

ONLINE APPENDIX

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Income Inequality in the United States: Using Tax Data to Measure Long-term Trends

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This online appendix provides details about each of the adjustments made to create pre-tax income, pre-tax/after-transfer income, and after-tax income. Table B1 summarizes each adjustment and the relevant data sources. Figure B1 shows the effect on top one percent income shares of each income adjustment (our initial set of changes before expansions) and setting groups by the number of individuals and ranking by size-adjusted income. Figure A1 in the main paper shows the effect of income expansions. Figures B2 and B3 show the effects of adding government transfers and consumption and removing taxes.

1. NIPA Data Sources

Our income measures include sources not reported on individual income tax returns. National totals for these sources of income, as well as target totals for income items only partially reported on tax returns, are taken from the Bureau of Economic Analysis (BEA) National Income and Product Accounts (NIPA). C corporation retained earnings are defined as undistributed profits, that is, profits with inventory value and capital consumption adjustments less taxes and net corporate dividends from NIPA table 1.12. Profits are the pre-tax difference between receipts and expenses. Two adjustments are made to these profits to provide consistent economic-accounting measures. The inventory value adjustment converts the value of inventory to a current-cost basis, removing the capital-gain-like effect in profits from applying historical costs to inventory. The capital consumption adjustment replaces tax depreciation with economic depreciation, as well as converting depreciation to a current-cost basis (see www.bea.gov/national/pdf/chapter13.pdf for further discussion). C corporation taxes include federal and state C corporation taxes from NIPA table 1.12, but remove payments to the U.S. Treasury by Federal Reserve banks from NIPA table 3.2 (these are government income from the interest on Federal Reserve assets, mostly mortgage and Treasury securities, added in a later step). Total tax-exempt interest is based on interest paid by state and local governments from NIPA table 7.11. The following come from various NIPA tables: employer-provided insurance from table 7.8, government transfers from table 3.12, federal income tax from table 3.2, state and local income and property taxes from table 3.3, net imputed rent from table 7.9, property taxes on housing from table 7.4.5, indirect taxes from table 1.12, payroll taxes from table 2.1, fuel and utility “taxes” from table 3.5, total taxes from table 3.1, and government consumption from table 3.9.5. Fuel taxes and public utility payments are excluded from both taxes and government consumption because they are closer to “user fees” than taxes.

2. Replicating Piketty and Saez Fiscal Income Shares

Our replication follows the Piketty and Saez (2003, hereafter PS) definitions of tax return-based market income (i.e., fiscal income). We make two corrections to the tax return data for these estimates. First, we remove a small number of duplicate observations from the confidential files between 1987 and 2015, about two dozen each year except since 2013, when the number was much larger as a result of major changes in top tax rates that caused taxpayers to file a second

return with corrections. Since most of the duplicate observations since 2013 are high-income returns, their presence would tend to overstate top income shares in recent years. Since they have small weights (often of one), their removal has little impact on the overall number of tax units but reflects over \$10 billion of income for 2014 and 2015. Unfortunately these duplicate returns are included in published IRS totals. We have discussed this issue with the IRS Statistics of Income and some duplicates have been removed from the 2014 and 2015 files, but we remove remaining duplicates. Second, in 1964 an additional \$21.5 billion in income is added to total income to match PS and published IRS total income. This replicates PS 1964 top income shares. In addition, our replication of PS numbers treat capital gains distributions from mutual funds reported directly on the 1040 as ordinary income rather than as capital gains to match PS totals. Our later computations treat these as capital gains and so remove them.

I. Corrected Fiscal Income

1. Correct Sample: Limit Returns to Adult U.S. Residents

Using Census data for the U.S. resident population, PS and Piketty, Saez, and Zucman (2018) estimate the total number of tax units as the sum of married men, divorced and widowed men and women, and single men and women aged 20 and over. The implicit assumption is that all primary tax filers are age 20 and over, independent economic units, and resident in the U.S. Our replication analysis starts with these estimates and assumes that the number of non-filer tax units is the total number of tax units less the number of tax returns filed in a given year.¹ However, substantial numbers of tax returns are filed by taxpayers who are under age 20, dependent filers claimed on other tax returns, or non-residents. To make the tax return sample consistent with the Census population, these returns are dropped from our sample. As explained below, the income of dependent filers is added to tax returns claiming dependents.

a. Remove filers under age 20 and dependent filers

Removing individuals who are under age 20 increases the number of non-filer tax units in 2015 by more than 7 million. Social Security data on dates of birth is used to identify filers younger than 20 years old, but before 1979 we cannot link this data to public use observations and so target this number based on the CPS civilian labor force aged 16 to 19.² We select unmarried tax returns without age exemptions and with low adjusted gross incomes (AGIs) in order to hit these targeted number of young filers.³ For example, in 1978 their AGIs ranges between \$1,400 and \$4,200. We allocate the wage share of under age 20 and dependent filer income, regardless of age, to adult tax returns proportional to the number of dependents claimed. To account for high-income tax units that shifted income and assets to dependents we allocate the non-wage share by capital income (dividends, interest, and realized capital gains) on returns with dependents.⁴ This accounts for a practice (before 529 plans and other education savings tax benefits) for parents and grandparents to set aside college funds under the Uniform Gifts for Minors Act. In addition, pre-Tax Reform Act of 1986 (TRA86), a tax planning device for high-income taxpayers involved shifting family income to children. For example, Lourie and Cutler (1971) explained how to

¹ Note that the 2007 sample omits returns identified by the IRS as only filing in order to claim a tax rebate. The actual number of 2007 tax filers was more than the PS number of total tax units because nearly 10 million filers were younger than 20 years old.

² The number of filers under age 20 before 1979 is estimated by scaling up by the average ratio of the number of filers younger than 20 years old to the civilian labor force age 16 to 19 between 1979 and 1986 (see online data).

³ Before 1986, we also exclude returns checking a box identifying them as dependent filers with unearned income. While some of these are full-time students over age 20, they are included with those under age 20 in the online data because age is not available before 1979.

⁴ Weber (1998) shows that incomes of dependent filers increases with the incomes of parents.

reduce taxes by shifting some income to children or spouses to benefit from multiple uses of the personal exemption and lower tax brackets.

Dependent filers are claimed as a dependent by another taxpayer but file their own tax return. To be claimed as a dependent means the individual provided less than half of his or her own support for the year, implying that they were not economically independent. Prior to 1972, dependent taxpayers could claim both the minimum standard deduction and a personal exemption. Because of concerns about shifting of investment income and double benefits from two exemptions and standard deductions, Congress took away the benefit of the minimum standard deduction in excess of any wages for dependent filers in the Revenue Act of 1971. This reduced the potential amount of exempt investment income from \$2,050 to \$750 under 1972 law. Rule changes in TRA86 greatly increased the numbers of dependent filers. Prior to 1987, dependents who filed their own return could claim a personal exemption (\$1,080 in 1986), but could not claim a standard deduction. Under TRA86, a dependent could no longer claim the personal exemption if claimed on another return, but could claim a standard deduction of the larger of \$500 or earned income up to the amount of the regular standard deduction. The drop from \$1,080 to \$500 in exempt investment income resulted in millions of additional tax returns being filed by young dependents. In addition to meeting a number of other tests, a child age 19 or over could not be claimed as a dependent unless they were a full time student receiving over half of their support from the taxpayer claiming them, and beginning in 1989 had to be under the age of 24. A child 18 or under can be claimed as a dependent if other tests, such as the support test, are met. At a higher income level, dependent filers could be subject to a complicated “kiddie tax” that required summing the incomes of all family members and allocating the incremental tax on dependent income among all the dependents.

Given the requirements needed to be claimed as a dependent, we remove remaining dependent filers regardless of their age. Since the unit of observation of our analysis is non-dependent tax units age 20 and over, the most appropriate approach is to treat dependent filers age 20 or older as part of another tax unit. Failing to remove them seems less appropriate because it would treat them as if they were low-income independent households. In 2013, for example, the average fiscal income of dependent filers age 20 to 23 was about \$8,000 compared to \$18,000 for non-dependent filers. Therefore, our approach is to drop all filers under age 20 and dependent filers over age 20 and allocate their income among returns with dependents, as discussed above. Since this adjustment effectively joins two tax units, the total number of tax units is reduced by the number of dependent filers age 20 and over that been dropped.

b. Remove non-resident filers and correct for married filing separately returns

As the number of total tax units is based on the U.S. resident population, non-resident filers are dropped and replaced with non-filer tax units. Since 1979, non-resident filers are identified as any filer with excluded foreign earned income or with an address outside the fifty states or the District of Columbia. For example, in 2011 this includes 800 thousand tax returns with average incomes of \$77,000. In 1979, this correction decreases top one percent income shares by only 0.02 percentage points, suggesting that any effect in earlier years would be small. Before 1979, the public use files do not have state codes and so non-resident filers are identified by likely foreign earned income exclusions identified by other income losses that almost exactly offset wages. Specifically, they are returns with wages of at least \$100, other income losses of at least \$100, and other income equals negative wages within a range of plus or minus \$50.⁵

⁵ Between 1976 and 1979, we also identify non-resident filers as any filer with excluded foreign earned income, but this variable only captures a fraction of likely non-resident filers.

The PS estimate of the total number of tax units counts all married couples as one tax unit. But some married couples file separate tax returns and so the PS approach counts them as two filing tax units. This means the number of adult tax returns is greater than the number of adult filing tax units, which leads to an undercount of the number of non-filers. To correct for this effect, we increase the number of non-filing tax units by half the number of married filing separately returns.

2. Impose Post-TRA86 Loss Limits

Before TRA86, taxpayers could offset taxable income with passive passthrough and rental losses (Joint Committee on Taxation, 1985). One of the goals of the reform was to limit the effect of these tax shelters with passive loss limitations (Nelson and Petska, 1990). The resulting non-deductible losses increased taxable income. In order to make non-deductible losses consistent before and after TRA86, post-TRA86 loss limitations are imposed in pre-TRA86 years. The fraction of losses that are non-deductible declines gradually after TRA86, which may be due to portfolio adjustments, the gradual phasing in of slower depreciation for real estate, or other behavioral changes as these losses became less valuable. It is less difficult to model imposing limits on pre-TRA86 losses than to try and simulate continuation of the prior regime of tax shelters and other tax avoidance. Therefore, we estimate non-deductible losses before TRA86 rather than make non-deductible losses deductible after TRA86. The imputation of non-deductible losses is based on the fractions of partnership/S corporation losses and rental losses that match those of non-deductible losses in years immediately following TRA86.⁶

3. Include Tax-Exempt Interest

State and local government tax-exempt interest payments are excluded from federal taxable income, although they have been reported on tax returns since TRA86. We include reported tax-exempt interest since 1987 and imputed tax-exempt interest in earlier years. For each year before 1987, the total tax-exempt interest received by tax units is assumed to be 65 percent of NIPA state and local monetary interest paid, the average percentage reported on tax returns since 1987.

