



# Measuring Income Inequality in the US

## Methodological Issues

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*December 2018*

**This brief discusses in depth the methodological issues of measuring income inequality in the US as discussed by Rose (2018). The primary issues concern different studies' definitions of income, datasets, units of analysis, income measures (market incomes only; total cash income with government transfers; and posttax, posttransfer income), income adjustments for household size, and the price deflators.**

## What Constitutes Income?

This basic question determines what is measured, and it does not have an easy answer. The classic Haig-Simons definition of income is the value of consumption plus change in net wealth.<sup>1</sup> But the more common view of income is the cash received during a year, consisting primarily of payments for work: wages, salaries, bonuses, and most self-employment income. Cash income also includes returns to ownership: dividends, interest payments received, business income, and rental payments. And some income measurements include payments to the elderly (pensions and Social Security) and monetary transfers to low-income people.

Many economists believe that this list does not cover the value of economic resources people consume, and they view employer-provided benefits as income for workers who receive them. Employer contributions for health insurance and 401(k) retirement accounts directly benefit workers and help shape current and future standards of living. Employers also pay taxes on their employees—6.2 percent to the Social Security Trust Fund, 1.45 percent to the Medicare Trust Fund, and between 1 and 10 percent for federal and state unemployment insurance.<sup>2</sup> These payments are often overlooked, but total compensation determines employers' employment decisions. Further, these employer payments

are significant and growing: employer benefits and taxes have grown from 10 percent of total worker compensation in 1979 to 15 percent in 2014.

Mishel and colleagues (2012) and other commentators suggest that benefits shouldn't be included in income calculations because recipients do not control them. But health insurance and the Social Security system were created because the services they fill were considered too important to leave to individual decisions; neglecting them could shortchange people's futures. If the government had chosen to not tax workers for these benefits, it could have mandated that everyone use his or her extra income to privately buy health insurance and create personal retirement accounts. But providing benefits collectively meant that lower-income people would be subsidized for getting higher retirement income than if they saved on their own and better health insurance than if they had to pay for it themselves.

People should also be credited for government services and payments, such as medical services in public clinics and veterans hospitals, the actuarial value of medical insurance (mainly Medicare and Medicaid), the Supplemental Nutrition Assistance Program, and housing vouchers. Except Medicare and Veterans Affairs services, these benefits require that recipients have low incomes.

Appreciation of financial assets complicates measuring income inequality. Tax returns report capital payments (i.e., interest, dividends, and rents) but not the appreciation of stocks, business interests, and home values. Piketty and Saez (2003) and the Congressional Budget Office (2018) use reported capital gains as a proxy for increasing capital values. However, this approach misses many capital gains that occur at death or involve housing sales with gains under \$250,000. And because capital gains are episodic, people with big capital gains in one year can be vaulted into the top 1 percent of the income distribution. When they drop out of the top 1 percent, they may be replaced by other people with big gains in that year. So, people's movement into and out of the top 1 percent gives the appearance that big investors are continuously reaping large capital gains.

In contrast, Larrimore and colleagues (2017) track all asset gains (including housing) to accurately measure change in wealth from year to year. However, big swings in the stock and housing markets can distort incomes and may lead to negative incomes for many people.

Another approach allocates retained earnings as a proxy for changes in capital wealth. Piketty, Saez, and Zucman (2018) and Auten and Splinter (2018) use this approach, which is consistent with the Bureau of Economic Analysis's national incomes totals. This approach avoids using reported capital gains and volatile asset prices. Because most people don't change their capital holdings regularly, individual feelings toward yearly gains and losses may not be strong because assets are used for retirement.<sup>3</sup>

Finally, if incomes mean benefits from economic activities, then three additional factors must be considered:

**Homeownership.** Renters pay their landlords for the consumption of housing services. Because economists don't want the transition from renting to ownership to change economic output, they create an "imputed" economic transaction in which owners pay themselves rent for housing services. This

imputation represents 6 percent of our gross domestic product and benefits most in the middle and upper-middle class; though very rich people have expensive houses, their imputed rent is only a small addition to their income.

**“Free” services.** Another large imputation is the services, such as checking accounts and ATM usage, that financial institutions provide their customers for free or at a reduced rate. Banks provide these services because they can use the idle assets to make loans from which they profit. Similarly, insurance companies profit most not from the excess of premiums over consumer payments but from holding people’s money. Consequently, people who have insurance are given imputed interest income from this source. Consumers receive imputed interest payments (2 percent of gross domestic product) that pay for the services they consume.

