



How Different Studies Measure Income Inequality in the US

Piketty and Company Are Not the Only Game in Town

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Piketty and Saez (2003) found that income inequality rose substantially between 1979 and 2002 because the top 10 percent of the income distribution took 91 percent of the income growth during that period. As the real incomes of the top 10 percent soared, the incomes of the bottom 90 percent stagnated. Piketty and Saez’s findings garnered tremendous attention and were cited repeatedly. But many researchers eventually found problems with Piketty and Saez’s approach and developed income inequality measures that led to different findings.

Though measuring inequality seems straightforward and uncontroversial, methodological issues greatly affect findings. Even Piketty, Saez, and Zucman (2018) reported new results based on a completely different approach from Piketty and Saez (2003). This brief presents the intricacies of several income inequality studies and explains their different results.

Before presenting data and findings, I clarify the terms used in these studies and point out key methodological decisions that influence a study’s results. An accompanying technical brief explores these issues in depth (Rose 2018).

The Studies

The main studies evaluated in this brief are

- Piketty and Saez’s 2003 article (with updates through 2014), “Income Inequality in the United States, 1913-1998”;

- data from the March supplement of Current Population Survey (CPS), as reported in DeNavas-Walt and Proctor (2015);
- Rose’s 2016 report, *The Growing Size and Incomes of the Upper Middle Class*;
- Burkhauser, Larrimore, and Simon’s 2011 working paper, “A Second Opinion on the Economic Health of the American Middle Class”;
- Piketty, Saez, and Zucman’s 2018 article, “Distributional National Accounts: Methods and Estimates for the United States”;
- the Congressional Budget Office’s (CBO) 2018 report, *The Distribution of Household Income, 2014*; and
- Auten and Splinter’s 2018 report, *Income Inequality in the United States: Using Tax Data to Measure Long-term Trends*.

I chose these and the other studies mentioned because they report trends in income inequality after 1979. This brief covers all the major studies and shows how and why they have different results.¹

What Constitutes Income?

The most common view of income is cash received during a year from working, dividends, interest, rents, and government programs (e.g., Social Security, unemployment insurance, Temporary Assistance for Needy Families, and the earned income tax credit). Economists believe this list does not cover the value of economic resources people consume and suggest it should include some combination of employer contributions for health insurance and 401(k) retirement accounts, the employer share of the Federal Insurance Contributions Act, and government noncash benefits (e.g., the Supplemental Nutrition Assistance Program, Medicare, Medicaid, and housing vouchers). Some income definitions include housing services (homeowners paying rent to themselves) and government services (e.g., defense, education, legal system, and administration).

Further, many researchers feel that after-tax income is the most relevant measure of well-being and deduct all federal, state, and local taxes on people, businesses, sales, and property.

Reporting Size-Adjusted Income

Once a total income is determined for each family or person, those with identical incomes won’t have the same standard of living if they have different household compositions.² Government reporting on poverty is based on separate thresholds for each family depending on the number and ages of household members, and many researchers adjust incomes for family size.

Adjusting for Inflation

Price deflators adjust for inflation by turning nominal dollars (in this case, the income generated in each year) into real dollars, which provides a consistent measure of purchasing power over time. Currently, the Bureau of Labor Statistics, the Census Bureau, and many researchers use the consumer price index research series using current methods (CPI-U-RS) to adjust for inflation. Government economists prefer the chained consumer price index, but Congress prohibited this approach. Because no historical data are available on the chained consumer price index, many researchers use the personal consumption expenditure (PCE) price deflator, reported by the Bureau of Economic Analysis, as the most accurate inflation measure. The PCE aligns closely with the chained consumer price index during the years in which data on the chained consumer price index are available (through 1929). Compared with the CPI-U-RS, the PCE shows less inflation and more income growth over time.

Methodological Choices

Simply, there is no methodological agreement between the studies' income measures. In 2001 and 2011, the Expert Group on Household Incomes recommended using posttax, posttransfer, and postemployer benefits and adjusting for family size to report incomes (Canberra Group 2001, 2011).

Income Inequality Measures

Change in Median Incomes

Although not an inequality measure, median income reflects middle class living standards. The real growth rates in median income from 1979 to 2014 from six income inequality studies vary from -8 percent to 51 percent (table 1). Piketty and Saez (2003) are the outlier, showing a real median decline of 8 percent.³ Two factors cause the low incomes and negative growth at the middle of the income ladder: First, Piketty and Saez only cover 61 percent of national income by excluding Social Security, all other government transfer payments, and employer health care contributions, which are fast-growing income sources for households in the bottom 75 percent of the income distribution. Second, Piketty and Saez use a tax filer as the unit of analysis and “create” tax records with estimated incomes for the 10 percent of people who don't file a tax return. But tax-filing units have grown faster than population growth because fewer adults are marrying, and new Internal Revenue Service rules have led to more people filing as single adults (from 44 percent in 1979 to 56 percent in 2014). Because single filers tend to have much lower incomes than married filers, median incomes are much lower.