Tax units with high marginal tax rates tend to invest in tax-exempt bonds more than those with lower marginal rates. Since top marginal rates were much higher before 1987, the fraction of tax-exempt interest going to the top of the distribution was also higher. As seen in Figure B4, high income tax units were still shifting out of tax-exempt bonds in 1988. Between 1982 and 1986, the fraction of tax-exempt interest going to each income group is based on shares from the 1983 Survey of Consumer Finances, which are similar to the 1987 shares seen in the tax data. The shares for 1960 and 1962 are based on the 1962 Survey of Financial Characteristics of Consumers. The shares are assumed to decrease in a straight line for years between 1962 and 1982 to account for gradual change in portfolios as the top income tax rate decreased from 91 percent to 70 percent by 1965 and 50 percent in 1982. Before 1987, tax-exempt interest is allocated after tax units have already been divided into relative income groups.⁷

⁶ Non-deductible losses affect the top of the distribution more and allowed rental losses phase out for AGIs over \$100,000. For tax units with positive market incomes over \$100,000 in 1987 (indexed in earlier years), 85% of partnership/S corporation losses and 30% of rental losses are estimated to be non-deductible. For tax returns below the threshold, 20% of partnership/S corporation losses are assumed to be non-deductible.

⁷ Note that Piketty, Saez, and Zucman (2018) allocate constant shares over this period based on the 1983 Survey of Consumer Finances, which would underestimate tax-exempt incomes of the highest income groups.

4. *Correct Income Definition*

Some income sources are missing from or do not reflect current year income. Our corrections and adjustments are to (1) add excluded dividends, (2) add excluded combat pay, (3) deduct gambling losses up to the amount of gambling income, (4) add back net operating losses that have been deducted from income, (5) remove capital gains distributions and ordinary gains, (6) remove Individual Retirement Account (IRA) contributions, (7) add missing alimony receipts and remove alimony paid, and (8) remove taxable state and local income tax refunds.

Gambling winnings are generally included in other income on tax returns, but gambling losses may only be deducted up to the level of reported winnings by taxpayers itemizing their deductions. Since only net income from gambling should be counted as income, the asymmetric treatment of gambling gains and losses is corrected by subtracting deducted gambling losses. Net operating losses are losses carried over from earlier years for tax purposes and do not represent income during the calendar year. In addition, large operating losses in one year may result in negative AGI for several years so that the one-time loss can be counted multiple times in future years. This adjustment for losses moves some taxpayers from bottom centiles to the top one percent.

Beginning in 1970, a new simplification measure allowed taxpayers with capital gains distributions and no other capital gains to report them directly on Form 1040 without filing out a Schedule D (except in 1997 and 1998). A separate line was added in 1971. It appears that this change was not accounted for in PS computations of market income. Therefore the capital gains reported only on Form 1040 (adjusted for the capital gains exclusion) are subtracted as a correction from our replication of PS. Previously, taxpayers did not have this option and so capital gains distributions were already removed in those years. Beginning in 1971, other gains and losses from Form 4797 (sales of business property) have been reported on a separate line of Form 1040 and also removed in this step. Part of this gain reflects the recapture of depreciation expense in computing capital gains on assets. In the 1960s and 1970s this amount was treated as capital gain eligible for preferential rates. Another part reflects a provision providing preferential capital gains rates for gains but ordinary treatment of losses so that the usual capital loss limits did not apply. These treatments were gradually cut back over time, especially in the 1980s, turning the net amount from a negative to a positive number. In order to adjust for these tax reforms, these gains and losses are subtracted out. Failing to make this adjustment would overstate income of the top one percent in recent years as compared to before TRA86 and earlier reforms.

Alimony received is included in our income measures since it has been part of AGI since the Revenue Act of 1942, but alimony paid is not deducted (as we add back adjustments to get to total income on Form 1040). Thus, alimony income is over-counted. We address this issue by deducting reported alimony paid. This amount, however, is larger than the amount of reported alimony income. To correct for both issues, we scale up reported alimony received to match deducted alimony payments and subtract alimony payments. This addresses both the issues of over-counting and the difference between the amounts, attributing this income to the more correct recipients.⁸

⁸ A related issue is that child support payments are not properly attributed because they are not reported in the tax data. As a result, these amounts are counted with the income of the payer, not the income of the recipient, which also slightly overstates top income shares.

Individual Retirement Account (IRA) contributions, as well as Keogh, SEP, SIMPLE and other qualified plan contributions, are removed for two reasons: they are parallel to employee contributions to defined contribution accounts such as 401(k) plans, which are also excluded, and retirement distributions are included in the definition of income, so contributions should be removed to prevent double counting. Note that we do not include non-taxable pensions or non-taxable IRA distributions reported on Form 1040, because most of the large values are likely to be rollovers, and small numbers of Roth IRA distributions in recent years. While some of the smaller non-taxable pensions and distributions reflect typically small amounts of pension basis recovery or housing allowances for certain religious employees, these cases are not common and also difficult to identify.

Refunds of state and local income taxes are included in total income on tax returns to correct for itemized deductions in the previous year that were too large (resulting in a lower tax burden). These refunds are adjustments and should not be included in measures of income and are therefore subtracted.

Due to missing variables in early years, some corrections are missing or can only be imputed. State and local tax refunds are available in the data only since 1971, the first year this appears on IRS tax forms. This may reflect a new regulation as there is no mention of this in the instructions in prior years. Gambling losses are only deducted since 1972. The effect of ignoring gambling in the 1960s is small because this is well before the expansion of lotteries, casinos, and other legalized gambling activity. Since gambling losses were not reported separately before 1991, they are set equal to miscellaneous deductions if miscellaneous deductions are equal to or slightly less than other income based on observed patterns when this variable is reported. In later years, this method accounts for over half of gambling loss deductions. Before 1989, net operating losses are generally assumed to be 80 percent of other income losses, since a large fraction of losses in other income in later years reflect net operating losses. This percentage has sometimes been used as a rule of thumb in tax policy estimates. In recent decades, the foreign earned income exclusion is included in other income on Form 1040 as an offset to wages. Because the tax returns with excluded foreign earned income are dropped from the sample as non-residents, we do not address the effects of the foreign earned income exclusion. Alimony paid is missing as a variable in even-numbered years in the 1970s and both alimony received and paid are missing before 1971. We impute the total amount of alimony paid in these years by indexing 1979 total alimony by inflation and scaling it by the share of divorced adults (which peaked in 1980) and assume half of alimony was reported before 1971. In these years, we match the 1979 income effects over the distribution by allocating alimony received half per capita and half by wages and alimony deducted one quarter by dividends and three-quarters by wages.

Economists generally consider economic income to be net of the expenses of earning that income. Failing to net expenses treats some income as gross income, rather than net income. As discussed above, our analysis corrects one important situation by netting reported gambling losses up to the amount of reported gambling income. However, other netting corrections could also be considered, the most important of which are employee business expenses and expenses associated with investment income, including investment interest expense. Our current analysis does not make these adjustments, in part because since 1987 employee business expenses are only observed for itemizing taxpayers and to the extent that they exceed two percent of AGI.

a. Income of non-filers

Based on non-filer information return data, non-filer income is assumed to be 20 percent of average filer income, which is the same as the PS assumption. Table B2 shows that the 20 percent estimate is stable between 2000 and 2010. After including underreported IRS income in a later step, non-filer incomes increase to about 30 percent of average filer income.

To estimate non-filer income, we use the SOI Databank, an individual level panel containing every person with a taxpayer identification number who was born before 2012 and had not died by 1996. For each year, we select individuals who did not file a tax return (late filers are removed), were ages 20 to 99 years and had not died. Information returns for individuals over age 99 are excluded because these records often reflect erroneous SSNs or fraudulent information returns. The information returns used to estimate the incomes of these individuals are: Forms W-2, 1099-DIV, 1099-MISC, and 1099-R. To control for outliers, 1099-MISC income for each source is excluded if \$99,999 or more. Summing income from these sources and dividing by the number of corrected non-filer tax units gives average non-filer income. This approach gives a conservative estimate of non-filer income because it excludes many sources of income, such as sole proprietorships, partnerships, S corporations, fiduciaries, alimony, interest, and illegal sources, that can be important for some non-filers.

To avoid double counting wages, we subtract wages of those filing tax returns where all filers use Individual Taxpayer Identification Numbers (ITINs). These are numbers that the IRS began issuing in 1996 to individuals without Social Security Numbers (SSNs) so that they could file tax returns and in many cases claim refundable child tax credits. However, ITINs are not allowed to be used on Form W-2s. The IRS accepts tax returns where the ITIN on the tax return does not match the SSN on Form W-2. This ITIN/SSN mismatch implies that we would attribute a large fraction of those W-2 wages to non-filers, even though the wages were claimed by ITIN filers. We use individual tax return samples to estimate wages on tax returns where all filers have ITINs and subtract this amount from our non-filer income.

5. Set Groups by Number of Individuals and Rank by Size-Adjusted Income

A measure more relevant to the distribution of economic welfare could base income groups on the total number of individuals (including primary and secondary taxpayers and dependents) and rank tax units using size-adjusted incomes, as in Congressional Budget Office (2016). This approach accounts for economies of scale and sharing, as well as the effects of supporting dependents and declining marriage rates outside the top one percent.

Decreasing marriage rates outside the top of the income distribution have tended to overstate the increase in top income shares based on tax units. To provide a measure of top income shares that controls for the declining marriage rate outside of the top of the distribution our analysis bases income groups on the number of individuals, rather than by the number of tax units. This means that there are equal numbers of individuals rather than equal numbers of tax units in each percentile. Since married tax units contain at least two individuals and the marriage rate and fraction of dependents claimed was relatively constant for high-income tax units, this will cause these two approaches to have different trends in top income shares.

For example, assume there are 100 million tax units each with two dependents per married tax unit, where all of the top one percent are married and half of the bottom 99 percent are married, so there are just over 250 million individuals. Grouping by tax units, the top one percent has 4 million individuals and 1 million tax units. Grouping by individuals, the top one percent has

about 2.5 million individuals and only about 0.63 million tax units.⁹ Since there are fewer tax units in the top one percent of individuals, there is less income in the top one percent and so their income share is lower. Setting groups by the number of adults results in a similar effect. There are just over 150 million adults, and therefore the top one percent of adults has about 1.5 million adults and only about 0.75 million tax units (again, fewer than when grouping by tax units).¹⁰

If the marriage rate and number of dependents claimed were constant across the income distribution, changing between tax units to individuals would not affect top income shares, as the threshold would not move. But because the marriage rate and average number of dependents is higher in the top one percent, using tax units always results in higher top one percent income shares. The falling marriage rate and increasing share of single-parent households outside the top one percent implies that the switch from grouping by tax units to individuals limits the increase in top income shares more in more recent years.

Changes in the distribution of dependents slightly offset the effect of falling marriage rates on top income shares. Between 1960 and 2015, the average number of dependents among top one percent tax units fell more (by 0.8 dependents, from 1.9 to 1.1) than for all tax units (by 0.6 dependents, from 1.2 to 0.6).

Following the Congressional Budget Office (2016) approach, we rank tax units using size-adjusted incomes. This approach accounts for sharing and economies of scale. Since exemptions may be claimed for spouses and children living in Canada or Mexico, a correction is needed because the number of individuals exceeds Census population estimates. Cilke (2014) also observed an excess number of resident children in the IRS tax data. To correct the data for this issue, the number of individuals is reduced since 2005 by the number of secondary filers and children with ITINs. Size-adjusted income is tax unit income divided by the square-root of the number of individuals in the tax unit.

