

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

December 20, 2019

Gerald Auten
Office of Tax Analysis, U.S. Treasury Department

David Splinter
Joint Committee on Taxation, U.S. Congress

Abstract

Top income share estimates based only on individual tax returns, such as Piketty and Saez (2003), are biased by tax-base changes, major social changes, and missing income sources. Addressing these issues requires numerous assumptions, especially for broadening income beyond that reported on tax returns. This paper shows the effects of adjusting for technical tax issues and the sensitivity to alternative assumptions for distributing missing income sources. Our results suggest that top income shares are lower than other tax-based estimates, and since the early 1960s, increasing government transfers and tax progressivity resulted in little change in after-tax top income shares.

JEL Codes: D3, E01, H2, H5, J3

For helpful comments and discussions, we thank Richard Burkhauser, Leonard Burman, Jim Cilke, Tim Dowd, Larry Katz, Wojciech Kopczuk, Jeff Larrimore, Kevin Moore, Austin Nichols, James Poterba, John Sabelhaus, Emmanuel Saez, Joel Slemrod, Eugene Steuerle, Gabriel Zucman, Erick Zwick, and participants of the Tax Economists Forum, Office of Tax Analysis Research Conference, Columbia Tax Conference, NBER Research on Income and Wealth Conference, CBO Distributional Tax Analysis Conference, Georgetown Tax Law and Public Finance workshop, and annual conferences of the National Tax Association, Society of Government Economists, and Allied Social Science Association. We thank Nathan Born for helpful research assistance. An online appendix, all data series, and code used to produce these series are available at www.davidsplinter.com. Send comments to Gerald.Auten@treasury.gov and David.Splinter@jct.gov.

Auten: Views and opinions expressed are those of the authors and do not necessarily represent official Treasury positions or policy. Splinter: This paper embodies work undertaken for the staff of the Joint Committee on Taxation, but as members of both parties and both houses of Congress comprise the Joint Committee on Taxation, this work should not be construed to represent the position of any member of the Committee.

Based on the results of studies using income tax data (Piketty and Saez, 2003; Piketty, Saez, and Zucman, 2018), the idea that U.S. income inequality has increased dramatically since the 1960s has become one of the most powerful narratives of our time. Broad acceptance of this view has fueled concerns that increasing inequality could indicate greater concentration of political power and increased rent-seeking (Stiglitz, 2012; Lindsey and Teles, 2017) or increased bargaining power of top earners for compensation (Piketty, Saez, and Stantcheva, 2014). In turn, these concerns have led to speculation that inequality could lead to problems such as decreasing institutional accountability, reduced economic efficiency, and stagnating middle-class wages due to shifts in relative bargaining power.

These profound implications emphasize the importance of correctly measuring income inequality. Estimating the income distribution over long time periods, however, is complicated by major challenges. These include changes in social conditions (marriage rates, household size and composition) and demographics (age distribution). Rising education standards and increased college attendance resulted in higher earnings but later entry into the labor force. Retirement incomes have changed due to expanded Social Security benefits and the shift from defined benefit to defined contribution plans. Periods of high inflation have distorted the measurement of income, and business cycles had differential effects on income groups.

Compared to survey data, tax data better represent top income groups,¹ but using tax data presents additional challenges. Tax rules and incentives for reporting income have changed over time as the result of tax legislation. Declining marriage rates and changing household structures can lead to biased results when tax units are the unit of observation.² While many adults do not file tax returns, many returns are filed by individuals under age 20, other dependents, and non-residents. Important sources of income are missing in tax data, including government transfer payments and non-taxable employer-provided benefits. The share of income missing in tax data has increased over time, such that market income on tax returns accounts for only about 60 percent of national income in recent years. In addition, there are many technical issues with respect to differences between what is reported on tax returns and what economists regard as current-year economic income. Prior studies may have been misleading as a result of failure to adequately account for these challenges.

¹ Information reporting to the Internal Revenue Service (IRS) and the potential for audit mean that reporting rates in tax data are high for most income. Of course, some income is underreported due to non-compliance, especially for self-employment and small business income not subject to information reporting.

² A tax unit combines all individuals filing a tax return together or who would file together in the case of non-filers. Tax units differ from households by including some dependents living elsewhere, but excluding other unrelated adults living in the household. For example, cohabiting couples are considered as the same household but are separate tax units.

This paper presents new estimates of the levels and trends of U.S. top income shares that address these challenges. We start with income as reported on tax returns and develop an improved measure of market income—also referred to as fiscal income—that corrects for tax reforms and technical tax issues as well as social issues such as declining marriage rates. We then account for total national income with estimates of pre-tax and after-tax income. While our results are similar to several other recent studies, they suggest lower top income shares and less upward trend than Piketty and Saez (2003) and Piketty, Saez, and Zucman (2018, hereafter PSZ). Finally, we discuss why our results differ from PSZ and the implications for considering the distribution of economic growth and tax burdens.

Using income reported on individual tax returns, the highly influential paper by Piketty and Saez (2003 and updates) estimated that the top one percent share more than doubled from 9 to 20 percent between 1962 and 2015. About 40 percent of this increase, however, occurred in the years just before and after the Tax Reform of 1986 (TRA86). This major reform lowered statutory tax rates and broadened the tax base, thereby substantially changing tax rules and incentives for reporting income and organizing businesses.³ The potential for TRA86 to affect measures of U.S. inequality was noted by Feenberg and Poterba (1993) and Gordon and Slemrod (2000). Basing income groups on tax units produced additional upward bias in top income shares over time because marriage rates decreased disproportionately more among lower-income groups.

PSZ addressed some of these issues and made several important methodological improvements. Their recent paper uses an expanded measure of income that targets total national income and incorporates Social Security benefits. It addresses declining marriage rates by basing income groups on the number of adults age 20 and over. Despite changes that might be expected to reduce top income shares, PSZ still concluded that the top one percent share doubled since 1980 and increased by about two-thirds since 1962.

As illustrated in Figure 1, our results are quite different, especially since 1979. We both estimate that the top one percent shares of pre-tax and after-tax incomes declined slightly between the early 1960s and 1979, although our top share levels are slightly lower. Between 1979 and 2014, however, PSZ estimated that pre-tax top one percent shares increased by 9.0

³ See Auten and Splinter (2016) for a more complete analysis of the effects of TRA86. Geloso et al. (2018) examine earlier reforms, showing that pre-WWII top income shares are overestimated when tax policy changes are not correctly accounted for.

percentage points while our estimates suggest that they increased by only 4.8 percentage points.⁴ For after-tax income, which also includes transfers, PSZ estimated that top one percent shares increased by 6.5 percentage points between 1979 and 2014. Our estimates suggest that they increased by only 1.4 percentage points. Over the longer period since the early 1960s, our estimates suggest that the top one percent share increased less than half as much as PSZ and that after-tax income shares were nearly unchanged.

Our estimates also differ for the bottom half of the distribution. PSZ estimated that the bottom 50 percent share of pre-tax and after-tax shares decreased by about 7.5 and 6.2 percentage points since 1979. In contrast, we estimate that pre-tax and after-tax income shares decreased by 5.6 and 2.2 percentage points over this period. Our estimates suggest that taxes and transfers offset most of the recent changes in both bottom and top income shares. In contrast with the PSZ estimate that average real pre-tax incomes of the bottom 50 percent remained virtually unchanged, we estimate that they increased by nearly one-third. For pre-tax/after-transfer income (which includes Social Security benefits) and after-tax income, we estimate a real increase for the bottom half of the distribution of nearly two-thirds. Our estimates are similar to those of the Congressional Budget Office (2018) for the bottom two quintiles.⁵

Why are our results so different from Piketty and Saez (2003) and PSZ? There are many methodological differences, and this paper provides a detailed decomposition of their effects. Our estimates correct the tax sample to remove dependent and non-resident filers, as well as filers under age 20. We account for increases in the share of single-parent households and changing family size, as well as for falling marriage rates. We also correct for many special features of how income is reported on individual and corporate tax returns and how this has changed over time. While many improvements have only small or offsetting effects on top income shares, their cumulative effects can be significant.

Different treatments of business losses and pension income prove to be particularly important. Our approach corrects for the large tax shelter losses prior to TRA86 and adds back net operating loss carryovers from prior years, which are not current-year income. Our approach also accounts for business losses when allocating underreported income because detailed IRS

⁴ Top income shares tend to be procyclical and should be compared at similar points in the business cycle, such as 1962, 1979, and 2014. Comparing a recession year, such as 1980, to a later expansionary year tends to exaggerate top income share increases. Besides being a recessionary year, 1980 is problematic because some high-income taxpayers shifted income from 1980 to 1981 to benefit from proposed tax cuts.

⁵ Congressional Budget Office (2018) estimates that per capita after-tax and after-transfer real incomes of the bottom two quintiles increased 62 percent since 1979. For bottom half changes since 1962, we estimate that taxes and transfers turn a 5 percentage point decrease into a 1 percentage point increase.

audit studies show that returns with business losses account for a significant share of underreported income. PSZ, however, ignore losses and allocate underreported income only by positive reported income. Our retirement income allocation methodologies also produce quite different results, in part because PSZ mix taxable retirement income flows with non-taxable amounts, which are largely rollovers of assets.

We are not alone in finding lower levels and smaller increases in U.S. top income shares when using broad measures of income. Combining tax return and Census data, Fixler, Gindelsky, and Johnson (2019) estimated a top one percent share of personal income in 2012 of 13 percent, compared to 21 percent in Piketty and Saez (2003 and updates, hereafter PS). Using Survey of Consumer Finance data, Bricker et al. (2016a) found that the top one percent share increased 3 percentage points between 1988 and 2012, compared to 6 percentage points in PS. Using tax return and Census data, the Congressional Budget Office (2016) found that the top one percent share of before-tax income increased 6 percentage points from 9 to 15 percent between 1979 and 2013, compared to the PS estimate of a 10 percentage point increase from 9 to 19 percent. Our pre-tax income share increases by 4 percentage points from about 10 to 14 percent over this period. Using internal Census data to overcome top-coding issues, Burkhauser et al. (2012) estimated that the top one percent share only increased 2 percentage points from 10 to 12 percent between 1967 and 2004.⁶

Our paper makes several important contributions to this emerging “consistent income inequality” literature on the distribution of income in the U.S. First, we provide new estimates of top income shares using administrative data to address major challenges in measuring the income distribution over long periods, while accounting for major tax reforms and other technical issues in using tax data. Second, we address the uncertainty created by the need to impute components of national income not reported in tax data by showing our step-by-step adjustments and imputations as well as sensitivity tests of less certain assumptions. This allows other researchers to see the effect of each adjustment and consider alternative estimates based on different combinations of assumptions. Third, we compare our methodology with PS, PSZ, and the Congressional Budget Office so that readers will have a better understanding of why our results (and those of other researchers) differ.

The following section briefly describes our income measures. Sections II and III discuss the data and adjustments used to construct these measures. Sections IV and V presents the main

⁶ Our pre-tax estimates also increase 2 percentage points over this period, from 11 to 13 percent. Fixler et al. (2016) estimate that between 1960 and 2012 the top five percent share of personal income increased only about 4 percentage points.

results and sensitivity analysis. Section VI provides a summary and conclusions.

I. Measuring Top Income Shares with Consistent Definitions of Income

Using annual tax microdata, we start with PS *fiscal income* and sample definitions because these were seminal estimates that are still widely cited and being updated. Our first step is to estimate *corrected fiscal income* that adjusts for major tax law changes (primarily TRA86), sample issues, and changing family structures (declining marriage and increasing single-parent rates). We then sequentially develop measures that account for total national income: *pre-tax income* that excludes government transfers, and *after-tax income* that includes government transfers and deducts federal, state, and local taxes. It is important to note that our pre-tax income is intended to be consistent with the national income concept and therefore does not include transfer payments.⁷ We also develop a measure of *pre-tax/after-transfer income* that necessarily exceeds national income. By including transfers, this measure provides a more complete estimate of the economic resources available to households for consumption, saving, and paying taxes. We use it in measuring effective tax rates. Starting with this broad measure of income, *after-tax income* is estimated by subtracting taxes and adding government deficits and government consumption to equal national income.

The most significant tax reform in the period studied was TRA86, which lowered individual tax rates and broadened the tax base. The base-broadening was targeted at high-income taxpayers, including limiting deductions for losses on rental income and passive investments. The reform also motivated some corporations to switch from filing as C to S corporations and to start new businesses as passthrough entities (S corporations, partnerships, or sole proprietorships), causing more business income to be reported directly on individual tax returns. This is because all passthrough income is reported on individual tax returns while C corporation retained earnings are not. Before TRA86, the top individual tax rate was higher than the top corporate tax rate (50 percent vs. 46 percent), allowing certain sheltering of income in C corporations with retained earnings. This incentive was even larger when the top individual rate was 70 percent in the 1970s and 91 percent before 1964. TRA86 lowered the top individual tax rate below the top corporate tax rate (28 vs. 34 percent), reducing the incentive to retain earnings inside of C corporations and creating strong incentives to organize businesses as passthrough

⁷ National income equals GDP less capital depreciation plus net income from abroad. PSZ use the term Distributional National Income (DINA), while Smith et al. (forthcoming) refer to Imputed National Income (INI). Stiglitz, Sen, and Fitoussi (2009) discuss shortcomings of national income. Personal income used in some distribution studies includes transfer payments, but does not include earnings retained inside businesses.

entities.⁸ Our analysis accounts directly for the limitations on deducting losses and indirectly for the shift into passthrough entities by including corporate retained earnings. This leads to important findings for in the 1960s and 1970s, when high individual income tax rates created strong incentives to shelter income inside corporations. Without these corrections, top income shares are understated before 1987.⁹

TRA86 also dramatically increased the number of dependent filers, which are inappropriately treated as separate low-income units if no adjustments are made.¹⁰ To address this issue and make our sample consistent over time and between tax and Census data, we remove dependent filers, other filers under age 20, and non-resident filers from the sample and increase the number of non-filing tax units accordingly. Without this correction non-filing tax units are undercounted and top income shares overstated, especially since 1987.

Declining marriage rates outside the top of the distribution also explain part of the increase in measured top income shares. This is because, holding all else equal, as the marriage rate in the bottom of the distribution decreases, more adults file separate returns. This increases the total number of tax units, thereby increasing the number of tax units in the top one percent. Another important social change is the increase in single-parent households. To address both issues, we take account of the two adults in married tax units, as well as dependents, and base income groups on the total number of individuals. That is, each percentile has an equal number of individuals rather than an equal number of tax units. Without this correction there are too many individuals in the top one percent, overstating top income shares in recent decades.

