), 61–103.

Kaymak, B. and M. Poschke: 2016, 'The evolution of wealth inequality over half a century: The role of taxes, transfers and technology'. *Journal of Monetary Economics* **77**(C), 1 – 25.

Kennickell, A. B.: 2009, 'Ponds and Streams: Wealth and Income in the U.S., 1989 to 2007'. Finance and economics discussion series 2009-13, Federal Reserve Board.

Kopczuk, W., E. Saez, and J. Song: 2010, 'Earnings Inequality and Mobility in the United States: Evidence from Social Security Data since 1937'. *Quarterly Journal of Economics* **125**(1), 91–128.

Lakner, C.: 2014, 'The Determinants of Incomes and Inequality: Evidence from Poor and Rich Countries'. Ph.D. thesis, University of Oxford.

Larrimore, J., R. V. Burkhauser, G. Auten, and P. Armour: 2016, 'Recent Trends in US Top Income Shares in Tax Record Data Using More Comprehensive Measures of Income Including Accrued Capital Gains'. *NBER Working Paper* (23007).

Lemieux, T., W. B. MacLeod, and D. Parent: 2009, 'Performance Pay and Wage Inequality'. *The Quarterly Journal of Economics* **124**(1), 1–49.

Lerman, R. I. and S. Yitzhaki: 1985, 'Income Inequality Effects by Income Source: A New Approach and Applications to the United States'. *The Review of Economics and Statistics* **67**(1), 151–156.

Lydall, H.: 1968, *The Structure of Earnings*. Clarendon Press.

Meade, J. E.: 1964, *Efficiency, equality and the ownership of property*. Allen & Unwin.

Milanovic, B.: 2017, 'Increasing Capital Income Share and Its Effect on Personal Income Inequality'. In: H. Boushey, J. B. DeLong, and M. Steinbaum (eds.): *After Piketty: The Agenda for Economics and Inequality*. Harvard University Press.

Nelsen, R. B.: 2006, *An Introduction to Copulas*. Springer.

Philippon, T. and A. Reshef: 2012, 'Wages and Human Capital in the U.S. Finance Industry: 1909-2006'. *The Quarterly Journal of Economics* **127**(4), 1551–1609.

Piketty, T.: 2014, *Capital in the Twenty-First Century*. Harvard University Press.

Piketty, T. and E. Saez: 2003, 'Income Inequality in the United States, 1913-1998'. *The Quarterly Journal of Economics* **118**(1), 1–39.

Piketty, T. and E. Saez: 2007a, 'Income and Wage Inequality in the United States 1913-2002'. In: A. B. Atkinson and T. Piketty (eds.): *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English-Speaking Countries*. Oxford University Press.

Piketty, T. and E. Saez: 2007b, 'How Progressive is the U.S. Federal Tax System? A Historical and International Perspective'. *Journal of Economic Perspectives* **21**(1), 3–24.

Piketty, T., E. Saez, and S. Stantcheva: 2014, 'Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities'. *American Economic Journal: Economic Policy* **6**(1), 230–71.

Piketty, T., E. Saez, and G. Zucman: 2018, 'Distributional National Accounts: Methods and Estimates for the United States'. *The Quarterly Journal of Economics*. forthcoming.

Saez, E.: 2004, 'Reported Incomes and Marginal Tax Rates, 1960-2000: Evidence and Policy Implications'. *Tax Policy and the Economy* **18**, 117–173.

Saez, E.: 2013, 'Income inequality in the United States, 1913-2012'. Updated Tables and Figures on http://elsa.berkeley.edu/ saez/, accessed: 07.09.2014.

Saez, E. and S. Stantcheva: 2017, 'A simpler theory of optimal capital taxation'. *NBER Working Paper Series* (22664).

Saez, E. and M. R. Veall: 2007, 'The Evolution of High Incomes in Canada, 1920-2000'. In: A. B. Atkinson and T. Piketty (eds.): *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*. Oxford University Press.

Saez, E. and G. Zucman: 2016, 'Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data'. *The Quarterly Journal of Economics* **131**(2), 519.

Sailer, P., M. Weber, and W. Wong: 2001, 'Disclosure-Proofing the 1996 Individual Tax Return Public-Use File'. *Proceedings of the American Statistical Association*.

Shorrocks, A. F.: 1982, 'Inequality Decomposition by Factor Components'. *Econometrica* **50**(1), 193–211.

Slemrod, J.: 1992, 'Do Taxes Matter? Lessons from the 1980's'. *American Economic Review Papers and Proceedings* **82**(2), 250–256.

Slemrod, J.: 1996, 'High-Income Families and the Tax Changes of the 1980s: The Anatomy of Behavioral Response'. In: M. S. Feldstein and J. M. Poterba (eds.): *Empirical Foundations of Household Taxation*. University of Chicago Press.

Smith, M., D. Yagan, O. Zidar, and E. Zwick: 2017, 'Capitalists in the Twenty-First Century'. Working paper, Chicago Booth.

Winglee, M., R. Valliant, J. Clark, Y. Lim, M. Weber, and M. Strudler: 2002, 'Assessing Disclosure Protection for a SOI Public Use File'. *Proceedings of the American Statistical Association*.

Wolff, E. N. and A. Zacharias: 2009, 'Household wealth and the measurement of economic well-being in the United States'. *The Journal of Economic Inequality* **7**(2), 83–115.

Online Appendix

A.1 Derivation of first-order dominance test

Association matrices A and A^* are defined as

$$A = \begin{array}{c} \\ \vdots \\ \text{i}-1 \\ \text{i} \\ \vdots \end{array} \begin{array}{c} \cdots \\ \ddots \\ \cdots \\ \cdots \\ \iddots \end{array} \begin{array}{c} \text{j}-1 \\ \vdots \\ p_{i-1,j-1} \\ p_{i,j-1} \\ \vdots \end{array} \begin{array}{c} \text{j} \\ \vdots \\ p_{i-1,j} \\ p_{i,j} \\ \vdots \end{array} \begin{array}{c} \cdots \\ \iddots \\ \cdots \\ \cdots \\ \ddots \end{array}$$

$$A^* = \begin{array}{c} \\ \vdots \\ \text{i}-1 \\ \text{i} \\ \vdots \end{array} \begin{array}{c} \cdots \\ \ddots \\ \cdots \\ \cdots \\ \iddots \end{array} \begin{array}{c} \text{j}-1 \\ \vdots \\ p_{i-1,j-1}+\gamma \\ p_{i,j-1}-\gamma \\ \vdots \end{array} \begin{array}{c} \text{j} \\ \vdots \\ p_{i-1,j}-\gamma \\ p_{i,j}+\gamma \\ \vdots \end{array} \begin{array}{c} \cdots \\ \iddots \\ \cdots \\ \cdots \\ \ddots \end{array}$$