**Government services.** Though defense, road building, and public administration are forms of “collective consumption,” no collective entity exists, and therefore government services should be allocated as income for each consumer offset by the taxes people pay.

Collective consumption represents 17 percent of national income, so it can greatly affect measured income inequality depending its allocation. The Congressional Budget Office (2013) estimated that in 2006, 40 percent of federal spending paid for goods and services that served the public (e.g., national defense, judicial and legislative expenses, and administration of all programs). They then allocated the \$920 billion in income that would have gone to each of the five income quintiles of nonelderly people in two very different ways. One way divided this income equally among all people, so each income quintile would receive \$184 billion dollars of extra income. The second way divided government goods and services by market income because government services support the economy, and people’s stake in the economy is best reflected by their market income. Using this approach, the bottom quintile received \$25 billion while the top quintile received \$520 billion. So, distributing government services by person lowers income inequality because extra income makes a much bigger difference in the bottom quintile than in the top quintile. But distributing the value of government services by market income would have little or no effect on income inequality. Auten and Splinter (2018) use a hybrid approach by distributing 50 percent of collective consumption by person and 50 percent by income.

An alternative would consider these services part of citizenship and not part of personal income. If these services are allocated per capita, low-income people might not seem to have low incomes. Including these factors so everyone receives all national income may overemphasize statistical completeness and not show the living standards of people on different rungs of the income ladder.

## Reporting Income Adjusted for Household Size

Once a total income is determined for each family, those with identical incomes won’t have the same standard of living if they have differing household compositions.<sup>4</sup> Government reporting on poverty is based on separate thresholds that depend on the number and ages of household members. Though the adage that “two can live as cheaply as one” is not true, economists have argued that there are “economies of scale” when multiple people share one roof: The rent on an apartment is only marginally

higher with two bedrooms rather than one. Similarly, a larger household still only requires one set of furniture and one set of plates, utensils, and cooking pots and pans.

Mishel and colleagues (2012) and others argue that adjusting for household size overstates incomes because having fewer children is driven by couples' low incomes. However, this is inconsistent with worldwide trends: every country's birth rate has declined as it has become richer. For low-income people around the world, having an extra child isn't an extra mouth to feed but an extra worker to bring in income and care for the parents when they are old and can't work. Further, many young adults, after finishing their education, prefer to be autonomous live alone or with roommates rather than save money by living with their parents.

Adjusting for size narrows the income gap between single people and married couples. The most widely cited median income in the US in 2016 (the most recent available data) is \$59,000. But the median for married couples, independent of age or how many are working, is \$87,000. In contrast, the median for nonfamily households, often with just one single person, is \$35,000. Though some disagree on how best to adjust for economies of scale, most common is to divide income by the square root of the number of family members to get size-adjusted equivalent incomes.<sup>5</sup>

I use family-of-three equivalents in table 1 because their median is close to the census data median,<sup>6</sup> consistent with today's average household size of 2.6 people. Table 1 shows that a three-person family with an income of \$100,000 is roughly equivalent to a four-person family with an income of \$115,470 and a single person with an income of \$57,735.

This approach changes the gap between the median incomes of married couples and that of nonfamily households cited. With the unadjusted numbers, the median for single-person households is 60 percent less than the married-couple median. But the gap is narrowed to 30 percent if the single person is compared with the \$87,000 income of a family of three. And the advantage of a family of four with \$87,000 over a single person with \$35,000 income is just 20 percent.

This issue is important because more people are living alone: the share of single people with no dependents rose from 16 percent in 1979 to 22 percent in 2014 (Rose 2016). If incomes are adjusted for household size, then reported growth of median income would have been nearly 10 percentage points higher.

TABLE 1

**Income Necessary to Equal a Three-Person Family with Income of \$100,000**

<b>Number of family members</b>	<b>Actual income (\$)</b>
1	57,735
2	81,650
3	100,000
4	115,470
5	129,099
6	141,421
7	152,753

Source: Author's calculation.

## Data Sources

Most research on inequality has revolved around two sources: the Annual Social and Economic Supplement of the Current Population Survey (CPS) and income tax records. Each of these sources has limitations, but the Congressional Budget Office income series links these sources to get both surveys' benefits. A third data source is the Survey of Consumer Finances. Bricker and colleagues (2016) use the Survey of Consumer Finances as its main data source, and others use it to supplement other data sources with its information on capital income, which is often underreported.