Some sources of market income are not included on individual tax returns. To address this issue and fully account for national income, pre-tax income includes tax-exempt interest, corporate retained earnings and taxes, employer-paid payroll taxes and insurance, imputed rental

⁸ This simple comparison ignores the double taxation of corporate income at the individual level. TRA86 also increased the maximum long-term capital gains tax rate from 20 to 28 percent, which may have further lowered the value of C corporations relative to passthrough businesses. Gordon and Slemrod (2000), Goolsbee (2004), and Auten, Splinter, and Nelson (2016) reviewed the effects of relative tax rates on business organization.

⁹ Studies in other countries have also found that inequality trends based on tax returns are biased when failing to account for tax reforms that changed incentives for corporate retained earnings. Wolfson, Veall, and Brooks (2016) estimated that including retained earnings of private corporations increased the Canadian top one percent income share in 2011 by about a third. Alstadsæter et al. (2015) found that an increase in the dividends tax rate caused a dramatic increase in corporate retained earnings in Norway. After the reform, tax return-based top one percent income shares were underestimated by about a third. Atkinson (2007) estimated that during the 1950s and early 1960s, including retained company profits increased United Kingdom top one percent income shares (excluding capital gains) by about half.

¹⁰ Auten, Gee, and Turner (2013) estimated that the number of dependent filers and filers younger than 20 years old increased from about 8 million in 1986 to 13 million by 1988. TRA86 eliminated the personal exemption for dependent filers, only allowing a single exemption on parent returns rather than on both dependent and parent returns, and reduced the amount of exempt investment income from \$1,080 to \$500.

income on housing, underreported income, and other taxes and income. These excluded sources increased over time from an average of 34 percent of national income in the 1960s to 39 percent since 2000. Because of the declining importance of corporate retained earnings and taxes and the growing importance of employer-provided health benefits and defined contribution retirement plans, these excluded sources have shifted away from the top of the distribution. Without these corrections top income shares are understated in the 1960s and overstated in recent decades.

Our measure of pre-tax income includes income earned from labor and investments and totals to national income.¹¹ Pre-tax/after-transfer income is obtained by adding government transfers, which grew from 5 to 16 percent of national income between 1960 and 2015. This measure is our broadest definition of income and the most appropriate for estimating effective tax rates and the distribution of tax burdens, as well as a more accurate income measure for retirees receiving Social Security. This measure follows a long-standing public finance tradition of using this type of broad measure of income for this purpose (Pechman and Okner, 1974; Office of Tax Analysis, 1987). This treatment is also consistent with measures of before-tax income in Congressional Budget Office (2016), gross income in the Luxembourg Income Study, and transfer-inclusive income definitions used by the Census Bureau. After-tax income subtracts taxes and includes government transfers and other spending, therefore providing a measure closer to total economic resources of tax units.

II. Data

Our analysis uses annual samples of individual income tax returns from 1960 to 2015. Each cross-section sample includes between 80 and 340 thousand tax returns, with oversampling of tax returns with high incomes. Public use individual income tax files are used for years before 1979. Beginning with 1979, we use internal IRS Statistics of Income (SOI) individual income tax samples and Social Security Administration data including dates of birth. Non-filer income, excluded combat pay, and the distribution of employer-provided health insurance, are estimated using IRS administrative data, which include the universe of tax returns and information returns. We also use the Survey of Consumer Finances in estimating the distribution of several types of income not on tax returns.

Target totals for income not reported or partially reported on income tax returns are from

¹¹ This differs from PSZ pre-tax income that includes Social Security benefits and unemployment compensation net of the associated payroll taxes. This avoids the problem of large numbers of retirees unemployed with little income, but is inconsistent with the conceptual basis of national income. Our pre-tax income measure is intended to be consistent with the conceptual basis of national income. As a result of not accounting for these employment-related benefits, our pre-tax measure underestimates the economic resources of these tax units. These benefits are included in our pre-tax/after-transfer income measure.

the Bureau of Economic Analysis National Income and Product Accounts (NIPA). Note that corporate retained earnings are defined as undistributed C corporation 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.

III. Distributing U.S. National Income Using Tax Data

This section describes each of the adjustments made to the individual income tax data. Our analysis starts by replicating PS income excluding capital gains (i.e., fiscal income excluding capital gains). For filers, this equals adjusted gross income (AGI), plus statutory adjustments, less taxable Social Security and unemployment benefits and Schedule D capital gains. We use the PS assumption that non-filers receive 20 percent of the average income of filers. *Corrected fiscal income* is developed as an intermediate step. This measure corrects the sample, adjusts for the effects of tax reform on tax shelter losses, adds tax-exempt interest, makes a number of additions and corrections to various income components, and bases income groups on the number of individuals rather than tax units. Then we estimate pre-tax and after-tax income measures that target national income. Tables 1 and 2 show the impact of each adjustment on top one percent income shares in selected years. Additional details are provided in the online appendix and data. While some adjustments lower top income shares, many others increase top shares: adding tax-exempt interest, ranking by size-adjusted incomes (which is offset by grouping by individuals), adding fiduciary and corporate retained income, allocating corporate and business taxes, correcting for inflation, and adding retirement account income.

A. *Corrected Fiscal Income*

1. *Correct sample: Limit Returns to Adult Residents.* It is important to start by ensuring that our sample is consistent with U.S. Census resident population age 20 or older. Census data are the basis for the PS estimate of the total number of filing and non-filing tax units, which we also target. Some tax filers, however, live abroad or are younger than 20 years old and therefore not included in the baseline Census numbers. To limit the sample of tax returns to adult residents, these returns are removed, thereby increasing the number of non-filer tax units. In addition, some filers age 20 and over are claimed as dependents on other tax returns, primarily college students. Since these filers are not independent economic units, they are also dropped from the sample.¹²

¹² Those 19 years or older who file as dependent filers receive more than half of their support from taxpayers claiming an exemption for them and be full-time students. Thus, they are not comparable to fully independent tax units and typically have very low incomes. The potential to influence measured inequality trends is illustrated by the

The income of dependent filers is allocated among tax returns with dependent children. We also correct for the effect of married couples filing separate returns, as the number of total tax units counts all married couples as one tax unit, but these married couples file two returns. These corrections have significant effects on the sample since 1987. For example, in 2015 there were 7.6 million filers under age 20, 3.8 million other dependent filers, 0.9 million non-resident filers, and 1.5 million married filing separately returns, totalling over 9 percent of all returns filed.

2. Impose Post-TRA86 Loss Limits. The first income adjustment is to apply post-TRA86 limitations on deductions of losses for rent and other business income to years before the reform. Prior to 1987, this makes a significant fraction of losses non-deductible, increasing the incomes of those taking advantage of tax shelters. This adjustment also helps correct for generous accelerated depreciation rules enacted in 1981 that increased the use of tax shelters and reported losses on tax returns, especially for real estate.

3. Add Tax-Exempt Interest. The inclusion of tax-exempt interest modestly increases top income shares (0.3 percentage points) in the 1960s when holdings of tax-exempt securities were concentrated among the highest income taxpayers, but has a smaller effect (0.2 percentage points) in recent decades due to broader holdings of these securities.

4. Correct Income Definition. Excluded dividends before 1987 and tax-exempt combat pay are added to filer incomes. Net operating loss carryovers from prior years are added back because they reflect prior-year losses rather than current income. Gambling losses (up to the amount of gambling income) and taxable state and local income tax refunds are deducted. Capital gains distributions listed separately from Schedule D and ordinary gains from the sale of business property are also subtracted.¹³ IRA contributions, including Keogh, SEP, SIMPLE and other qualified plan contributions, are subtracted to parallel the treatment of excluded employee contributions to other defined contribution accounts, such as 401(k) plans. These corrections provide a consistent exclusion of capital gains and retirement contributions. These adjustments can result in large income changes for particular tax returns, substantially changing their rank in

increase between 1960 and 2012 in school enrollment by those age 20 to 24 from 13 to 40 percent (National Center for Education Statistics, 2018). Some elderly parents are also claimed as dependents. A more detailed discussion is provided in the online appendix.

¹³ Adding back net operating loss carryovers prevents counting the same loss multiple times and moves some taxpayers from the bottom centiles into the top one percent. Since gross gambling winnings are reported as other income but gambling losses (up to the amount of winnings) are an itemized deduction, failing to make this adjustment would overstate the economic income of these taxpayers. Taxable state and local income tax refunds are an adjustment for an over-deduction in the prior year rather than income. Ordinary gain from the sale of business property and should be subtracted when calculating income net of capital gains because it is comparable to capital gain income and tax reforms have changed the definition of capital vs ordinary gain over time.

the income distribution and potentially affecting top income shares

Non-filer income is estimated using the SOI Databank, an individual-level panel containing every person with a taxpayer identification number. For filing years 2000 through 2010, we identify non-filers as individuals who did not file a tax return in a given year, were age 20 through 99, and alive at the end of the year. The fiscal income of non-filers is estimated using Forms W-2 (wages), 1099-R (pensions), 1099-DIV (dividends), and 1099-MISC (miscellaneous income). Summing income from these sources and dividing by the number of corrected non-filer tax units gives average non-filer income. Estimated non-filer income for this period averages about 20 percent of filer income, which is the same amount as PS.¹⁴ After including underreported income, non-filer pre-tax incomes are about 30 percent of average filer income.

5. Set Groups by Number of Individuals and Rank by Size-Adjusted Income. To obtain a measure more relevant to the distribution of economic welfare, we follow Congressional Budget Office (2016) in defining income groups based on all individuals (including primary and secondary taxpayers and dependents) and rank tax units using size-adjusted incomes). Setting groups by the number of individuals helps control for the bias introduced from falling marriage rates as compared to groups set by tax units. Size-adjusting incomes accounts for the costs of supporting dependents and the economies of scale from shared resources.¹⁵ For example, when a family shares a residence the incremental costs are likely to decline with each additional person.

Marriage rates among tax filers declined from 67 to 39 percent of tax units between 1960 and 2015 (after removing filers younger than 20 years old, dependent filers, and non-residents).¹⁶ However, marriage rates among the top one percent have remained consistently high in these years: 90 and 85 percent, respectively. Holding all else constant, declining marriage rates outside the top of the income distribution increases top income shares. For example, Larrimore (2014) estimated that declining marriage rates explain 23 percent of the increase in household income Gini coefficients between 1979 and 2007. Basing income groups on the number of individuals, rather than the number of tax units, controls for differentially declining marriage rates

¹⁴ This is a conservative estimate because it excludes many sources of income that can be important for some non-filers, such as income from sole proprietorships, partnerships, S corporations, fiduciaries, alimony, interest, and income from illegal sources.

¹⁵ Controlling for both the falling marriage rate and tax unit size helps account for the rising share of children under 18 years old living in single-parent households, which Census data show increased between 1960 and 2015 from 9 to 27 percent (see Table CH-1 at www.census.gov/data/tables/time-series/demo/families/children.html).

¹⁶ Growth in cohabitation explains some of this change. While there was relatively little cohabitation before 1970, more than 27 percent of couples currently living together are unmarried (Lundberg, Pollak, and Stearns, 2016). The rise in non-married couples means tax unit incomes may understate the economic welfare of many single or head of household filers because the income of other members of the household is not included (Larrimore, Mortenson, and Splinter, forthcoming).

When ranking tax units, we account for size differences by dividing tax unit income by the square-root of the number of individuals in the unit. This equivalence scale is used by the Congressional Budget Office (2016) and similar to that used by the Census Bureau to estimate equivalence-adjusted income inequality (Cronin, DeFilippes, and Yin, 2012). The square-root of the number of individuals in the sharing unit is between the extremes of assigning the full tax unit income to each individual (complete economies of scale) and per capita income (equal sharing but no economies of scale) and implicitly assumes equal sharing among all individuals in the tax unit.¹⁷ Note that size-adjusted incomes are only used to rank tax units and determine income groups in the income distribution. Income shares are calculated using total tax unit incomes, such that they sum to national income.

Changing from income groups based on tax units to individuals ranked by size-adjusted incomes decreases top one percent income shares by 0.8 percentage point in the 1960s and 1.9 percentage points in recent years.¹⁸ Other studies have found similar reductions in top one percent income shares when moving away from tax units as the unit of observation. Bricker et al. (2016b) estimated that in 2010 using families rather than tax units decreases the top one percent income share by 2.4 percentage points. Larrimore, Mortenson, and Splinter (forthcoming) estimated that using households rather than tax units decreases the top one percent income share by 2.0 percentage points.

B. *Pre-Tax Income: Expansions*

The next step in computing pre-tax income is to add sources that are not captured on individual tax returns, including: (1) fiduciary retained income, (2) corporate retained earnings, (3) corporate taxes, (4) business property taxes, (5) the inflationary component of business interest deductions and other inflation adjustments, (6) underreported income, (7) imputed rental income on housing (including property taxes), (8) the employer portion of payroll taxes, (9) employer-provided insurance costs, (10) retirement account income, and (11) other sources of national income, primarily sales taxes. Table 1 and Figure 2 show the impact of these adjustments on top one percent income shares. The effects of adding retained earnings and corporate taxes decrease over time as the share of business conducted by C corporations and corporate tax rates

¹⁷ This approach differs from actual individual income shares, which result in higher measured inequality due to unequal spousal incomes (Saez and Veall, 2004).

¹⁸ Grouping by individuals, but still ranking by tax unit income, decreases top one percent income shares in 1960 and 2015 by 1.6 and 2.7 percentage points. In contrast, ranking by size-adjusted income *increases* top shares by moving some tax units with more individuals out of the top one percent, allowing the entry of more tax units and income, increasing top one percent income shares (grouped by the number of individuals) about one percentage point.

decrease. Meanwhile, the effects of payroll taxes and insurance increase over time.

1. Fiduciary Retained Income. Fiduciaries, which include estates and trusts, distribute much of their income each year and this income is included on individual tax returns. Some fiduciary income, however, is retained and therefore missing from individual returns. Retained fiduciary income and taxes are allocated to individual tax returns by taxable fiduciary income.

2. Corporate Retained Earnings. Pre-tax corporate profits are treated as income to capital owners regardless of whether profits are distributed, retained, or paid out in taxes. Corporate profits distributed as dividends are already included in taxable income. Since retained earnings are not reported on individual tax returns they must be allocated among various corporate owners: retirement accounts, non-profits/governments, and private individuals.¹⁹ With the growth of retirement savings, the retirement account share of corporate ownership increased dramatically from 4 to 50 percent between 1960 and 2015. This portion of retained earnings is allocated by wages of filers for the share of corporate ownership by defined benefit (DB) plans and otherwise by the share of defined contribution (DC) account wealth, calculated using the Survey of Consumer Finances. The portion of retained earnings reflecting ownership by non-profit organizations and domestic governments, which increased from 5 to 7 percent, is allocated half per capita (equally across all individuals including dependents) and half by wages to account for both the redistribution and consumption spending of non-profits and governments.

