Top Income Shares and the Difficulties of Using Tax Data

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This chapter reconsiders income methods of estimating of inequality using US tax data. It presents a new approach that accounts for the effects of important social changes, tax reforms, technical tax issues, and the 40 percent of income missing from tax returns. Results suggest much smaller increases in top 1 percent shares of pre-tax income. After accounting for taxes and transfers, top 1 percent shares changed little since 1962. This resulted from substantial increases in transfers and increased overall progressivity of the tax system. While effective tax rates for the top 1 percent show little trend, they declined for the bottom 50 percent. Rather than stagnating, per capita real incomes of the bottom half of the population increased over time. Rather than increasing and capturing most economic growth, incomes of those starting at the top decreased while those starting with low incomes received most of the growth.

Keywords: income inequality, income measurement, redistribution, tax progressivity, income mobility

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The conventional view of the US income distribution paints a dark picture: inequality increased dramatically in recent decades, top incomes grew substantially while lower and middle incomes have stagnated, the tax system has become less progressive, and most economic growth has been "captured" by the top of the distribution. Our analysis suggests, however, that this conventional view may be overstated. After addressing limitations of the data and assumptions used to support this view, a different picture emerges: income inequality has increased only modestly in recent decades, incomes of the bottom 50 percent have not stagnated, the overall tax system has become more progressive, and economic growth has been more widely shared.

Researchers need to account for a number of challenges in measuring the distribution of income, especially when trying to compare distributions over long time periods. While tax data are superior to survey data in many ways, especially for measuring the top of the distribution, researchers need to be mindful of their limitations. Tax returns are designed to report income and collect taxes according to the current Internal Revenue Code, which often deviates from economists' view of what constitutes economic income. Tax reforms, especially the Tax Reform Act of 1986, have changed both how income is defined in tax data and who is required to file tax returns. In addition, as much as 40 percent of national income is missing from tax returns. Accounting for this missing income is necessarily sensitive to the decisions of researchers about how to allocate it.

Social and economic conditions have also changed dramatically since the 1960s, in ways that can affect income distribution estimates in both tax and survey data. Among these changes are differential declines in marriage rates, increases in post-secondary education, and substantial increases in government transfer programs (including Social Security). Failing to adequately account for changes in social and economic conditions as well as issues associated with tax data can result in misleading estimates of inequality levels and trends.

The conventional view of dramatically increasing income inequality largely reflects the influential Piketty and Saez (2003) paper and the more recent paper by Piketty, Saez, and Zucman (PSZ, 2018).[1] The original paper used tax return data and suffered from a number of well-recognized problems: using a narrow measure of income that omitted Social Security and other transfers, failing to account for the effects of tax reforms, and basing income groups on tax units, which creates an upward bias in their estimated top income shares over time because of differential decreases in marriage rates. PSZ addressed a number of these issues by targeting total national income and basing income groups on the number of adults rather than tax units. National income is a broad measure that includes compensation of employees, proprietorship income, net interest, rental income, and corporate profits. The new paper, however, created additional issues, primarily due to certain assumptions about how to allocate the increasing share of income not reported on tax returns.

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[1] Their new book was released just as this article went to press. Emmanuel Saez and Gabriel Zucman. T*he Triumph of Injustice: How the Rich Dodge Taxes and How to Make them Pay.* New York, NY: W.W. Norton. 2019. One change from PSZ was to allocate corporate income taxes by corporate ownership which increased top income shares and tax burdens in the 1960s.

The estimates presented in this chapter reflect our analysis as of mid-2019, which fully accounts for national income and improves upon PSZ by paying more careful attention to the allocation of income missing from individual tax returns. We start with income reported on individual tax returns, as did Piketty and Saez. However, we then account for the effects of tax reforms as well as important technical details of how income is reported in tax data. We account for social changes such as declining marriage rates and the increase in single-parent households. We provide a step-by-step comparison between our estimates and those of PSZ, and we discuss how different assumptions for allocating missing income affect estimates of top income shares.

Our estimates suggest a modest increase in the top 1 percent share of national income of 3 percentage points (pp) between 1962 and 2014. The period since 1979, however, differs from the earlier period. Our estimates suggest that the top 1 percent share of pre-tax income declined by about 2 pp from 1962 to 1979 and increased by just under 5 pp from 1979 to 2014.

The expansion of transfers and increased progressivity of the overall tax system largely offset the increases in pre-tax income inequality. We find that the top 1 percent share of after-tax/transfer income increased by less than 1 percentage point over the full period. In spite of the drop in top statutory income tax rates from 91 percent in 1960 to 39.6 percent in 2015, total effective tax rates on the top of the distribution exhibit no long-term trend due to tax reforms that broadened the tax base. However, the overall tax system became more progressive as a result of tax reductions and refundable credits targeted at lower and middle-income taxpayers.

The first section of this chapter summarizes our estimates of the top 1 percent and bottom 50 percent shares of pre-tax national income and the effects of transfers and taxes. The second section discusses how our estimates of the distribution of national income are constructed, presenting step-by-step effects on top 1 percent shares when moving from income reported on tax returns to national income, and it examines why our estimates differ from PSZ. The following two sections discuss changes over time in high-income tax avoidance and estimates of the distribution of economic growth.

I. Distribution of National Income

A. The Top 1%

As shown in Figure 1, our estimate is that the top 1 percent share of pre-tax national income has increased about 3 pp since the early 1960s, from 11 to 14 percent. This increase is more modest than that observed when only considering income reported on tax returns (i.e., *fiscal income*). The addition of income missing from fiscal income increases top shares in the 1960s, largely from adding corporate retained earnings, and it reduces top shares in recent decades, largely from adding non-taxable employee compensation. This explains why the increase in top shares is more modest when using a broader measure of pre-tax income that includes income sources missing from tax returns. Figure 1 also illustrates how top 1 percent shares tend to increase during expansionary periods and decrease during recessionary periods.

Including the effects of taxes and transfers, top 1 percent shares increased less than 1 pp between 1962 and 2014. For the more recent period between 1979 and 2014, top 1 percent pre-tax (pre-transfer) shares increased 5 pp, but after-tax/transfer shares increased by only 1 pp.