where i and j are particular quantile groups (of labor and capital), $p_{i,j}$ is the frequency in the association matrix, and $\gamma > 0$. A^* is obtained from A by a correlation-increasing switch, which raises the weight on the diagonal without changing the marginal distributions. Hence A^* exhibits stronger association between labor and capital. The survival association matrix of A is defined as

$$\alpha = \begin{array}{c} \\ \vdots \\ \geq \text{i}-1 \\ \geq \text{i} \\ \geq \text{i}+1 \\ \vdots \end{array} \begin{array}{c} \cdots \\ \ddots \\ \cdots \\ \cdots \\ \cdots \\ \iddots \end{array} \begin{array}{c} \geq \text{j}-1 \\ \vdots \\ \alpha_{i-1,j}+\alpha_{i,j-1}-\alpha_{i,j}+p_{i-1,j-1} \\ \alpha_{i,j}+\alpha_{i+1,j-1}-\alpha_{i+1,j}+p_{i,j-1} \\ \alpha_{i+1,j-1} \\ \vdots \end{array} \begin{array}{c} \geq \text{j} \\ \vdots \\ \alpha_{i-1,j+1}+\alpha_{i,j}-\alpha_{i,j+1}+p_{i-1,j} \\ \alpha_{i,j+1}+\alpha_{i+1,j}-\alpha_{i+1,j+1}+p_{i,j} \\ \alpha_{i+1,j} \\ \vdots \end{array} \begin{array}{c} \geq \text{j}+1 \\ \vdots \\ \alpha_{i-1,j+1} \\ \alpha_{i,j+1} \\ \alpha_{i+1,j+1} \\ \vdots \end{array} \begin{array}{c} \cdots \\ \iddots \\ \cdots \\ \cdots \\ \cdots \\ \ddots \end{array}$$

where $\alpha_{i,j} = \Pr(l > l_i \cap k > k_j)$. We have used the fact that $\alpha_{i,j} = \alpha_{i,j+1} + \alpha_{i+1,j} - \alpha_{i+1,j+1} + p_{i,j}$; the diagonal element $\alpha_{i+1,j+1}$ needs to be subtracted because adding the adjacent elements $\alpha_{i,j+1}$ and $\alpha_{i+1,j}$ double-counts these cells. All other cells follow from the

same formula. Similarly, the survival association matrix of A^* is denoted by

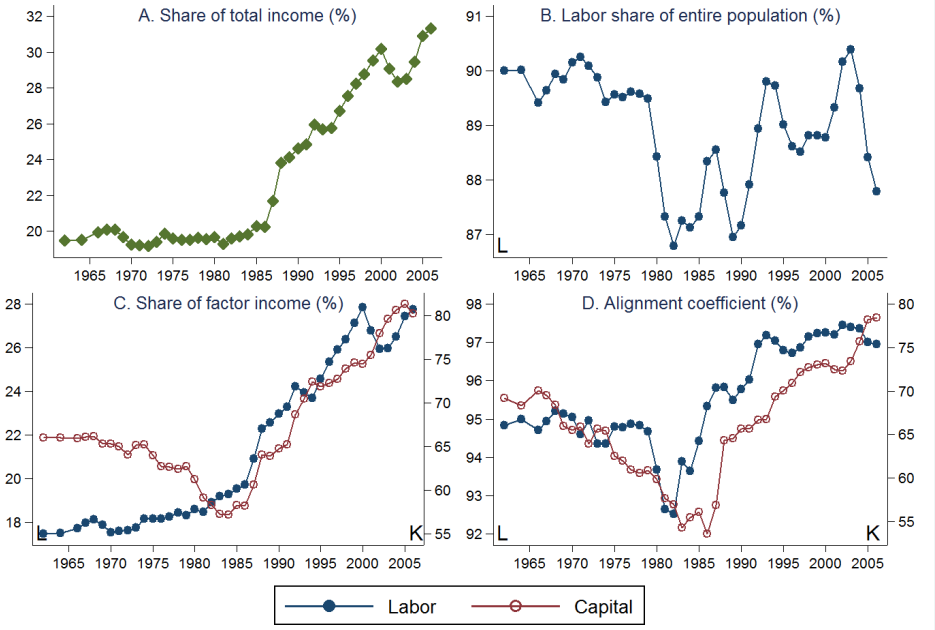
$$\alpha^* = \begin{array}{c} \\ \vdots \\ \geq \mathrm{i}-1 \\ \geq \mathrm{i} \\ \geq \mathrm{i}+1 \\ \vdots \end{array} \begin{array}{c} \cdots \\ \ddots \\ \cdots \\ \cdots \\ \cdots \\ \iddots \end{array} \begin{array}{c} \geq \mathrm{j}-1 \\ \vdots \\ \alpha_{i-1,j}+\alpha_{i,j-1}-(\alpha_{i,j}+\gamma)+p_{i-1,j-1}+\gamma \\ (\alpha_{i,j}+\gamma)+\alpha_{i+1,j-1}-\alpha_{i+1,j}+p_{i,j-1}-\gamma \\ \alpha_{i+1,j-1} \\ \vdots \end{array} \begin{array}{c} \geq \mathrm{j} \\ \vdots \\ \alpha_{i-1,j+1}+(\alpha_{i,j}+\gamma)-\alpha_{i,j+1}+p_{i-1,j}-\gamma \\ \alpha_{i,j+1}+\alpha_{i+1,j}-\alpha_{i+1,j+1}+p_{i,j}+\gamma \\ \alpha_{i+1,j} \\ \vdots \end{array} \begin{array}{c} \geq \mathrm{j}+1 \\ \vdots \\ \alpha_{i-1,j+1} \\ \alpha_{i,j+1} \\ \alpha_{i+1,j+1} \\ \vdots \end{array} \begin{array}{c} \cdots \\ \iddots \\ \cdots \\ \cdots \\ \cdots \\ \ddots \end{array}$$

where we used the following results: $\alpha^*_{i,j}$=$\alpha_{i,j}+\gamma$; $\alpha^*_{i,j-1}=\alpha_{i,j-1}$ and $\alpha^*_{i-1,j}=\alpha_{i-1,j}$ because γ cancels out. After canceling out γ, it is clear that the only difference between α and α^* is $\alpha^*_{i,j}$, such that $\alpha^*_{i,j}=\alpha_{i,j}+\gamma$. Therefore, taking the difference between α^* and α yields the following result (also see equation 4 in the main text)