The remaining retained earnings associated with non-retirement private ownership are allocated to individual tax returns. Three-quarters of retained earnings are allocated based on a tax filer's share of dividends and one-quarter based on their share of realized capital gains. As shown in the sensitivity analysis, our results are robust to a broad range of alternative assumptions. Since our goal is to attribute retained earnings accrued in a given year to the owners of corporations, we favor using dividends received as the primary indicator of corporate ownership. The portion allocated to capital gains reflects the fact that some corporations do not pay dividends and a substantial portion of capital gains is from the sale of corporate stock. The timing of realized capital gains can differ substantially from that of retained earnings, in some cases by decades, but over the long run they tend to equalize (Clarke and Kopczuk, 2016).²⁰

3. Corporate Taxes. Pre-tax income includes taxes paid by businesses allocated based on

¹⁹ Note that corporate passthrough entities (S corporations and REITs) are removed before estimating ownership shares because they have little or no undistributed profits. Our approach to attributing ownership of C corporations among these three groups closely follows that of Rosenthal and Austin (2016) and PSZ.

²⁰ Armour, Burkhauser, and Larrimore (2014) take the alternative approach of estimating annual accrued capital gains, which tend to be volatile.

assumptions of economic burden. Following Joint Committee on Taxation (2013) and Congressional Budget Office (2012), we allocate 25 percent of corporate taxes to wages.²¹ The rest is allocated to individual tax returns based on the ownership of corporate capital (allocated as for retained earnings) and interest-bearing assets (allocated by taxable interest).²²

4. Business Property Taxes. Business property taxes are allocated to tax filers by business income (dividends, capital gains, interest, and passthrough income). The larger effect of business property taxes on top shares in 1960 is due to the substantial fraction allocated to individual corporate equity owners. This fraction declines as corporate ownership shifts to retirement accounts.

5. Inflation Correction for Interest. High inflation rates, most importantly in the 1970s and early 1980s, distort the measurement of income and deductions. Since inflation can affect real incomes differently across the income distribution, correcting for inflation provides a more consistent measure of income over time, as well as across individuals with different types of income and assets. Inflation causes an overstatement of real interest income and an understatement of real business profits, which are net of deductible interest payments (Steuerle, 1985). To account for fluctuating inflation rates, we make three adjustments to interest flows. First, we decrease household net interest receipts by the fraction accounted for by inflation, estimated as the inflation rate divided by the Baa corporate bond yield. Second, we increase business income by the inflation component of net interest payments. Third, we estimate the value of inflation on government interest payments as the difference between household interest decreases and business income increases so that total income is unchanged by the inflation adjustment. Since lower real government interest payments likely decrease current or future taxes, we allocate this effect by federal and state income taxes. These inflation adjustments increase top one percent income shares by an average of 0.4 percentage points in the 1970s and early 1980s when inflation was high, but only 0.2 percentage points in other years.

6. Underreported Income. There are gaps between national income and tax-based incomes that reflect underreported income, largely due to estimates of tax evasion included in national income

²¹ There are various reasons for believing a portion of the burden falls on wages, including reduced labor productivity from a smaller capital stock. In addition, bonuses of executives are often based on corporate profits and their wages include and are affected by stock option values. Some empirical estimates also support this view, though estimates vary widely. In the U.S., for example, Suárez Serrato and Zidar (2016) estimated that wages bear one-third of state corporate taxes and Liu and Altshuler (2013) estimated that the average wage share is between 60 and 80 percent. See the online appendix for additional discussion.

²² The Congressional Budget Office (2012), the Joint Committee on Taxation (2013), and the Office of Tax Analysis, U.S. Treasury Department (Cronin et al., 2013) all distribute the burden of the corporate tax in part by interest received by individuals.

(see the online appendix for a detailed discussion). Since the 1970s, adding this missing income more than doubles sole proprietor and partnership net income. Our underreporting rates by income group are based on the IRS National Research Program (NRP) and Taxpayer Compliance Measurement Program (TCMP). These studies rely on detailed audits of representative samples of tax returns to estimate the overall extent of underreporting.²³ The Bureau of Economic Analysis bases their NIPA estimates of misreported income included in national income on these studies.

One of the few published studies on the distribution of underreported income is Johns and Slemrod (2010), which uses the 2001 NRP Individual Income Tax Reporting Compliance Study. They find that top one percent income shares are essentially unchanged when underreported income is included. They also find that while the top one percent receives about 18 percent of reported AGI, it accounts for only about 5 percent of underreported income. Since underreported income is concentrated in a subset of taxpayers, its inclusion moves some taxpayers into the top one percent while others drop out. Other IRS detailed audit studies also suggest that inequality measures are unaffected when including the underreported income of filers.²⁴

Underreported income is allocated in three steps. First, underreported income is estimated as the difference between amounts already in pre-tax income and NIPA totals separately for wages and salaries, rental income, farm income, non-farm proprietor income, and S corporation net income. Second, 15 percent of underreported income is allocated to non-filers based on IRS tax gap estimates. Third, 85 percent of underreported income is allocated to filers based on Johns and Slemrod (2010) or TCMP estimates of the shares of underreported income by reported AGI group. To account for underreported income going to those with negative AGIs and the larger prevalence of tax shelters before TRA86, we allocate 16 percent of underreported income before 1992 (based on estimates from the 1988 TCMP), and 9 percent in subsequent years (based on Johns and Slemrod working paper estimates) to those with negative AGIs. Within each AGI group, the amounts of underreported income are allocated to specific tax returns. Underreported wages are allocated by reported wages within each AGI group. The same is done for

²³ Under both programs, a stratified random sample of tax returns is selected for detailed and rigorous audit analysis. While exact procedures have evolved over time, the raw audit results are adjusted for estimated income not found based on the extent of information returns provided to the IRS. Thus, pass-through business income receives large adjustments because of the lack of such information reporting.

²⁴ Using data from 1979 through 1988, Bishop, Formby, and Lambert (2000) found that Gini coefficients were relatively unchanged. Using 1988 data, Auten and Gee (2009) found that underreported income as a fraction of reported income was highest in the bottom quintile and lowest in the top one percent when ranking by reported income. For the recent period between 2006 and 2014, DeBacker, et al. (2019) also found that including underreported income had little effect on top income shares.

underreported business income, but using the absolute value of combined business income to account for businesses that report losses and selecting a subset of taxpayers to incorporate a re-ranking effect and account for the fact that not all taxpayers have underreported business income.

7. *Imputed Rent (including property taxes)*. Imputed rental income from owner-occupied housing is primarily allocated in proportion to deductions for real estate taxes. NIPA imputed rent is pre-tax and thus includes property taxes. Non-housing rents from consumer durable goods, such as cars and washing machines, are excluded from national income and thus not included. Including this other rental income would slightly reduce top income shares.

8. *Employer Payroll Taxes*. The full burden of employer payroll taxes is generally assumed to fall upon workers and considered part of their pre-tax economic income. Payroll taxes are estimated based on reported wages for filers. Missing amounts relative to NIPA totals, usually below 5 percent, are due to non-filers and allocated to the bottom of the distribution.

9. *Employer Insurance*. Employer-provided insurance is non-taxable income and thus another important addition to tax-based incomes. Between 1960 and 2015, these benefits increased from 1 to 5 percent of national income. Since the value of employer-provided health insurance makes up most of employer-provided insurance, but has only recently become available in tax data, the allocation is based on health insurance amounts reported on Form W-2. 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 (see the online appendix).

10. *Retirement Account Income*. The treatment of retirement savings and income presents difficult choices when thinking about measuring income (Nelson, 1987). The basic options are to count retirement income when it accrues, when it is distributed, or both. Under the first option, contributions to retirement accounts are counted when the income is earned and investment income on retirement savings is counted as it accrues. This accrual approach implies that many retired people have very little income. This is especially important if an accrual approach is applied to Social Security retirement, as the 2015 benefits paid were over \$850 billion, about equal to taxable private pension and IRA distributions (\$639 and \$214 billion, respectively). If retirement income is counted only when distributed, this provides better measures of the current incomes of retired people and their ability to consume. The distribution approach to retirement income is used in most studies of income inequality, including PS, but relative to an accrual approach this shifts income from individuals' working years. Some studies count retirement income both when accrued and when distributed, but this double counts retirement income.

Measuring the accrual of defined benefits can be problematic due to non-linear vesting rules, underfunding of promised pensions, and uncertainty about future wages and lifespans. Moreover, defined benefit plans act like annuities—if you live another year you essentially “earn” the income that year. This suggests that a distribution basis may be more appropriate for this type of plan. Besides being more consistent with the functioning of retirement systems and current-year welfare, a distribution basis matches the timing of tax burdens. Therefore, we start with a distribution approach that includes taxable income from pensions, retirement account distributions, and annuities but excludes retirement account contributions to prevent double counting and accounts for income accumulating in retirement accounts, as described next.

Since accumulations of retirement account income have outpaced distributions, the difference needs to be included to match national income. Dividend and interest income of retirement accounts, also referred to as inside buildup, is therefore added to pre-tax income. Note that corporate retained earnings and taxes have already been allocated to retirement account owners. The difference between current-year retirement account contributions and taxable distributions is also added to conform to national income retirement totals. These adjustments are on an accrual basis, allocated by wages for the share of corporate ownership by DB plans and otherwise by the share of DC wealth. Overall, this results in a mixed distribution/accrual approach that fully accounts for retirement account income totals in national income.

11. Remaining Indirect Taxes and Other Income. Remaining indirect taxes—mostly sales taxes—are allocated by disposable income (defined below) less savings.²⁵ Saving rates are substantially higher for higher income groups and come from the Surveys of Consumer Finance estimates presented in Dynan, Skinner, and Zeldes (2004). Small amounts of business transfers and subsidies, surplus of government enterprises, and dividends and interest income of non-profits/governments are allocated half per capita and half by wages.

C. Pre-Tax/After-Transfer Income

Government cash and non-cash transfers are sequentially added to pre-tax income to calculate pre-tax/after-transfer income (Table 2), which we believe provides a better measure of economic income. First, Social Security and unemployment benefits reported on tax returns are added to income. Prior to these becoming taxable in the 1980s, the 1980s distributions are used. The remaining NIPA Social Security and unemployment benefits not reported on tax returns are allocated to the bottom half of the distribution. Second, the NIPA value of other cash transfers is

²⁵ The inclusion of these taxes in pre-tax income can be thought of as a shift from conventional tax-inclusive prices to tax-exclusive prices, essentially increasing real purchasing power.

allocated to the bottom half of the distribution. These cash transfers include federal supplemental security income and the refundable portion of tax credits (generally, earned income and additional child tax credits), as well as cash transfers from state and local governments. In 2008, \$83 billion in stimulus payments are allocated to qualifying tax filers. Third, the value of Medicare benefits less premiums is allocated proportionally to filers and non-filers age 65 and older, except for high-wage filers likely receiving insurance through their employers. Finally, the NIPA value of remaining non-cash transfers, such as Medicaid and food stamps, is allocated to the bottom half of the distribution. As shown in Table 2, the inclusion of transfers decreases top one percent income shares with a growing effect over time: 0.5 percentage points in 1960, 0.8 in 1979, and 1.9 in 2015. Similarly, Bricker et al. (2016b) and Congressional Office (2016) both estimate that including transfers decreased the 2010 top one percent share by more than 2 percentage points.

D. After-Tax Income

Taxes are subtracted from pre-tax/after-transfer income sequentially in order to show the effect of each tax on top one percent shares. To match national income, two final adjustments fully account for the government sector by including government deficits/surpluses and government consumption (Table 2).

Several adjustments are needed for federal individual income tax liabilities. Foreign tax credits, which reflect foreign withholding taxes paid, are added back to federal income taxes. Refundable portions of tax credits are not accounted for here because they are already included in cash transfers. The Additional Medicare Tax and Net Investment Income Tax, which began in 2013, are included in federal income taxes. Self-employment taxes and other payroll taxes are considered separately in connection with Social Security and unemployment insurance benefits.

The estate tax encourages planning over many years prior to actual payment of the tax. Therefore, we assume that estate and gift taxes are borne by decedents over the decade before estate taxes are filed. Using population tax data, we estimate the fraction of estate tax paid by decedents by income group in each of these years. This approach accounts for year-to-year income variability among high-wealth individuals (see the online appendix). Relative to alternative approaches, such as the Piketty and Saez (2007) assumption that decedent income and wealth rankings are the same, and the PSZ current-year income capitalization approach, our approach reflects the complex relationships among income dynamics, wealth, and estate tax planning.

State and local income taxes and residential real estate taxes are based on deducted

amounts. Since the overwhelming majority of tax returns at the top of the distribution itemize deductions, this approach provides good measures for top income groups.²⁶ Corporate income taxes and property taxes are those previously calculated for pre-tax income. Payroll taxes include employee and employer taxes, as well as self-employment taxes reported on tax returns. The employee portion of payroll taxes uses previously calculated employer taxes except for years with special rates (1984, 2011, and 2012). Sales and other taxes are allocated by disposable income (after-tax income at the stage above after subtracting payroll taxes) less savings. Government deficits/surpluses are allocated by federal payroll and income taxes paid because almost all deficits are at the federal level.

Government consumption includes spending valued at cost of military expenditures, education spending, and other non-transfer government spending. Prante and Chamberlain (2007) argued for an equal per household allocation. The Congressional Budget Office (2013) considered the effects of allocating government consumption either all per capita or all by market income, suggesting both rely on problematic assumptions. We allocate government consumption half per capita and half by after-tax income to account for the mixture of types of government spending. For example, police and military spending may be considered to have a large public good component, while higher-income individuals may derive more benefits from government spending for public universities. The incidence of government spending is quite uncertain and deserves further study. We therefore provide estimates excluding government consumption in the online data and present alternative allocations in the sensitivity analysis.

IV. Results

This section summarizes our basic findings and compares our top income share estimates to PS, PSZ, and the Congressional Budget Office. While only top one percent income shares are discussed here, we also find that increases in income shares for the top 10 percent and top 0.1 percent are smaller than PS and PSZ for pre-tax income and trends are relatively flat for after-tax incomes (Figure A1). This section also discusses implications for estimating the distribution of economic growth and effective tax rates.