Figure 1: Top 1% national income shares
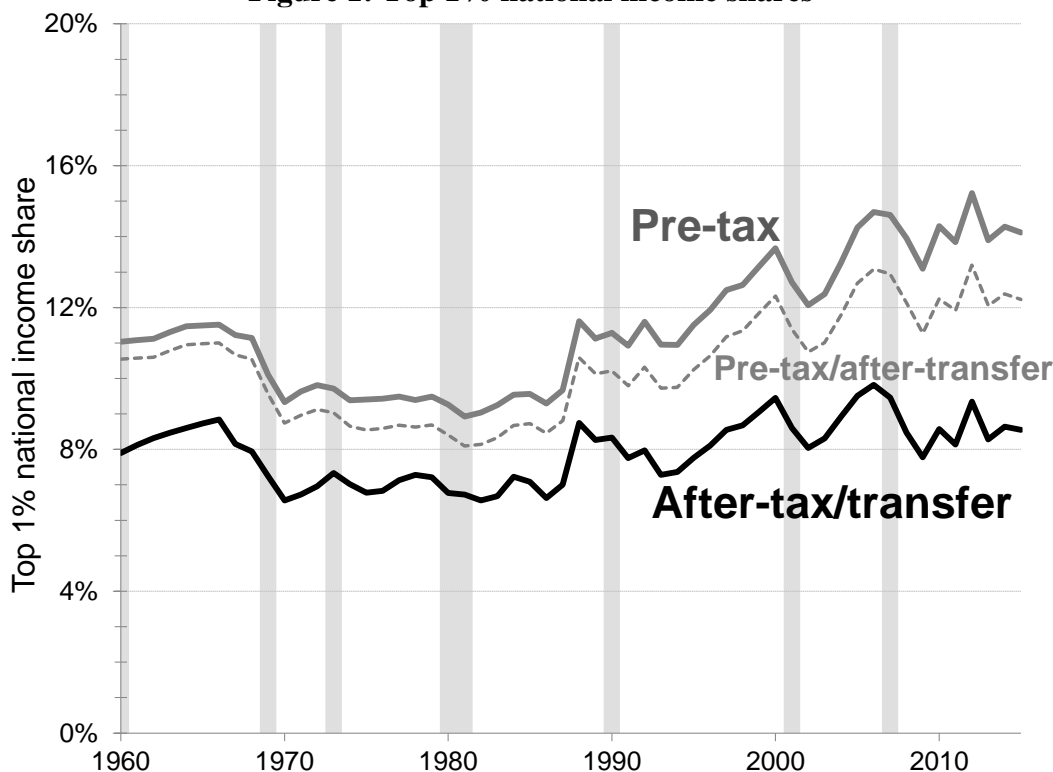
Notes: Shaded years show initial years of NBER recessions.
Source: NBER, Auten and Splinter (2019a), and authors' calculations.

B. Pre-tax Incomes of the Bottom 50% and Upper-Middle Class

Changes in income shares outside the top 1% are also important to consider. PSZ argue that their estimated increase in the top 1% share is almost exactly matched by a decrease in bottom 50% share and that real incomes of the bottom have increased little in recent decades. What do our estimates show?

As illustrated in Figure 2A, the bottom 50% pre-tax share of national income increased slightly from 21 to 22 percent from 1962 to 1979, but then declined to 16.4 percent by 2014. As discussed in the following section, transfers and taxes offset almost all of this pre-tax decline in the bottom 50% share. Figure 2B shows that the income shares of those in the 50th to 90th percentiles, who might be considered the upper-middle class, were relatively constant over the last five decades and are much less affected by transfers and taxes.

While income shares are a common focus, it is at least important to consider changes in levels of real incomes. One of the arguments of PSZ and the conventional wisdom is that real pre-tax incomes of the bottom 50% have been nearly unchanged since 1979. Our estimates indicate that average per capita incomes of the bottom 50% increased by nearly one-third. Accounting for transfers, real incomes of this group increased by nearly two-thirds. Similarly, Congressional Budget Office (CBO, 2018) estimates suggest that per capita after-tax/transfer real incomes of the bottom two quintiles increased by 62 percent from 1979 to 2014.
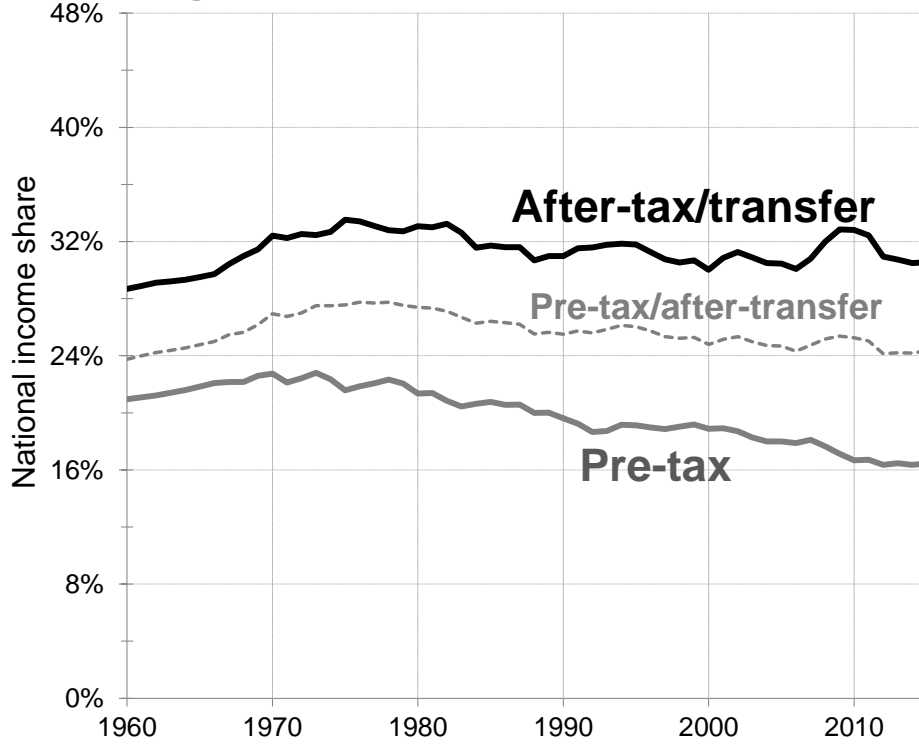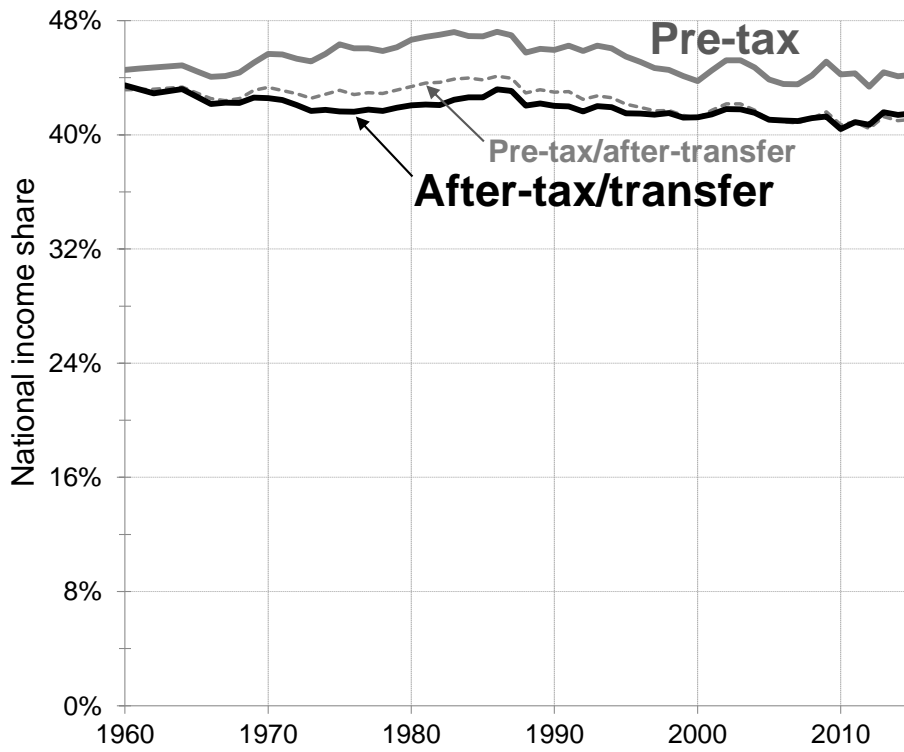
Figure 2A: Bottom 50% national income shares

Figure 2B: Upper-middle class national income shares (50th to 90th percentiles)

Source: Auten and Splinter (2019a).