Conversely, Piketty, Saez, and Zucman (2018) show a real gain of 33 percent over these years. Several reasons account for the 41 percentage-point difference between this and the Piketty and Saez study: First, adjusting for taxation and including all components of national income, especially employer benefits, government transfers to the elderly, and government provision of services (e.g., Medicare, Medicaid, Supplemental Security Income, and Temporary Assistance for Needy Families) increases median income growth by 14 percentage points. Second, the national income price deflator (which is

closer to the PCE than the CPI-U-RS) adds another 7 percentage points. Third, Piketty, Saez, and Zucman use all Americans ages 20 and older as units of observation, compared with just tax filers in Piketty and Saez, increasing median income by another 20 percentage points.

Finally, Piketty, Saez, and Zucman do not adjust incomes for household size, even though the study claims this would more accurately reflect standards of living. CBO (2018) and Rose (2016) show that adjusting for family size adds 8 more percentage points to median income growth over these years.

The widely cited CPS data show only a 7 percent increase in median income from 1979 to 2014 (DeNavas-Walt and Proctor 2015). Using those same data, Rose reports a 30 percent increase because he uses a price deflator that shows more growth and less inflation, adjusts for family size, and uses independent adults as the unit of analysis rather than households.⁴ This last factor is significant because couples have considerably higher incomes than single-adult households. Therefore, a couple and one child would be treated as one observation in the CPS and two observations in Rose's study.

Both Rose and the CPS exclude employer benefits and government services that directly serve people (total CPS incomes account for less than 60 percent of national incomes). If Rose included employer-paid and government-provided noncash benefits and adjusted for taxes and income underreporting, then real median income growth in his study would be over 40 percent.

Burkhauser, Larrimore, and Simon (2011) also start with raw CPS data (through 2007) and add the value of employer and government health benefits. Adjusting posttax incomes for family size, the study finds that real median income grew 37 percent from 1979 to 2007. If this study had used the PCE as the price deflator, real median growth would have been 5 percentage points higher.

Finally, CBO (2018) reports 75 percent of national income by including employer benefits (including the employer's Federal Insurance Contributions Act share and federal unemployment taxes) and higher capital and pension income than the CPS.⁵ CBO then adjusts income for household size, deducts all federal taxes that were included in worker's compensation, and adds noncash benefits (mostly the insurance value of Medicare and Medicaid). With these additions, the 2014 median income in CBO's study was much higher than CPS's 2014 median (\$77,100 versus \$53,000). CBO's measure of income grew 51 percent after adjusting for taxes and family size.

CBO's median income grew more than in the other studies because of strong growth in the bottom three income quintiles: 69 percent for the bottom quintile, 39 percent for the second quintile, and 36 percent for the middle quintile. In other studies, growth was slowest in the bottom two quintiles. CBO's estimates differ from other studies' because they include the monetary value of many government transfer programs (including the insurance value of Medicare and Medicaid). In the other studies cited in table 1, government benefits were either not included or contributed little to income growth in the bottom three quintiles.

TABLE 1

Median Income Growth, 1979–2014

Study	Change in median (%)	Price deflator	Income concept	Adjust for size	Unit of analysis, 2014
Piketty and Saez (2003)	-8	CPI-U-RS	Gross income as reported on tax forms without government transfers	No	165 million tax filers ^a
CPS	7	CPI-U-RS	Pretax, postcash transfers and no employer benefits	No	123 million households
Rose (2016)	30	PCE	Pretax, postcash transfers and no employer benefits	Yes	186 million independent adults
Piketty, Saez, and Zucman (2018)	33	National income deflator	All national income including homeownership and government services	No	234 million adults age 20 and older
Burkhauser, Larrimore, and Simon (2011) ^b	37	CPI-U-RS	Posttax, posttransfer income with health benefits	Yes	117 million households
CBO (2018)	51	PCE	Posttax and post- and noncash transfers and employer benefits	Yes	310 million people

Sources: Table 2C13 in Piketty, Saez, and Zucman's (2018) "Appendix II: Detailed distributional series"; table 2D13 in Piketty and Saez (2003); Supplemental Data Spreadsheet #4 in CBO (2018); Rose (2016); and Burkhauser, Larrimore, and Simon (2011).