II. Pre-tax Income: Expansions

1. Include Fiduciary Retained Income

Fiduciaries, which include estates and trusts, distribute much of their income each year and this distributed income is included in individual taxable income on tax returns. Some fiduciary income, however, may be retained and missing from tax-based measures of income. To account for undistributed fiduciary income, we add undistributed income excluding capital gains to individual pre-tax income and add both distributed and undistributed interest, dividends, and capital gains to each of these sources, such that later imputations based on these income sources include fiduciary income. Undistributed fiduciary income is allocated to tax returns by taxable fiduciary income (1966 shares going to income groups are used in prior years). Fiduciary level income taxes (excluding estate tax) are added to state income taxes and federal fiduciary taxes are added to federal income taxes and also allocated by taxable fiduciary income.

2. Include Corporation Retained Earnings

C corporation retained earnings are allocated to various corporate owners and beneficiaries of corporate income: individual owners, retirement account owners and pension beneficiaries, and non-profit organizations and domestic governments. C corporation retained earnings is defined

⁹ The number of tax units results from dividing the 2.5 million individuals in the top one percent of individuals by the 4 individuals per tax unit among those at the top of the distribution.

¹⁰ While grouping by adults partially corrects for declining marriage rates, it does not account for the increasing share of single-parent families.

as NIPA undistributed corporate profits and calculated as profits with inventory value and capital consumption adjustments less taxes and net corporate dividends. These amounts include reinvested earnings of incorporated foreign affiliates of U.S. corporations, that is, unrepatriated foreign earnings.¹¹ Also, in all years the ownership by U.S. residents of foreign corporations is almost exactly offset by the non-resident ownership of U.S. corporations. Therefore, we implicitly assume that the retained earnings accruing to residents from the ownership of foreign corporations is similar to that accruing from a similar amount of asset value of domestic corporations.

Including current year retained earnings of C corporations is one way to account for capital gains income. There are several ways to measure capital gains income: realized capital gains on tax returns, accrued capital gains and losses, or the underlying income that produces capital gains income. Realized capital gains reported on tax returns may have accrued over many years but are only seen on tax returns when realized. Accrued capital gains are difficult to measure and can be highly volatile due to the effects of asset price bubbles and their collapse and business cycles (Larrimore et al., 2017).

A portion of corporate retained earnings are allocated to individual filers. Since we want to attribute retained earnings accrued in a given year to the owners of corporations, we favor using dividends received as the primary means of indicating corporate ownership.¹² Since some corporation don't pay dividends, we also allocate a portion by realized capital gains. Three-quarters of retained earnings are imputed based on a tax filer's share of dividends and one-quarter based on their share of Schedule D capital gains.¹³

Another portion of corporate ownership is associated with retirement income, including private and public pensions, IRAs, and life insurance funds. Based on the Federal Reserve Financial Accounts, the fraction of corporate ownership associated with these retirement funds was 4 percent in 1960, peaked at 57 percent in 2008, and decreased to 50 percent by 2012.¹⁴ The corporate ownership share of non-profit organizations and domestic governments increased modestly from 5 percent in 1960 to 7 percent in 2013. Rosenthal and Austin (2016) present similar estimates. The dramatic increase in the share of corporate ownership by pension funds has important implications for thinking about both the allocation of corporate income and the burden of the corporate income tax that has been overlooked in prior distribution studies.

The defined benefit (DB) plans' share of corporate ownership is allocated by wages reported on tax returns. The defined contribution (DC) account share is allocated over tax returns as follows. First, DC wealth to income ratios are calculated using the Federal Reserve's Survey of Consumer Finances (SCF) by income group (P0-90, P90-95, P95-99, P99-99.5, P99.5-99.9, P99.9-P99.99, top 0.01 percent) and age group of the family head (20-40, 41-65, 66-72, 73+). DC wealth includes assets in individually-owned IRAs, Keoghs, and thrift-type retirement plans and excludes defined benefit plans. Second, these DC wealth to income ratios are interpolated for years between triennial SCF surveys. Since 1989 is the earliest year SCF data is available, the

¹¹ For more details, see www.bea.gov/national/pdf/chapter13.pdf

¹² Alstadsæter et al. (2015) use a national registry of stock ownership to impute accrued business income to personal owners in Norway. No centralized registry is available for the United States.

¹³ Taking into account the small amount of dividends earned by non-filers (about 2 percent of the total) would slightly decrease our estimates of top income shares.

¹⁴ We use the 2017 Investment Company Institute Fact Book data to estimate the corporate equity shares of IRA assets, including shares owned through mutual funds, which ranged from about 60 percent to 80 percent from 1997 through 2015.

1989 ratios are used in prior years when DC wealth was relatively small. Third, these ratios are merged to individual tax returns matching the income and age group criteria. Since ages are not available in the tax data before 1979, the ratios of either the 41–65 or 66–72 year old age groups are used depending on whether the tax return claimed an elderly exemption (that is, one of the filers was 65 years or older). Fourth, the corresponding ratio of each tax return is multiplied by AGI and this estimated DC wealth is aggregated across all tax returns. Finally, the share of estimated DC wealth corresponding to each tax return is used to allocate the various income sources related to retirement accounts: corporate retained earnings, corporate taxes, and dividends and interest excluded from tax returns.

For non-profits/governments, retained earnings are allocated half per capita (equally across all individuals including dependents) and half by wages. This accounts for both redistribution- and consumption-type spending of non-profits (for example, United Way and local symphonies).

3. Include Corporate Taxes

C corporation tax burdens are allocated to tax filers following an approach similar to Congressional Budget Office (2012) and the Joint Committee on Taxation (2013). One-quarter of the tax is borne by wages. The remaining three-quarters is allocated by corporate ownership and interest bearing assets. Various rationales have been used in favor of the view that a portion of the burden of the corporate income tax falls on wages. These include reducing the amount of capital available per worker thereby reducing their marginal product and the relative mobility of labor and capital. An additional hypothesis is that strong labor unions shared in the after-tax profits of oligopolistic industries in the 1960s. Especially since 1993, executive compensation has been based on after-tax corporate profits and stock prices. Because non-qualified stock options are included in wages as reported on Form W-2, this suggests another avenue for corporate income taxes to affect wages in the tax data.

The corporate tax share associated with non-retirement corporate equity ownership is allocated three-quarters by dividends and one-quarter by capital gains reported on tax returns. The share associated with bonds is allocated by taxable interest. The shares associated with retirement and non-profit/govt. ownership are allocated as for retained earnings (see above).

In 2015, for example, these assumptions result in 21 percent of corporate tax being assigned to the top one percent. First, 25% is assigned to wages, of which the top one percent (after our adjustments) earns about 9%, including executive bonuses. Of the remaining 75%, half is attributed to retirement income and the top one percent receives about 15% of the retirement allocation, and 7% to non-profits or government and the top one percent is allocated about 7% of this share. Finally, the remaining share is allocated by capital income with the top one percent earning about 40% of dividends, capital gains, and interest. In summary: $0.25 \cdot 9\% + 0.75 \cdot (0.50 \cdot 15\% + 0.07 \cdot 7\% + 0.43 \cdot 40\%) = 21\%$. This fraction of corporate tax assigned to the top one percent is less than Congressional Budget Office (2016) estimates, which disregard the large fraction of ownership of corporations by retirement accounts.

4. Include Business Property Taxes

Business property taxes are also included in income. The aggregate amount is defined as all property taxes less housing property taxes and is distributed to tax returns in proportion to non-housing capital ownership shares. The portion associated with household corporate equities is allocated by three-quarters dividends and one-quarter capital gains. The portion associated with bonds is allocated by taxable interest. The portion associated with retirement plan and non-

profit/government ownership is allocated as above. The portion associated with passthrough ownership is distributed to passthrough entity positive net income. The large effect of property taxes on top shares in 1960 is due to the substantial fraction of business property taxes being distributed to corporate equity owners. This fraction declined as corporate ownership shifted to retirement accounts.

5. Inflation Correction

Inflation affects real incomes differently over the income distribution, and so correcting for inflation moves towards a more consistent measure of top income over time. Inflation causes an overstatement of interest receipts and an understatement of business profits, which are net of deductible interest payments. Steuerle (1985) explains that “[i]nflation raises the nominal interest rate on loans and decreases the probability that nominal financial or taxable income will be measured as positive even when real economic profits are present.” (pg. 129) This inflation effect may partially explain low nominal business income in the 1970s and early 1980s. Businesses may have increased this inflation caused understatement of income to the extent they sought to lower tax burdens by increasing borrowing and deductible interest payments. Between 1961 and 1981, interest payments that were potentially deductible increased from 5.5 to 13.1 percent of GNP (Steuerle, 1985).

In order to estimate incomes that are more consistent across years despite inflation rate fluctuations, we make four adjustments to interest flows. First, we decrease household net interest receipts by the fraction accounted for by inflation, estimated as the inflation rate (using the PCE) as a fraction of the Baa corporate bond yield. Second, we increase business income by the fraction of net interest payments accounted for by inflation as a fraction of the Aaa corporate bond yield. Third, we account for the effects of inflation on employer-sponsored pensions. Inflation likely reduces the real retirement income of households and causes businesses to increase real contributions to pension and other retirement funds. We divide the retirement account portion of the inflation adjustment equally between households and businesses. The main household inflation adjustment is distributed by taxable and non-taxable interest and the retirement effect by wages. The business adjustment is distributed by all business net income, both corporate and positive passthrough income. Fourth, governments also benefit from lower real interest payments. We estimate the aggregate value of inflation on government interest payments as the difference between household interest decreases and business income increases, such that total income is unchanged by the inflation adjustment. This residual approach results in amounts that are similar to the net interest paid by governments to domestic residents times the fraction of inflation. It is unclear who benefits from lower real government interest payments, but it likely decreases current taxes and so we distribute the effect by federal and state income taxes.

This inflation adjustment increases top one percent income shares by an average of 0.4 percentage points in the 1970s and early 1980s when inflation was high. But the effect is much smaller in the 1960s and recent decades. This approach, however, may understate the impact of inflation on top income shares. Steuerle (1985) suggests that higher income business owners are better able to secure loans to take advantage of inflation tax arbitrages than lower income business owners. Allocating a larger fraction of the inflation based business income increase based on this assumption would further increase top income shares in the inflationary 1970s.

6. Add Underreported Income

Since income is underreported on tax returns, we add this missing income. This is an important addition since it results in roughly doubling sole proprietor and partnership income.

Underreporting rates are based on the IRS National Research Program (NRP) and previous Taxpayer Compliance Measurement Program (TCMP) studies, which are detailed audits used to estimate the overall degree of underreporting. BEA also uses these studies in estimating national income. Since these studies are the best available information on underreported income, the distributions observed are the primary basis for allocating it across the distribution.¹⁵

Underreported income is a large source of income, but there is little research available on its distribution. One exception is Johns and Slemrod (2010), which used the tax year 2001 NRP Individual Income Tax Reporting Compliance Study to estimate income shares with and without underreported income. While the top one percent received about 18 percent of reported AGI, it accounted for only about 5 percent of underreported income. If underreported income was distributed evenly across taxpayers within AGI groups then top shares should decrease. Underreported income, however, is concentrated in a subset of taxpayers and so its inclusion moves some taxpayers into the top one percent while others drop out. This re-ranking effect explains why the top one percent share in Slemrod and Johns (2010) was unchanged whether or not underreported income was included.