C. Redistribution: Increasing Transfers and Tax Progressivity

Government policies can have important effects on the income distribution through transfer programs and taxes. As shown in Figure 3, overall transfers more than tripled as a share of national income, increasing from 5 percent in 1962 to 17 percent by 2014. Almost two-thirds of this was from the growth in the Social Security and Medicare programs. Adding transfers to income increases the bottom 50% share of income by 3 pp in 1962 and 8 pp in 2014 since this group received most of the growth in transfers. The growth of transfers also resulted in larger decreases in top 1% income shares over time: 0.5 pp in 1962 and 1.9 pp in 2014.

Our analysis also indicates that the overall tax system has become more progressive since the 1960s. This is primarily a result of top tax burdens showing no clear trend while lower and middle-income tax burdens fell due to tax cuts and the expansion of refundable credits. The combined effects of transfers and taxes almost completely offset the changes in pre-tax shares of both the top 1% and the bottom 50% of the population.

Figure 3: Transfers as a share of national income
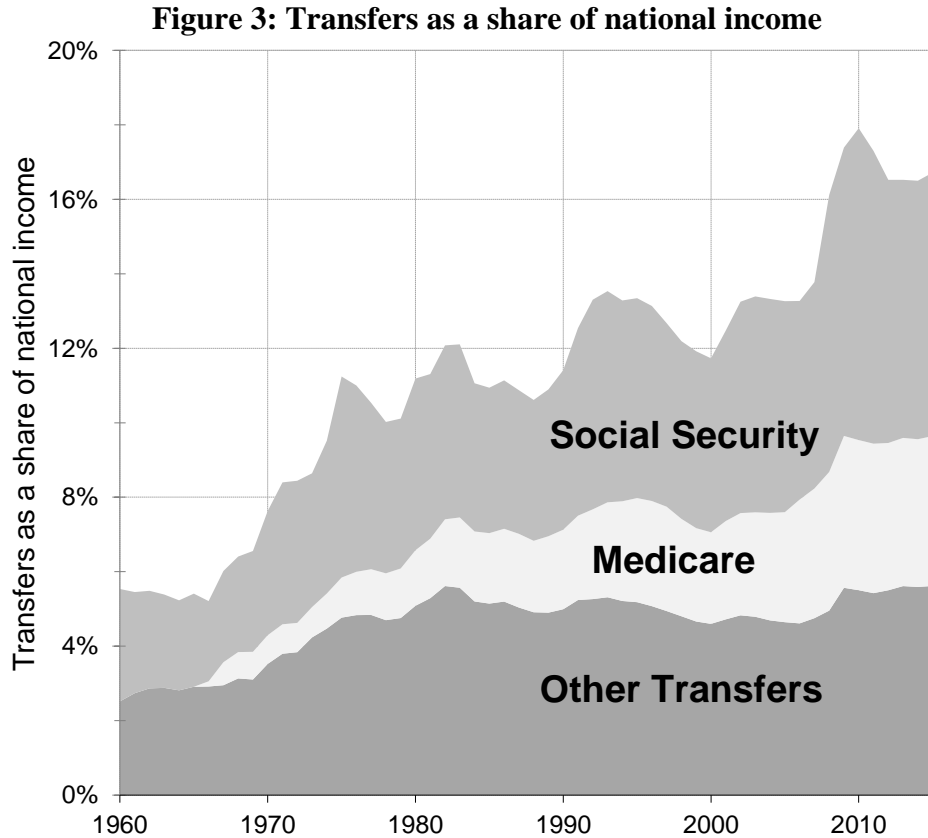
Note: Other transfers includes the refundable portion of tax credits.
Source: Bureau of Economic Analysis and authors' calculations.

Figure 4A: Top 1% effective tax rates
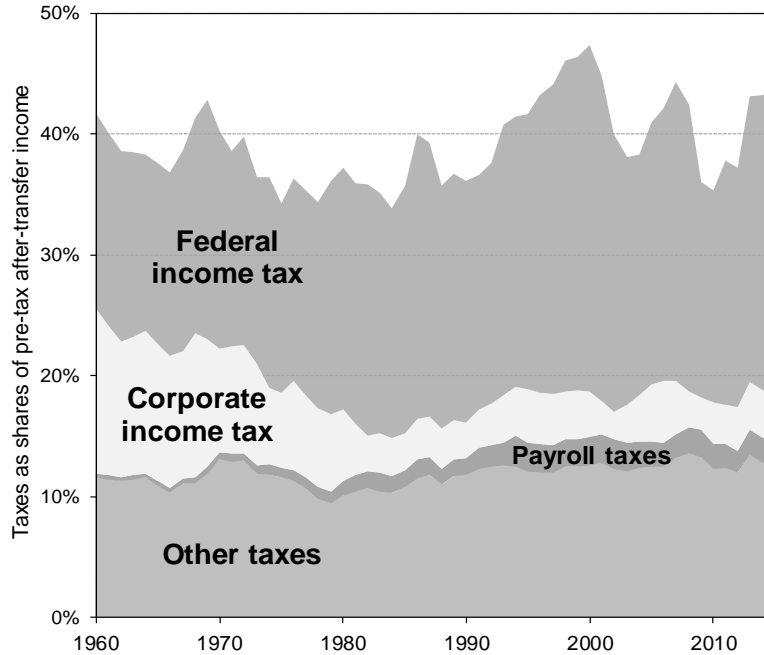
Figure 4B: Bottom 50% effective tax rates
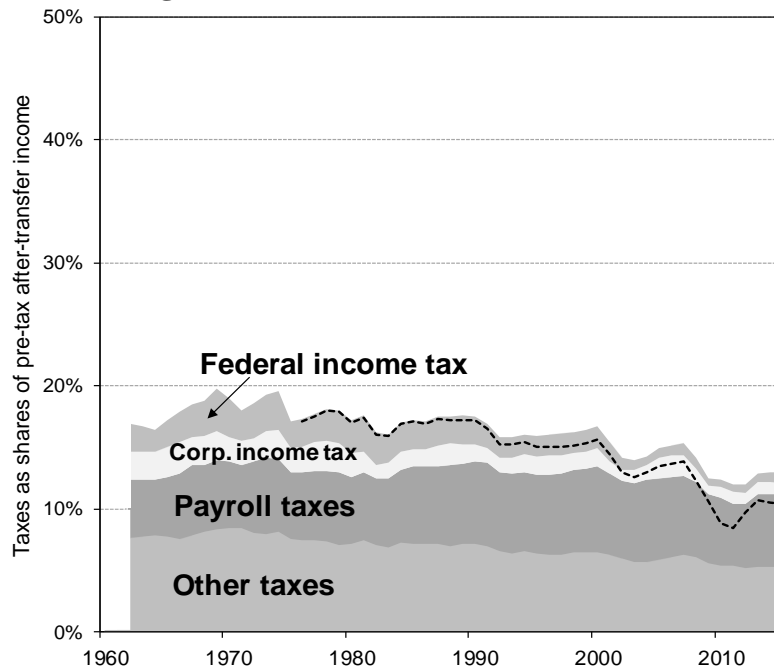
Notes: Income is pre-tax/after-transfer income, which is the broadest income definition. The refundable portion of tax credits is included in government transfers rather than taxes, but the effects are shown by the dashed line.
Source: Auten and Splinter (2019a) and authors' calculations.