$$\alpha^*-\alpha = \begin{array}{c} \\ \vdots \\ \geq \mathrm{i}-1 \\ \geq \mathrm{i} \\ \geq \mathrm{i}+1 \\ \vdots \end{array} \begin{array}{c} \cdots \\ \ddots \\ \cdots \\ \cdots \\ \cdots \\ \iddots \end{array} \begin{array}{c} \geq \mathrm{j}-1 \\ \vdots \\ 0 \\ 0 \\ 0 \\ \vdots \end{array} \begin{array}{c} \geq \mathrm{j} \\ \vdots \\ 0 \\ \gamma \\ 0 \\ \vdots \end{array} \begin{array}{c} \geq \mathrm{j}+1 \\ \vdots \\ 0 \\ 0 \\ 0 \\ \vdots \end{array} \begin{array}{c} \cdots \\ \iddots \\ \cdots \\ \cdots \\ \cdots \\ \ddots \end{array}$$

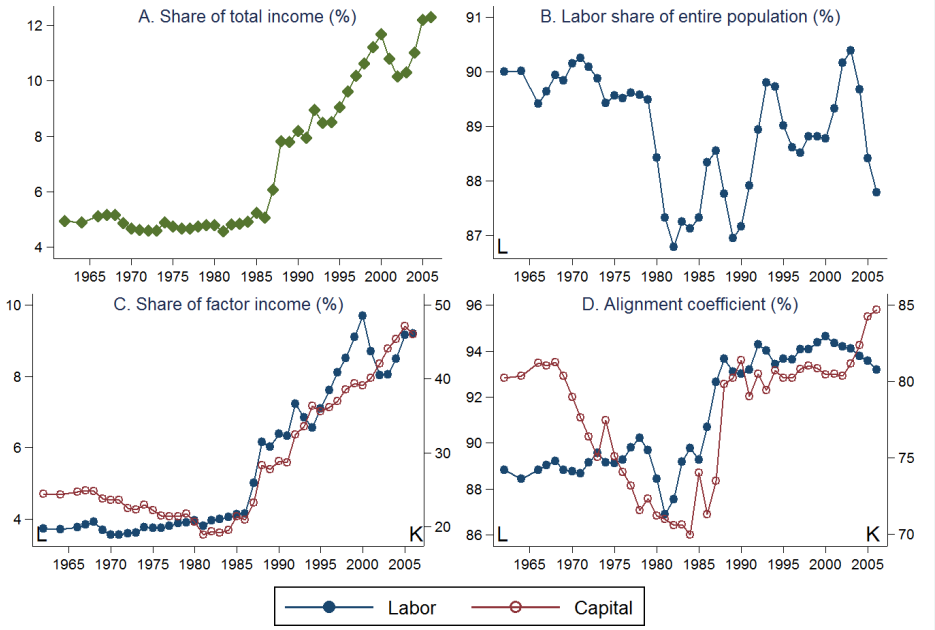
A.2 Additional results

Figure A.1: Decomposition by factor income of the top 5% income share



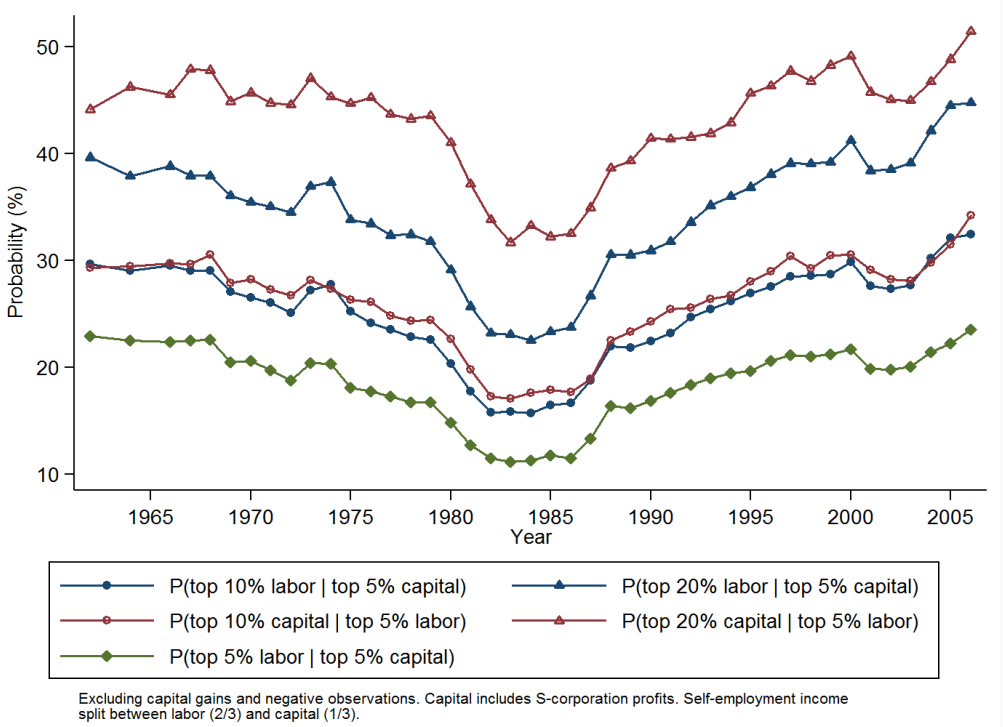
Separate axes: labor (L) on left, capital (K) on right. Excluding capital gains and negative observations.
Capital includes S-corporation profits. Self-employment income split between labor (2/3) and capital (1/3).