We distribute underreported income in three steps. First, underreported income is estimated as the difference between amounts already in pre-tax income and NIPA totals, separately estimated for wages and salaries, rental income, farm income, non-farm proprietor income, and S corporation net income.¹⁶ This approach leads to similar amounts as BEA “misreported” income. For example, Park (2000) presents BEA estimates of 1996 misreported wages of \$84 billion and non-farm proprietors’ income of \$224 billion, as compared to our estimates of \$50 billion and \$260 billion, respectively. Estimates based on Ledbetter (2007) between 1990 and 2005 also suggest that misreported income accounts for essentially all of our estimated underreported income. For example, in 1990 the nonfarm proprietors’ misreported income is about \$150 billion for NIPA (estimated as the difference between Ledbetter’s Tables 3 and 5), matching our estimate of \$150 billion. In 2005, this misreported income is about \$400 billion for NIPA, as compared with our estimate of \$480 billion. For wages, however, between 2000 and 2005 NIPA misreported amounts only increased from \$100 to \$120 billion, while our underreported amount increased from \$100 to \$220 billion and then stabilized. Note that the base data for our approach and NIPA is quite different and likely explains this growing gap. NIPA wage estimates are based on Bureau of Labor Statistics’ Quarterly Census of Employment and Wages, which is derived from administrative data on wages subject to federal social insurance taxes (FICA) and business surveys.¹⁷ The BEA increases these amounts for both misreporting and wages not subject to FICA (usually government employees, see NIPA Table 7.18). In comparison, our base wage data are the amounts reported on tax returns (which are not affected by FICA exclusions) and estimated non-filer wages based on Form W-2 amounts (see Table B2). The larger gap between tax return-based wages and NIPA wages since the early 2000s is likely the result of larger

¹⁵ Because of the importance of this issue and the possibility that the NRP and earlier TCMP may not fully capture underreported income of some of the wealthiest taxpayers, we are continuing to examine the distribution of underreported income.

¹⁶ Specifically, it is the difference between NIPA values and tax-based income values for each sources: wages (including estimated amounts from non-filers), Sch. F farm income, Sch. C and partnership net income (including estimated amount from non-filers), rental income, and S corporation income. See Table T1 in the online data for details.

¹⁷ For more detail, see the Bureau of Economic Analysis chapter discussing compensation of employees in the national accounts: <https://bea.gov/national/pdf/ch10%20compensation%20for%20posting.pdf>

misreporting of wages on tax returns.¹⁸ That is, the BEA approach will capture some wages subject to social insurance taxes that are not reported on tax returns. This suggests that for our tax return-based approach, the full underreporting should be allocated according to the NRP-based approach.

Second, we allocate a portion of underreported income to non-filers. While most of the Johns and Slemrod study only includes tax filers, their Table 1 shows an individual income tax gap of \$25 billion for non-filers out of a total of \$222 billion. Because non-filers likely have lower tax rates than filers, their share of underreported income is likely larger than the 11 percent suggested by the fraction of the tax gap. Therefore, we assume that non-filers account for 15 percent of underreported income. We believe this is still a conservative assumption and that non-filers may account for an even greater share of underreported income. Our assumption implies that the underreported income attributed to non-filers represented an average of one-quarter of non-filer total pre-tax income since 1960, and about a third in recent years.

Third, the filer portion of underreported income is generally allocated among income classes using Johns and Slemrod (2010) estimates of the shares for each reported AGI group. Table 3 of Johns and Slemrod (2010) shows that in 2001 the bottom 90 percent of the distribution by reported AGI accounts for 80 percent of underreported income. For other income groups it is distributed as follows: P90-95 receive 5%, P95-99 receive 10%, P99-99.5 receive 2%, P99.5-99.9 receive 1.5%, P99.9-99.99 receive 1%, and the top 0.01 percent receive 0.5% (the final three groups divide the estimated share of the top 0.5 percent by average relative income shares). These shares are used to distribute underreported income to tax filers by reported AGI income groups using tax unit weights.¹⁹ Fixler and Johnson (2014) use a similar method to allocate the underreporting gap between NIPA and CPS totals for various sources by income group.

While Johns and Slemrod (2010) do not separate out taxpayers with negative AGI, their tabulations of the 2001 NRP illustrate the importance of business losses and non-compliance of those with negative reported incomes. For the bottom decile, the percentage of underreported sole proprietorship income as a fraction of reported sole proprietorship income is negative, implying that reported losses are offset or even turned into positive income by these audits. In addition, the bottom decile of returns ranked by *reported* income accounts for 13 percent of underreported income. When ranked by *actual* income (including underreported income), the bottom decile accounted for less than 0.5 percent of underreported income. Therefore, the addition of underreported income to the bottom decile by reported income pushes these tax returns higher up the distribution (the re-ranking effect discussed above). As shown next, many of these re-ranked tax returns seem to have reported negative business income.

Tabulations by the authors of the 1988 TCMP data suggest that nearly one-third of underreported passthrough business income (sole proprietorships, partnership, S corporations, and farms) was found among taxpayers reporting business losses. In contrast, less than 5 percent of underreported business income was found among the top one percent of taxpayers ranked by AGI, even though they accounted for a about half of business income. These results highlight the

¹⁸ The timing of this gap suggests that it may be related to an early 2000s growth in unauthorized worker wages using “fake” SSNs, which would be captured in NIPA wages because they are in the FICA base, but not necessarily captured on tax returns because of slower growth in wage reporting on tax returns using ITINs, see Table B2. Recall that unauthorized workers often file tax returns with mismatched Form W-2 SSNs and Form 1040 ITINs.

¹⁹ To obtain a consistent measure of AGI closer to the 2001 definition, employee business deductions are added back before 1991 and excluded Sch. D capital gains are added back before 1987.

importance of non-compliance among taxpayers reporting business losses.²⁰ We also estimate that 17 percent of filer underreporting was among taxpayers with negative reported AGIs. Our tabulations of the 1988 TCMP suggest a similar distribution of underreported income as Johns and Slemrod estimated for 2001, although a larger fraction going to those with negative AGIs.

To account for underreported income going to those with negative AGIs and the larger prevalence of tax shelters before TRA86, we divide the bottom 90 percent allocation between those with and without negative AGIs. To those with negative AGIs, we allocate 17 percent between 1987 and 1991, and 10 percent in subsequent years. As discussed above, the 1988 TCMP data suggests that immediately after the 1986 tax reform 17 percent of underreported income was from tax returns with negative reported AGIs and so we use that share in 1987 and years immediately following. By the early 1990s we expect a lower share as the use of tax shelters resulting in negative AGIs decreases. Prior to the tax shelter limitations of TRA86 we expect a higher share of underreported income among tax returns reporting negative AGIs. In fact, the 1985 TCMP shows that 39 percent of underreported income was allocated to those with negative AGIs. We follow the distribution of underreported income in the 1985 TCMP for years before 1987.

Within each AGI group, underreported wages are distributed by shares of reported wages. The same is done for underreported business income (including rental, farm, sole proprietorship, partnership, and S corporation income), but using the absolute value of business income and only for select taxpayers. A subset of taxpayers is selected to receive underreported business income to target the changes in reported and true income shares estimated by Johns and Slemrod (2010, see Table 5). Specifically, 50% of tax units in the bottom 95 percent and 10% of tax units in the top 5 percent are selected to receive underreported business income. This generates large re-ranking effects at the top such that in 2001 top one percent income shares are unchanged, while top ten percent income shares increase by 0.4 percentage points (these estimates are before distributing any underreported income to non-filers, because the targeted AGI share changes in Johns and Slemrod excluded non-filers). The re-ranking effect that emerges from this approach tends to decrease top shares during business expansions but have little effect in recessionary years, such as 2001.

7. Include Imputed Rent

Imputed rental income accruing to residents of owner-occupied houses is included and allocated by real estate taxes, which are identified for the top ten percent by deductions on tax returns. In years where specific tax deductions are not available, distributions are set to those in surrounding years. Imputed rents includes property taxes paid, as this is a pre-tax measure.

8. Include Employer Payroll Taxes

The employer portion of payroll taxes for filers is based on reported wages and for non-filers based on average wages and applying tax rates and annual OASDI contribution limits. For individual filers in 2013, these taxes include a 6.2% OASDI tax on the first \$113,700 of wages, a 1.45% Medicare tax on all wages, and a 6.0% unemployment insurance (UI) tax on the first

²⁰ Also using the 1988 TCMP data, Auten and Gee (2009) found that while over half of taxpayers in the top one percent by reported AGI were found to have underreported income, it represented only 6 percent of reported income. The lower the income class, however, the larger the proportion of underreported income. For the bottom quintile of returns, underreported income was 39 percent of reported income. Thus, while the dollar amounts are much smaller in the lower part of the distribution, the relative amounts of underreported income do not increase in proportion to reported incomes.

\$7,000 of wages. Since both spouses may work, we adjust the OASDI and UI covered wages for married filers by increasing the annual contribution limits for OASDI by between six- and eight-tenths. The effect of adding employer payroll taxes to income is smaller in years before 1979, since the employer OASDI tax rate was below 4.0% for most of the 1960s and the Medicare tax was non-existent before 1966. The difference between total NIPA payroll taxes and amounts estimated for filers, which usually ranges between 5 and 10 percent of the total, is allocated to the bottom 90 percent of tax units because this residual represents payroll taxes paid by non-filers.

9. Include Employer-provided Insurance

We use the proportional distribution of non-taxable employer-provided health insurance reported on 2015 Form W-2 to allocate the total NIPA amount of employer-provided insurance in all years to each income group. This includes health, life, and workers' compensation insurance paid for by employers (including employee pre-tax contributions), of which health insurance represents about 90 percent in recent years.²¹ Bureau of Labor Statistics data presented in Warshawsky (2016) suggest that the distribution of this benefit in top earnings groups was very similar in 1992 and 2010 (see Table C11b of the online data). We estimate that the top one and ten percent of tax units (grouped by tax units) received 2.0 and 24.9 percent of employer-provided health insurance.²² The effect of adding employer-provided insurance on top income shares increased monotonically and in 2015 decreased the top one percent share by 0.8 percentage points. Kaestner and Lubotsky (2016) review distributional studies of the effect of adding employer-provided health insurance. While adding insurance to income increases distribution-wide inequality, as the top half of the distribution earns most employer-provided insurance, we show that it can decrease top inequality, as insurance becomes a smaller share of income at the top of the distribution.

10. Include Retirement Account Income

Dividend and interest income of retirement accounts, also referred to as inside buildup, is added. Note that corporate retained earnings and taxes have already been allocated to retirement account owners. The difference between employer and employee retirement account contributions and current year distributed income is also added to conform with national income retirement income totals. These are both allocated the same way as retained earnings: by wages for the share of corporate ownership by DB plans and otherwise by the share of DC wealth. The growth of DC plans, which are more concentrated among high income owners, means that the addition of this income results in a smaller decrease in top one percent income shares in more recent years. Also, the income from DC plans makes up a relatively larger share of income for those in the top ten percent but below the top one percent. For example, in 2015 adding this retirement income decreases top one percent income shares, has almost no effect on the top five percent, and slightly increases top ten percent income shares.

11. Include Remaining Indirect Taxes and Other Income

²¹ In recent decades, health insurance accounts for almost all of employer-provided insurance. In the 1960s, however, life insurance accounted for a significant fraction.