Figure 4A shows how total tax burdens (i.e. average effective tax rates from all taxes) of the top 1% evolved over the last five decades. Total top 1% tax burdens fluctuated around 39 percent, but were lower in the 1970s (37 percent) and highest in the late 1990s and 2013–2015 (44

percent).[2] The federal individual income tax accounts for the largest share of taxes paid by the top 1% and has been the most volatile. Individual income taxes increase during economic expansions, such as 1991–2000 and 2003–2007, as high-income taxpayers move into higher tax brackets, and decrease during recessions, such as 2001 and 2008–2009. They were also affected by the top tax rate increases in 1993 (from 31 to 39.6 percent), the reduction in 2003 to 35 percent, and the restoration of the 39.6 percent rate in 2013 along with the imposition of two new taxes and other provisions targeting high-income taxpayers.[3]

Individual income taxes paid by the top 1 percent have increased despite top federal individual tax rates falling from 91 percent to 39.6 percent. In 1962, only about 1 in 1,000 of the top 1 percent paid the top tax rate, as it only applied to extremely high incomes. But in 2014, the majority paid the top rate. Another factor is base broadening targeted at high-income taxpayers, especially in the Tax Reform Act of 1986 (TRA86), as discussed later. In addition, the shift from C corporations to pass-through businesses after TRA86 resulted in the large decline in the importance of the corporate income tax seen in Figure 4A. Income previously taxed under the corporate income tax is now reported and taxed under the individual income tax. While the effect of payroll taxes is relatively small for high-income taxpayers, these taxes have become more important since the uncapping of the Medicare tax in 1994.

In contrast, Figure 4B shows that total tax burdens of the bottom 50% have declined over time, especially after 1979. Since 1962, tax burdens of the bottom 50% decreased from 17 to 13 percent. If the refundable portion of tax credits is counted as part of the tax system—rather than as transfers as in the national accounts—tax burdens of the bottom 50% decreased from 17 to 10 percent (the dashed line in Figure 4B). Income tax burdens of the bottom 50% have been substantially reduced since 1962 by various tax cuts and expansions of earned income and child tax credits. Accounting for the refundable portion of tax credits more than fully offsets income tax liabilities since 2002.

The combined effects of transfers and taxes increased the bottom 50% after-tax/transfer income share by 8 pp in 1962 and 14 pp in 2014. Note that the 2008 to 2010 bump in after-tax/transfer bottom 50% shares in Figure 2A resulted from the increase in transfers and tax credits enacted during the Great Recession as an economic stimulus. Overall, our estimates suggest that transfers and taxes offset almost all of the pre-tax decline in bottom 50% income shares.

The combination of flat top tax burdens and decreasing bottom 50% tax burdens has increased the progressivity of the overall tax system. Other estimates also find that federal taxes have become more progressive over time. CBO estimates show that average federal tax rates decreased for all but the top quintile from 1979 to 2013, with the largest decreases in the bottom

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[2] The estimates in this paper are from the July 2019 version of Auten and Splinter (2019a) estimates and do not account for the Tax Cuts and Jobs Act enacted December 22, 2017. The effects of this act will not be known for several years due to lags in filing and processing of IRS data and short-run behavioral responses.

[3] In 2013, changes to high-income taxpayers included the higher top statutory rate, the phaseout of itemized deductions, two new surtaxes (the Additional Medicare Tax and the Net Investment Income Tax), as well as other tax increases on capital income. Auten, Splinter, and Nelson (2016, p. 952) estimated that "top individual marginal tax rates increased by about 7 percentage points on earned income. The top effective individual marginal rate on capital gains and qualified dividends increased from 15 percent to over 25 percent."

of the distribution (Perese, 2017). Using several distributional measures, Mathews (2014) also concluded that federal income taxes have become more progressive since the late 1960s and have been most progressive since 2000.

II. Changing from Fiscal to National Income

Distributional estimates based on allocating total national income can overcome some of the limitations of estimates based on fiscal income. Table 1 shows our step-by-step adjustments to change from fiscal income as reported on tax returns to national income and the effect of each adjustment on top 1% income shares.[4] This approach stacks changes one after another, however, so that estimated effects on top shares may be sensitive to the specific order shown. The table also shows estimates using the assumptions of PSZ for comparison.[5]

A. Step-by-Step Effects on Top 1% Income Shares

Table 1: Top 1% national income shares

	Auten-Splinter		PSZ		1962–2014 increase		
	1962	2014	1962	2014	AS	PSZ	PSZ–AS diff.
Panel A: Summary of changes							
Fiscal income with cap. gains	9.8	21.8	9.8	21.8	12.0	12.0	---
Pre-tax changes (Panel B)	1.3	–7.7	2.8	–1.6	–9.0	–4.4	---
Pre-tax national income	11.1	14.1	12.6	20.2	3.0	7.6	4.6
Transfers and Taxes (Panel C)	–2.8	–5.6	–2.5	–4.5	–2.8	–2.0	---
After-tax/transfer income	8.3	8.5	10.1	15.7	0.2	5.6	5.4
Panel B: Fiscal income to pre-tax national income							
Unit of observation & sample	–0.6	–2.2	–0.7	–1.6	–1.6	–0.9	0.6
+ employer-sponsored insurance	–0.1	–1.3	–0.1	–1.3	–1.2	–1.2	*
+ corporate income taxes	1.1	0.1	1.4	0.5	–1.0	–0.8	0.2
+ payroll & other taxes	–0.2	–1.2	*	–0.4	–1.1	–0.5	0.6
+ private retirement income	–0.2	–0.2	–0.2	1.1	0.1	1.3	1.2
+ income corrections	0.4	0.1	0.6	0.6	–0.3	*	0.4
+ underreported income	0.1	–0.6	0.5	1.4	–0.7	0.9	1.6
+ imputed rent	–0.1	–0.3	0.2	–0.2	–0.1	–0.4	–0.3
– realized capital gains	–1.2	–2.6	–0.9	–2.2	–1.5	–1.3	0.1
+ corporate retained earnings	2.1	0.6	2.0	0.6	–1.5	–1.4	0.1
Panel C: Pre-tax to after-tax/transfer income							
+ transfers	–0.5	–1.9	–0.2	–1.8	–1.4	–1.6	–0.1
– taxes	–1.9	–2.5	–2.3	–3.0	–0.6	–0.7	*
+ government surplus	0.4	–0.4	*	0.2	–0.8	0.2	1.0
+ government consumption	–0.8	–0.7	---	---	*	---	*

Notes: * denotes change between –0.05 and 0.05. In Panel B, the PSZ addition of social insurance and deduction of associated taxes is not shown.
Source: Auten and Splinter (2019a), Piketty, Saez, and Zucman (2018), and authors' calculations.

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[4] This section only provides a brief description of our methodology. For more details, see the online appendix to Auten and Splinter (2019a), http://davidsplinter.com/AutenSplinter-Tax_Data_and_Inequality_onlineapp.pdf

[5] Auten and Splinter (2019b) provides a similar step-by-step comparison to Congressional Budget Office estimates, another frequently cited source of U.S. income inequality estimates using tax data.

The first steps are to ensure that our sample is consistent with the baseline population of the US resident population age 20 and older, to define our unit of analysis for determining income groups, and to account for the non-filer population as well as individuals represented on tax returns.[6] To make our sample consistent with the baseline Census population, we drop non-resident filers and other filers under age 20. We also drop dependent filers age 20 and older, primarily full-time students aged 20–23 who have not provided more than half of their own support and are being claimed as a dependent on another tax return. The income of young and dependent filers is allocated to returns claiming dependent exemptions. Following an approach similar to that of the CBO, we define income groups based on the total number of individuals, which accounts for all individuals on a tax return. This means that each percentile has the same number of individuals instead of the same number of tax units. For purposes of ranking tax units, income is size-adjusted by dividing by the square root of income, a standard equivalence scale in distribution studies (Cronin, DeFilippes, and Lin, 2012).