Notes: Piketty and Saez (2003) has been updated to 2014 and includes capital gains.

^aSome low-income people do not file tax returns. Piketty and Saez (2003) created tax records by giving them an imputed amount of income.

^bThis study compares 2007 with 1979; the 2007 median income is very close to the 2014 median.

All six studies used CPS and/or Internal Revenue Service data, thus their different findings arise from methodological choices. Piketty and Saez use only Internal Revenue Service records, excluding government transfer payments. Rose as well as Burkhauser, Larrimore, and Simon use CPS data. All studies except Piketty and Saez would show real median income gains of over 40 percent between 1979 and 2014 if they used similar units of observation and reported posttax, posttransfer, post-employer benefits and size-adjusted incomes, as recommended by the Expert Group on Household Incomes (Canberra Group 2001, 2011).

Share of Income Growth Captured by the Top 10 Percent

Piketty and Saez (2003) made income inequality a major public issue when they reported that the top 10 percent of the income distribution monopolized income growth between 1979 and 2002. Figure 1 shows the share of income growth between 1979 and 2014 that went to the richest 10 percent of the population, per four studies.⁶

Using Piketty and Saez's methodology and including capital gains, 100 percent of the income growth during this time went to the top 10 percent, because the average income of the bottom 90

percent of the income distribution did not grow over these years. Without growth, the income shares of the bottom 90 percent plummeted from 66 percent in 1979 to 49 percent in 2014.

Piketty, Saez, and Zucman (2018) report that the wealthiest 10 percent of the population received 55 percent of income growth, differing greatly from Piketty and Saez (2003). Instead of including only tax filers, Piketty, Saez, and Zucman include all adults. They also include all sources of income, use a different price deflator, and examine posttax, rather than pretax, income.

The CBO's (2018) report does not add as many income sources but includes employer-paid benefits and government cash and noncash benefits. It finds that the top 10 percent of the income distribution received 46 percent of posttax, posttransfer growth, a figure slightly smaller than that of Piketty, Saez, and Zucman.

Auten and Splinter (2018) also allocate all national income, but they do so differently than Piketty, Saez, and Zucman. Auten and Splinter note that many high-income people control how and when they get paid. When marginal tax rates were high (at least 70 percent) before 1980, many executives and business owners minimized their cash payments and increased their ownership stakes' net worth. In 1986, marginal tax rates fell to 28 percent, thus changing executives' and business owners' compensation preferences. Consequently, Auten and Splinter developed a measure of "consistent market income" for each year.⁷

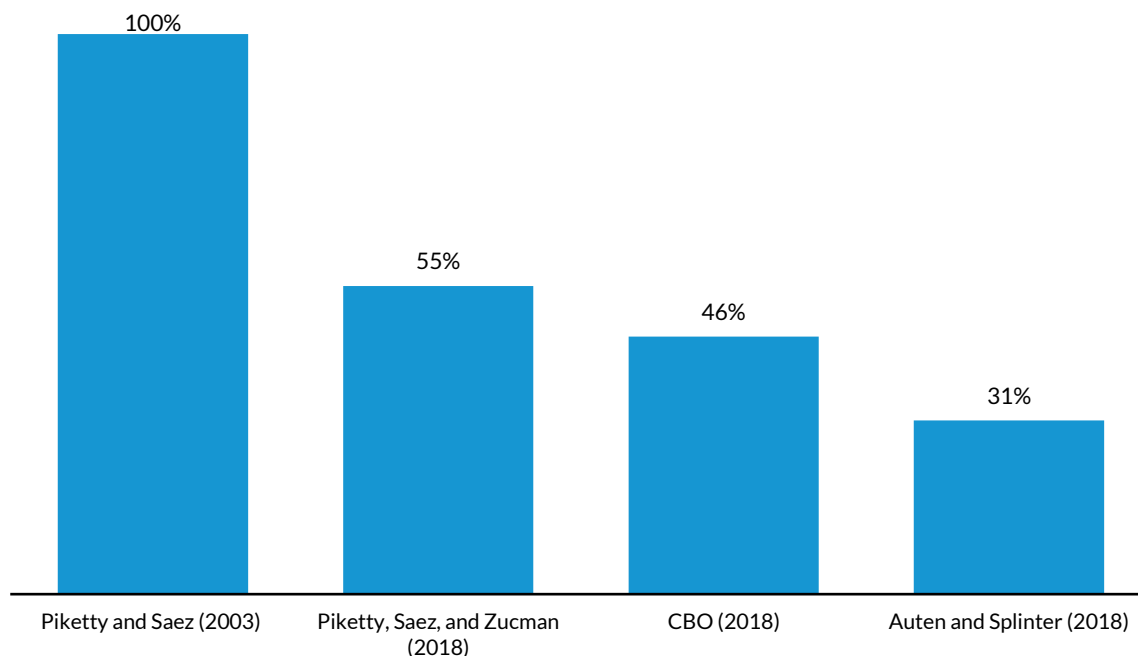
Auten and Splinter exclude dependent tax filers, adjust incomes for family size, and stratify, as CBO does, with equal numbers of people in each percentile. This approach is considerably different from that of Piketty, Saez, and Zucman, who count every person over age 19 (where married couples share joint income and dependents have only their personal income). This difference may seem trivial, but it leads to a much larger number of low-income cases in Piketty, Saez, and Zucman's report than in Auten and Splinter's.