Figure A.2: Decomposition by factor income of the top 0.5% income share



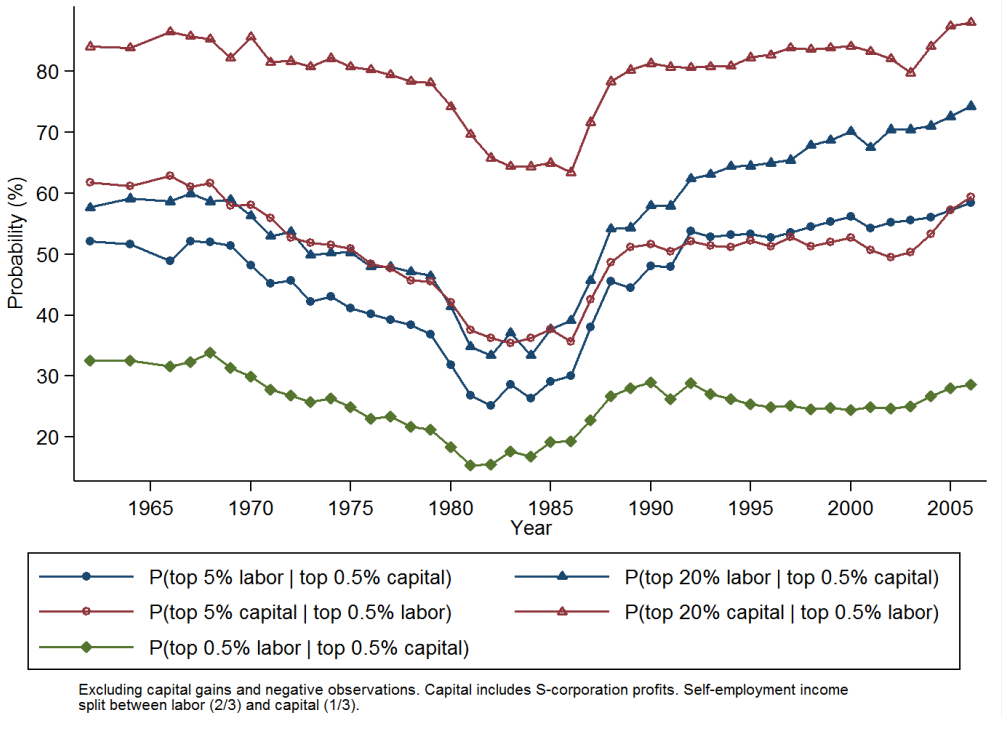
Separate axes: labor (L) on left, capital (K) on right. Excluding capital gains and negative observations.
Capital includes S-corporation profits. Self-employment income split between labor (2/3) and capital (1/3).

Figure A.3: Long-run changes in the distribution conditional on top 5%



Excluding capital gains and negative observations. Capital includes S-corporation profits. Self-employment income split between labor (2/3) and capital (1/3).

Figure A.4: Long-run changes in the distribution conditional on top 0.5%



Excluding capital gains and negative observations. Capital includes S-corporation profits. Self-employment income split between labor (2/3) and capital (1/3).

Table A.1: Association matrix in 2006 (frequencies in %)

	Capital								
Labor	$\leq P50$	$P50$-$P60$	$P60$-$P80$	$P80$-$P90$	$P90$-$P95$	$P95$-$P99$	$P99$-$P99.5$	$> P99.5$	Total
$\leq P50$	30.36	3.00	7.63	5.12	2.32	1.39	0.12	0.07	50.00
$P50$-$P60$	6.20	0.90	1.52	0.66	0.47	0.24	0.02	0.01	10.01
$P60$-$P80$	9.36	2.78	4.39	1.66	0.88	0.81	0.06	0.04	19.99
$P80$-$P90$	2.94	1.85	3.07	1.04	0.47	0.53	0.05	0.04	10.00
$P90$-$P95$	0.84	0.90	1.82	0.65	0.33	0.37	0.04	0.04	4.99
$P95$-$P99$	0.39	0.45	1.39	0.69	0.39	0.47	0.14	0.09	4.00
$P99$-$P99.5$	0.01	0.02	0.11	0.10	0.08	0.08	0.04	0.06	0.50
$> P99.5$	0.01	0.00	0.05	0.07	0.07	0.12	0.03	0.14	0.50
Total	50.10	9.91	19.99	10.00	5.00	4.00	0.50	0.50	100.00

Note: 30.36% of tax units are in the bottom half of both the labor and capital income distribution. In other words, 61% of tax units who are in the bottom half of labor incomes are also in the bottom half of capital incomes.

Table A.2: Survival association matrix in 2006 (frequencies in %)

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	30.25	23.34	10.99	6.11	3.42	0.81	0.43
Top 40%	26.44	20.43	9.59	5.37	3.16	0.78	0.42
Top 20%	15.80	12.58	6.14	3.58	2.24	0.68	0.37
Top 10%	8.74	7.37	4.00	2.48	1.62	0.58	0.33
Top 5%	4.59	4.11	2.57	1.71	1.18	0.50	0.29
Top 1%	0.98	0.96	0.80	0.63	0.48	0.28	0.20
Top 0.5%	0.49	0.49	0.44	0.37	0.30	0.18	0.14

Note: 2.24% of tax units are both in the top 20% of earnings and the top 5% of capital incomes. That is, 45% of tax units in the top 5% of capitalists are also in the top 20% of earnings.

A.3 Adjustments made to public use files

The public use files (PUF) are subject to some adjustments that try to avoid individual taxpayers being identified. Because public data on executive compensation may be available, salaries reported on tax returns have been blurred (or micro-aggregated) since 1983 by replacing adjacent records by their average. Therefore, an observation in the PUF never contains all the information on a tax return, and may include information from other returns. Before 1996, this only affected salaries at the top (the top 1% or less), so it is unlikely to affect our results substantially.[30] We present two robustness checks which confirm that the association has increased between 1982 and 1995. None of the income components we use were blurred in 1982. 1995 is the last year before blurring was applied to salaries throughout the distribution, and before profits from sole-proprietorships were also blurred.

Since the blurring affects income components, but not total income, one can attempt to recreate the raw salaries from the correctly recorded total income, as we do here for 1995. It will be impossible to reproduce the raw salaries with certainty, since multiple income components have been removed or blurred at the same time, and components have been rounded, but it is nevertheless a useful robustness check. For example, in 1995 alimony paid and received, which is part of total taxable income, was removed for high-income tax units and blurred for low-income tax units. For the low-income observations, for whom salaries were not blurred, our recreated salaries are 5% greater on average than the raw salaries in 1995. The recreated salaries also contain a substantial number of negatives (almost 8% of the high-income observations), which we set to zero. Our recreated salary variable combines the raw salaries for the low-income observations (approximately the bottom 99%) with the

[30] Other variables such as alimony payments, real estate deductions or the state of residence were also blurred or removed, but we do not use them in our analysis. Because the PUFs also exclude some records at the very top (between 13 and 191 records during 1996 to 2008, as reported by Piketty et al.), Saez and Zucman (2016) and Piketty et al. (2018) augment the PUF with a synthetic observation to match the totals above $10m. The cut-off for the top 0.5%, which is the smallest group we consider in our analysis, is far lower than that, so this is unlikely to affect our results. Sailer et al. (2001) find that the original and blurred data match well for the top 1%, but they find larger differences for the top 400 taxpayers. For a full description of the PUF construction, see Winglee et al. (2002) and http://users.nber.org/~taxsim/gdb/.

recreated salaries for the high-income observations.