### The Current Population Survey

To produce monthly estimates of labor market conditions, the US Census Bureau began fielding the CPS in 1940. Once a year, starting in 1948, they asked detailed questions about family incomes. But it wasn't until 1968 that coverage was expanded to include nonfamily households. In 2000, the Census Bureau contracted with the newly formed University of Minnesota Population Center to make all available CPS waves and related surveys compatible by creating a consistent set of answers to basic questions, creating the Integrated Public Use Microdata Series. The free and downloadable Integrated Public Use Microdata Series has made historical analyses of income-related questions much easier.

The census relies on respondents' recollection of incomes, leading to underreporting of some income sources. Though the sum of wages and salaries is almost equal to national totals as reported by the Bureau of Economic Analysis's gross domestic product accounts, the amounts of pensions, capital income, and certain government payments are lower than national estimates, some by as much as half of the known total. Further, underreporting may be increasing.

CPS data is limited because census questions tend to focus on money individuals receive. As discussed, economists define income more broadly with elements such as employer benefits, which are not reflected in the CPS. Second, the census is very concerned with ensuring its respondents' anonymity and suppresses the exact income of very high earners, often by setting a "top code" and reflecting income at or above that level. Consequently, data on the top 1 percent aren't reliable and must be estimated through statistical techniques.

## Tax Records

Because of the lack of income information on wealthy people in census data, Piketty and Saez (2003) turned to a public dataset created by the Internal Revenue Service that uses many anonymized tax returns. This gave them data on not only the top 1 percent but also the top one-thousandth of the top 1 percent. Underreporting is lower in tax records, which contain accurate figures for different incomes.

However, tax records have disadvantages:

- Information on the receipt of Social Security and other government cash payments is inconsistent.
- The employer's nontaxed benefits and taxes paid on a worker's behalf to Social Security and unemployment aren't included.
- The number of filers has changed as older children with low earnings increasingly file taxes.
- The number of nonfilers is increasing.
- When marginal rates were high (at least 70 percent through 1980), corporate and business owners took reduced salaries to avoid taxes. But after the Tax Reform Act of 1986 lowered the highest-margin tax rate to 38.5 percent in 1986, 33 percent in 1987, and 28 percent in 1988, business owners and executives increased the share of their compensation as salaries.
- Decreasing numbers of married adults mean more lower-income filers, because married couples combine incomes in a joint return, but single adults file individual returns.
- Adjusting for size is difficult because information on the number of people sharing incomes in families is incomplete.

## Survey of Consumer Finances

This wealth survey was first fielded in 1983 and became a consistent triannual survey in 1989. Because of the highly concentrated holdings of wealth, the survey has always oversampled rich people and encouraged respondents to have tax records and other information about their wealth handy during the survey, which could last up to 80 minutes. This means respondents more accurately report capital income. The drawbacks of this survey are its small sample size and lack of information on employer benefits.

## Linked Surveys

Many researchers have developed methods to link two or more of these surveys through "statistical matching." Therefore, the household characteristics available on the CPS can be combined with the better income numbers of tax filers and/or the greater detail on financial assets of the Survey of Consumer Finances.

## Observation Unit

CPS questions are organized in three nested components—households, families in households, and people in households. Households consist of every person living in the same residential unit; people who live in group quarters, military bases, long-term care facilities, prisons, and other group settings are excluded. So household income is the total of every person’s income in that unit, and family incomes only include incomes of the householder, spouse, and children and other relatives of the householder. Having separate series for household and family incomes with the only difference being the 6 percent of people who are not relatives of the householder can be confusing.

Many researchers organize their data into different “sharing income groups,” and table 2 presents the CPS division of people in households in 2014, which explains the studies’ choices of observation units:

- In 2014, CPS income figures were reported for 122 million households independent of household composition.
- The Congressional Budget Office (2018) and Auten and Splinter (2018) allocate the size-adjusted family income to each person, including young children. Their income tables are organized into quintiles of household composition, meaning a family of five, which counts as one observation in the CPS, has five observations in Auten and Splinter and the Congressional Budget Office’s calculations.
- Piketty and Saez (2003), which has been updated to 2014, use 165 million tax units. Most of the additional 43 million observations have low incomes because Social Security and other government cash transfers are excluded, and many children in households file separately.
- Piketty, Saez, and Zucman (2018) develop income levels for 234 million people age 20 and older (including people in group quarters). Incomes are not adjusted for size, and married couples split all common income while older children and other relatives in the household have only their own incomes.
- Rose (2014, 2016) tracks 186 million “independent adults”; all married couples, single parents, cohabiters (who are joined with the householder in pooled incomes), and all roommates are treated as separate single-person families. Incomes are reported in family-size-adjusted values.