A. Moving from Fiscal Income to National Income Measures

To summarize our results of moving from fiscal income to pre-tax national income, we start with income as reported on individual income tax returns. In 1960, our sample and income corrections (and excluding capital gains) reduce the top one percent income share of fiscal

²⁶ Between 1960 and 2015, generally at least 95 percent of the top one percent itemized deductions and is generally high for the top half of filers. Details of the allocation to non-itemizers is provided in the online appendix.

income from 9.0 to 7.9 percent. Income expansions to reach national income increase this share to 11.0 percent (Table 1 and Figure 3). The most important factor in this higher share is the addition of pre-tax C corporation income (including corporate retained earnings and taxes) in place of realized capital gains. This reflects the sheltering of income inside corporations to avoid high individual income tax rates. For 2015, while the fiscal income share is 20.3 percent, our pre-tax income share is 14.1 percent, almost 6 percentage points (pp) lower. The most important factors in this difference are controlling for the decrease in the marriage rate of lower-income tax units (1.9 pp), replacing realized capital gains with pre-tax C corporation income (1.1 pp), including employer-provided insurance (0.8 pp), including underreported income (0.8 pp), and including the employer share of payroll taxes (0.5 pp).

Our measure of pre-tax/after transfer income includes government transfers, the largest of which is Social Security benefits. Relative to pre-tax national income, this measure avoids the problem of treating a large share of older retired individuals as having almost no income. In 1960, the top one percent income share is 10.5 percent, only slightly lower than the pre-tax national income share because transfers were relatively small. In 2015, the top share is reduced by two percentage points from 14.1 to 12.2 percent due to the growth of transfers (see Table 2). These differences are consistent with the increase in earned income inequality being offset by increasing amounts of transfers.

After-tax income top one percent shares fluctuate with the business cycle, but have remained relatively unchanged over the last five decades. The estimated increase in the top one percent after-tax income share between 1962 and 2015 is small compared to PS: 0.2 vs. 11.4 pp.

B. Comparison with PSZ Estimates

This section discusses the similarities and differences between the methodologies in our paper and those in PSZ. Many of our adjustments have similar effects to those reported by PSZ. Similar decreases in top shares result from changing from tax units to adults as in PSZ, and our ranking individuals by size-adjusted income. We both remove filers younger than 20 years old (PSZ since 1979). We both allocate non-retirement corporate retained earnings by reported dividends and realized capital gains, with similar effects on income shares. There is little uncertainty about the distribution of some sources of added income because they are reported on tax returns (income taxes, and Social Security benefits and tax-exempt interest in recent decades) or calculated from reported values (payroll taxes, and imputed rent and property taxes in recent decades). Other allocations have similar effects on top shares because the top of the distribution unambiguously receives a small amount (transfers) or because data sources suggest similar

distributions (employer-sponsored insurance).

In earlier decades, our estimated changes in top one percent income shares are similar to PSZ. As seen in Figure 1 and Table 3, from 1962 to 1979, the PSZ pre-tax share decreases 1.4 pp and ours decreases by 1.6 pp. This similarity is because during these decades most of the income excluded from tax returns was from retained earnings and our allocation approaches have similar distributional effects. In 1962 and 1979, differences in top one percent share levels are also small: less than two percentage points for pre-tax income and after-tax income.

There are, however, many differences in our approaches to allocating components of national income not on tax returns that have the potential to affect estimated income inequality levels and trends. From 1979 to 2014—the latest year reported in PSZ—the PSZ increase was 9.0 pp (11.2 to 20.2 percent), while our increase was 4.8 pp (9.5 to 14.3 percent).²⁷ For after-tax income, the PSZ share increases by 6.5 pp compared to our estimate of only 1.4 pp (7.2 to 8.6 percent). Over the full period from 1962 to 2014, the PSZ pre-tax top one percent share increases by 7.6 pp, while our share increases by 3.2 pp. For after-tax income, the PSZ share increases 5.6 pp, while our share increases by only 0.3 pp.

To understand the effects of specific differences in our approaches, Table 4 shows how top one percent shares change for each difference independently so that the order of changes does not affect the results. In 2014, our top one percent pre-tax income share is 14.3 percent, 5.9 pp below the PSZ estimate. The reasons for this difference can be summarized as follows: four-tenths from differences in allocating underreported income, two-tenths from the treatment of retirement income, one-tenth from differences in non-retirement pre-tax corporate income including corporate tax differences, one-tenth from other taxes being allocated by our measure of disposable income less savings versus PSZ factor income less savings (which ignores effects from transfers, retirement income and taxes), one-tenth from the net effects of our corrections to tax return–based income, and about one-tenth from other differences.

About two percentage points of the difference in 2014 is due to PSZ attributing much more underreported income to top earners than suggested by the detailed IRS audit data. Most of this results from PSZ distributing underreported (passthrough) business income in proportion to positive reported business income. By truncating business income at zero, the PSZ approach ignores the significant share of underreported business income found on tax returns with reported business losses and overstates amounts found on returns that do report large profits. It also

²⁷ While reduced in magnitude, we still estimate a jump in the top one percent share between 1986 and 1988. This remaining jump is largely due to shifting of ordinary income from 1986 to 1987 and larger amounts from 1987 to 1988 when taxpayers had a full year to plan how to take advantage of the decrease in the top individual tax rate from 50 percent to 38.5 percent and then 28 percent.

ignores evidence that the ratio of underreported income tends to decline at higher levels of reported income.²⁸ In 2014, the PSZ approach implies distributing about 50 percent of underreported business income to the top one percent. However, audit data suggest that only about 15 percent should go to the final top one percent after re-ranking.²⁹ In response to our critique, PSZ explained that they allocate more underreported income to the top of the distribution because of lower-quality audits of complex partnerships. The PSZ approach, however, effectively removes underreported income found lower in the distribution and transfers that income to the top.

Differences in allocating private retirement income explain about one percentage point of the difference in pre-tax top one percent shares. Our 2014 retirement income is about half from taxable distributions (of which the top one percent receives about 2 percent) and half from inside buildup, which we allocate by retirement account ownership (and the top one percent receives under 10 percent). Overall, the top one percent receives about 6 percent. In comparison, PSZ online data suggest they allocate more than twice this share to the top one percent. One factor in the high PSZ share is that they use both taxable and non-taxable IRA distributions and pension income reported on tax returns to allocate “investment income payable to pension funds”—i.e., inside buildup.³⁰ While some pension and IRA income can be non-taxable, most of the non-taxable amounts on tax returns reflect rollovers and, in recent years, the basis portion of Roth conversions.³¹ Since these amounts reflect asset values rather than income, they should not be mixed with income flows to allocate retirement income. In 2014, the PSZ rollover-inclusive approach results in a top one percent share of pension wealth of 14 percent—much higher than the Devlin-Foltz, Henriques, and Sabelhaus (2016) estimate of about 8 percent when using the Survey of Consumer Finance, which is better suited than tax returns for estimating the distribution of pension wealth.

For after-tax income, the PSZ estimate of the top one percent share in 2014 is much higher than ours (15.7 percent vs 8.6 percent), but most of this difference is explained by pre-tax differences. After accounting for pre-tax differences, only 1.1 percentage points of difference remains. The largest after-tax effect is 1.3 percentage points due to PSZ allocating all

²⁸ See the online appendix for detailed data and Johnston (2008).

²⁹ The computation explaining the two percentage point gap is: $2.0\% = [(50\% - 15\%) \cdot \$0.8 \text{ trillion in underreported business income}] / \$15.2 \text{ trillion national income}$.

³⁰ This is based on PSZ file `build_usdina.do` lines 368–371. See our online appendix for details.

³¹ When traditional IRAs are converted to Roth IRAs, non-deductible contributions are considered basis and thus non-taxable and included as such on Form 1040. Pensions can also be rolled over into other pension plans or retirement accounts. Some rollovers from one pension plan or retirement account to another can be quite large, with the largest reflecting pension rollovers by executives. In 2014, for example, 79 percent of pension distributions reported by taxpayers with AGI of \$1 million or more were tax-exempt. See the online appendix for more details.

government consumption by after-tax income and none per capita. This assumption ignores the redistributive and public goods aspects of government consumption, which are captured by our half per capita allocation. Another half a percentage point is due to the allocation of government deficits. These two effects, which lower our top share estimates relative to PSZ, are partially offset by differences in the distribution of corporate and other taxes (essentially undoing pre-tax differences).

The final column of Table 4 shows the reasons for differences in the top one percent income share increase between 1962 and 2014. Because our 1962 estimates are more similar to PSZ, the reasons for the 2014 differences in levels also explain the differences in changes. One exception is imputed rent, allocated by reported property taxes in both studies. PSZ, however, fixed the share of property taxes allocated to non-itemizers at 25 percent in all years, despite non-itemizers accounting for nearly 50 percent in 1962. Thus, our imputed rent approach allocates more imputed rent to the bottom of the distribution in the 1960s.

C. Comparison with Congressional Budget Office Estimates

The Congressional Budget Office (CBO) also produces widely cited estimates of top income shares using tax data. Auten and Splinter (2019) estimated how specific differences affect top one percent pre-tax income shares. In 1979, the earliest year estimated by CBO, our estimates are almost identical. In 2014, however, our top one percent income share is 3.6 pp lower than the CBO estimate. Our lower share results from several factors: 1.8 pp from our replacement of realized capital gains with retained earnings, 0.7 pp from CBO excluding the institutionalized population and the employee portion of employer-sponsored insurance, 0.7 pp from CBO allocating corporate taxes using only capital income reported on tax returns and ignoring corporate ownership by retirement accounts, 0.5 pp from our inclusion of state and local taxes, and 0.4 pp from our inclusion of underreported income and imputed rents. These reductions are offset by 0.7 pp from our size-adjustments being at the tax unit level and CBO's at the household level. In 2014, both CBO's and our top one percent shares are reduced by about 3 pp when adding transfers and removing taxes.

D. Distribution of Economic Growth

Our results have implications for computations of the distribution of U.S. economic growth over time. The cross-sectional approach of PS (online updates) suggests that 73 percent of the increase in fiscal income between 1979 and 2014 went to the top one percent of tax units. In comparison, our estimates imply that only 25 percent of the increase in pre-tax income went to the top one percent. Using this cross-sectional approach, our income measures thus suggest that

economic growth has been shared more equally than implied by PS or PSZ estimates.³²

A more fundamental issue is that such cross-sectional computations of the distribution of economic growth convey the impression that it is the same people at the top of the distribution over time. The beneficiaries of economic growth, however, *cannot* be determined by comparing two cross-sections because the membership of income groups changes substantially over time. More than one-third of 1979 adults filing tax returns died by 2014 and were replaced by a larger cohort of new adults and immigrants. This new cohort of adults earned more than half of adjusted gross income in 2014. Income mobility studies also show that it is not the same people at the top across years and that the incomes of the majority of those in top income groups in a given year decline in later years. For example, Kopczuk, Saez, and Song (2010) estimated that about 40 percent of individuals in the top one percent of wages drop out after five years. Auten, Gee, and Turner (2013) found that over half of tax units in the top one percent of incomes drop out after five years. Those at the top in a particular year typically earn little, if any, of the economic growth in following years. Instead, mobility studies show that incomes of those in the lowest income groups increase by the largest percentages in following years, suggesting that economic growth is shared more equally if one tracks the incomes of individuals over time rather than comparing cross-sections in different years (Auten and Gee, 2009; Splinter, 2018).

E. Tax Burdens

The top statutory federal individual income tax rate has fallen dramatically from 91 to 39.6 percent between 1960 and 2015. But top tax rates present only a limited picture of the true tax burden of the top one percent. Before TRA86, high-income taxpayers could take advantage of various tax shelters and in the 1960s only a tiny fraction of taxpayers were actually subject to the top tax rates (about 0.002 percent of tax units in 1962). Since TRA86, many high-income tax shelters have been closed or made uneconomic by lower rates that apply to more taxpayers. Meanwhile, the bottom 90 percent has benefitted from increased tax credits and receives an increasing share of its income from tax-preferred and tax-exempt sources. These considerations suggest it would be useful to examine overall tax burdens using a consistent measure of broad income. Figure 4 shows total federal, state, and local tax burdens as a percent of pre-tax/after-transfer income—i.e., the average effective tax rate—and the distribution of this burden by type of tax for the top one percent (upper figure) and the bottom 90 percent of individuals (bottom figure). Payroll taxes are considered later along with social insurance benefits.

³² Between 1979 and 2014, average real income of the bottom 90 percent increased only 3% for PS fiscal income and 27% for PSZ pre-tax national income. For our estimates, it increased 52% for pre-tax income and 65% for after-tax income.

Total tax burdens (excluding payroll taxes) of the top one percent ranged from 32 to 45 percent over this period, averaging 38 percent and with no clear trend. Indeed, the average tax burden was about 42 percent in both 1960 and 2015.³³ While a constant tax burden with falling statutory tax rates may seem surprising, it is consistent with earlier analyses of tax burdens in the 1960s.³⁴ Despite the persistence of the overall tax burden for the top one percent, the type of taxes paid has changed substantially. In 1960, about one-third of their taxes were from federal individual income taxes, one-third from corporate income taxes, and one-third from state and local taxes. In 2015, about two-thirds were from federal individual income taxes.³⁵ Corporate and property taxes decreased substantially as a percent of income, while state and local income taxes increased for the top one percent.

The variation in average effective tax rates of the top one percent is primarily due to factors affecting federal individual income tax liabilities. First, top incomes are procyclical, moving a larger fraction of their incomes into higher tax brackets during expansions and lower brackets during recessions. Second, top tax rates have changed frequently. Especially prominent are the 1968–1970 Vietnam War surtax and the top rate increase in 1993. Third, individual income taxes include realized capital gains taxes, even though pre-tax income replaces these with corporate retained earnings. The 1986 spike in taxes paid by the top one percent was due to the unlocking of unrealized gains before capital gains tax rates increased with TRA86.

Our results in Figure 4 suggest that taxes reduce after-tax income inequality more in recent decades. While effective tax rates for the top one percent fluctuated around 38 percent with no clear trend, taxes for the bottom of the distribution decreased from 17.5 to 14 percent.³⁶ The decreasing tax burden for the bottom 90 percent was primarily due to falling federal individual income taxes, especially from the growth in tax credits (Splinter, 2019). Thus the increase in overall tax progressivity was driven primarily by individual income tax changes.