Table A.3 reports the first-order dominance tests between 1982 and 1995 for the baseline income definitions (i.e. excluding capital gains and two-thirds of self-employment income allocated to labor). Using variables as recorded in the PUF, the association between labor and capital incomes increased over this period (panel a), similar to what we observed between 1985 and 2006 (Table 2). When we use the recreated salary variable, the results are almost identical (panel b); the differences are all within 0.01pp. Finally, we can compare these results with what the recorded PUF data show between 1982 and 1996, when disclosure avoidance procedures became more stringent.[31] Comparing 1982 to 1996 with 1982 to 1995 may tell us something about the role of these procedures, although we can obviously not control for any other contemporaneous events that may affect the association. The first-order dominance is also confirmed between 1982 and 1996 (panel c).

[31]Salaries were blurred also for the low-income observations. Sole-proprietorship profits were now blurred.

Table A.3: Difference in survival association matrices (in percentage points)

(a) 1995 compared with 1982: Baseline results

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.32	1.09	1.36	1.10	0.85	0.29	0.16
Top 40%	1.16	1.02	1.23	1.03	0.86	0.29	0.16
Top 20%	0.98	0.81	0.94	0.88	0.68	0.29	0.16
Top 10%	0.57	0.60	0.76	0.68	0.56	0.27	0.15
Top 5%	0.20	0.41	0.59	0.54	0.41	0.24	0.14
Top 1%	0.03	0.06	0.16	0.17	0.13	0.10	0.10
Top 0.5%	0.01	0.02	0.08	0.09	0.08	0.05	0.05

(b) 1995 compared with 1982: Recreated salaries

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.31	1.09	1.36	1.10	0.85	0.29	0.16
Top 40%	1.16	1.01	1.23	1.04	0.86	0.30	0.16
Top 20%	0.98	0.81	0.95	0.89	0.69	0.29	0.16
Top 10%	0.57	0.60	0.76	0.69	0.56	0.28	0.15
Top 5%	0.20	0.42	0.60	0.54	0.41	0.24	0.14
Top 1%	0.03	0.07	0.16	0.17	0.14	0.10	0.10
Top 0.5%	0.01	0.02	0.08	0.09	0.08	0.05	0.05

Note: For 1995, salaries have been recreated from total income.

(c) 1996 compared with 1982

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.13	1.04	1.53	1.19	0.93	0.29	0.16
Top 40%	1.06	0.97	1.43	1.11	0.93	0.30	0.16
Top 20%	0.86	0.78	1.09	0.96	0.74	0.29	0.16
Top 10%	0.55	0.57	0.83	0.74	0.59	0.27	0.15
Top 5%	0.24	0.38	0.63	0.58	0.46	0.24	0.14
Top 1%	0.03	0.07	0.18	0.18	0.14	0.10	0.09
Top 0.5%	0.01	0.02	0.08	0.08	0.07	0.05	0.05

A.4 Comparison with earlier literature

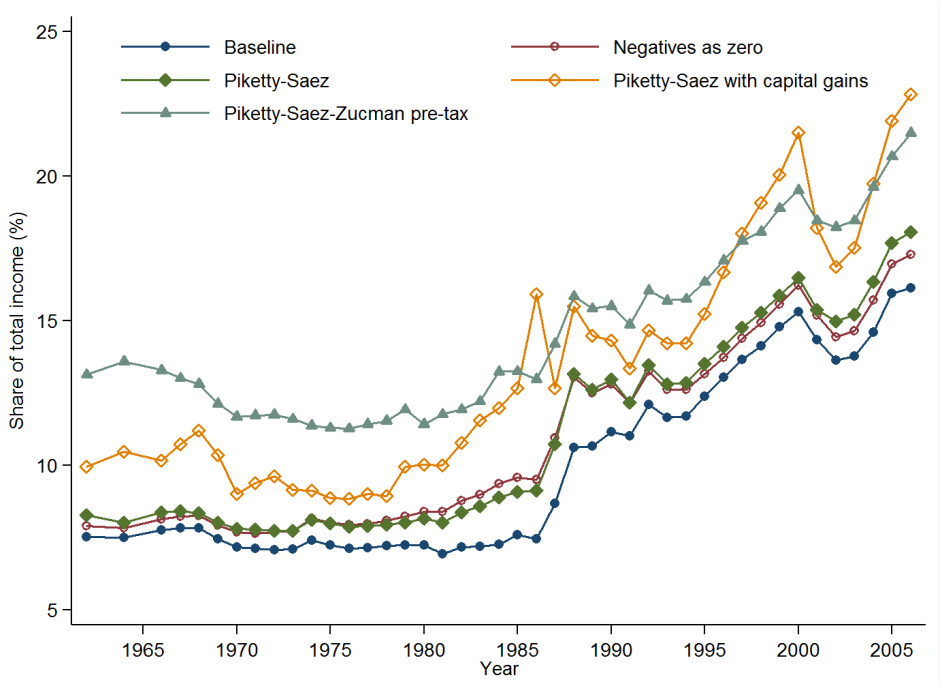
Figure A.5 compares our top 1% income share with the estimates by Piketty and Saez (2007a) (taken from Saez, 2013). Our methodology differs from Piketty and Saez in several aspects: (a) Piketty and Saez adjust for non-filing and define top quantiles relative to the entire US population of *potential* taxpayers, while we only consider the tax units that file a return. (b) Piketty and Saez use total gross market income reported on the tax return, while we report the sum of income components. We thus exclude some small income sources, such as alimony. The disclosure avoidance procedures, which affect income components but not total income, could also lead to differences (see Appendix A.3). (c) The sample is different because we exclude observations which are negative in either labor, capital or self-employment income. (d) The Piketty and Saez estimates rely on tabulated data after 2001, while we use micro data throughout.

Our baseline shares are lower than Piketty and Saez (2007a), but they follow a very similar trend. Setting negative observations to zero instead of excluding them (see Appendix A.5), raises the top income share and brings us very close to Piketty and Saez, despite all the methodological differences.[32]

Figure A.5 also shows the top 1% income shares estimated by Piketty et al. (2018), whose income definition follows national accounts. For example, Piketty et al. include employee fringe benefits and impute rents to owner-occupiers, which are relatively widely distributed. They also account for all capital income, including capital income paid to pension funds and earnings retained in corporations. On the other hand, Piketty et al. exclude those short-term capital gains that do not reflect retained earnings. Their top 1% income share exceeds that based on taxable income because the former have a more complete coverage of capital incomes, which are concentrated at the top. While the Piketty et al. top 1% income share is higher than our estimates and increased somewhat slower, the general trend is similar.