²² Using the 2015 Form W-2 data, employer-provided health insurance shares for the top 10, 5, 1, 0.5, 0.1 and 0.01 percent tax unit income groups (set by number of tax units and based on PS total number of tax units) are: 24.9, 12.2, 2.0, 0.94, 0.18, and 0.02 percent. These estimates are similar to U.S. Treasury distributions of the health insurance exclusion tax expenditure (www.treasury.gov/resource-center/tax-policy/tax-analysis/Documents/Selected-Credits-Deductions-and-Exclusions-2015-Revised.pdf). See Larrimore and Splinter (2018) for a discussion of the W-2 data and its distribution.

Remaining indirect taxes, which are mostly sales tax, are allocated by disposable income (defined below) less savings.²³ Savings rates for the top ten percent groups come from the Surveys of Consumer Finance in Dynan, Skinner, and Zeldes (2004): 24 percent for P90-95, 37 percent for P95-99, and 51 percent for the top one percent. For the bottom 90 percent, we assume that saving rates are 10 percent. A small amount of business transfers and subsidies, surplus of government enterprises, and dividends and interest income of non-profits/governments are allocated as above (half per capita and half by wages). Transfers largely consist of donations, insurance payments, losses due to fraud and theft, deposit insurance premiums, fines and fees, lawsuit settlements, and excise taxes paid by non-profits. Subsidies are mostly federal payments for housing and agriculture. Finally, Federal Reserve payments to the U.S. Treasury, which are mostly interest on mortgage and Treasury securities, are allocated by mortgage interest deductions because Federal Reserve purchases of mortgage debt should lower interest rates on this debt. The difference between mortgage interest deductions on tax returns and NIPA totals (only about one-tenth of mortgage interest in recent decades) are attributed to non-itemizers on a per capita basis.

III. Pre-tax/After-Transfer Income

1. Include Social Security Benefits

Most Social Security and disability insurance (SS) benefits are excluded from federal taxable income, but since 1984, some benefits have been reported on tax returns. We add reported benefits to tax filers' incomes since 1985 and imputed SS benefits in earlier years. To create an imputation, we match the 1985 distribution and adjust proportionally by the fraction of adults at least 65 years old in each income group, where both adults on joint returns are counted if the primary filer is at least 65 years old. The fraction of filers age 65 and over in the top one percent was higher in earlier years: about 1.8 percent 1962 compared to 1.2 percent in 1985. Adjusting shares of SS based on these fractions, the top one percent of adults received 3.8 percent of SS benefits in 1962 and 2.5 percent in 1985. The fraction of SS benefits reported on tax returns (SS plus railroad retirement benefits) increased from one-third in 1985 to two-thirds of NIPA totals more recently. Unattributed benefits are added to total income, assuming that the residual benefits do not go to those in the top ten percent of the income distribution.

2. Include Unemployment Insurance Benefits

Unemployment insurance (UI) benefits were at least partially excluded from federal taxable income before 1987. Since 1979, UI benefits of filers have been reported on their tax return. Reported benefits since 1981 are added to tax filers' incomes and imputed benefits in earlier years. To create an imputation, we match the 1981 distribution and levels of reported benefits. In 1981, the top ten percent of adults receive only 2.2 percent of unemployment benefits. Since 1981, the total UI benefits received by tax filers have averaged 84 percent of NIPA unemployment insurance. Unattributed benefits are added to total income.

3 Include Other Cash Transfers

We add the NIPA value of cash transfers to total income, assuming that no tax filers in the top ten percent of the distribution receive cash transfers. Cash transfers include federal supplemental security income (SSI) and refundable tax credits (generally, earned income and additional child tax credits). Also included are transfers from state and local governments: social insurance funds (generally, temporary disability insurance and workers' compensation), family assistance

²³ Since this is a pre-tax income measure, the inclusion of these taxes in income can be thought of as a shift from conventional tax-inclusive prices to tax-exclusive prices, essentially increasing real purchasing power.

(generally, aid to families with dependent children and temporary assistance for needy families), and SSI.

4. Include Medicare

The NIPA value of Medicare is added, where each income group receives a share proportional to the number of adult individual tax filers aged 65 or older, assuming that if the primary filer is aged 65 or older then the secondary is also. In 2013, the share of individuals aged 65 or older in each income group is roughly proportional. That is, the top tenth of one percent contains 0.13 percent of individuals aged 65 or older, and the top one percent contains 1.09 percent of individuals aged 65 or older.

5. Include Other Non-Cash Transfers

We add the NIPA value of remaining non-cash transfers, such as Medicaid and food stamps to total income, assuming that top income groups receive none of these in-kind transfers. Kaestner and Lubotsky (2016) estimate that among top decile families less than one percent has a family member participating in Medicaid. Elwell and Burkhauser (2016) find that Medicaid is the largest income source in the bottom quintile.

IV. After-tax Income

Each tax is removed from pre-tax/after-transfer income sequentially. For each tax, the difference between the amounts accounted for on tax returns and NIPA totals are attributed to the bottom 90 percent of the distribution, which includes non-filers and almost all non-itemizers. Since the overwhelming majority of tax returns at the top of the distribution itemize deductions (including state income taxes and housing property taxes), this approach provides good measures of state and local taxes for top income groups. To match national income, two final adjustments fully account for the government sector by including government deficits/surpluses and non-transfer government spending.

1. Federal Individual Income and Estate Taxes

Federal individual income taxes are federal tax liability after non-refundable credits. That is, the refundable portion of credits are excluded because they are already accounted for in cash transfers.

The estate tax encourages planning over many years prior to the actual payment of the tax. This suggests that the estate tax affects behavior over many years. Therefore, we assume that the estate tax is borne by decedents with an equal probability over the decade before the actual year of observed bequest (excluding the year before estate tax returns were filed). Using population tax data, we estimate the fraction of estate tax paid by decedents in various income groups in each of these years prior to the year of bequest.²⁴ This accounts for income variability among high-wealth individuals. In comparison, Piketty and Saez (2007) assumed that decedent income and wealth rankings are equivalent. Their assumption shifts the estimated incidence to higher income groups than observed in the tax data, allocating about 99 percent of the estate tax to the top one percent. The U.S. Treasury (Cronin, 1999) and Burman, Gale, and Rohaly (2004) used survey data to link wealth and income distributions and estimated that about two-thirds of the

²⁴ Tax data only allow us to track the income of the decedent. The estate tax would be borne by decedents if they target an after-tax bequest, causing the estate owner to reduce their consumption or increase their effort to earn income. Alternatively, the estate tax may be borne by the beneficiaries. The close relation of the parties further complicates any clear assignment of burden (Kopczuk, 2013). Allocating a portion of the estate tax to beneficiaries would shift the estate tax burden lower in the income distribution, further lowering our 1960s top tax burdens.

2000 and 2001 estate tax burden fell on the top one percent. Our approach instead relies on the more complex relationships among annual incomes, income variability, wealth, and estate tax policy. We estimate that in 2000 only 37 percent of the estate tax was borne by the top one percent and by 2015 this increased to 65 percent.

As tax return population data is available starting in 1996, we estimate these fractions for bequests subject to estate taxes ten year later, in 2006, as well as in 2015. The taxable threshold of estates increased over this period from \$2 million to over \$5 million. Since 1982, the share of the estate tax borne by each income group is interpolated based on the real taxable threshold. The 1982 shares are used in prior years. The share of the estate tax allocated to the top one percent by income is 33 percent in 1982 (and prior years), increases to 44 percent by 2006, and to 65 percent by 2015. To check that this estimated increase in the progressivity of the estate tax corresponds to published IRS data from early years, we compare the distribution of the estate tax paid by real sizes of estates (as opposed to incomes of the decedents). In 1960, about half of the estate tax was paid from estates of under \$5 million (2015 dollars), while by 2006 only about one-third was paid by these smaller estates, and by 2015 the higher threshold essentially exempted these estates. In contrast, in 1960 about a third of the estate tax was paid from estates of over \$10 million, while in 2006 about 60 percent was paid by these larger estates, and by 2015 this increased to about 90 percent. This suggests that the estate tax is increasingly borne by larger estates, which likely corresponds to higher income decedents (see the online data).

2. State/Local Individual Income Taxes

State and local income taxes are set to deducted amounts.²⁵ As discussed above, the difference between amounts deducted on tax returns and NIPA totals (only about one-tenth of the totals in recent years) are attributed to the bottom 90 percent of the distribution.

3. Corporate Taxes

Corporate income taxes deducted are the amounts previously included in pre-tax income.

4. Property Taxes

Property taxes (both business and residential property taxes included with imputed rent) are those previously calculated for pre-tax income.

5. Payroll Taxes

Payroll taxes removed include the employer and employee portions, as well as self-employment taxes as reported on tax returns. Employee payroll taxes are set equal to previously calculated employer taxes except for 1984, 2011, and 2012 due to employee portion payroll tax holidays. Two surtaxes on high-income taxpayers began in 2013: the Additional Medicare Tax and the Net Investment Income Tax. We include these surtaxes in federal income taxes despite their association with Medicare, because their tax base is not strictly labor earnings as is the case with other payroll taxes.

6. Sales and Other Taxes

Sales and other taxes (excluding fuel and utilities “taxes” as these are closer to user fees) are distributed by disposable income, which is after-tax income up to this point excluding non-cash imputations, less savings.

²⁵ The fraction of the top one percent itemizing was generally at least 95 percent between 1960 and 2015. Most of these non-itemizers live in states with no income tax.

7. Include Government Deficits/Surpluses

Government deficit and surpluses are allocated by income and payroll taxes paid, but excluding state income taxes because almost all deficits are at the federal level.

8. Include Government Consumption

Government consumption includes spending valued at cost of military expenditures, schooling costs, and other non-transfer government spending. This excludes all transfer spending and user fee type government taxes/spending for fuel taxes and government utilities. We allocate government consumption half per capita and half by after-tax income. This accounts for quasi per capita-type spending (for example, the pure public good component of military spending) and that higher income individuals may derive more benefits from some government spending (public university spending). The allocation of this spending to income groups includes a large amount of uncertainty and deserves further study.

V. PSZ Comparison

There are numerous differences in the approach we and Piketty, Saez, and Zucman (2018, hereafter PSZ) take to distribute national income across the U.S. population. To understand the relative impact of these differences, Table B3 presents estimates of how top one percent income shares change when moving from our approach to the PSZ approach and vice-versa (the average of these two changes is shown). Note that we present changes in top one percent shares that results from changing each assumption independently, such that the order of changes does not affect our results.²⁶ In 2014, our top one percent pre-tax income share is 5.8 percentage points below the PSZ estimate. After accounting for the differences in our pre-tax income estimates compared to PSZ, there are less than two percentage points of remaining difference between our after-tax income shares. In 1962 and 1979, the pre-tax differences are only about one percentage point and the after-tax differences half a percentage point.