Our approach accounts for both differential changes in marriage rates by income groups and the increasing fraction of single-parent households. Marriage rates have declined significantly in the lower and middle-income population, but have remained high in the top 1%. The lower marriage rate increases the total number of returns filed—unmarried individuals file separate returns whereas married couples usually file one joint return—and therefore increases the number of returns in the top 1 percent. The returns added to the top 1 percent will have higher than average incomes, thereby mechanically increasing top income shares in recent decades. Basing income groups on the numbers of individuals rather than tax units controls for both changes in household structure. Relative to baseline tax return data and tax units, these adjustments reduce top 1% income shares by 0.6 pp in 1962 and 2.2 pp in 2014. The 2014 effect is similar to the 2.4 pp decrease estimated by Bricker et al. (2016b) when income groups are based on families rather than tax units.

The baseline income for this analysis is fiscal income including capital gains. Our analysis makes three basic types of adjustments to distribute national income: adjustments that account for major tax reforms, technical adjustments to account for certain features of how income is reported on tax returns, and additions to account for income not included in tax data.

The largest effect on top 1% income shares is from adding sources of national income not on tax returns, such as employer-sponsored insurance and the employer portion of payroll taxes. The growth in employer-sponsored insurance contributions results in larger reductions in top 1% shares in more recent years: a negligible decrease in 1962 and a 1.3 pp decrease in 2014. The portion of payroll taxes paid by employers is included in pre-tax income because they help fund programs benefitting workers and because economists generally assume the incidence falls on workers. The effect of payroll taxes has grown over time and, by 2014, including these and other taxes decreased top 1% income shares by 1.2 pp.

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[6] The age 20 standard was used in PSZ as well as the Piketty and Saez (2003). This has the advantage of making it easier to estimate the non-filer population, although it excludes independent households under age 20 and does not account for later entry into the labor force due to rising college attendance in recent decades. As discussed in the text, we address these issues by our treatment of taxpayers under age 20 and dependent filers age 20 and older.

An important aspect of allocating total national income is accounting for all the components of corporate pre-tax income: retained earnings, dividends, and corporate taxes paid. We replace realized capital gains, which are included on individual tax returns but excluded from national income, with corporate retained earnings, which are excluded from individual tax returns but included in national income. Realized capital gains can be considered less appropriate for measuring current-year incomes because they tend to be lumpy and generally reflect gains accrued over many years. Replacing realized capital gains with retained earnings increases the top 1% share in 1962 but decreases it by 2 pp in 2014, largely because of the increased share of stock held by retirement accounts.

The inclusion of retained earnings and corporate taxes is an important factor in accounting for the base-broadening effects of the TRA86. Before TRA86 business activity was concentrated in C corporations, which had substantial retained earnings and were subject to the corporate income tax. TRA86, however, greatly changed tax incentives so that it was often more advantageous to organize businesses as pass-through businesses (S corporations, partnerships and sole proprietorships) whose income is reported directly on individual tax returns and is not subject to the corporate income tax. Failing to include business income on a consistent basis would tend to overstate top income shares after TRA86 compared to before its enactment. The effects can be seen in Table 1. In 1962, the combined effect of including corporate retained earnings and corporate taxes increased the top 1% share by about 3.2 pp. By 2014, the increase was only 0.7 pp. An additional factor in this change is that the share of corporate ownership in retirement accounts grew from about 5 to 50 percent over this period. Assets in these accounts are more equally distributed than direct corporate ownership.

Other adjustments necessary to conform to national income have smaller effects on top income shares, although they may be important for ranking individual tax units and for other parts of the distribution. These adjustments include technical income corrections and accounting for sources of income missing from tax returns: income accruing in retirement accounts, underreported income, and imputed rent. Corrections for technical features of income reporting on tax returns make our income definition more consistent over time. For example, we add back deductions for net operating loss carryovers, which reflect losses incurred in prior year, and subtract gambling losses included in itemized deductions up to the amount of gambling income, which better reflects net income from this source.

We allocate income accruing inside retirement accounts (i.e., inside buildup) based on wages for defined benefit accounts and asset ownership for defined contribution accounts. Underreported income is defined here as the difference between national income totals and amounts reported in tax data for wages and pass-through businesses. As discussed below, we allocate these underreported amounts based on detailed IRS audit studies that are representative of the entire filing population. Finally, we add imputed rent, the non-taxable value of living in owner-occupied housing net of expenses.

After-tax/transfer national income accounts for the effect of transfers and taxes, as well as government surpluses or deficits and government consumption. Starting with our measure of pre-tax national income, we first add transfers. As discussed earlier, the increasing size of transfers results in larger reductions in top 1% income shares over time: 0.5 and 1.9 pp in 1962 and 2014.

Subtracting taxes reduces top 1% income shares by 1.9 and 2.5 pp in 1962 and 2014. This increasing effect is due to the growing progressivity of individual income taxes that resulted from tax credit expansions and other changes that primarily benefitted lower- and middle-income households (Splinter 2019b). This is partially offset by decreasing progressive effects from corporate taxes.

We allocate government surpluses or deficits by federal taxes. Historical experience suggests that federal surpluses have been followed by tax cuts (e.g., 1964 and 2001) and large federal deficits have preceded tax increases (e.g., 1982, 1984, and 1991). The surplus in 1962 therefore slightly increases top income shares and the deficit in 2014 decreases them. Finally, we add government consumption, which includes non-transfer spending consisting primarily of education and national defense expenditures. These expenditures are allocated half per capita and half by income. While recognizing uncertainties involved in allocating government expenditures, our approach acknowledges both that the benefits of government services may increase with income as well as the public goods aspect of government consumption.[7]

C. Comparison with Piketty, Saez, and Zucman

Our estimates differ considerably from those in PSZ, especially for the most recent periods. This section examines the reasons for these differences and shows their effects on top 1% shares in Table 1. The largest differences from PSZ include our differing assumptions for allocating retirement income and our more careful treatment of business losses. In recent years, the largest difference is in allocating underreported income, part of which is from our accounting for business losses.

Before considering specific differences, it is important to note that PSZ have made several important improvements over their earlier paper. These include using a broader definition of income that accounts for total national income and basing income groups on adults (i.e., primary and secondary taxpayers). The definition of national income does not include transfer payments, but PSZ finessed this issue by including Social Security and unemployment compensation benefits and netting out the associated payroll taxes. In addition, many of our estimated effects of including income not in tax data are very similar to PSZ. For example, we use similar approaches to allocate corporate retained earnings and estimate that including employer-sponsored insurance benefits reduce the top 1% share by similar amounts.

The first difference to consider is units of observation and sample selection. PSZ changed from tax units to the number of adults to set income groups and evenly split incomes of married couples by dividing them in half. While it accounts for the decline in marriage rates, the PSZ approach does not account for the increase in single-parent households or decreasing household size and also implies no economies of scale in households. The PSZ approach reduces the top 1% share by 0.7 pp in 1962 and by 1.6 pp in 2014. Our approach bases income groups on all individuals and ranks by size-adjusted income. While we both exclude filers under age 20, our analysis also excludes dependent filers age 20 and over and non-resident filers who are not in the baseline population. While our results are very similar in 1962, by 2014 the PSZ approach decreases the top 1% share by 0.6 pp less than ours.