[32] When we set negatives to zero, we add additional observations relative to the baseline. This additional income is concentrated towards the top, especially after setting the negative components to zero.

Figure A.5: Comparison of top 1% income share with Piketty and Saez (2007a) and Piketty et al. (2018)



A.5 Robustness checks for alternative income definitions

We replicate the main results for five alternative income definitions, which are summarized in Table A.4 and in the main text (Section 1). Capital gains have been adjusted to account for changes in legislation affecting the taxable portion of capital gains.[33] Figure A.6 shows the decomposition of the top 1% income share by factor income. The baseline results reported in the figure are identical to the estimates in the main text (Figure 2). Including capital gains increases the share of total income accruing to the top 1%, and makes the series more volatile (panel A). Including 54% of S-corporation profits with labor income affects the total income share slightly due to the treatment of negative incomes.[34]

Table A.4: Overview of income definitions used in robustness checks

Income concept	Definition of		Treatment of
	Labor	Capital	negative obs.
(1) Baseline	W+2/3*S	K+1/3*S+SCorp	Dropped
(2) Negatives as zero	W+2/3*S	K+1/3*S+SCorp	Set to zero
(3) Capital gains	W+2/3*S	K+1/3*S +SCorp+KGains	Dropped
(4) 54% S-corp profits to labor	W+2/3*S+0.54*SCorp	K+1/3*S+0.46*SCorp	Dropped
(5) All self-employment to capital	W	K+S+SCorp	Dropped

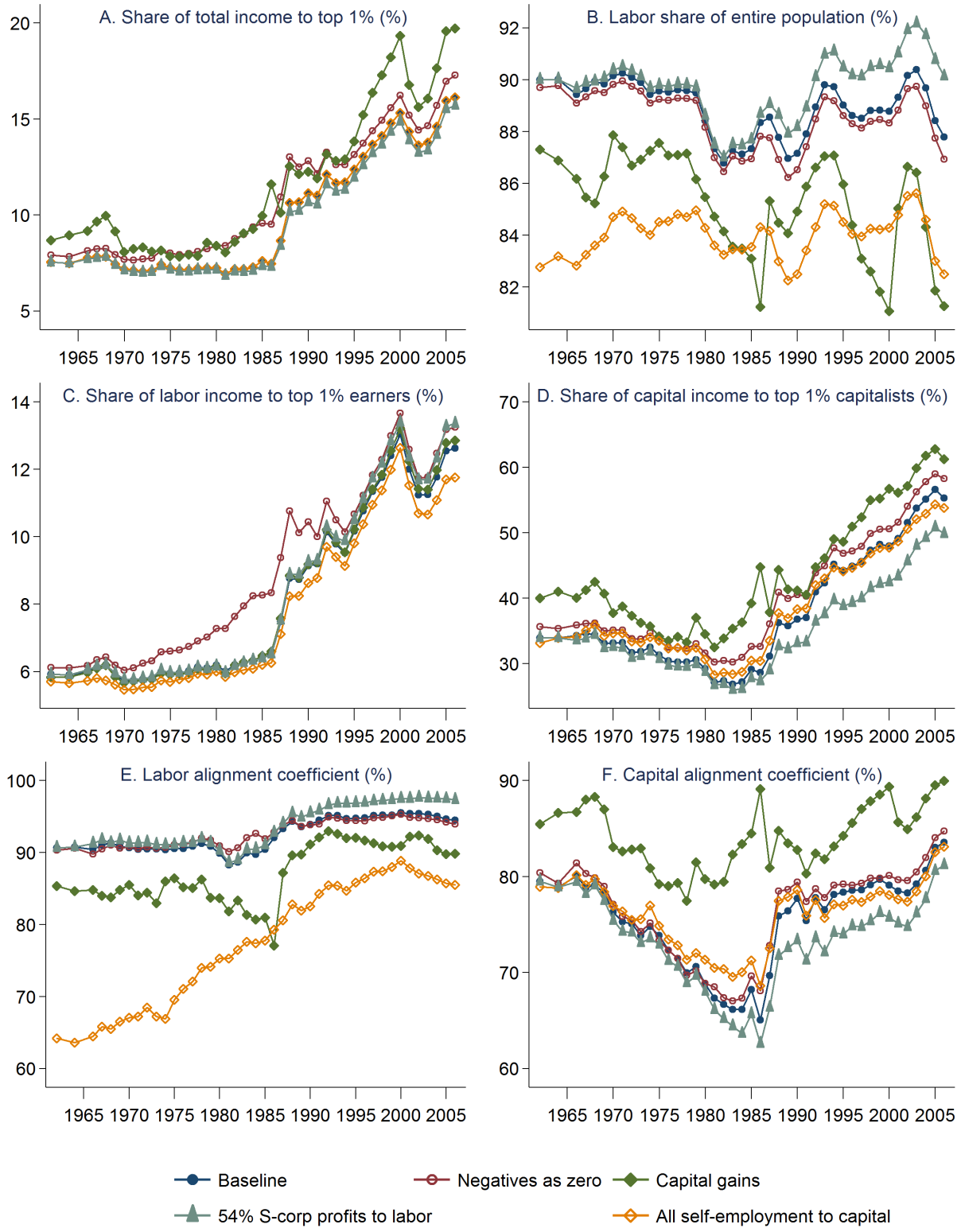
Note: W=wages+pensions; S=ScheduleC+partnership; K=dividends+interest+rents+estate income+royalties

Figure A.7 reproduces the long-run changes in the conditional distribution (similar to Figure 3). The treatment of self-employment income and S-corporation profits seems to have a greater effect than including capital gains. Including a share of S-corporation profits with labor, raises the probability that the top 1% capitalists are also at the top of the distribution of labor income (panels A, C and E). This is consistent with the finding that this income source has become more important at the top (Figure 1; Smith et al., 2017). Allocating self-employment income entirely to capital income has a large effect (also see panel E in Figure A.6), but this is a very extreme allocation rule that seems unrealistic, since self-

[33]This income definition is used when the US results of this paper are discussed in comparison with Norway, see unpublished note by Aaberge et al. (2017).

[34]In addition to the sample selection adopted in the baseline, observations with negative S-corporation profits are excluded in this robustness check.

Figure A.6: Decomposition by factor income of top 1% share: Alternative income definitions



employment income reflects at least some return to labor. Using the first-order dominance test, the rise in the association between capital and labor income between 1985 and 2006 is confirmed for all income definitions (Tables A.5 to A.8). When we treat S-corporation profits as a mix of capital and labor or allocate all self-employment income to capital, we find first-order dominance also over the entire period from 1966 to 2006 (Tables A.7 and A.8).