## Price Deflators

Price deflators are used to turn nominal dollars into real dollars (usually for the last year of available data). Following the change in a commodity’s price over time is difficult because products tend to embody new features and improvements, which requires disentangling the cost of the improvement from the listed price to extract the “pure” price change. The US Department of Commerce employs 5,000 people who go into stores around the country listing prices and evaluating if a product has improved quality since the previous year. If so, they estimate how much of the added price is from higher quality rather than pure price change.

Other challenges to creating an accurate price deflator include substitution. If the price of chicken goes down and the price of beef goes up, people will eat more chicken and less beef. The switch to cheaper substitutes is often missed because commodities are weighted based on past consumption patterns. This is an issue for new products such as cell phones and computers; comparable products would have been exorbitantly expensive 35 years ago and don't reflect current products. The Department of Commerce does not include new products' initial introduction and massive price drops as they become mass products; only after new products are widely available are they included in determining quality-adjusted prices. Consequently, the reported rate of inflation does not include most of the products' consumer benefits.

Consumers now shop much more in outlets and discount megastores such as Walmart and Costco, and through internet outlets such as Amazon. This means that the Department of Commerce must continually change what stores they visit to capture how prices for the same goods change from year to year.

In the last 40 years, the Department of Commerce has done three major recalibrations of how they compute their main price series, the consumer price index research series using current methods (CPI-U-RS); each adjustment showed less inflation and more economic growth. This creates three separate series for creating adjustment factors that translate past nominal prices to equivalent prices today.

First, the official price series, as found on the Department of Commerce website, uses the consumer price index methodology to calculate change in prices.

Second, the CPI-U-RS is based on applying the 2000 consumer price index methodology to all years back to 1947. The Bureau of Labor Statistics and Census Bureau use this approach to report historical series in real prices.

Third, in 2002, a joint panel of experts at the Bureau of Labor Statistics and the Census Bureau created a methodology for a new price deflator—the chained consumer price index, or C-CPI (Cage, Greenlees, and Jackman 2003). This was a belated response to the Boskin Commission report in December 1996 that said the consumer price index overstated inflation by 1.1 to 1.3 percent per year.<sup>7</sup> Though the joint panel said the C-CPI was the most accurate measure of price change, it was never officially adopted because both Republicans and Democrats did not want a price deflator that showed prices changed less than previous price deflators estimated. Lower inflation would lead to more people in higher tax brackets (a Republican concern) and to a lower annual inflation adjustment to Social Security payments (a Democratic concern).

The C-CPI starts in 2002 and is updated yearly in an obscure Census Bureau publication. Researchers became concerned that the CPI-U-RS was skewing their results because it overstated inflation and understated growth. Starting in the mid-2000s, more researchers began using the personal consumption expenditures deflator from the National Income and Product Accounts prepared by the Bureau of Economic Analysis. This showed less inflation than the CPI-U-RS, was in line with the C-CPI changes after 2002, and is available back to 1913.



Compared with the official consumer price index, C-CPI adjustments back to 1979 show about 25 percentage points more real median income growth through 2014. Compared with the CPI-U-RS, the C-CPI shows an extra 10 percentage points of real growth. And many researchers, including Robert Gordon, believe that the C-CPI still understates inflation by about 0.5 percentage points per year.

Finally, Nordhaus (2003) argues that the US gross domestic product and income growth rates in the first half of the 20th century were understated by half because they did not factor in increased life expectancy and better health. Today, people can expect to live an extra five years than they did in 1979, and those who are 65 can expect to live an extra three years. In a similar vein, two reports from the Bureau of Economic Analysis and Bureau of Labor Statistics find that medical inflation has been overstated by 1.5 percentage points per year (Aizcorbe et al. 2011).<sup>8</sup> If true, inflation is overstated by 0.2 percentage points per year.

## Measures of Income Inequality

Researchers use various techniques to measure income inequality because it is a slippery concept. The annual CPS report on incomes has six summary measures of income inequality that tend to shift evenly when distributions change (DeNavas-Walt and Proctor 2015). The most cited measure is the Gini coefficient, which computes the gap between the current income distribution and perfect equality. The other five are the mean logarithmic deviation of income, which is the average distance from the income mean; the Thiel index, which has the advantage of disaggregating the causes of inequality by characteristics such as urban versus rural area, age, or race; and three values of the Atkinson index, which weights low-income people. These indices' values don't have an obvious interpretation for income inequality and aren't cited outside academic journals.