Payroll taxes and the associated Social Security benefits and disability insurance (i.e., old age, survivor, and disability insurance, or OASDI), Medicare, and unemployment insurance are

³³ Including payroll taxes, total tax burdens of the top one percent ranged from 34 to 47 percent, averaging 39 percent and with values of 42 percent in 1960 and 44 percent in 2015.

³⁴ For the top one percent in 1966, Okner (1975) estimated that total federal, state, and local taxes ranged from 32 to 39 percent of his measure of adjusted family income using a broad range of incidence assumptions. Our estimate of 37 percent for 1966 falls in the middle of this range. This situation of high statutory but low effective tax rates in the 1960s has been described as “dipping deeply into great incomes with a sieve,” a phrase originally used by Simons (1938, p. 219) for similar policies in the 1930s.

³⁵ In 2013, the average federal individual income tax rate of the top one percent increased 4 percentage points due to the increase in the top rate and the adoption of two new surtaxes (Auten, Splinter, and Nelson, 2016).

³⁶ Including the refundable portion of tax credits here, rather than with transfers, would decrease 2015 bottom 90 percent tax rates an additional percentage point to 13 percent.

also important factors affecting the distribution of income. These social insurance transfers are dependent on having paid payroll taxes, and in the case of Social Security, increase with the amount of taxes paid. While payroll taxes appear regressive relative to annual income, the transfer side of these programs is progressive.³⁷ This tax and transfer asymmetry suggests that the incidence of payroll taxes and social insurance transfers should be considered jointly.

Figure 5 shows that before 1975, payroll taxes were about equal to social insurance benefits as a percent of income for both the bottom 90 and top one percent.³⁸ Since then, benefits continued to increase for the bottom 90 percent, while their payroll tax rates leveled off after the 1980s. In comparison, benefits remained roughly constant for the top one percent, while payroll tax rates jumped in 1994 with the uncapping of the 2.9 percent Medicare tax. These changes increased the overall progressivity of the combined tax and benefits of social insurance policies. These payroll tax estimates exclude both the post-1983 income taxes on Social Security benefits of higher income taxpayers that go into the Social Security Trust Fund and the portion of the earned income tax credit that offsets payroll taxes which were accounted for in the analysis of taxes. If included here, the increase in the system's progressivity would be even larger.

V. Sensitivity Analysis

This section and Table 5 present sensitivity tests of alternative assumptions for allocating income not on tax returns and a discussion of offshore wealth. These sensitivity tests suggest that while alternative assumptions can result in modestly higher or lower top income shares, they are within about a percentage point of our main results. As discussed in the online appendix, our tax-based analysis likely underestimates some low-income economic resources and there are additional uncertainties beyond those examined here.

The incidence of the corporate income tax has long been controversial and researchers have drawn different conclusions. As discussed earlier, our analysis distributes 25 percent of the corporate tax burden by wages and 75 percent by corporate capital and interest-bearing assets. Using this approach, the top one percent shares of pre-tax income increased by 3.0 percentage points from 11.1 to 14.1 percent between 1962 and 2015. Distributing half of the corporate tax by wages (as suggested by some recent studies) and half by corporate capital and interest-bearing

³⁷ The OASDI tax base is capped and the Medicare (i.e., HI) tax base was capped before 1994. Below these caps, earnings are taxed proportionally. Social Security benefits are paid relative to average earnings using a progressive formula, under which 90 percent of initial average earnings translate into benefits but less than a third of average annual earnings over about \$50,000 in 2018. Accounting for differences in longevity would attenuate the system's progressivity from a lifetime perspective.

³⁸ Several of the benefit jumps reflect Social Security's role as an automatic stabilizer during recessionary periods by raising incomes for the bottom 90 percent. This role is especially prominent during the Great Recession.

assets results in lower top one percent pre-tax income shares of 10.8 and 14.0 percent, an increase of 3.3 percentage points. Distributing only by corporate capital and interest-bearing assets results in slightly higher top one percent pre-tax income shares of 11.5 and 14.2 percent, and a smaller increase of 2.7 percentage points. Distributing the corporate tax to all forms of non-housing capital, including passthrough capital (similar to PSZ), increases top one percent pre-tax income shares by two-tenths of a percentage point.³⁹

Corporate retained earnings can also be allocated in different ways. Rather than allocating the non-retirement portion 25 percent by capital gains and 75 percent by dividends, distributing 50 percent by capital gains and 50 percent by dividends decreases top one percent after-tax income shares by only about a tenth of a percentage point.⁴⁰

Since the economic incidence of government consumption is inherently uncertain, it's important to examine alternatives. Our approach allocates 50 percent each per capita and by after-tax income. Distributing only 25 percent per capita (smaller public good effects) would increase the top one percent share by about 0.3 percentage points in all years shown while distributing 75 percent per capita (larger public good effects) would decrease it by about the same amount. Changes in top shares over time are essentially unaffected.

A more robust sensitivity test is to combine a number of alternative allocations affecting top income shares, with an emphasis on allocations that are more uncertain. First, we combine changes to our approach that would *increase* 2015 after-tax top shares: include no underreported income or government deficits/surplus and allocate government consumption 25 percent per capita (and remaining by income). Second, we combine changes that *decrease* 2015 after-tax top shares: set the minimum age at 25 to control for increasing college attendance, size adjust using households rather than tax units as done by CBO (following the approach of Auten and Splinter, 2019), allocate non-retirement retained earnings 50 percent capital gains/50 percent dividends, allocate only five percent of DB ownership to the top one percent (following Devlin-Foltz, Henriques, and Sabelhaus, 2016), and allocate government consumption 75 percent per capita (and remaining by income). With these two set of extreme assumptions, Table 5 shows that the 2015 top one percent after-tax share ranges between 7.4 and 9.1 percent.

³⁹ Distributing the corporate tax to all non-housing capital, including non-C corporation capital implies an infinite elasticity of substitution between different forms of business organization or a long-run equilibrium. While there was some immediate switching from existing C corporations to S corporation status following TRA86, most of the shift into the passthrough sector occurred gradually from more new businesses forming as S corporations or partnerships. See the online appendix and Auten, Splinter, and Nelson (2016). This suggests significant frictions between the C corporate sector and other forms of business, especially for large publicly traded corporations.

⁴⁰ Smith, et al. (forthcoming) also examine the sensitivity of allocations of retained earnings to alternative assumptions about the relative importance accorded to dividends and capital gains.

How might changes in tax compliance affect top income shares? In the 1950s and 1960s, nearly all state governments initiated withholding (along with third-party reporting) and intergovernmental agreements for coordinating audits. Troiano (2018) estimated that these policy changes caused large increases in reported top income shares. This implies larger pre-1970 high-income underreporting rates than more recent IRS NRP audit data. Accounting for half of the Troiano (2018) effect—because just over half of states had implemented these policies by the early 1960s—increases our 1962 top one percent income share by 0.7 percentage points, suggesting a half a percentage point decrease for the after-tax share between 1962 and 2015.

How might including income from unreported offshore wealth affect top income shares? Saez and Zucman (2016) estimate that offshore wealth would increase top one percent wealth in 2013 by about \$1.2 trillion (online appendix Table B.6). Assuming this wealth earns a 5 percent return and is owned by the same individuals in the top of the income distribution, it would increase our top one percent pre-tax income shares by only a third of a percentage point.⁴¹ Other currently available evidence also finds only modest effects from offshore income (Johannesen et al., 2018). There is of course considerable uncertainty about off-shore wealth and other forms of evasion and more evidence may be forthcoming in future years.

In summary, sensitivity tests suggest that alternative assumptions can result in modestly higher or lower top income shares. Our findings of lower levels of inequality and smaller increases in top income shares generally appear robust to alternative assumptions.

VI. Summary and Conclusions

Using administrative U.S. tax data, this paper develops new estimates of levels and trends in top income shares since the 1960s. Our estimates for pre-tax income based on distributing total national income suggest that the top one percent share declined from 11.1 percent to 9.5 percent from 1962 to 1979 and then increased to 14.1 percent by 2015. Viewed over the full period, the top share increased by only 3 percentage points. While our pre-tax income includes labor and investment income, it provides an incomplete picture of the overall resources available to tax units. A broader measure that includes Social Security benefits and other transfers shows lower shares and an increase of only 2 percentage points. Our estimates for after-tax income suggest that the top one percent share increased 1.3 percentage point since 1979 and a quarter of a percentage point since 1962.

⁴¹ Johannesen et al. (2018) found an average nominal rate of return after 2008 of only 3 percent on recently reported offshore wealth. Zucman (2013) estimated average yield on offshore securities in 2008 of 3.5 percent. Zucman (2013) also suggests that national income measures are understated because they do not account for offshore wealth in tax havens. This view implies that national income should be increased by the amount of missing income when estimating top income shares.

Using tax return data, Piketty and Saez (2003) argued that the top one percent income share more than doubled since 1962. This analysis, however, did not account for the effects of major tax reforms, income sources not reported on individual income tax returns, or changes in marriage rates, resulting in a distorted view of income inequality levels and trends. Piketty, Saez, and Zucman (2018) reached similar conclusions after addressing some of these issues. Our analysis shows that these conclusions are sensitive to certain allocation assumptions.

The large share of income not reported in tax data means and the challenges of accounting for major social and economic changes means that there is considerable uncertainty associated with estimating income distributions over time. While noting these challenges, our analysis highlights the importance of attention to detail in using tax data, accounting for tax reforms, and including income not reported on tax returns. It also shows the sensitivity of top income share estimates to the assumptions used to allocate income not reported on tax returns. We believe that our estimates make an important contribution to the emerging consistent income inequality literature about the evolution of the income distribution since the 1960s.

References

- Alstadsæter, Annette, Martin Jacob, Wojciech Kopczuk, and Kjetil Telle. 2016. "Accounting for Business Income in Measuring Top Income Shares: Integrated Accrual Approach Using Individual and Firm Data from Norway." NBER working paper no. 22888.
- Armour, Philip. Richard V. Burkhauser, and Jeff Larrimore. 2014. "Levels and Trends in U.S. Income and its Distribution: A Crosswalk from Market Income towards a Comprehensive Haig-Simons Income Approach." *Journal of Southern Economics* 81(2): 271–293.
- Atkinson, Anthony B. 2007. "The Distribution of Top Incomes in the United Kingdom 1908–2000." In Atkinson, Anthony B. and Thomas Piketty, 82–140. *Top Incomes over the Twentieth Century. A Contrast between Continental European and English-Speaking Countries*. Oxford: Oxford University Press.
- Auten, Gerald, and Robert Carroll. 1999. "The Effect of Income Taxes on Household Income." *The Review of Economics and Statistics* 81(4): 681–693.
- Auten, Gerald, and Geoffrey Gee. 2009. "Income Mobility in the United States: New Evidence from Income Tax Data." *National Tax Journal* 62 (2): 301–328.
- Auten, Gerald, Geoffrey Gee, and Nicholas Turner. 2013. "New Perspective on Income Mobility and Inequality." *National Tax Journal* 66 (4): 893–912.
- Auten, Gerald, and David Splinter. 2016. "Using Tax Data to Measures Long-Term Trends in U.S. Income Inequality." Paper presented at the 2017 ASSA Annual Meeting. Available at www.aeaweb.org/conference/2017/preliminary/paper/NkfkQ2ak.
- Auten, Gerald, and David Splinter. 2019. "Top 1 Percent Income Shares: Comparing Estimates Using Tax Data." *AEA Papers and Proceedings* 109: 307–311.
- Auten, Gerald, David Splinter, and Susan Nelson. 2016. "Reactions of High-Income Taxpayers to major Tax Legislation." *National Tax Journal* 69 (4): 935–964.
- Bishop, John A., John P Formby, and Peter Lambert. 2000. "Redistribution through the Income Tax: The Vertical and Horizontal Effects of Noncompliance and Tax Evasion." *Public Finance Review* 28(4): 335–350.
- Bricker, Jesse, Alice Henriques, Jacob Krimmel, and John Sabelhaus. 2016a. "Measuring Income and Wealth at the Top Using Administrative and Survey Data." *Brookings Papers on Economic Activity* Spring: 261–312.
- Bricker, Jesse, Alice Henriques, Jacob Krimmel, and John Sabelhaus. 2016b. "Estimating Top Income and Wealth Shares: Sensitivity to Data and Methods." *American Economic Review* 106(5): 641–645.
- Burkhauser, Richard V., Shuaizhang Feng, Stephen P. Jenkins, and Jeff Larrimore. 2012. "Recent Trends in Top Income Shares in the United States: Reconciling Estimates from March CPS and IRS Tax Return Data." *The Review of Economics and Statistics* 44(2): 371–388.
- Burkhauser, Richard V., Jeff Larrimore, and Kosali I. Simon. 2012. "A 'Second Opinion' on the Economic Health of the American Middle Class." *National Tax Journal* 65(1): 7–32.
- Carroll, Robert, and David Joulfaian. 1997. "Taxes and Corporate Choice of Organizational Form." Office of Tax Analysis, U.S. Department of the Treasury. Working Paper no. 73.
- Clarke, Conor, and Wojciech Kopczuk. 2017. "Business Income and Business Taxation in the United States since the 1950s." In *Tax Policy and the Economy, Vol. 31*, ed. Robert A. Moffitt, 121–159. Chicago: University of Chicago Press.

