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Measuring Inequality in the National Accounts

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Introduction

This paper provides context for the Bureau of Economic Analysis (BEA) prototype estimates of the distribution of income. It describes measurement questions, such as what concept of income should be used, and a summary of the results for the 2007–2016 period. The paper also presents a comparison with estimates produced by other studies of the distribution of income.

Simon Kuznets, in the 1930's creation of gross domestic product (GDP), maintained that the aggregate totals were not sufficient to measure the economic well-being of society. In 1953, Selma Goldsmith, an economist at the Department of Commerce Office of Business Economics (OBE), produced an article in the *Survey of Current Business* that estimated the distribution of personal income (PI) from 1944 to 1950.[2] The initial year, 1944, was the year that the Bretton Woods Agreement declared an international standard for measuring growth, gross national product (GNP). From 1950 to 1962, OBE and then its successor, BEA, regularly released distributional estimates in the *Survey of Current Business* (Fitzwilliams 1964). Estimates for 1971 followed Radner and Hinrichs (1974). Recent work follows the general methodology in Fixler et al. (2017). This year, BEA re-establishes these regular estimates with new prototype estimates. The decomposition by income level is in the spirit of decompositions of BEA aggregate data by regions and by industry.

This paper provides an overview of inequality measurement in the United States; to fully examine the relationship between changes in the household distribution of income and growth in income, a comparable measure of income is required. The paper also discusses the methods of determining the appropriate income and inequality measures and their implications for inequality and growth. The detailed methodology is described in the technical document "A Methodology for Distributing Personal Income" (hereafter referred to as "technical document" (Gindelsky 2020)).

Released prototypes can be found in tables 1–3 and charts 1–2. They are also compared with other current research on the U.S. income distribution (see Auten and Splinter (AS) (2019), Piketty, Saez, and Zucman (PSZ) (2016), and Congressional Budget Office (CBO) (2018)). Table 1, "Major Components of Personal Income by Decile," distributes the household income portion of National Income and Product Accounts (NIPA) table 2.9, "Personal Income and Its Disposition by Households and by Nonprofit Institutions Serving Households" by decile. Table 1 also includes the totals for each line item in the first column as well as a summary line for personal income. Table 2, "Decomposition of Personal Income for Households," shows the decomposition of PI. Table 3, "Inequality Metrics," reports inequality statistics for equivalized personal income and equivalized household income. Additionally, charts 1 and 2 show levels and growth, respectively, in PI over 2007–2016.

2. Selma Goldsmith was the Chief of the Income Size Distribution Section (see OBE (1953)).

The What, Who, Where, When, Why, and How of Inequality

To measure inequality, we need to decide on our measurement yardstick. That is, whose standard of living are we measuring and how are we going to measure it and update it over time? The various summary statistics are helpful if the measure is well defined. To truly understand inequality measurement, the following questions should be answered:[3]

What: Which resource measure will be used?

Who: Whose income is being measured?

When: What time period is used, and which inflation measure?

Where: How do we adjust for differences by geographic location?

Why: What is the purpose of these measures?

How: Which summary statistics?

What: The choice of income

Since one of the first National Bureau of Economic Research meetings of the Conference on Research in Income and Wealth (1943), researchers have discussed the many choices that need to be made in determining the appropriate components of income to include in a measure of income distribution.[4] There are a multitude of income measures used by researchers and the government in examining inequality. Table 8.1 in Fixler and Johnson (2014) provides a comparison of income definitions across a variety of agencies and income measures. Most studies of income and its distribution include the money income concept, but do not examine changes in assets, and only a few examine the impact of capital gains (for example, CBO (2013) and Piketty and Saez (2003)).

Table 4 builds on Fixler and Johnson (2014) and compares the components of PI, Census money income, national income (NI) measures found in PSZ and in AS, and the CBO income measure. There are many components of income that are included in the measures. Only three components are included in all income measures—employment income, proprietors' income, and investment income. The main differences are the treatment of imputed income, retirement income,[5] capital gains (realized and unrealized), unrealized interest on property income, and the inclusion of government in-kind transfers. In terms of government transfers, there

3. Here we follow the approach in Johnson and Smeeding (2014).

4. Economists usually focus on the suggestions of Haig and Simons. Haig (1921) stated that income was "the money value of the net accretion to one's economic power between two points of time," and Simons (1938) defined PI as "the algebraic sum of (1) the market value of rights exercised in consumption and (2) the change in the value of the store of property rights between the beginning and end of the period in question."

5. One of the main differences is the treatment of retirement income. Consider an elderly person with both a savings account and a defined contribution retirement account. The interest on these accounts will be counted as income in all measures, but the timing is different. Planned pension disbursements (including social security) will also be included in the Census and CBO measure (including any interest earned), but not in personal income, since these income components are not part of current production.

are differences in the treatment of social insurance cash transfers (like Social Security, unemployment insurance and disability insurance), means-tested cash transfers (like Temporary Assistance for Needy Families (TANF)), and in-kind transfers (like Supplemental Nutrition Assistance Program (SNAP) and Medicaid). The CBO, AS and PSZ each produce complementary after-tax-and-transfer measures, which include all of the government transfers. Accordingly, Table 4 indicates a couple differences between the AS and PSZ measures of pre-tax NI in terms of social security and cash transfers.