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[7] Our approach is half way between the two extremes considered by Congressional Budget Office (2013).

Different treatments of retirement account income result in large differences in estimated top income shares. Our 2014 private retirement income is about half from taxable amounts reported on tax returns and half from non-taxable income accruing in retirement accounts. The top 1% receives about 2 percent of taxable retirement income and almost 10 percent of retirement account income associated with retirement wealth. This allocation is comparable to Federal Reserve economist estimates that the top 1% by wealth owns about 8 percent of retirement wealth (Devlin-Foltz, Henriques, and Sabelhaus, 2016). For 2014, PSZ online data suggest they overstate top income shares by allocating about 16 percent of private retirement income to the top 1%, a much higher share than suggested by either taxable retirement benefits or retirement wealth estimates. This results from PSZ using non-taxable retirement income as well as taxable retirement income amounts reported on tax returns to allocate this income. Nearly all of these non-taxable amounts reflect rollovers of assets that should not be treated as retirement income for this purpose.

Another important difference is the treatment of business losses. Our analysis accounts for business losses in three ways not done in PSZ: the effects of TRA86 in limiting the deduction of losses on passive investments, the fact that net operating loss carryovers do not reflect current-year income, and that a significant share of underreported business income is from tax returns with losses. Although not shown separately in Table 1, we estimate that imposing post-TRA86 loss limits in earlier years to make business income consistent over time increases the top 1% share in 1985 by 0.5 pp. Removing net operating losses in 2015 reduces the top 1% by 0.5 pp. Relative to tax return income, these two adjustments result in a 1 pp smaller increase in the top 1% share. As discussed in more detail in the next section, we also account for business losses in allocating underreported business income, which explains part of our difference with PSZ top 1% shares.

Important steps to getting to total national income are allocating corporate retained earnings and corporate taxes. Our approach to allocating corporate retained earnings is very similar to PSZ. As a result, our estimated effects on top income shares are almost identical. The allocation of corporate taxes, however, is an issue which continues to challenge economists. As compared to our allocation of one-quarter to wages—as done by the CBO[8]—and three-quarters by corporate capital ownership, PSZ allocate it by all capital ownership. The larger PSZ allocation to the top 1% in recent years results from the increasing share of capital held by pass-through businesses. Smith et al. (2019), however, concluded that most pass-through income from S corporations reflects human capital rather than the conventional understanding of capital likely to be affected by corporate taxes.

After-tax/transfer income incorporates the effects of adding transfers and subtracting taxes. PSZ estimates suggest that the top 1% share of after-tax/transfer income increased by 5.6 pp from 1962 to 2014 compared to only 0.2 pp in our estimates. Most of this difference, however, is a result of the 4.6 pp difference in pre-tax income increases.

The PSZ estimates of the effects of adding transfers on the top 1% share is virtually identical to ours. While PSZ estimates of the effects of taxes on top 1% shares are larger than ours by 0.5 pp or less, the differences over time are almost the same.

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[8] Estimates by Liu and Altshuler (2012) and Suárez Serrato and Zidar (2016) suggest that wages bear an even larger share of the corporate tax.

When estimating effective tax rates, as opposed to the effect of taxes on income shares, our results differ significantly from PSZ. Our estimates show that tax rates are significantly higher for high-income groups than for low-income groups. This suggests the overall tax system is progressive and is similar to the pattern for federal taxes found by the CBO and the Tax Policy Center. In comparison, the PSZ tax rates are much flatter over the income distribution. By shifting underreported income away from the bottom of the distribution and to the top of the distribution (relative to our audit-based approach), PSZ calculations increase average effective tax rates for low-income taxpayers and decrease tax rates for high-income taxpayers. In addition, the PSZ income definition excludes transfers other than Social Security and unemployment compensation and subtracts the payroll taxes for these programs. This reduces income for low-income taxpayers, thereby further increasing estimated tax rates for this group relative to broader measures of income typically used to estimate effective tax rates.

The PSZ approach for allocating government surpluses or deficits results in a 1.0 pp increase in top 1 percent shares since 1962, relative to our approach. While we allocate surpluses and deficits by federal taxes, PSZ allocate them half by all taxes paid and half by transfers received in the current year. Their approach implies that deficit financing effectively offsets a portion of transfers actually received. While large deficits may eventually result in some cutbacks in transfer programs, this assumption is inappropriate from a current-year perspective. Although it has little effect on the trend, the PSZ allocation of government consumption by after-tax income increases top 1 percent after-tax/transfer shares by three-quarters of a percentage point in both 1962 and 2014 compared to our approach. This is because their allocation essentially implies that government consumption has no additional redistributive effect relative to after-tax/transfer income. As discussed earlier, we allocate it half per capita to account for the public goods aspect of this spending.

III. Issues in Measuring Income: Alternative Definitions, Tax Reforms, Underreported Income and Tax Avoidance

While the earlier part of the paper presented our methodology and results and discussed reasons why our results differ from PSZ, some income measurement issues deserve additional attention. This section examines alternative definitions of income, changes in the tax base reported on individual returns due to tax reforms, the underreporting of income due to tax evasion, and how high-income tax avoidance has evolved over time.

A. *National Income, Personal Income, and Other Income Measures*

Many different income measures are used to estimate the distribution of income. This section briefly discusses the major components of national income and other commonly used income measures.[9] National income is the sum of compensation of employees, proprietorship income, net interest, rental income, and corporate profits; which equals GDP plus foreign-source income less capital depreciation. Thus the conceptual basis for national income is earnings from both labor and capital. Transfers are not considered in determining total national income.

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[9] See Rose (2020) for additional discussion of alternative definitions of income and income data.

Personal income is defined as all income of persons. A large share of personal income sources are the same as for national income and total personal income is about equal to total national income. Personal income, however, excludes social insurance taxes and includes cash and non-cash transfers: Social Security benefits, unemployment insurance, veterans' benefits, Medicare, Medicaid, and other similar benefits. Instead of including all economic income of corporations, personal income includes only dividends received by individuals. Fixler, Gindelsky, and Johnson (2019) and other papers by these authors have estimated the distribution of personal income.

Another long-standing approach used by public finance economists has been to obtain broader measures of economic income than that reported on tax returns by including additional sources received or accrued in a given year, although not targeting national income. Examples include studies by Pechman and Okner in the 1960s and 1970s, transfer-inclusive cash income used by Treasury's Office of Tax Analysis, and expanded income used by the staff of the Joint Committee on Taxation.

Other studies have used narrower definitions of income that can produce misleading distributional estimates because of the omission of important sources of income. Census money income omits capital gains (or any related measure such as corporate retained earnings on stock holdings) and non-cash transfers. In addition, survey-based estimates suffer from measurement error, especially in the bottom and top tails of the distribution (Bollinger et al., 2019). While tax data can attenuate this measurement error, fiscal income as defined in Piketty and Saez only includes non-transfer income reported on tax returns, missing up to 40 percent of national income.

Since a large fraction of national income is not reported on individual tax returns (or related information returns), it must necessarily be imputed when using tax data. While a number of missing income sources can be reasonably allocated using data available in surveys, the distribution of some income components is inherently ambiguous. Estimates of the income distribution will therefore always be subject to some uncertainties. For this reason, in other work we present sensitivity analysis (Auten and Splinter, 2019a). For example, accounting for income from unreported offshore wealth increases top 1% income shares by only about 0.3 pp in 2014. Combining the effects of several alternative allocation assumptions that increase or decrease the top 1% income share results in changes of about 1 pp. This analysis suggests a relatively narrow range around our main estimates.