- Congressional Budget Office. 2012. “The Distribution of Household Income and Federal Taxes, 2008 and 2009.” Congressional Budget Office.
- Congressional Budget Office. 2013. “The Distribution of Federal Spending and Taxes in 2006.” Congressional Budget Office.
- Congressional Budget Office. 2016. “The Distribution of Household Income and Federal Taxes, 2013.” (supplemental tables) Congressional Budget Office.
- Congressional Budget Office. 2018. “The Distribution of Household Income and Federal Taxes, 2015.” (supplemental tables) Congressional Budget Office.
- Cronin, Julie Anne, Portia DeFilippes, and Emily Y. Lin. 2012. “Effects of Adjusting Distribution Tables for Family Size.” *National Tax Journal* 65(4): 739–758.
- Cronin, Julie Anne, Emily Y. Lin, Laura Power, and Michael Cooper. 2013. “Distributing the Corporate Income Tax: Revised U.S. Treasury Methodology.” *National Tax Journal* 66(1): 239–262.
- DeBacker, Jason, Bradley T. Heim, Anh Tran, and Alexander Yuskavage. 2019. “Income Inequality and Tax Compliance.” Working paper.
- Devlin-Foltz, Sebastian, Alice M. Henriques, and John Sabelhaus. 2016. “Is the U.S. Retirement System Contributing to Rising Wealth Inequality?” *Russell Sage Foundation Journal of the Social Sciences* 2(6): 59–85.
- Dynan, Karen E., Jonathan Skinner, and Stephen P. Zeldes. 2004. “Do the Rich Save More.” *Journal of Political Economy* 112(2): 397–444.
- Feenberg, Daniel R., and James M. Poterba. 1993. “Income Inequality and the Incomes of Very High-Income Taxpayers: Evidence from Tax Returns.” In *Tax Policy and the Economy*, vol. 7, ed. James Poterba, 145–177. Cambridge, MA: NBER/MIT Press.
- Fixler, Dennis, Marina Gindelsky, and David Johnson. 2019. “Improving the Measure of the Distribution of Personal Income.” *AEA Papers and Proceedings* 109: 302–306.
- Fixler, Dennis, David Johnson, Andrew Craig, and Kevin Furlong. 2016. “A Consistent Data Series to Evaluate Growth and Inequality in the National Accounts.” National Poverty Center working paper 16-04.
- Geloso, Vincent, Phillip Magness, John Moore, and Philip Schlosser. 2018. “How Pronounced Is the U-Curve? Revisiting Income Inequality in the United States, 1917–1945.” working paper available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2985234.
- Goolsbee, Austan. 2004. “The Impact of the Corporate Income Tax: Evidence from State Organizational Form Data.” *Journal of Public Economics* 88(11): 2283–99.
- Gordon, Roger, and Joel Slemrod. 2000. “Are ‘Real’ Responses to Taxes Simply Income Shifting Between Corporate and Personal Tax Bases?” In *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, ed. Joel Slemrod, 240–288. New York: Russell Sage Foundation and Harvard University Press.
- Johannesen, Niels, Patrick Langetieg, Daniel Reck, Max Risch, and Joel Slemrod. 2018. “Taxing Hidden Wealth: The Consequences of U.S. Enforcement Initiatives on Evasive Foreign Accounts.” NBER working paper no. 24366.
- Johns, Andrew, and Joel Slemrod. 2010. “The Distribution of Income Tax Noncompliance.” *National Tax Journal* 63(3): 397–418.
- Johnston, David Cay. 2008. “Trust, But Verify” *Tax Notes* 120 (August 4): 485–488.
<http://www.taxhistory.org/www/features.nsf/Articles/6C8346A9DB201A588525749E0010A5F1?OpenDocument>

- Joint Committee on Taxation. 2013. "Modeling the Distribution of Taxes on Business Income." JCX-14-13.
- Kopczuk, Wojciech, Emmanuel Saez, and Jae Song. 2010. "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data since 1937." *The Quarterly Journal of Economics* 125(1): 91–128.
- Kuznets, Simon. 1944. "National Product, War and Prewar." In *National Product, War and Prewar*, ed. Simon Kuznets, 1–56. Cambridge, MA: NBER.
- Larrimore, Jeff. 2014. "Accounting for United States Household Income Inequality Trends: The Changing Importance of Household Structure and Male and Female Labor Earnings Inequality." *The Review of Income and Wealth* 60(4): 683–701.
- Larrimore, Jeff, Jacob Mortenson, and David Splinter. Forthcoming. "Household Incomes in Tax Data: Using Addresses to Move from Tax Unit to Household Income Distributions." *Journal of Human Resources*.
- Ledbetter, Mark. 2007. "Comparison of BEA Estimates of Personal Income and IRS estimates of Adjusted Pre-tax Income." *Survey of Current Business* 87(11): 35-41.
- Lerman, Robert I. 1999. "U.S. Wage-Inequality Trends and Recent Immigration." *American Economic Review* 89(2): 23–28.
- Lindsey, Brink, and Steven M. Teles. 2017. *The Captured Economy: How the Powerful Enrich Themselves, Slow Down Growth, and Increase Inequality*. Oxford University Press: New York.
- Liu, Li and Rosanne Altshuler. 2013. "Measuring the Burden of the Corporate Income Tax Under Imperfect Competition." *National Tax Journal* 66(1): 215–237.
- Lundberg, Shelly, Robert A. Pollak, and Jenna Stearns. 2016. "Family Inequality: Diverging Patterns in Marriage, Cohabitation, and Childbearing." *Journal of Economic Literature* 30(2): 79–102.
- National Center for Education Statistics. 2018. *Digest of Education Statistics*. <https://nces.ed.gov/programs/digest/d16/> accessed August 2018.
- Nelson, Susan, 1987. "Family Economic Income," in Office of Tax Analysis, U.S. Department of the Treasury. *Compendium of Tax Research, 1987*. Washington, D.C.: U.S. Government Printing Office, 77–99.
- Office of Tax Analysis, U.S. Department of the Treasury. *Compendium of Tax Research, 1987*. Washington, D.C.: U.S. Government Printing Office, 1987.
- Okner, Benjamin A. 1975. "Individual Taxes and the Distribution of Income." In *The Personal Distribution of Income and Wealth*, ed. James D. Smith, 45–74. New York: NBER.
- Pechman, Joseph, and Benjamin Okner. 1974. *Who Bears the Tax Burden?* Brookings Institution: Washington, D.C.
- Piketty, Thomas, and Emmanuel Saez. 2003. "Income Inequality in the United States, 1913-1998." *The Quarterly Journal of Economics* 118(1): 1–39. Updated estimates accessed from <https://eml.berkeley.edu/~saez/> on January 4, 2019.
- Piketty, Thomas, and Emmanuel Saez. 2007. "How Progressive is the U.S. Federal Tax System? A Historical and International Perspective." *Journal of Economic Perspectives* 21(1): 3–24.
- Piketty, Thomas, Emmanuel Saez, and Stefanie Stantcheva. 2014. "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities." *American Economic Journal: Economic Policy* 6(1): 230–271.

- Piketty, Thomas, Emmanuel Saez, and Gabriel Zucman. 2018. "Distributional National Accounts: Methods and Estimates for the United States." *The Quarterly Journal of Economics* 133(2): 553–609.
- Plesko, George. 1994. "Corporate Taxation and the Financial Characteristics of Firms." *Public Finance Quarterly* 22(3): 311–223.
- Prante, Gerald, and Andrew Chamberlain. 2007. "Who Pays Taxes and Who Receives Government Spending? An Analysis of Federal, State and Local Tax and Spending Distributions, 1991-2004." Tax Foundation working paper No. 1.
- Rosenthal, Steven M., and Lydia S. Austin. 2016. "The Dwindling Taxable Share of U.S. Corporate Stock." *Tax Notes* (May 16): 923–934.
- Simons, Henry C. 1938. *Personal Income Taxation: The Definition of Income as a Problem of Fiscal Policy*. University of Chicago: Chicago.
- Slemrod, Joel. 1996. "High Income Families and the Tax Changes of the 1980s: The Anatomy of Behavioral Response." In *Empirical Foundations of Household Taxation*, ed. Martin Feldstein and James Poterba, 169–192. Chicago: NBER.
- Smith, Mathew, Danny Yagan, Owen Zidar and Eric Zwick. Forthcoming. "Capitalists in the Twenty-First Century." *Quarterly Journal of Economics*.
- Splinter, David. 2018. "Income Mobility and Inequality in the United States: Evidence from Tax Data since 1979." Working paper.
- Splinter, David. 2019. "Who Does Not Pay Taxes? The Declining Fraction Paying Income Taxes and Increasing Tax Progressivity." *Contemporary Economic Policy* 37(3): 413–426.
- Suárez Serrato, Juan Carlos, and Owen Zidar. 2016. "Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms." *American Economic Review* 106(9): 2582-2624.
- Stiglitz, Joseph E. 2012. *The Price of Inequality: How Today's Divided Society Endangers Our Future*. W. W. Norton & Company: New York.
- Stiglitz, Joseph E., Amartya Sen, and Jean-Paul Fitoussi. 2009. "Report by the Commission on the Measurement of Economic Performance and Social Progress."
- Troiano, Ugo. "Do Taxes Increase Economic Inequality? A Comparative Study Based on the State Personal Income Tax." NBER working paper No. 24175. www.nber.org/papers/w24175.pdf
- U.S. Census Bureau. 2016. "Custodial Mothers and Fathers and Their Child Support, Detailed Tables." Series P60-255. <https://www.census.gov/topics/families/child-support.Tables.html> (accessed August 2018).
- Warshawsky, Mark J. 2016. "Earnings Inequality: The Implication of the Rapidly Rising Cost of Employer-Provided Health Insurance." Mercatus working paper.
- Wolfson, Michael C., Michael R. Veall, William Neil Brooks, and Brian B. Murphy. 2016. "Piercing the Veil: Private Corporations and the Income of the Affluent." *Canadian Tax Journal/Revue Fiscale Canadienne* 64(1): 1–30.
- Zucman, Gabriel. 2013. "The Missing Wealth of Nations: Are Europe and the U.S. Net Debtors or Net Creditors." *The Quarterly Journal of Economics* 128(3): 1321–1364.

Table 1: Effects of adjustments on top 1% market and pre-tax income shares

Adjustments	Top 1% income shares					Top 1% share changes				
	1960	1979	1985	1989	2015	1960	1979	1985	1989	2015
Piketty-Saez fiscal income (with CGs)	9.0	9.0	11.1	13.8	20.3	----	----	----	----	----
Piketty-Saez fiscal income (no CGs)	8.3	8.1	9.2	12.8	18.6	-0.7	-0.9	-1.9	-1.0	-1.7
<i>Adjustments to PS fiscal income & income groups</i>										
Correct sample	8.3	8.0	9.2	12.6	18.2	*	-0.1	-0.1	-0.3	-0.4
Impose post-TRA86 loss limits	8.4	8.2	9.7	----	----	*	0.2	0.5	----	----
Add tax-exempt interest	8.7	8.6	10.1	12.9	18.3	0.3	0.3	0.4	0.3	0.2
Correct income definition	8.7	8.5	9.9	12.7	17.8	0.0	*	-0.1	-0.2	-0.5
Set groups by #indivs/sz-adj. inc.	7.9	7.6	9.2	11.7	16.0	-0.8	-0.9	-0.7	-1.0	-1.9
Corrected fiscal income & total chg.	7.9	7.6	9.2	11.7	16.0	-1.1	-1.4	-1.9	-2.1	-4.4
<i>Expansions to PS fiscal income</i>										
Fiduciary retained income	8.1	7.9	9.5	12.0	16.1	0.2	0.3	0.3	0.3	0.2
C-corp retained earnings	10.4	9.7	10.5	12.4	16.8	2.4	1.8	1.0	0.4	0.6
C-corp taxes	11.8	10.1	10.6	12.5	17.0	1.4	0.4	0.1	0.1	0.2
Business property tax	12.4	10.3	10.7	12.6	17.2	0.6	0.2	0.2	0.2	0.3
Inflation correction for interest	12.5	10.8	11.1	13.1	17.2	0.1	0.6	0.3	0.4	*
Underreported income	12.5	11.0	11.2	13.0	16.4	*	0.2	0.1	-0.1	-0.8
Imputed rent	12.2	10.9	11.1	12.8	16.1	-0.2	-0.1	-0.1	-0.1	-0.4
Employer payroll tax	12.0	10.4	10.6	12.3	15.5	-0.2	-0.4	-0.5	-0.5	-0.5
Employer insurance	11.8	10.1	10.3	11.8	14.8	-0.1	-0.3	-0.4	-0.5	-0.8
Retirement account income	12.0	10.3	10.5	12.1	15.1	0.1	0.2	0.3	0.3	0.3
Indirect taxes, non-profits, etc.	11.0	9.5	9.6	11.1	14.1	-0.9	-0.8	-1.0	-0.9	-1.0
Pre-tax income & total changes	11.0	9.5	9.6	11.1	14.1	2.0	0.5	-1.5	-2.7	-6.2

Notes: Total changes are relative to the Piketty and Saez series with capital gains (thresholds set without capital gains). See the online appendix for detailed description of adjustments. * denotes changes between -0.05 and 0.05 percentage points.

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

Table 2: Effects of transfers, taxes, and government spending on top 1% income shares

Adjustments	Top 1% income shares					Top 1% share changes				
	1960	1979	1985	1989	2015	1960	1979	1985	1989	2015
Pre-tax income	11.0	9.5	9.6	11.1	14.1	----	----	----	----	----
<i>Pre-tax/after-transfer Income, Add transfers</i>										
Social Security benefits	10.8	9.1	9.2	10.7	13.4	-0.2	-0.4	-0.4	-0.4	-0.7
Unemployment benefits	10.7	9.1	9.1	10.7	13.4	-0.1	*	*	*	*
Other cash transfers	10.6	8.9	9.0	10.5	13.2	-0.2	-0.1	-0.1	-0.1	-0.2
Medicare	----	8.8	8.9	10.3	12.8	----	-0.1	-0.1	-0.2	-0.4
Other non-cash transfers	10.5	8.7	8.7	10.1	12.2	*	-0.2	-0.2	-0.2	-0.5
Pre-tax/after-transfer income & total changes	10.5	8.7	8.7	10.1	12.2	-0.5	-0.8	-0.8	-1.0	-1.9
<i>After-tax Income, Remove taxes</i>										
Federal indiv. income & estate tax	9.6	7.7	7.6	8.8	10.1	-0.9	-1.0	-1.2	-1.3	-2.2
State/Local indiv. income tax	9.5	7.6	7.4	8.5	9.6	-0.1	-0.1	-0.2	-0.3	-0.5
Corporate income tax	8.3	7.3	7.3	8.4	9.4	-1.2	-0.4	-0.1	-0.1	-0.2
Property tax	7.7	7.1	7.1	8.3	9.1	-0.6	-0.1	-0.1	-0.1	-0.3
Payroll tax	8.0	7.6	7.6	8.8	9.5	0.3	0.4	0.5	0.6	0.4
Sales and other taxes	8.3	7.8	7.8	9.0	9.6	0.3	0.2	0.2	0.1	0.1
<i>After-tax Income, Add rest of government sector</i>										
Government deficit/surplus	9.0	8.1	7.7	9.2	9.0	0.8	0.3	0.0	0.2	-0.6
Government consumption	7.9	7.2	7.1	8.3	8.5	-1.1	-0.9	-0.7	-1.0	-0.4
After-tax income & total changes	7.9	7.2	7.1	8.3	8.5	-3.1	-2.3	-2.5	-2.9	-5.6

Notes: Total changes are relative to pre-tax income. Tax totals are based on NIPA amounts. Fuel and utility taxes are not included. See the online appendix for detailed description of adjustments. * denotes changes between -0.05 and 0.05 percentage points.

Source: Authors' calculations.