Following the lead of Kuznets (1955), who suggested using PI, our focus is on PI in the national accounts.[6] The BEA prototype estimates use PI, which is the income received by persons from participation in production, from government and business transfers, service flows from homeownership and from holding interest-bearing securities and corporate stocks. PI is household income plus income received by nonprofit institutions serving households (NPISH). The Current Population Survey (CPS) measure of money income, produced annually by the Census Bureau, is defined as the total pretax money income received by people on a regular basis, excluding certain lump-sum payments and capital gains, and represents about two-thirds of PI.

Because PI incorporates many sources of income, it is substantively different from earnings, or even money income. Computing PI requires many complex imputations. One way to decompose it is to think of it as (1) census money income (definitionally adjusted to be national accounts) + (2) financial items, such as imputed interest on pensions and life insurance and rental equivalence + (3) health items, such as employer contributions to health insurance and Medicare + Medicaid, + (4) other transfers, such as the Supplemental Nutrition Assistance Program, Women, Infants, and Children program, refundable tax credits, and so forth. The methodology for arriving at each of these subtotals is described in the technical document and a numerical decomposition is laid out in table 2.

While there are other measures of income in the NIPAs (for example, NI and gross domestic income (GDI)), PI incorporates household income and is closest to the measure of economic resources available to households to purchase goods in the PCE. Starting with PI will allow further analysis of disposable PI (after taxes) and a better comparison to consumption.[7]

It is important to note that others use different income concepts, which makes it challenging to compare results. For example, PSZ and AS use NI. PSZ state, "[it is] in our view a more meaningful starting point, because it is internationally comparable, it is the aggregate used to compute macroeconomic growth, and it is comprehensive, including all forms of income that eventually accrue to individuals." Despite the different

6. Kuznets (1955) stated: "...income should be defined as it is now for national income in this country, i.e., received by individuals, including income in kind, before and after direct taxes, excluding capital gains."

7. Research demonstrates that using consumption could be a useful measure for economic well-being (Fisher, Johnson, and Smeeding 2015; Meyer and Sullivan 2017), and often wealth is used instead of income (Wolff 2014; Bricker et al. 2017).

definition, PI and NI are fairly close in aggregate and trend.[8] The advantage of PI is that it includes all income and transfers that can be used to increase consumption, and hence, corresponds to the BEA measure of personal consumption expenditures.

Who: Whose income?

To examine the distribution of income, researchers need to determine whose income to evaluate, that is, the unit of analysis. The focus on the national accounts has always been per capita PI (or GDP). However, many measures of inequality and the standard of living use household (or family) resources, as with the Census measures (Semega et al. 2019). The significant differences between these metrics can result in different effects on the growth of income. Since the number of households has increased more than the number of people, using a per capita measure (per person) will show a larger increase than using a per household measure. PSZ and others who are using tax data use a tax unit (such as a married couple with two dependents) or an adult as the unit of analysis, which could be smaller than the household. Most inequality research uses the household as the unit of analysis; this has been recommended as the international standard by the Canberra Group report (2011).

Since households with more members may need additional income to be comparable (that is, equally well-off) to smaller households, most studies also adjust household income by an "equivalence scale" to adjust for economies of scale within the household. One of the most common scales is the single-parameter constant-elasticity equivalence scale reviewed by Buhmann et al. (1988) and Ruggles (1990); it is used most often in international comparisons of inequality (see Atkinson, Rainwater, and Smeeding 1995) and is recommended by the Canberra Group report (Canberra 2011). In general, the constant elasticity scales are given by $(\text{household size})^e$, in which e is the scale elasticity. Notice that if $e = 1$, then the scale equals the household size, there are no assumed economies of scale in living arrangements, and the equivalent resources are simply the per-capita resources. Alternatively, if the elasticity equals zero then there is no adjustment for family size, there are complete economies of scale in living, and the marginal cost of another person is zero.

Earlier research has shown that the choice of equivalence scale can affect both the level of and trend in the standard of living (Coulter, Cowell, and Jenkins 1992; Short et al. 1999). In addition, research on poverty measurement shows how different scales can have large impacts for larger families (Short et al. 1999; Johnson 2004). Following the suggestions by Ruggles (1990), Buhmann et al. (1988), and the Canberra Group (2011), most research uses an elasticity of 0.5, which is the square root of household size. CBO and AS follow this approach, and the BEA prototype estimates also use the household as the unit and equivalize income using the square root of household size.[9]

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8. Table 4 does not include all relevant components of PI and NI. PI is NI less corporate profits (including taxes on production), contributions for social insurance, net interest, business current transfer, and current surplus of government enterprises plus personal income receipts and personal current transfer receipts.