B. Tax Reforms Affecting Fiscal Income of High-income Taxpayers

The income tax system in the 1960s was characterized by high statutory tax rates but relatively modest effective tax rates for the top of the distribution. Hellerstein (1963) concluded that this was because the tax base was "full of leaks, loopholes, exemptions and preferences." The combination of high tax rates and loopholes provided both the incentive and opportunity for tax avoidance. This situation was described as "dipping deeply into great incomes with a sieve."[10] While some loophole closing provisions were enacted starting in 1969, the Economic Recovery Tax Act of 1981 created new opportunities for tax shelters. Some of these new sheltering

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[10] First used by Simons (1938) to describe the tax system in the 1930s, this phrase was later used to describe the situation in the 1960s.

opportunities were limited in 1982 and 1984, but major reform was not accomplished until TRA86.[11]

TRA86 was based on the principle of lowering tax rates and broadening the tax base to achieve revenue and distributional neutrality. Individual income tax rates were reduced and simplified to two basic rates: 15 and 28 percent. To achieve distributional neutrality and target tax shelters, the base broadening was targeted at the top of the distribution. The 60 percent exclusion for long-term capital gains was repealed, increasing the top capital gains rate from 20 to 28 percent. Real estate tax shelters were addressed by lengthening depreciation periods and making the tax rate on capital gains the same as that on ordinary income. Deductions for rental losses were capped and phased out for high-income taxpayers, and the use of passive losses on investments to offset positive income was limited. These changes resulted in higher reported incomes on the individual tax returns of wealthy taxpayers.[12]

TRA86 also created strong incentives to change the form of business organization. Before TRA86, the top individual tax rate was greater than the top corporate tax rate (50 vs. 46 percent), causing shifting into C corporations (Gordon and Slemrod, 2000). After TRA86, the top individual tax rate was less than the top corporate tax rate (28 vs. 34 percent), causing shifting into pass-through businesses (S corporations, partnerships, and sole proprietorships). This shifting of entity form further increased reported top incomes because pass-through income is reported directly on individual tax returns but C corporation retained earnings are not. This shift from C corporations to pass-through businesses caused an exaggerated jump in top fiscal income shares in the late 1980s. Measures based on national income address this issue by including corporate retained earnings, which was more important prior to TRA86.

C. Underreported Income

U.S. national income includes estimates of underreported income, which are based on periodic detailed audit studies by the IRS. These audit studies are based on stratified random samples of tax returns representative of the potential for underreporting. They are much more comprehensive than normal operational audits, making full use of information returns and generally requiring taxpayers to provide adequate proof of income and deductions. Based on the extent of information reporting, the IRS increases the amounts found to account for income not found. Early studies were called the Taxpayer Compliance Measurement Program (TCMP). Starting in 2001, these were replaced by the National Research Program (NRP).

Table 2 shows the distribution of underreported business income in the 1988 TCMP. Since research on the income distribution is based on reported incomes (i.e., underreporting-inclusive incomes are not observed in annual tax data), the table shows the distribution by adjusted gross income (AGI) as originally reported on income tax returns. One notable result is that the percentage

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[11] For further insights into the base-broadening movement leading up to TRA86 and previous expansions of tax shelters, see Pechman (1987) and Bakija and Steuerle (1991).

[12] While the focus in this section is on longer-term effects of TRA86, there were also important short-term shifting responses that had temporary effects on top income shares. The unlocking of capital gains in 1986 to realize gains ahead of the rate increase roughly doubled reported gains. In addition, ordinary income was deferred to 1988 to be taxed at a much lower rates. Both of these resulted in temporary spikes in top 1% income shares. See Auten, Splinter, and Nelson (2016).

change in income from adding underreported income is highest at the bottom of the distribution and declines among returns with higher reported incomes. For taxpayers with a negative AGI, usually the result of current-year business losses and/or large net operating losses carried over from prior years, the TCMP found enough income to make the overall corrected income of this group positive. In some cases, adding underreported income moves taxpayers from the bottom of the distribution to the top 1%. For the bottom two quintiles by reported income, business income is increased by more than 400 percent. For the top 1% by reported income, business income is increased by only 10 percent. Recent research suggests that these patterns persist through recent periods and confirm the importance of accounting for overstated business losses when allocating underreported income (Auten and Langetieg, 2020).

Table 2: Underreporting rates of pass-through business income by reported AGI, 1988

Reported AGI group	Reported on return	Income gap	Corrected income	Percentage change in income	Share of income change	Share of positive business income (PSZ)
Less than $0	-10	20	10	∞	13%	1%
0-40 (excl. < $0)	9	42	51	441%	27%	6%
40-80	34	50	84	145%	32%	19%
80-95	32	24	55	75%	16%	16%
95-99	40	11	51	26%	7%	20%
Top 1%	77	8	85	10%	5%	38%
Total	183	153	336	84%	100%	100%

Notes: Pass-through business income includes net income of sole proprietorships, partnerships, and S corporations.
Source: Tabulations by the authors of the 1988 Taxpayer Compliance Measurement Program File.

Auten and Splinter (2019a) national income estimates are based on the results of these TCMP and NRP data.[13] In contrast, PSZ allocate underreported business income in proportion to positive amounts of reported business income. Their approach implies that all those who do report large amounts of income have hidden even more and nearly doubles highly concentrated pass-through income of the top 1% in many years. Moreover, the PSZ approach disregards underreporting on returns with business losses. In 1988, for example, our audit-based approach allocates about one sixth of underreported business income to returns with negative AGI, compared to almost none being allocated to these returns with the PSZ approach.

In recent decades, these differences in allocating underreported income explain one third of the larger PSZ top 1% pre-tax shares. In 2014, about $500 billion of the income of the top 1% came from the profits of pass-through businesses.[14] This represented about 50% of total positive pass-through income, and therefore PSZ allocated about half of underreported pass-through income to the top 1%, or about $350 billion. In comparison, the 2001 NRP audit study shows that

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[13] This paper's estimates use the 1988 audit distribution to allocate underreported income in years prior to 1992 and the 2001 audit distribution for later years. Since the focus of these audit studies is the overall amount of missing tax revenue, there are few published studies providing information on the distribution of underreported income. One exception using the 2001 NRP study data is Andrew Johns and Joel Slemrod (2010).

[14] This number is based on Piketty and Saez (2003) online data as currently updated.

only 5% of the underreported income of filers was received by the top 1% by *reported* income (Johns and Slemrod, 2010). Based on the NRP data and accounting for non-filer underreporting, we allocate about $35 billion to these returns. Re-ranking from adding underreporting income means our final top 1% has a bit more underreported income than the initial allocation suggests.[15] This difference of more than $300 billion results in PSZ increasing top 1% income shares by about 2 pp more than our audit-based approach.

The PSZ estimates are the basis for U.S. incomes in the World Inequality Database,[16] which is intended to allow international comparisons of income distributions. Because of concerns about some of the assumptions behind the U.S. data, especially regarding the allocation of retirement and underreported income, we hope that improvements can be made to this important new database.