Table 3: Comparison of top 1% income shares and changes

	1962	1979	2014	1962–1979 Change	1979–2014 Change	1962–2014 Change
Piketty-Saez-Zucman						
Pre-tax	12.6	11.2	20.2	-1.4	9.0	7.6
After-tax	10.1	9.1	15.7	-0.9	6.5	5.6
Auten-Splinter						
Pre-tax	11.1	9.5	14.3	-1.6	4.8	3.2
Pre-tax/after-transfer	10.6	8.7	12.4	-1.9	3.7	1.8
After-tax	8.3	7.2	8.6	-1.1	1.4	0.3

Notes: Adjustments used to estimate various definitions of income are listed in Tables 1 and 2 and described in detail in the online appendix.

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

Table 4: Decomposition of top one percent income shares by approaches

Auten-Splinter approach	PSZ approach	Percentage point level difference			Percentage point difference in changes	
		1962	1979	2014	1979–2014	1962–2014
<i>Pre-tax income</i>						
Underreported income by IRS audit data	Underreported income by reported income	0.4	1.0	2.2	1.2	1.8
Include distributed & other retirement income	Retirement alloc. partly includes rollovers	0.5	0.1	1.3	1.2	0.9
Other taxes by disposable income less savings	Other taxes by factor income less savings	0.3	0.2	0.7	0.5	0.4
Non-retirement pre-tax corporate income	PSZ non-retirement pre-tax corp. income	0.5	0.2	0.7	0.5	0.1
Various corrections to tax income definition	Use uncorrected tax return market income	-0.1	-0.1	0.4	0.6	0.5
Imputed rent by property tax deductions	Imputed rent by housing wealth estimates	0.4	0.2	0.3	0.1	-0.1
Limit returns to non-dependent U.S. residents	No adjustment	-0.2	0.2	0.2	*	0.4
Groups by individuals/size-adjusted incomes	Groups by adults/equal-split married inc	*	0.1	0.2	0.1	0.2
Non-profits/govt. income half per capita	Non-profits/govt. income all by income	*	*	0.1	0.1	*
Inflation correction	No correction	*	-0.5	-0.1	0.5	*
Social insurance benefits/deficit excluded	Social insur. ben./def. incl., taxes deducted	*	*	-0.1	-0.1	-0.1
Pre-tax differences (PSZ less AS) & totals		1.5	1.7	5.9	4.3	4.5
<i>After-tax income</i>						
Govt. consumption allocated half per capita	Govt. consumption all by after-tax income	0.8	0.8	1.3	0.5	0.5
Non-SS deficits by federal income taxes	Half by government transfers, half taxes	-0.3	0.0	0.5	0.6	0.8
Estate tax by prior decade decedent income	Estate tax by wealth distribution	-0.3	-0.2	*	0.2	0.3
Government transfers as described in text	PSZ transfers distribution	*	*	*	*	*
Corporate taxes by wages/corp. ownership	Corporate taxes by capital ownership	-0.2	-0.3	-0.3	*	-0.1
Other taxes by disposable inc. less savings	Other taxes by factor income less savings	*	*	-0.3	-0.3	-0.3
After-tax differences (PSZ less AS) & totals		0.3	0.3	1.1	0.8	0.8

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 may not sum to the PSZ less AS difference. Results shown are the average changes in top one percent income shares of going from AS to PSZ and PSZ to AS assumptions (see online data for details). Note also that the total after-tax difference is after netting out the pre-tax differences. * denotes changes between -0.05 and 0.05.

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

Table 5: Sensitivity analysis, changes in top 1% income shares

Alternative Allocation Assumptions	1962	1979	2015	1979–2015 Change	1962–2015 Change
Corporate tax burden alternatives (pre-tax income)					
25% wages/75% corporate capital (baseline)	11.1	9.5	14.1	4.6	3.0
50% wages/50% corporate capital	10.8	9.3	14.0	4.7	3.3
0% wages/100% corporate capital	11.5	9.6	14.2	4.6	2.7
0% wages/100% non-housing capital	11.2	9.7	14.3	4.6	3.1
Corporate retained earnings (after-tax income)					
individuals: 25% capital gains/75% dividends (baseline)	8.3	7.2	8.5	1.3	0.2
individuals: 50% capital gains/50% dividends	8.3	7.1	8.4	1.3	0.2
Government Consumption (after-tax income)					
50% per capita /50% after-tax income (baseline)	8.3	7.2	8.5	1.3	0.2
25% per capita /75% after-tax income	8.7	7.5	8.9	1.4	0.2
75% per capita /25% after-tax income	8.0	6.9	8.2	1.3	0.2
Multiple Changes (after-tax income)					
Changes increasing 2015 top share	8.1	7.0	9.1	2.1	0.9
Baseline	8.3	7.2	8.5	1.3	0.2
Changes decreasing 2015 top share	7.8	6.5	7.4	0.9	-0.4

Notes: Baseline assumptions are described in text and in detail in the online appendix. Assumptions for sensitivity analysis are described in the text.

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

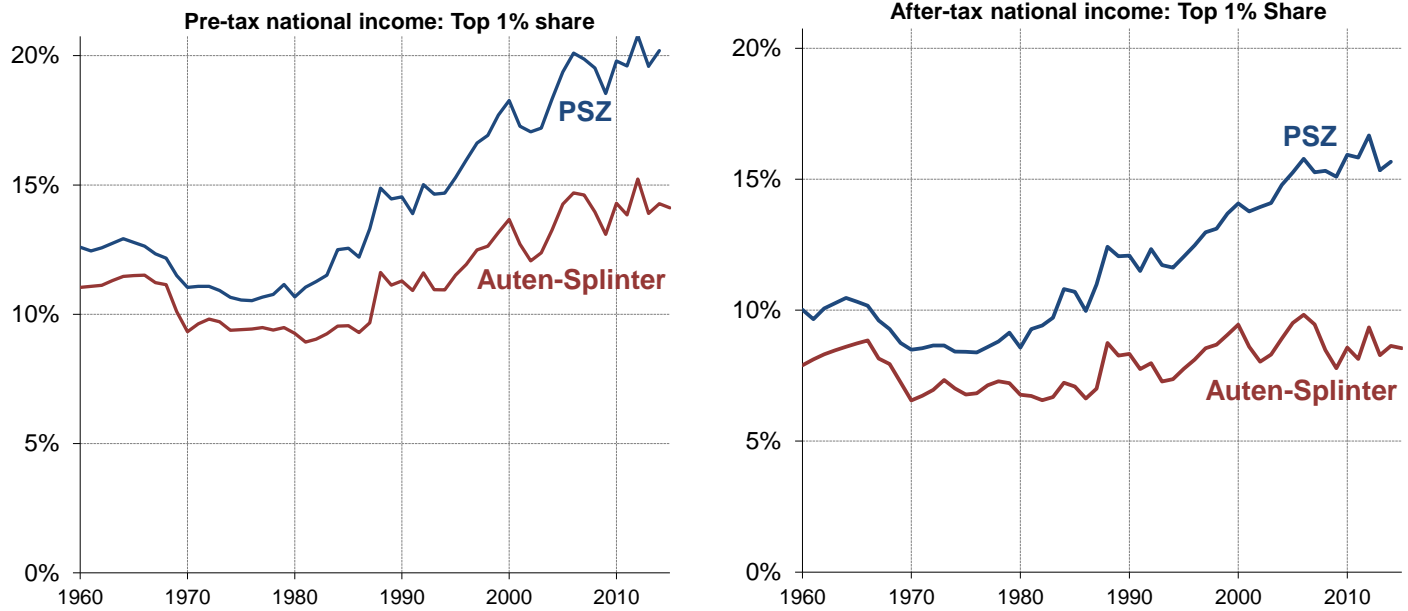


Figure 1: Top 1% shares of national income

Notes: Adjustments used to estimate Auten-Splinter pre-tax and after-tax income are listed in Tables 1 and 2 and described in detail in the online appendix.

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

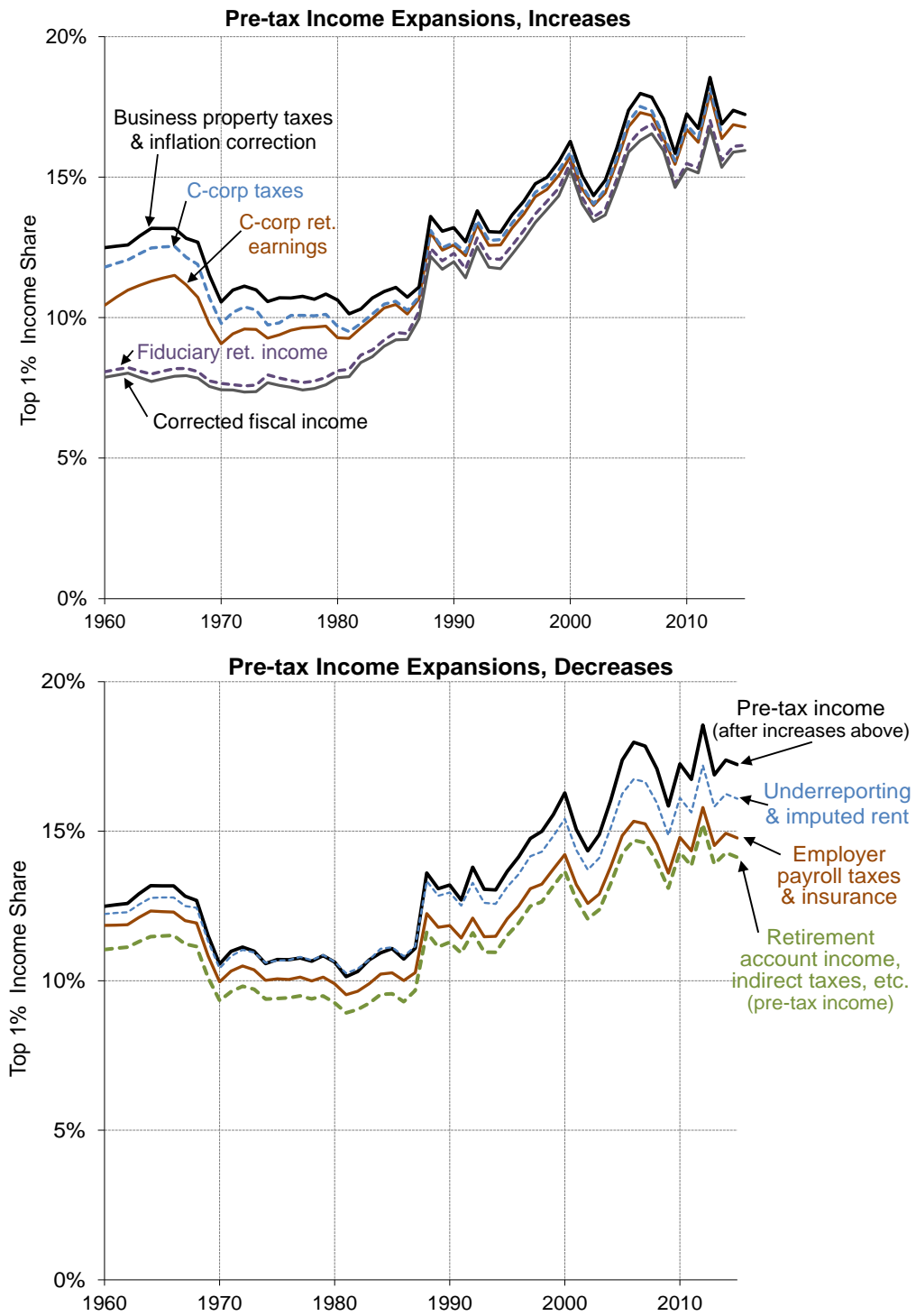


Figure 2: Top 1% income shares: Pre-tax income expansions

Notes: See text and Table 1 for description of adjustments.

Sources: Authors' calculations.

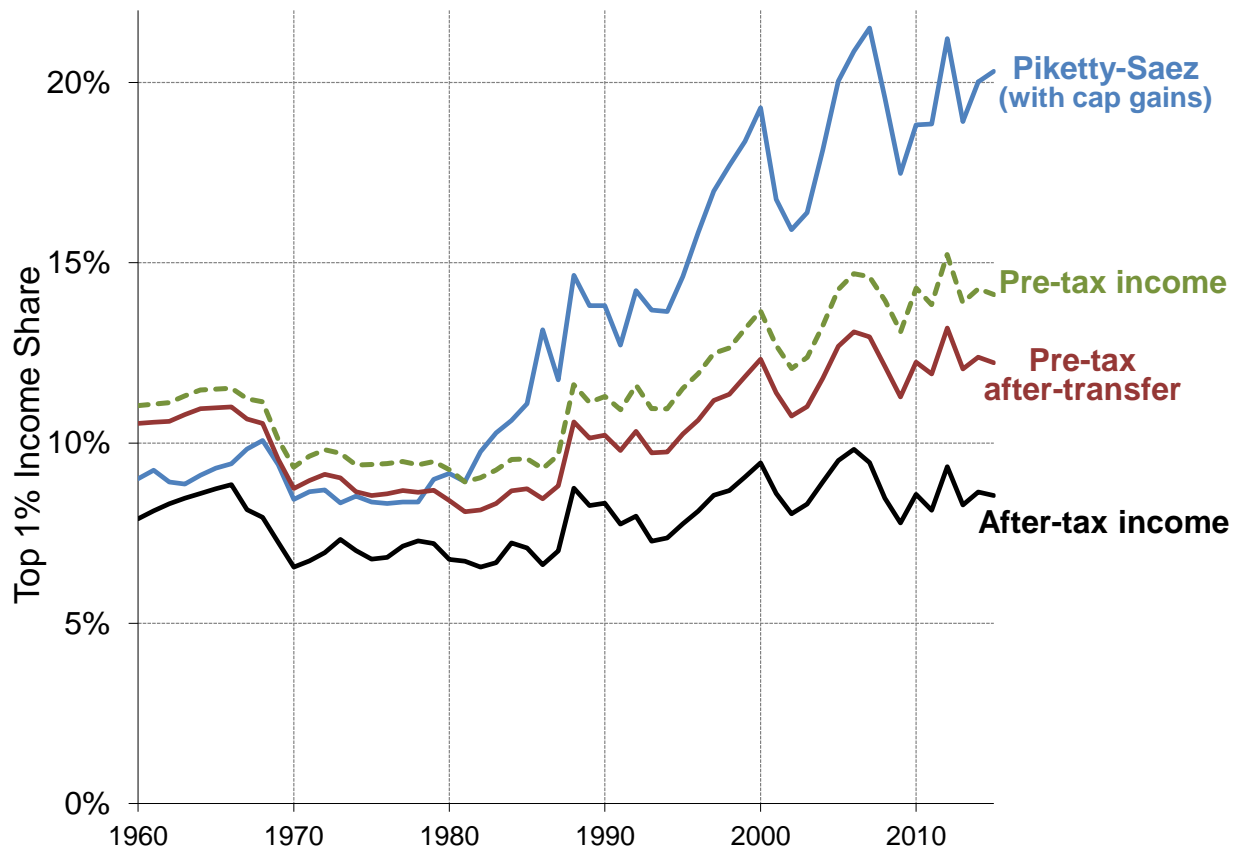


Figure 3: Comparison of top 1% income shares

Notes: Piketty and Saez series includes capital gains (thresholds set without capital gains). Adjustments used to estimate pre-tax, pre-tax/after-transfer, and after-tax income are listed in Tables 1 and 2 and described in detail in the online appendix.
Sources: Authors' calculations and Piketty and Saez (2003 and updates).