For pre-tax incomes, we consider twelve separate differences in our approaches: (1) switches from allocating underreported income by IRS audit data as described in section II.6 to allocating underreported wages by wages reported on tax returns (non-filer wages are only about two percent of wages) and underreported business income by positive passthrough and rental income; (2a) include distributed private retirement income includes taxable pension, annuity, and retirement account payments as reported on tax returns and PSZ private retirement distribution allocates the same amount of income by the PSZ private retirement distribution (calculated as retirement income less Social Security income distribution, see online data table C19); (2b) retirement account income (inside buildup) is described in section II.10 and is reallocated from the wages/DC wealth distribution to the PSZ private retirement income distribution;²⁷ (2c) the retirement portion of retained earnings is reallocated from the wages/DC wealth distribution to the PSZ private retirement distribution; (2d) the retirement portion of business property taxes is reallocated from the wages/DC wealth distribution to the PSZ private retirement distribution; (3) switches from allocating other taxes by disposable income less savings to allocating by PSZ factor income less savings distribution, (since we did not find this distribution in the PSZ results we use AGI, which is less concentrated than factor income and so should approximate the effects

²⁶ In contrast, adding changes on top of previous changes in a cumulative fashion would make the estimates sensitive to the specific order chosen.

²⁷ In the main paper, we discuss a number of issues with applying this accrued income approach to undistributed retirement income. Another issue is that early withdrawals of accrued income in defined contribution accounts would face a 10 percent early withdrawal penalty, implying that a discount should be applied to this income under an accrual basis. We ignore this effect for national income targeting.

of savings); (4) corrections to tax income definition includes removing non-deductible losses and other corrections described in sections I.1 and I.4 and for PSZ there is no change from tax return based incomes; (5) limit returns to adult non-dependent residents includes the adjustments described above in section I.3 and for PSZ there is no change from raw tax returns; (6) switching from our non-retirement pre-tax corporate income by removing dividends reported on tax returns and retained earnings and corporate taxes as described in sections II.2 and II.3 and instead allocating these amounts based on the PSZ distributions for these income sources (see our online data table C19a); (7) switches from allocating imputed rent by property tax deductions to the PSZ housing wealth distribution (see PSZ online table TE2); (8) grouping by the number of individuals and ranking by size-adjusted incomes is described in section I.5 and the PSZ grouping by adults and ranking by equal-split married incomes doubles the weight and divides income by two for married filing joint returns;²⁸ (9) switches from allocating Federal Reserve payments by mortgage interest deducted to allocating by AGI, which should approximate PSZ pre-tax income; (10) switches from allocating half of non-profit and government pre-tax income per capita to allocating this amount by AGI; (11) switches from excluding social insurance benefits and deficits to the PSZ pre-tax approach of deducting OASDI and unemployment taxes paid (HI taxes are not removed) and adding Social Security and unemployment benefits and deficits half by social insurance benefits received and half by payroll taxes (12) removes the inflation correction described in section II.5. When applying all of these changes together, the resulting 1962, 1979, and 2014 PSZ replicated top one percent income shares are within one-tenth of a percentage point of the PSZ estimates.

For after-tax incomes, we consider six separate differences in our approaches: (1) switch from allocating half of government consumption per capita to allocating all by PSZ after-tax income (see PSZ table TC3e), with small adjustments made to target the after-tax AS/PSZ top one percent share gap (when applying all PSZ approaches); (2) switch from allocating non-social insurance deficits/surpluses by federal income taxes to allocating half by government transfers and half by all taxes; (3) switch government transfers (excluding Social Security and unemployment insurance) from being allocated as described in sections III.3, III.4 and III.5 to allocating Medicare by the PSZ distribution (see PSZ online tables TC3b and TC3c) and remaining transfers to the bottom 90 percent of the distribution; (4) switch from allocating estate taxes by the decade-before-death income groups of the decedent, as described in section IV.1, to allocating all to the top one percent, which approximates the PSZ approach; (5) switch from allocating corporate taxes one-quarter by wages and three-quarters by corporate ownership to allocating only by capital ownership (this offsets part of the corporate income differences for pre-tax income); (6) switch from allocating other taxes by disposable income less savings to allocating PSZ factor income less savings (allocated as discussed above).

Table B3 shows that about four-tenths of the 2014 gap in pre-tax top one percent shares, or two percentage points, is due to PSZ attributing much more underreported income to top earners than suggested by the IRS audit data, as explained in the main paper. About two-tenths of the gap in pre-tax top one percent shares, or one percentage point, is due to differences in distributions of retirement income. We estimate that the PSZ method allocates about 16 percent of retirement income to the top one percent (see online data), while our method allocates 7 percent. Our approach of including this retirement income when it appears on tax returns, rather than when contributed, is expected to give a more equal distribution because retirees tend to have lower

²⁸ While grouping by adults partially corrects for declining marriage rates, it does not account for other changes in household structure over time, such as smaller families and a larger share of single-parent families.

incomes than contributing workers.²⁹ Given uncertainty in the distribution of retirement contributions, as well as the conceptual issues discussed in the main paper, we prefer the precisely measured retirement income that is reported on tax returns. The rest of the 2014 pre-tax gap is explained as follows: one-tenth from other taxes being allocated by our measure of disposable income less savings versus PSZ factor income less savings (which ignore effects from taxes, transfers, and retirement income), one-tenth from our various corrections to tax return based income (next two lines in the table), one-tenth from differences in returns on personal equity including corporate tax differences, and about one-tenth from other differences (final six lines for pre-tax income).

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²⁹ In 2014, three-quarters of our retirement income appears as taxable distributions on tax returns and the top one percent have only about 5 percent of this income. For retirement account income (inside buildup), we estimate that the top one percent has about 10 percent of this income.

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Table B1: Descriptions and data sources of adjustments to income and tax units

| Changes | Initial Year | Final Year | Data source | Adjustment Method |
|---|--------------|------------|--|---|
| <i>Panel 1: Pre-tax income, Adjustments and income groups</i> | | | | |
| Remove filers under age 20 | All Years | | Tax return and Social Security microdata | Remove tax filers less than 20 years old, as not in baseline Census age 20+ population |
| Remove dependent filers | 1987 | present | Tax return microdata | Primarily college students age 20-23, not identified before 1987, fewer in early years, see college enroll. |
| Remove non-resid. filers & MFS fix | All Years | | Tax return microdata | Remove if excl. foreign earn. inc. or not in the U.S. (since 1979). Increase non-filers by half MFS returns. |
| Impose post-TRA86 loss limits | 1960 | 1986 | Tax return microdata | Limit pre-1986 business losses based on post-TRA86 rules |
| Add tax-exempt interest | All Years | | NIPA Table 3.3, tax return & SCF data | Listed on returns since 1987, shares before 1988 based on SCF, see Figure B2 |
| Include excluded dividends | 1960 | 1986 | Tax return microdata | \$100/200 exclusion ended with Tax Reform Act of 1986 |
| Add tax-exempt combat pay | 1995 | present | IRS Compliance Data Warehouse | Use information returns, for missing years use military pay (2000-01), interpolate (2002-04), 1999 values minus \$500M a year (1995-98) |
| Net out gambling losses | 1972 | present | Tax return microdata | Before 1991, equals miscellaneous deductions (not subject to 2% AGI limit after 1986), but only up to other income (which includes gambling winnings) |
| Remove cap. gains distributions | 1971 | present | Tax return microdata | From 1040 amounts not on Schedule D. Not separate in 1997 and 1998 and before 1971 |
| Remove other gains on 1040 | 1971 | present | Tax return microdata | Remove gain or loss on 1040 beginning 1971 |
| Remove IRA contributions | 1975 | present | Tax return microdata | Remove amount reported on return, new provision beginning 1975 |
| Remove tax refunds | 1971 | present | Tax return microdata | State and local income tax refunds variable missing before 1971 |
| Remove net operating losses | All Years | | Tax return microdata | Before 1989, equals 80 percent of other income losses |
| Alimony: add received/remove paid | All Years | | Tax return microdata | Add only missing portion received, where total is based on deductions. Imputed before 1971. |
| Set groups by #indivs/sz-adj. inc. | All Years | | Tax return microdata | Set income groups by #individuals and rank by size-adjusted income |
| <i>Panel 2: Pre-tax income, Expansions</i> | | | | |
| Add fiduciary retained income | All Years | | IRS public data | Allocate by taxable fiduciary income (use 1966 shares in prior years) |
| Add C-corp retained earnings | All Years | | NIPA Table 1.12, Tax return microdata, SCF & U.S. Financial Accounts | Allocate household portion 3/4 by dividends, & 1/4 by capital gains, retirement portion by wages by DB ownership and otherwise by DC wealth, non-profit/govt. portion half per capita and half by wages. |
| Add corporate income tax | All Years | | NIPA Table 1.12, Tax return microdata, SCF & U.S. Financial Accounts | Allocate household portion of C-corp ownership 3/4 by capital (as above) & 1/4 by wages on tax returns, bond share by taxable interest, and retirement and non-profit/govt. portions as with retained earnings. |
| Add business property tax | All Years | | NIPA Tables 3.3 and 7.4.5 | Allocate as corporate tax (no wages) and includes passthrough ownership by positive passthrough income. |
| Inflation effect on interest | All Years | | BEA inflation & Moody's BAA corp. yields | Increase business income, decrease household interest receipts and government payments |
| Add underreported income | All Years | | NIPA residuals of taxable income | Allocate additional wages and business income by distribution in Johns and Slemrod (2010) Table 3 |
| Add imputed rent | All Years | | NIPA Tables 3.3, 7.9, and 7.4.5 | Includes real estate taxes as pre-tax measure. Allocate based on real estate taxes deducted. |
| Add employer payroll tax | All Years | | Tax return microdata | Calculated based on reported wages or non-filer income and legislated rates and benefit bases |
| Add employer-provided insurance | All Years | | 2014 Form W-2 & NIPA Table 7.8 | Allocate NIPA health, life, and workers' comp. insurance using 2014 Form W-2 distribution |
| Add retirement account income | All Years | | NIPA Table 1.12, Tax return microdata, SCF & U.S. Financial Accounts | Allocate interest and dividend income to tax returns as with retained earnings. |
| Add indirect taxes, non-profits, etc. | All Years | | NIPA Table 1.12 & Tax return microdata | Allocate indirect taxes (mostly sales tax) by disposable income less savings, transfers/subsidies/govt. income by half per capita and half wages, and Federal Reserve payments by mortgage interest payments. |
| <i>Panel 3: Pre-tax/after-transfer income</i> | | | | |
| Add SS benefits | All Years | | Tax return microdata & NIPA Table 3.12 | Include reported benefits, use 1985 distribution in prior years, unallocated to bottom 90% |
| Add UI benefits | All Years | | Tax return microdata & NIPA Table 3.12 | Include reported benefits, use 1981 distribution in prior years |
| Add other cash transfers | All Years | | NIPA Table 3.12 | Veterans benefits, fed. SSI, ref. tax credits, wkrs. comp., and state/local social insurance |
| Add Medicare | 1965 | present | NIPA Table 3.12 | Allocate based on fraction of age 65+ adults in each income group, use 1979 fractions for previous years |

| | | | |
|---|-----------|---|---|
| Add other non-cash transfers | All Years | NIPA Table 3.12 | Includes federal SNAP, state and local medical care, general assistance, energy assistance, and other |
| <i>Panel 4: After-tax income, Remove taxes</i> | | | |
| Remove fed. indiv. inc. & estate tax | All Years | Tax return data & NIPA Tables 3.12 & 5.11 | Include foreign tax credits as taxes paid. Estate tax allocated by decedent prior-decade income groups. |
| Remove state/local indiv. inc. tax | All Years | Tax return microdata & NIPA Table 3.3 | Allocated by state/local income tax deductions and remaining taxes allocated to bottom 90% |
| Remove corporate income tax | All Years | see above | As calculated above |
| Remove property tax | All Years | Tax return data & NIPA Tables 3.3 & 7.4.5 | Allocate business portion as above & housing portion by deductions |
| Remove payroll tax | All Years | Tax return microdata & NIPA Table 2.1 | Employee tax equal employer FICA tax, except in 1981, 2011 and 2012 |
| Remove sales and other taxes | All Years | Tax return data & NIPA Tables 3.1 & 3.5 | Allocate to filers by after-tax income less savings, based on SCF results in Dynan et al (2004) |
| <i>Panel 5: After-tax income, Add government sector</i> | | | |
| Add government deficit/surpluses | All Years | NIPA Table 1.12 & calcs. in Table T3 | Allocate by federal income and payroll taxes |
| Add government consumption | All Years | Tax return data & NIPA Tables 3.9.5 & 3.5 | Allocate half per capita and half by after-tax income |

Notes: Unallocated amounts of transfer payments are allocated to income groups below the top 10 percent.