Figure A.7: Long-run changes in the conditional distribution: Alternative income definitions

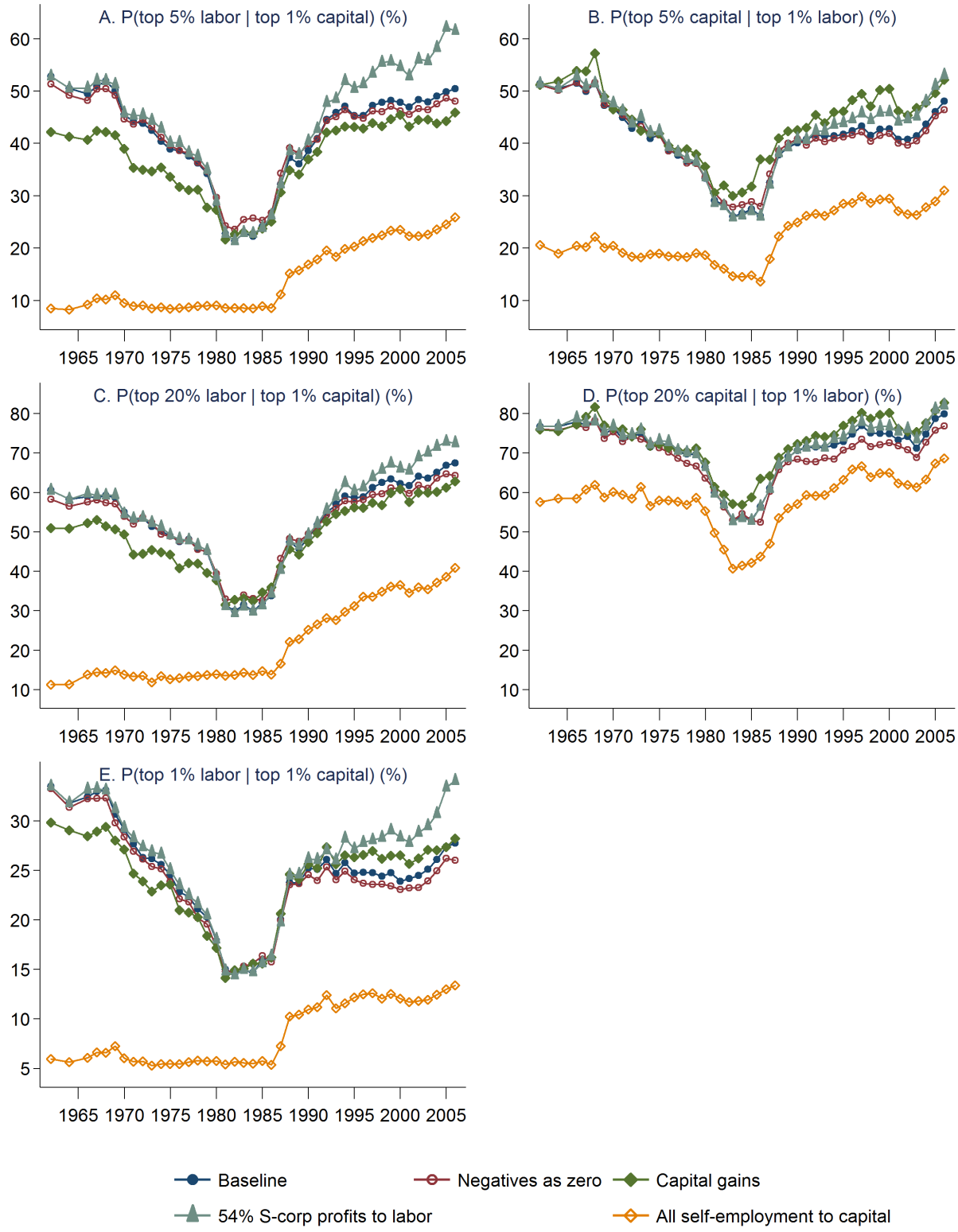


Table A.5: Difference in survival association matrices (in percentage points): Negatives as zero

(a) 1985 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	0.86	**-1.51**	**-0.85**	**-0.88**	**-1.01**	**-0.22**	**-0.07**
Top 40%	1.11	**-1.12**	**-0.79**	**-0.77**	**-1.00**	**-0.24**	**-0.08**
Top 20%	0.43	**-0.81**	**-0.77**	**-0.66**	**-0.70**	**-0.25**	**-0.09**
Top 10%	**-0.08**	**-0.61**	**-0.69**	**-0.62**	**-0.58**	**-0.24**	**-0.08**
Top 5%	**-0.22**	**-0.45**	**-0.59**	**-0.53**	**-0.48**	**-0.23**	**-0.08**
Top 1%	**-0.16**	**-0.18**	**-0.24**	**-0.25**	**-0.23**	**-0.16**	**-0.07**
Top 0.5%	**-0.09**	**-0.10**	**-0.14**	**-0.15**	**-0.14**	**-0.10**	**-0.07**

(b) 2006 compared with 1985

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.73	2.10	2.41	2.01	1.31	0.34	0.15
Top 40%	1.80	2.07	2.36	1.89	1.27	0.34	0.16
Top 20%	1.35	1.52	1.79	1.38	0.93	0.32	0.16
Top 10%	0.73	0.92	1.22	0.97	0.67	0.27	0.14
Top 5%	0.37	0.52	0.80	0.67	0.49	0.23	0.13
Top 1%	0.15	0.17	0.24	0.23	0.18	0.10	0.07
Top 0.5%	0.09	0.10	0.13	0.13	0.11	0.06	0.05

(c) 2006 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	2.59	0.59	1.56	1.13	0.30	0.11	0.08
Top 40%	2.92	0.95	1.57	1.13	0.27	0.11	0.08
Top 20%	1.78	0.71	1.02	0.72	0.24	0.07	0.07
Top 10%	0.65	0.31	0.53	0.36	0.09	0.03	0.06
Top 5%	0.15	0.08	0.21	0.15	0.01	0.00	0.05
Top 1%	**-0.01**	**-0.01**	0.00	**-0.02**	**-0.05**	**-0.06**	0.00
Top 0.5%	0.00	0.00	**-0.01**	**-0.02**	**-0.03**	**-0.04**	**-0.02**

Table A.6: Difference in survival association matrices (in percentage points): Including capital gains