Finally, Auten and Splinter allocate the 17 percent of national income that is collective consumption (e.g., defense, education, police, fire, courts, and administration) differently than do Piketty, Saez, and Zucman, who apportion this total per individuals' disposable income. Auten and Splinter evenly split collective consumption between per capita and posttax incomes. This difference moves about 3 percent of national income from the top 10 percent to the bottom 50 percent. Thus, Auten and Splinter report only 31 percent of income growth going to the top 10 percent between 1979 and 2014.

Piketty and Saez's study is an outlier, finding 100 percent of the growth going to the top 10 percent. Though the other studies' estimates vary, their average estimate of income growth going to the top 10 percent is 44 percent.

FIGURE 1

The Top 10 Percent's Share of Economic Growth, 1979–2014



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Notes: Figure shows top 10 percent of income distribution. Piketty and Saez is updated with capital gains. Piketty, Saez, and Zucman and Auten and Splinter report posttax income, and CBO reports posttax and posttransfer income.

The Wealthiest 1 Percent's Changing Income Share

The four studies in figure 1 reveal different trends in the top 1 percent's rising income share. Piketty and Saez's (2003) data include capital gains (but exclude taxes, nontaxable government transfers, and employer benefits) and show that the top 1 percent's income share grew from 10 percent in 1979 to 22 percent in 1983. After 1983, the top 1 percent's share of income rose to 24 percent, before declining slightly to 22 percent in 2014. Piketty and Saez find that the top 1 percent increased their share of income by 12 percentage points between 1979 and 2014 (table 2).

Again, Piketty and Saez are the outliers, finding the income share of the top 1 percent more than doubling as it grows by almost 12 percentage points. Piketty, Saez, and Zucman's methodology shows only a 6.6 percentage-point gain, over 5 percentage points less than Piketty and Saez's figure.

In contrast, Auten and Splinter's consistent market income series shows a much smaller gain in the top 1 percent's income share. Their 1979 estimate is similar to Piketty, Saez, and Zucman's, but their 2014 estimate is nearly 7 percentage points lower than Piketty, Saez, and Zucman's 2014 estimate. Auten and Splinter find less than a 1 percentage-point increase in the top 1 percent's income share between 1979 and 2014. Both Auten and Splinter and Piketty, Saez, and Zucman allocate all national income, but many of Auten and Splinter's methodological choices lead to less income growth among the top 1 percent and more income growth among middle- and lower-income people.

TABLE 2

Changes in Top 1 Percent's Income Share, 1979–2014

Study	1979 (percent)	2014 (percent)	Percentage-point change
Piketty and Saez (2003), pretax and updated with capital gains	10.0	22.0	11.9
Piketty, Saez, and Zucman (2018), posttax	9.1	15.7	6.6
Auten and Splinter (2018), posttax	8.2	8.8	0.7
CBO (2018), posttax	7.4	13.3	5.9

Sources: Piketty and Saez (2003); Piketty, Saez, and Zucman (2018); Auten and Splinter (2018); and CBO (2018).

CBO's (2018) estimate of the posttax income share of the top 1 percent in 1979 is 7.4 percent, lower than the other three approaches' estimates. CBO estimates the top 1 percent's income as 13.3 percent in 2014, slightly below the 2014 share found by Piketty, Saez, and Zucman. The growth in the share of the top 1 percent found by CBO is so much larger than that found by Auten and Splinter because CBO does not include many government noncash assistance activities that primarily benefit people in the bottom half of the income distribution (Early 2018).⁸

Three other studies are worth mentioning but don't have data for 1979 and 2014. Burkhauser and colleagues (2009) uses nonpublic CPS data to better estimate the top 1 percent's income. They argue that using households (rather than tax filers) as the observation unit and including government transfer incomes will reduce inequality, especially in posttax distributions. They report the first and last available data from 1967 to 2006 and find that the top 1 percent's share of income grew by 5 percentage points, one-half of Piketty and Saez's and Piketty, Saez, and Zucman's estimates over the same period.