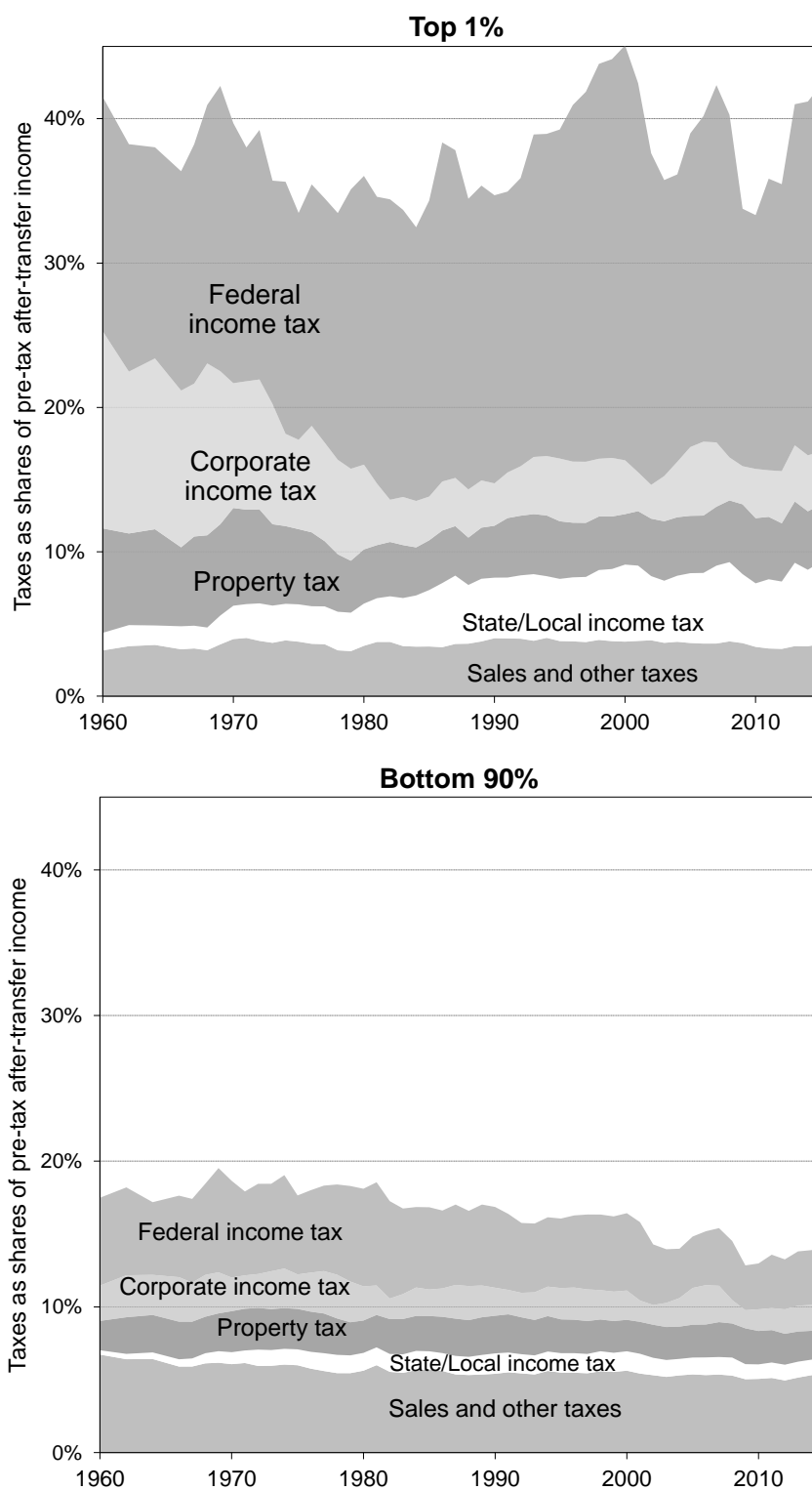


Figure 4: Taxes as shares of pre-tax income

Notes: Payroll taxes are examined in Figure 5 in connection with transfer payments. Refundable tax credits are included in government transfers and excluded from income taxes.

Sources: Authors' calculations.

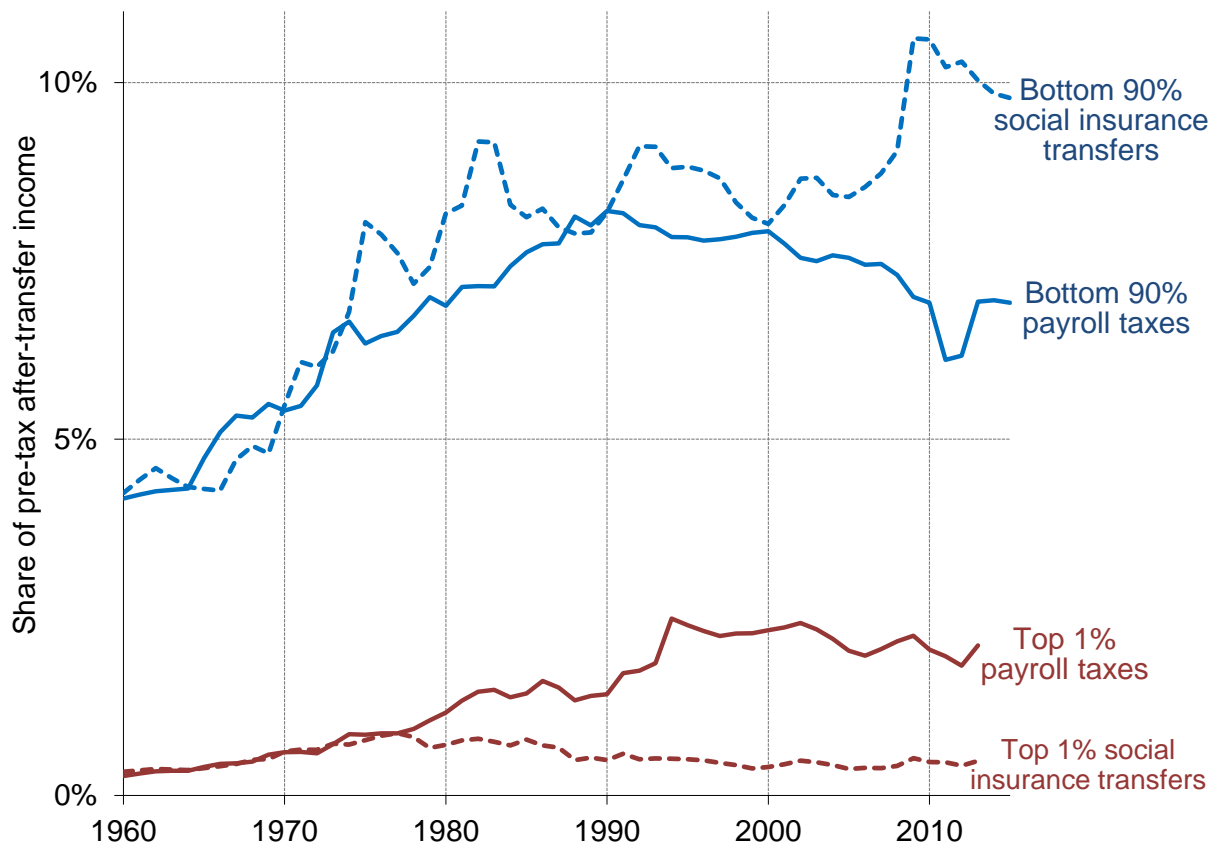


Figure 5: Payroll and social insurance as a share of pre-tax income

Notes: Social insurance transfers includes benefits from Social Security, Medicare (less premiums), and disability and unemployment insurance. Surtaxes beginning in 2013 are included with income taxes rather than payroll taxes.

Sources: Authors' calculations.

Appendix

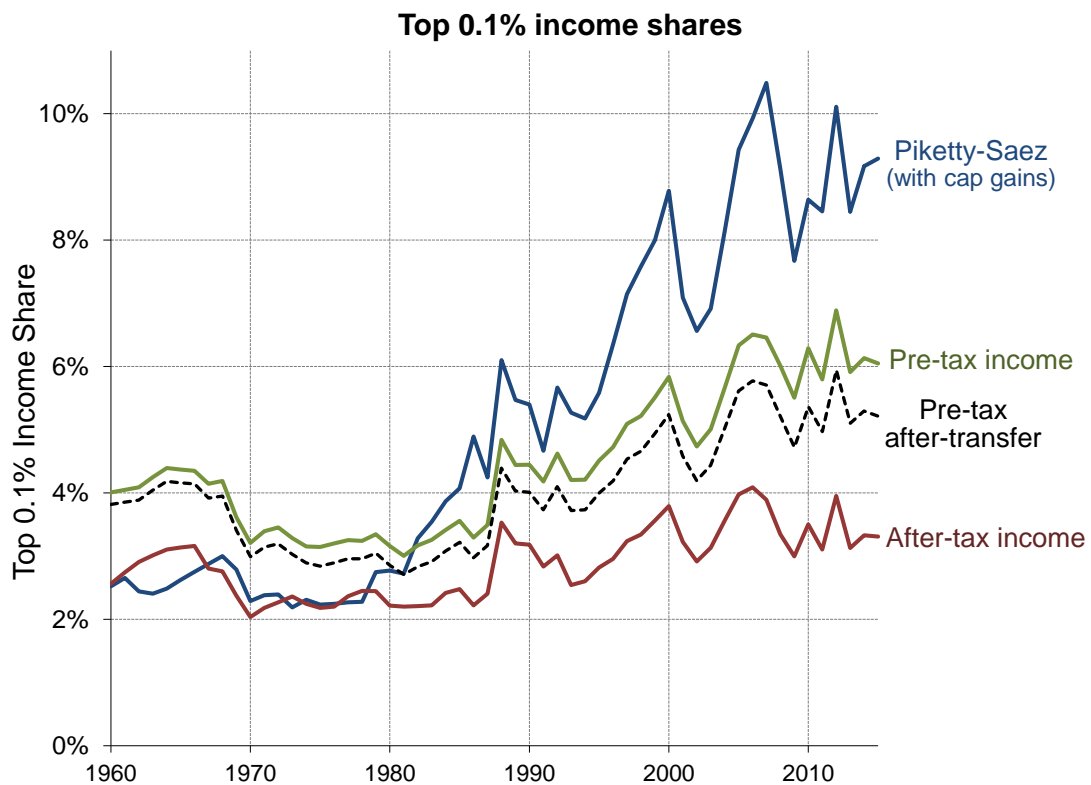
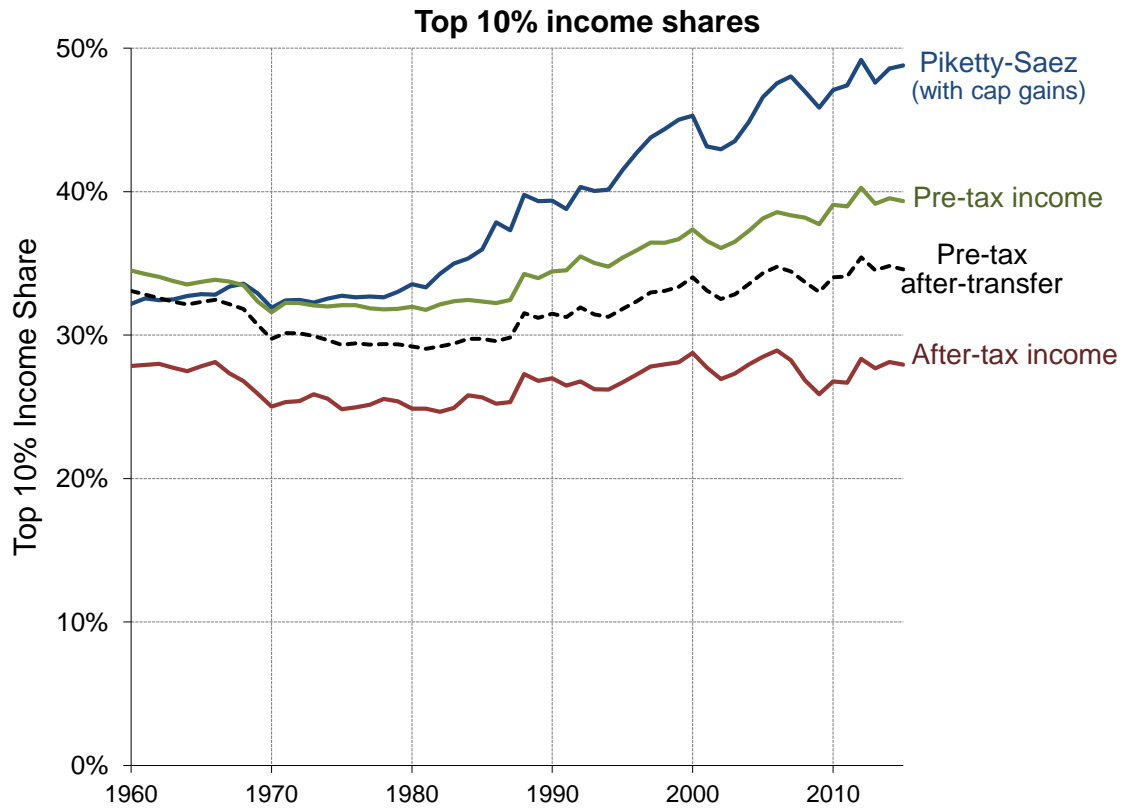


Figure A1: Top income shares: Top 10% (top figure) and top 0.1% (bottom figure)

Notes: Piketty and Saez series includes capital gains (thresholds set without capital gains).

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