A different approach to measuring income inequality compares points on the income ladder. The most common income ratios are of the 90th to 50th, 50th to 10th, and 90th to 10th percentiles, representing the gaps between the rich and the middle, the middle and the bottom, and the rich and the bottom. Again, there is no obvious level that designates inequality is too extreme. Instead, historical comparisons show inequality is becoming larger and detrimental for the country.

The third method evaluates shares of total incomes. The Census P60 incomes report shows the shares of each of the five quintiles and of the top 5 percent. Piketty and Saez (2003) shift the focus to the growing share of the top 1 percent. When combined with stagnation in the bottom 50 percent, they concluded inequality had clearly become too high.

## Notes

- <sup>1</sup> For a description of Haig–Simons income, see “Overview of the Definition of Income Used by the Staff of the Joint Committee on Taxation in Distributional Analyses,” Joint Committee on Taxation, accessed November 14, 2018, <https://www.jct.gov/publications.html?func=startdown&id=4408>.
- <sup>2</sup> State tax rates on companies vary by their experience of laying off qualified workers. See “State Unemployment Tax Rates: 2008 to 2017,” Tax Policy Center, accessed October 30, 2018, <https://www.taxpolicycenter.org/statistics/state-unemployment-tax-rates>.
- <sup>3</sup> Studies of the “wealth effect” show that people increase their consumption by 3 cents on the dollar of unexpected wealth gains.
- <sup>4</sup> Burkhauser, Larrimore, and Simon (2011) shows 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, just over half were in the bottom quintile of non-size-adjusted incomes; for the middle three quintiles, just over a third were in the same non-size-adjusted quintiles. In the top quintile, two-thirds were in the same quintile of non-size-adjusted incomes.
- <sup>5</sup> All inequality measures cited in Rose (2018) that adjust incomes for household size use the square root approach. There are other approaches, but economists who study incomes in the US and other Organisation for Economic Co-operation and Development countries use the square root approach.
- <sup>6</sup> The sum of size-adjusted incomes, even for family-of-three equivalents, may not add up to the total income reported by the Bureau of Economic Analysis, an issue for those wanting an exact accounting of national income.
- <sup>7</sup> “Boskin Commission Report,” Advisory Commission to Study the Consumer Price Index, published December 4, 1996, <https://www.ssa.gov/history/reports/boskinrpt.html>.
- <sup>8</sup> See Aizcorbe and colleagues (2011) for a similar study.

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**Stephen Rose** is a nonresident fellow in the Income and Benefits Policy Center at the Urban Institute. He is a nationally recognized labor economist and has spent the last 35 years researching and writing about the interactions between formal education, training, career movements, incomes, and earnings. His book *Social Stratification in the United States* was originally published in 1978, and the seventh edition was released in 2014. His book *Rebound: Why America Will Emerge Stronger from the Financial Crisis* addresses the causes of the financial crisis and the evolving structure of the US economy over the past three decades. Rose has worked with large longitudinal and cross-sectional datasets to develop unique approaches to understanding long-term income and earnings movements. He recently coauthored the report "The Economy Goes to College," showing that the high-end service economy of work in offices, health care, and education was the main driver of the US postindustrial economy, responsible for 64 percent of employment, 74 percent of earnings, and over 80 percent of workers with a bachelor's or advanced degree. Before coming to Urban, Rose held senior positions at the Georgetown University Center on Education and the Workforce, Educational Testing Service, the US Department of Labor, Joint Economic Committee of Congress, the National Commission for Employment Policy, and the Washington State Senate. His commentaries have appeared in the *New York Times*, *Washington Post*, *Wall Street Journal*, and other print and broadcast media. He has a BA from Princeton University and an MA and PhD in economics from the City University of New York.

# Acknowledgments

This brief was funded by the Urban Institute. The views expressed are those of the author and should not be attributed to the Urban Institute, its trustees, or its funders. Funders do not determine research findings or the insights and recommendations of Urban experts. Further information on the Urban Institute's funding principles is available at [urban.org/fundingprinciples](http://urban.org/fundingprinciples).

The author wishes to thank Greg Acs and Rachel Kenney for their assistance in producing this research.



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