Bricker and colleagues (2016) are researchers at the Federal Reserve Board closely involved in producing and disseminating information from the Survey of Consumer Finances.⁹ Because this triannual survey was first fielded in 1989 (reporting 1988 incomes), it is limited to the years in which the survey is available. Like Auten and Splinter's and Piketty, Saez, and Zucman's reports, this study attempts to allocate all national income to families and finds a small gain in the top 1 percent's income share, from nearly 16 percent in 1988 to nearly 18 percent in 2012.

Larrimore and colleagues (2017) find a small gain (under 2 percentage points) in the top 1 percent's income share. This study uses a combination of income tax records, the CPS, and the Survey of Consumer Finances to estimate capital gains accrual by year for every class of capital ownership, including homeownership by county and by tax-preferred retirement accounts. The combination of data sources allows more options to impute missing incomes. Because the study uses tax records for income and the Survey of Consumer Finances for capital income estimates, the study's analysis begins in 1989 and ends in 2013.

Once again, Piketty and Saez's findings of a 12 percentage-point gain in the top 1 percent's income share is an outlier. Two of the studies show sizeable gains of 5.9 and 6.6 percentage points, and four of

the studies show, at most, a 2 percentage-point gain. Excluding Auten and Splinter's low estimate, the top 1 percent's average gain across these five studies is about 3.5 percentage points.

Conclusion

As shown, researchers' estimates of income inequality differ significantly because they use different units of analysis, definitions of income, adjustments for family size, capital income measures (if any), and adjustments for inflation. And some studies provide estimates of both post- and pretax incomes.

The results from at least four studies were compared for three measures of income change: change in median incomes, share of growth captured by the top 10 percent, and the changing income share of the top 1 percent. In all cases, Piketty and Saez (2003) were the outlier, showing the most increased inequality. And in all three measures of income change, Piketty, Saez, and Zucman (2018) found much less growth in income inequality than Piketty and Saez (2003).

This brief does a meta-analysis of different findings to estimate a "consensus" level of change. Applying Canberra Group (2001, 2011) recommendations, I find that

- instead of stagnating, real median incomes grew by just over 40 percent (1 percent a year) from 1979 to 2014;
- the top 10 percent of the income ladder captured 45 percent of income growth from 1979 to 2014; and
- the share of the top 1 percent grew 3.5 percentage points.

All studies find that income inequality rose after 1979, but common perceptions that all income gain went to the top 10 percent and middle class incomes stagnated (or even declined) are wrong.

Notes

¹ Fixler and colleagues (2017) also study income distribution changes using an expanded definition of income but only report data for 2000 to 2012.

² Burkhauser, Larrimore, and Simon (2011) show that adjusting for size often changes a specific household's place on the income scale: For those in the first quintile of size-adjusted incomes, slightly more than half were in the bottom quintile of non-size-adjusted incomes; for the middle three quintiles, just over one-third were in the same quintiles of non-size-adjusted incomes. In the top quintile, two-thirds were in the same quintile of non-size-adjusted incomes.

³ The original data used the unadjusted historical consumer price index through 2008, when the study moves to the CPI-U-RS price deflator. If the unadjusted consumer price index was used for the 1979 to 2014 comparison, then the 2014 median income would have been 15 percent lower than the 1979 median.

⁴ Rose (2007) shows that real median income grew 33 percent between 1979 and 2005. This research includes the growth of employer benefits.

- ⁵ Following the consensus of tax economists, 25 percent of corporate taxes are allocated as being paid by workers, because workers' cash incomes would be higher if corporations did not pay corporate taxes. See CBO (2013) for a justification of this decision.
- ⁶ The CPS data only report income shares of quintiles and the top 5 percent.
- ⁷ This shift concerns how the top 1 percent reported their income: In 1968, 13 percent of the top 1 percent's income was from labor compensation and 25 percent was from corporate retained earnings. By 2014, 35 percent was labor compensation and 7 percent was from retained earnings.
- ⁸ Early (2018) only covers 2015 and doesn't show any changes over time.
- ⁹ Smeeding and Thompson (2011) and Wolff and Zacharias (2009) also use the Survey of Consumer Finances, but for a different time frame.

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