D. Changes in Tax Avoidance

Given the tax rules in effect in the 1960s, the introduction of information reporting on additional types of income, and the effects of TRA86 in closing tax shelters and inducing the shift of businesses from corporate to pass-through form, it is no surprise that changes in tax avoidance help explain the increase in top fiscal income shares. Saez (2020), however, dismisses the importance of the tax-avoidance channel based on two arguments: (1) a perceived inverse relationship between top statutory tax rates and top income shares and (2) high-income charitable contributions. Evidence suggests that both arguments are flawed.

While top federal individual tax rates and pre-tax top income shares since 1960 could appear to have a negative correlation, this is fully driven by changes in TRA86: a large drop in the top tax rate, base-broadening, and entity-shifting. Using our top 1% pre-tax national income shares, for 1960–2015 the correlation with top tax rates is –0.58, consistent with the negative correlation narrative. But for the sub-periods 1960–1986 and 1988–2015 the correlations are +0.61 and +0.23. Removing the effects of TRA86 reverses the sign of the correlation, suggesting no consistent relationship between top rates and income shares.

There are additional issues with such correlation analysis. The fraction of taxpayers subject to the top rate has changed dramatically. For example, in 1962, only 0.001 percent of tax units were subject to the top tax rate, while in 1988, it was more than 20 percent and in 2014, it was 0.6 percent.

With respect to charitable giving, Saez (2020) argues that because deductions for charitable contributions of the top 1% increased from 35 percent to 80 percent of average economy-wide income since the 1960s, this shows that "their ability to give has grown almost parallel to the share of their reported income" and thus their income share must have increased as well. Leaving aside the question of whether this is a sensible comparison, it is important to note that these numbers are partly explained by changes in tax laws. In the 1960s, deductions for charitable contributions were limited to 30 percent of AGI for donations to certain 501(c) charitable organizations and 20 percent

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[15] Johns and Slemrod (2010) shows that the top 1% shares of reported income and true income after adding underreported income are essentially the same, but that the top 1% by reported income receives a less than proportional amount. This apparent contradiction is reconciled by the effects of re-ranking by true income.

[16] Information can be found at https://wid.world/country/usa/

for other donations, including to donations to private foundations. Starting with the 1969 Act, these limits were increased to 50 and 30 percent (20 percent in some cases), allowing much larger deductions of charitable contributions. Furthermore, AGI in the 1960s included only 50 percent of capital gains making the limits on maximum charitable deductions even stricter than implied by the percentage limits alone. Since post-TRA86 law income includes all capital gains, this further relaxed the contribution deduction limits.

IV. Distribution of Economic Growth

Comparisons of cross-sectional inequality over time have been used in Saez (2013) and elsewhere to calculate the "fraction of total growth (or loss) captured by top 1%." Using this method, updated estimates by Piketty and Saez suggest that the top 1% received about three-quarters of the increase in fiscal income between 1979 and 2014. But the question of who has benefited from economic growth can only be answered by using data that tracks individuals over time, such as the panels used in income mobility studies.

The basic issue is that it's not the same people at the top all the time. Instead, there is substantial turnover. For example, Auten, Gee, and Turner (2013) examined persistence in the top 1% before and after 2005. They found that 48 percent had not been in the top 1% the prior year and 39 percent dropped out of the top 1% by the next year. Only 16 percent were continuously in the top 1% for the five previous years and 24 percent for the five following years. From a longer-term perspective, they found that the combined Greatest Generation and Silent Generation occupied 79 percent of the top 1% in 1987. But by 2010 their share fell to 22 percent and they had been replaced by the Baby Boomers who occupied a 59 percent share. The turnover rate is also high on the 400 taxpayers with the highest incomes. Over the period from 1992 to 2008, the Internal Revenue Service (2010) found that over 3,600 taxpayers appeared in this group. Over two-thirds of primary filers appeared only once and fewer than 10 appeared in all 17 years.

Another perspective in the mobility literature comes from examining the income changes of taxpayers initially in top or bottom-income groups. While the cross-sectional approach implies high income growth for top income groups and little growth for bottom income groups, mobility studies tracking the same individuals over time show that most of those in the top 1% in the base year experience income decreases while those starting at the bottom have the largest increases. Between 1996 and 2005, Auten and Gee (2009) estimated that for those starting in the top 1%, almost 70 percent had income *decreases*, while 80 percent of those initially in the bottom quintile had income *increases*. Those in the top 1% (excluding the top 0.1%) had average real income declines of 37 percent, while those in the top 0.01% had declines of 67 percent. Similarly, Splinter (2019a) followed the same primary taxpayers in 1980 and 2014 and found that real incomes decreased for those starting in the top income quintile, but more than doubled for the bottom two quintiles, which earned about three-fourths of fiscal income growth.

Van Kerm (2009) found similar results for other countries including Greece, Ireland, Italy, and Portugal. For Britain, Jenkins and Van Kerm (2016) concluded that "…from a longitudinal perspective, the pattern of individual income growth is progressive: the lower the rank in the base-year distribution, the greater the expected income growth. Expected income growth, absolute or proportionate, is positive for the majority of individuals, but negative for individuals in the richest fifth in the base year."

Mobility studies illustrate that most of those at the top in a particular year earn little, if any, of the economic growth in following years and those in the lowest income groups experience the largest increase in following years. While some of this reflects transitory income and life cycle effects, the mobility literature highlights the importance of keeping in mind that it is not the same people at the bottom and the top over time.

V. Conclusion

Using tax data to estimate income inequality over long time periods is difficult because of social changes, tax policy changes, and the nearly 40 percent of national income missing from tax returns. Our analysis accounts for important social and tax policy changes, adjusts for important technical issues in using income reported on individual tax returns, and includes estimates of missing income. We show step-by-step how our adjustments affect top income shares and compare our approach to those of Piketty and Saez and Piketty, Saez, and Zucman.

It is important to note that our analysis is not intended to make any normative judgements about the distribution of income, transfers, or taxes. Instead, our research is intended to improve upon prior estimates by addressing the challenges posed by changes in social and economic conditions and changes in how and where income is reported in tax data. Because an increasing share of national income is not reported in tax data, all such estimates necessarily involve a degree of uncertainty. In addition, there are many areas where information is currently lacking, but we may learn more in the future.

Other studies have found results similar to those we report in this paper. Using the Survey of Consumer Finance, Bricker et al. (2016a) estimate that between 1988 and 2012 the top 1% pre-tax income share increased 3 percentage points. Using internal Census data to deal with top-coding, Burkhauser et al. (2012) estimate that between 1967 and 2004 it increased only 2 percentage points. Combining survey and tax data, Fixler, Gindelsky, and Johnson (2019) estimate a 2012 top 1% share of personal income of 13 percent, similar to our pre-tax/after-transfer share.

Our estimates are that pre-tax top 1% national income shares increased only 3 percentage points (from 11 to 14 percent) since the early 1960s, with a decline of about 2 percentage points from 1962 to 1979 and an increase of about 5 percentage points from 1979 to 2015. After accounting for taxes and transfers, our estimates suggest that the top 1% share was almost unchanged between 1962 and 2014. Redistribution from transfers and taxes almost fully mitigated the increase in pre-tax top income shares. This resulted from the growth of transfers from 5 to 17 percent of national income and more overall progressivity in the tax system, primarily due to increases in refundable credits and other tax reductions targeted at lower- and middle-income taxpayers. Another important finding is that real incomes of the bottom 50% have increased rather than stagnated. Finally, we find that claims that most of economic growth has gone to the top of the distribution are misleading. Panel data show that those starting with low incomes have the largest percentage increases while incomes fall for those at the top. Moreover, it is not the same people at the top over time.

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