Table B2: Non-filer reported income as a fraction of filer income (at least 20 years old)

| | Non-filers All ages Wages (millions \$) | Non-filers >=20 yrs old Dividends (millions \$) | Non-filers >=20 yrs old Misc Inc. (millions \$) | Non-filers >=20 yrs old Txbl. Retire (millions \$) | ITIN filers All ages Total wages (millions \$) | Non-filers >=20 yrs old Total Income (millions \$) | Non-filers >=20 yrs old N. tax units (thousands) | Non-filers >=20 yrs old Avg. Income (\$) | Filers >=20 yrs old Avg. Inc. (\$) | Non-filers >=20 yrs old %Filer Inc. (%) |
|------|--|--|--|---|---|---|---|---|---|--|
| 2000 | 112,000 | 8,000 | 27,000 | 23,000 | 5,000 | 165,000 | 18,581 | 8,900 | 42,200 | 21% |
| 2001 | 109,000 | 8,000 | 22,000 | 22,000 | 8,000 | 153,000 | 19,543 | 7,800 | 42,200 | 18% |
| 2002 | 113,000 | 5,000 | 24,000 | 23,000 | 11,000 | 154,000 | 21,219 | 7,300 | 41,100 | 18% |
| 2003 | 115,000 | 7,000 | 30,000 | 25,000 | 14,000 | 163,000 | 22,468 | 7,300 | 41,400 | 18% |
| 2004 | 132,000 | 12,000 | 34,000 | 28,000 | 19,000 | 187,000 | 22,860 | 8,200 | 43,600 | 19% |
| 2005 | 142,000 | 9,000 | 35,000 | 28,000 | 39,000 | 175,000 | 22,646 | 7,700 | 46,100 | 17% |
| 2006 | 154,000 | 11,000 | 37,000 | 28,000 | 49,000 | 181,000 | 21,390 | 8,500 | 48,600 | 17% |
| 2007 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2008 | 163,000 | 12,000 | 37,000 | 31,000 | 61,000 | 182,000 | 21,216 | 8,600 | 50,600 | 17% |
| 2009 | 151,000 | 11,000 | 36,000 | 34,000 | 57,000 | 175,000 | 22,137 | 7,900 | 47,300 | 17% |
| 2010 | 156,000 | 12,000 | 42,000 | 41,000 | 60,000 | 191,000 | 22,186 | 8,600 | 48,300 | 18% |

Notes: Wages are from Form W-2, dividends from Form 1099-DIV, miscellaneous income from Form 1099-MISC, and taxable retirement income from Form 1099-R. To control for outliers, 1099-MISC income for each source (non-employee compensation, medical payments, fishing income, rents, royalties, other income) is excluded if \$99,999 or more. Individuals with years of death in subsequent years or aged 100 or more are removed. 2007 removed due to stimulus filers. After including underreported IRS income, non-filer incomes increase to about 30 percent of average filer income.

Sources: Authors' calculations using IRS data and Piketty and Saez (2003 and updates).

Table B3: Decomposition of top one percent income shares by approaches

| Auten-Splinter approach | PSZ approach | Percentage point difference (PSZ-AS) | | | Percent of total difference | | |
|---|---|--------------------------------------|-------------|------------|-----------------------------|------------|------------|
| | | 1962 | 1979 | 2014 | 1962 | 1979 | 2014 |
| <i>Pre-tax income</i> | | | | | | | |
| Underreported income by IRS audit data | Underreported income by reported income | * | 0.6 | 2.2 | -2 | 60 | 38 |
| Include distributed & other retirement income | PSZ private retirement distribution | 0.2 | 0.1 | 1.1 | 16 | 8 | 19 |
| Other taxes by disposable income less savings | Other taxes by factor income less savings | 0.3 | 0.2 | 0.6 | 21 | 19 | 11 |
| Various corrections to tax income definition | Use uncorrected tax return market income | * | -0.1 | 0.4 | -1 | -11 | 8 |
| Limit returns to adult residents | No adjustment | * | 0.2 | 0.2 | 0 | 23 | 3 |
| Non-retirement pre-tax corporate income | PSZ non-retirement pre-tax corp. income | 0.4 | 0.2 | 0.6 | 30 | 20 | 10 |
| Imputed rent by property tax deductions | Imputed rent by housing wealth estimates | 0.5 | 0.2 | 0.3 | 40 | 22 | 5 |
| Groups by individuals/size-adjusted incomes | Groups by adults/equal-split married inc. | * | 0.1 | 0.2 | 4 | 13 | 4 |
| Federal Reserve payments by mortgage interest | Fed. Res. payments by income | * | * | 0.1 | 3 | 2 | 2 |
| Non-profits/govt. income half per capita | Non-profits/govt. income all by income | * | * | 0.1 | 1 | 2 | 2 |
| Social insurance benefits/deficit excluded | Social insur. ben./def. incl., taxes deducted | -0.1 | -0.1 | * | -9 | -5 | ^ |
| Inflation correction | No correction | * | -0.5 | -0.1 | -2 | -52 | -1 |
| Pre-tax differences (PSZ less AS) & totals | | 1.1 | 1.1 | 5.8 | 100 | 100 | 100 |
| <i>After-tax income</i> | | | | | | | |
| Govt. consumption allocated half per capita | Govt. consumption all by after-tax income | 0.8 | 0.5 | 1.2 | --- | --- | 140 |
| Non-SS deficits by federal income taxes | Half by government transfers, half taxes | * | 0.3 | 0.5 | --- | --- | 59 |
| Government transfers as described in text | PSZ transfers distribution | * | * | -0.1 | --- | --- | -6 |
| Estate tax by prior decade decedent income | Estate tax by wealth distribution | -0.3 | -0.2 | * | --- | --- | -5 |
| Corporate taxes by wages and corp. ownership | Corporate taxes by capital ownership | -0.2 | -0.3 | -0.3 | --- | --- | -36 |
| Other taxes by disposable income less savings | Other taxes by factor income less savings | -0.1 | -0.1 | -0.4 | --- | --- | -52 |
| After-tax differences (PSZ less AS) & totals | | * | -0.1 | 1.0 | --- | --- | 100 |

Notes: Auten-Splinter approach is described in text and in detail in the online appendix. Percentage point differences are from changing each assumption independently (as opposed to stacking changes) and therefore do not sum to the PSZ less AS difference. Results are the average changes in top one percent income shares of going from each AS to PSZ and PSZ to AS assumption (see online data for details). The total after-tax difference nets out the pre-tax difference. * denotes changes between -0.05 and 0.05. ^ denotes changes between -0.5 and 0.5 percent. Non-retirement pre-tax corporate income for both columns includes dividends, retained earnings, and corporate tax effects.

Sources: Authors' calculations and Piketty, Saez, and Zucman (2018).

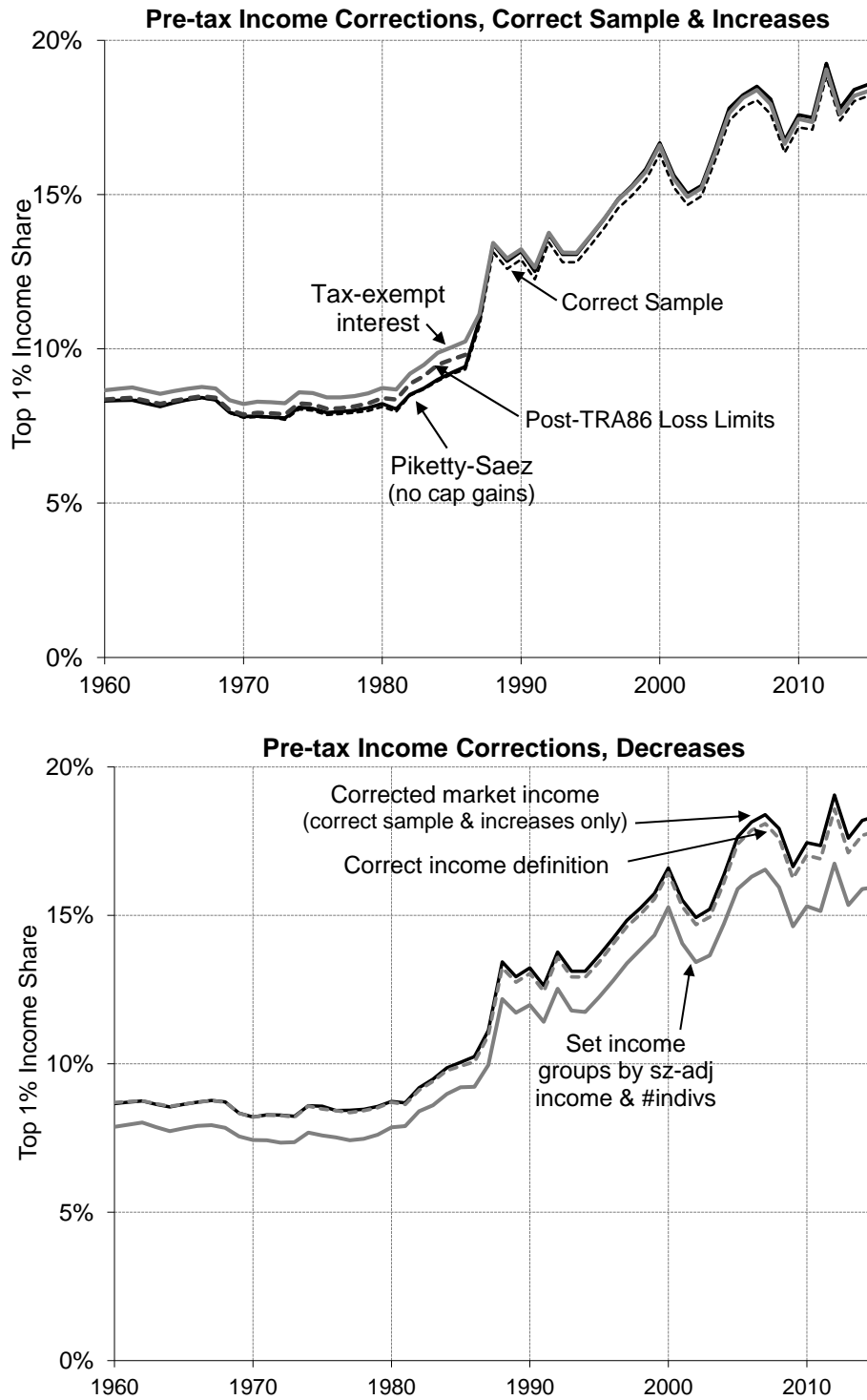


Figure B1: Top 1% income shares: Corrected fiscal income adjustments

Notes: Replicated Piketty and Saez series is shown, where income is adjusted gross income less adjustments, government transfers, and capital gains. See text for description of adjustments.