(a) 1985 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	0.96	**-1.51**	**-0.80**	**-0.82**	**-0.71**	**-0.13**	**-0.05**
Top 40%	1.30	**-1.09**	**-0.71**	**-0.67**	**-0.72**	**-0.15**	**-0.05**
Top 20%	0.85	**-0.68**	**-0.68**	**-0.58**	**-0.60**	**-0.18**	**-0.06**
Top 10%	0.42	**-0.37**	**-0.66**	**-0.57**	**-0.53**	**-0.18**	**-0.07**
Top 5%	0.14	**-0.25**	**-0.51**	**-0.47**	**-0.43**	**-0.17**	**-0.07**
Top 1%	0.00	**-0.05**	**-0.18**	**-0.22**	**-0.22**	**-0.13**	**-0.05**
Top 0.5%	0.00	**-0.02**	**-0.08**	**-0.11**	**-0.11**	**-0.08**	**-0.04**

(b) 2006 compared with 1985

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.79	2.07	2.48	2.11	1.20	0.28	0.14
Top 40%	1.90	2.10	2.46	2.01	1.19	0.29	0.14
Top 20%	1.36	1.66	1.96	1.57	0.98	0.28	0.14
Top 10%	0.58	0.96	1.39	1.17	0.76	0.25	0.13
Top 5%	0.23	0.54	0.95	0.81	0.57	0.22	0.12
Top 1%	0.03	0.06	0.24	0.25	0.20	0.13	0.07
Top 0.5%	0.01	0.03	0.10	0.12	0.10	0.06	0.04

(c) 2006 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	2.74	0.56	1.68	1.29	0.50	0.15	0.09
Top 40%	3.21	1.01	1.75	1.35	0.47	0.14	0.08
Top 20%	2.20	0.98	1.28	0.99	0.38	0.11	0.08
Top 10%	1.00	0.58	0.74	0.60	0.23	0.07	0.06
Top 5%	0.37	0.29	0.43	0.34	0.14	0.05	0.06
Top 1%	0.02	0.01	0.06	0.03	**-0.02**	0.00	0.02
Top 0.5%	0.01	0.01	0.02	0.01	**-0.01**	**-0.02**	0.01

Table A.7: Difference in survival association matrices (in percentage points): 54% of S-corporation profits to labor

(a) 1985 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	0.74	**-1.56**	**-1.04**	**-0.92**	**-1.07**	**-0.24**	**-0.09**
Top 40%	1.17	**-1.11**	**-0.95**	**-0.85**	**-1.04**	**-0.26**	**-0.10**
Top 20%	0.70	**-0.76**	**-0.96**	**-0.77**	**-0.77**	**-0.28**	**-0.12**
Top 10%	0.33	**-0.42**	**-0.84**	**-0.72**	**-0.67**	**-0.28**	**-0.12**
Top 5%	0.10	**-0.30**	**-0.68**	**-0.60**	**-0.55**	**-0.27**	**-0.11**
Top 1%	**-0.01**	**-0.06**	**-0.26**	**-0.28**	**-0.26**	**-0.18**	**-0.10**
Top 0.5%	**-0.01**	**-0.02**	**-0.12**	**-0.15**	**-0.14**	**-0.09**	**-0.08**

(b) 2006 compared with 1985

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.38	1.89	2.40	1.89	1.43	0.36	0.17
Top 40%	1.62	1.98	2.53	1.93	1.37	0.37	0.18
Top 20%	1.21	1.54	2.04	1.63	1.16	0.38	0.20
Top 10%	0.59	0.96	1.52	1.27	0.93	0.38	0.20
Top 5%	0.21	0.50	1.01	0.90	0.70	0.35	0.20
Top 1%	0.03	0.07	0.26	0.29	0.27	0.18	0.15
Top 0.5%	0.01	0.03	0.13	0.16	0.15	0.10	0.09

(c) 2006 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	2.43	0.59	1.56	1.19	0.46	0.13	0.09
Top 40%	2.99	1.11	1.68	1.28	0.47	0.13	0.10
Top 20%	2.04	0.96	1.18	0.90	0.40	0.13	0.10
Top 10%	0.91	0.56	0.66	0.55	0.27	0.13	0.10
Top 5%	0.32	0.24	0.35	0.28	0.15	0.11	0.10
Top 1%	0.02	0.01	0.03	0.02	0.00	0.01	0.06
Top 0.5%	0.01	0.01	0.01	0.01	0.01	0.01	0.02

Table A.8: Difference in survival association matrices (in percentage points): All self-employment income to capital

(a) 1985 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.46	**-0.92**	0.41	0.67	0.43	0.07	0.03
Top 40%	1.61	**-0.72**	0.23	0.47	0.30	0.05	0.02
Top 20%	0.90	**-0.63**	**-0.24**	0.06	0.07	0.01	0.00
Top 10%	0.50	**-0.28**	**-0.37**	**-0.08**	**-0.01**	0.00	0.00
Top 5%	0.21	**-0.22**	**-0.33**	**-0.14**	**-0.05**	0.00	0.00
Top 1%	0.01	**-0.04**	**-0.16**	**-0.12**	**-0.06**	0.00	0.01
Top 0.5%	0.00	**-0.03**	**-0.10**	**-0.09**	**-0.04**	0.00	0.01

(b) 2006 compared with 1985

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	1.78	2.10	2.25	1.66	1.05	0.29	0.15
Top 40%	1.84	2.14	2.19	1.66	1.05	0.30	0.15
Top 20%	1.39	1.69	1.79	1.26	0.83	0.26	0.14
Top 10%	0.61	0.95	1.24	0.86	0.58	0.21	0.12
Top 5%	0.22	0.52	0.83	0.59	0.42	0.17	0.10
Top 1%	0.03	0.08	0.27	0.21	0.16	0.08	0.05
Top 0.5%	0.02	0.04	0.14	0.12	0.09	0.04	0.03

(c) 2006 compared with 1966

	Capital						
Labor	Top 50%	Top 40%	Top 20%	Top 10%	Top 5%	Top 1%	Top 0.5%
Top 50%	3.24	1.18	2.65	2.33	1.48	0.36	0.17
Top 40%	3.45	1.41	2.42	2.13	1.35	0.35	0.17
Top 20%	2.29	1.07	1.55	1.33	0.90	0.27	0.14
Top 10%	1.11	0.66	0.87	0.78	0.57	0.21	0.12
Top 5%	0.43	0.31	0.50	0.45	0.37	0.17	0.10
Top 1%	0.03	0.03	0.10	0.09	0.11	0.07	0.05
Top 0.5%	0.02	0.01	0.04	0.03	0.06	0.04	0.03