Sources: Authors' calculations and Piketty and Saez (2003 and updates).

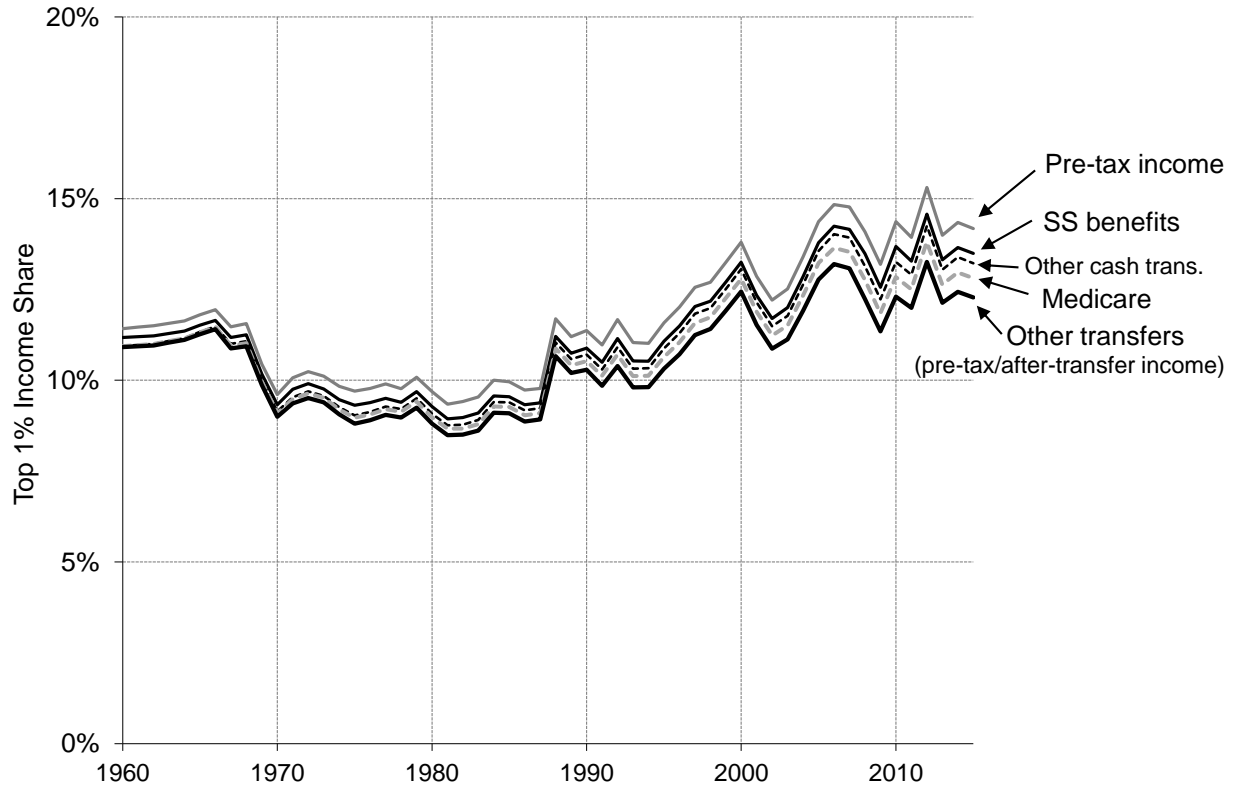


Figure B2: Top 1% income shares: Inclusion of transfers in pre-tax income

Notes: The effect of unemployment insurance is not shown separately from other cash transfers due to its small effect.

Source: Authors' calculations.

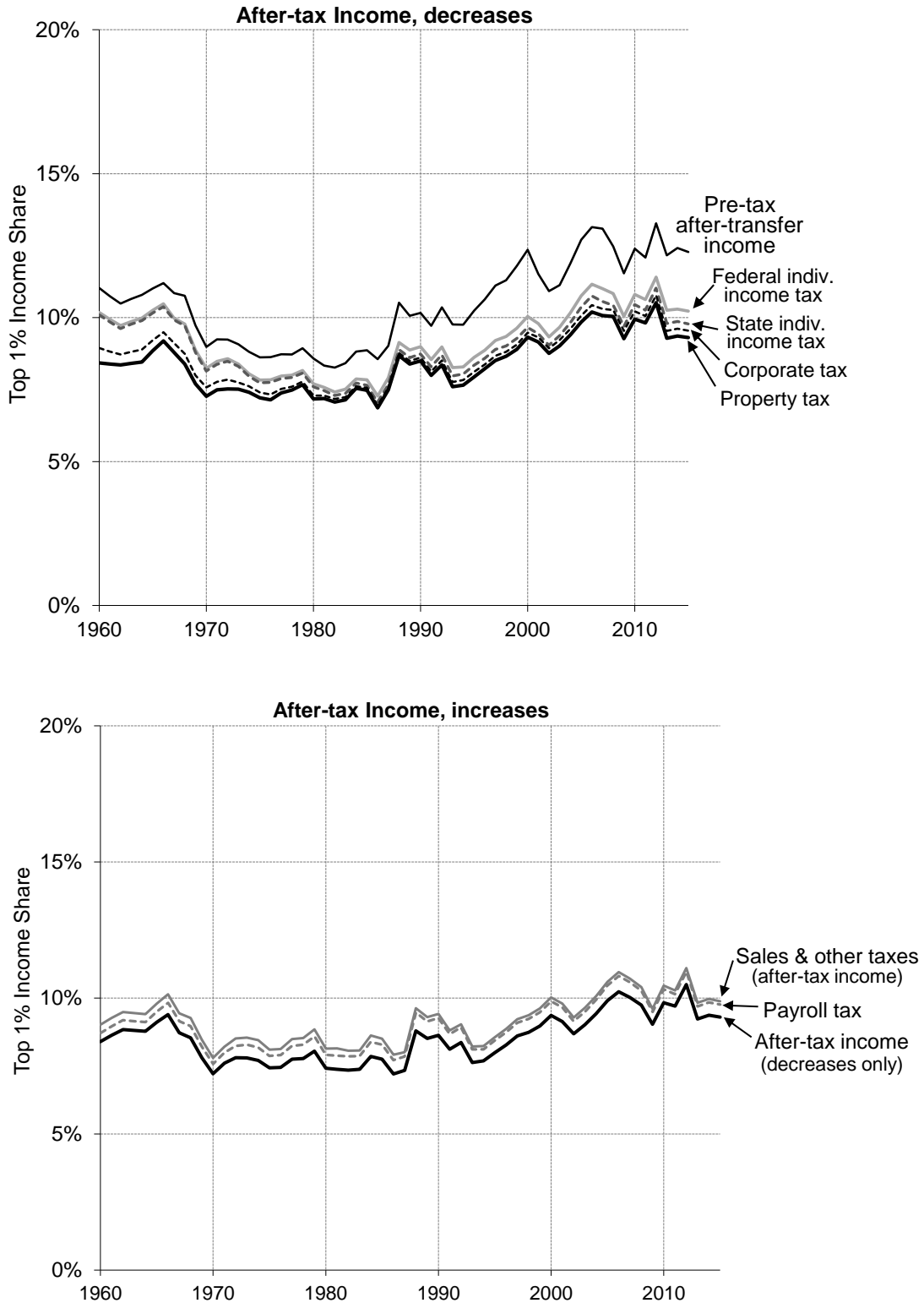


Figure B3: Top 1% income shares: Tax adjustments

Notes: Taxes that decrease top income shares are in the top figure and those increasing them in the bottom figure. Excludes adjustments for government deficits/surplus and consumption (see Table I in main paper).

Source: Authors' calculations.

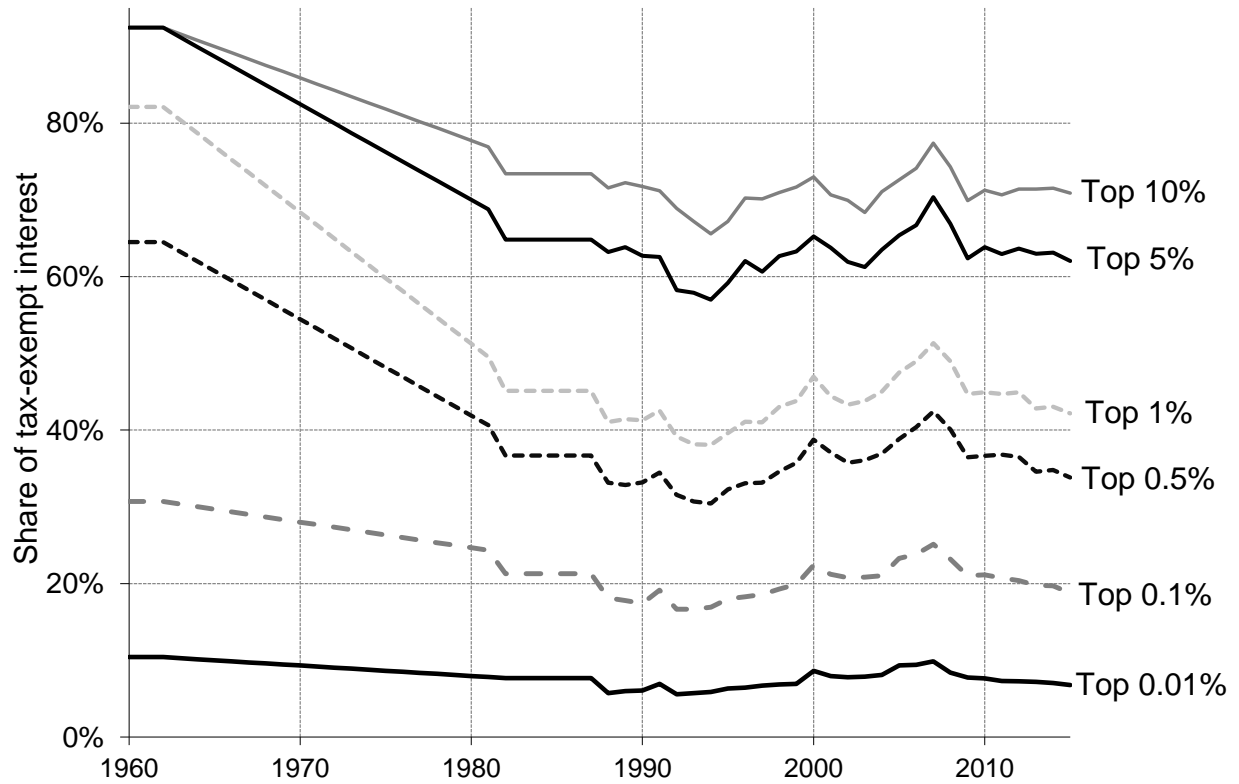


Figure B4: Share of tax-exempt interest by income group

Notes: Income groups are PS income excluding capital gains with non-deductible losses removed. Tax-exempt interest was only reported on tax returns since 1987 and shares are estimated in previous years.

Source: Authors' calculations.