9. PSZ use the number of adults over age 20 in the household and create a per capita measure, which will not adjust for any changes in household size over the period.

When: Choosing a time period and adjusting income over time

In order to create trends in income and the distribution of income, one must choose a reference period, time period, and methods to adjust for changes in the cost of living that occur during the time period. Most studies use annual measures of income. Monthly or quarterly measures of income are more likely to be volatile. Alternatively, if the goal is to measure permanent income or consumption, which requires more stability, averaging over longer periods (years) may be more appropriate. The time period chosen significantly affects the results.

When measuring real income, a price index is necessary, such as PCE or the Consumer Price Index (CPI) to adjust for changes in price. While different price indexes lead to a variety of changes in the level of the median and mean and to changes in the levels of various quintiles, they do not affect the trend in inequality measures. Census uses the CPI-U-RS to deflate the trends in real mean and median income, while BEA uses the PCE price index, which rises more slowly.[10] As a result, the mean increases more over a longer period.[11] Fixler and Johnson (2014) and Nolan et al. (2019) show the impacts of price indexes on the changes in the median income; however, inflation can affect inequality measures if the inflation is different for different incomes, such as high or low income.[12] In the case of PI, the PCE price index is the appropriate price index.

Where: How are the measures adjusted for differences in geographic location?

Similar to the adjustment for family size, it could be that some areas in the country (or even different countries) have different living costs. BEA has constructed a regional price parity index to adjust PI and show that the range across countries narrows; that is, inequality is lower across the country than when using unadjusted income.

Moretti (2013) and Deaton (2010) discuss other implications of using geographically adjusted income in comparing wages across the United States and income internationally. Especially in making international comparisons, the Canberra Group report (2011) suggests using price index adjustments. At this point, the BEA prototype estimates are only produced at the national level and do not adjust for differences in the geographic price differences.[13]

How: Which summary statistic and data set?

Much research focuses on the levels and trends in the Gini coefficient to evaluate inequality, but Atkinson (1970), Sen (1997), and Theil (1967) evaluate a variety of inequality measures and their properties. The Gini coefficient is a common summary measure of the amount of inequality (or disparity) in income (or any resource).

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10. CPI-U-RS is the current urban price adjustment method used by the BLS.

11. Between 1979 and 2018 the real mean household money income increased 35 percent (Semega et al. 2019); using the PCE price index to adjust for inflation would yield a 51 percent increase.

12. See Sherman and Van de Water (2019) for a discussion about whether inflation is higher for the poor.

13. Fixler et al. (2017) show how price differences could affect the level and trends in inequality across states.

The Gini ranges from 0 to 1, with 0 meaning perfect equality—everyone gets the same income—and 1 signifying perfect inequality. The Gini is determined by examining the shares of income owned by each household, or group of households (like percentiles or quintiles). Hence, the top 1 percent owning 20 percent compared to 15 percent of all income, would lead to higher Gini coefficients. The Gini satisfies a variety of properties that are valuable in evaluating inequality, such as increasing everyone's income proportionately, which does not affect inequality, and shifting income from a higher income person to a lower income person, which decreases inequality.[14]

The Census Current Population Reports (Semega et al. 2019) produce a variety of inequality measures. While all show increases in inequality over the past 40 years, the changes differ. In addition, some measures show much more volatility and are affected by changes at the top of the distribution (such as the coefficient of variation) or the bottom of the distribution (such as the Theil measure).

Another measure is the concentration of income measured by shares of income owned by the top percentiles of the distribution. These measures are more volatile and can increase more than overall inequality measures that capture the entire distribution (Jasso 2014; Alvarado 2011).[15] One way of simultaneously assessing the concentration and looking at the distribution overall is to decompose PI into quantiles, such as deciles and quintiles.

Related to how one measures inequality is the choice of data set used to measure inequality (and income). The Census Bureau and CBO use the CPS to create their income measures. CBO extends the CPS to create a more comprehensive income measure by using tax data. PSZ and AS use income tax records from the Internal Revenue Service. The Federal Reserve Board Survey of Consumer Finances has also been used to examine inequality (see Bricker et al. (2017)). Others have used a combination of data sets (see Fisher et al. (2018)).

Different data sets yield different levels of measurement error. Research using the CPS demonstrates a significant amount of underreporting of income and transfers (Meyer, Mok, and Sullivan 2015; Rothbaum 2015). While aggregate wages in the CPS are fairly close to the national account totals, interest and dividends are substantially lower. Meyer, Mok, and Sullivan (2015) show that government transfers in the CPS are underreported. Scaling up the aggregate totals addresses most of the underreporting as long as underreporting occurs similarly across the distribution and all people report receipt of the income source. As Meyer, Mok, and Sullivan (2015) show, however, much of the underreporting is due to people not reporting receipt of government transfers. As discussed in the accompanying technical document, the prototype estimates use the CBO imputations for the receipt and amount for some of these government transfers.

Similar improvements could be made for the receipt of self-employment income, as demonstrated by Abraham et al. (2013). New linkages to administrative data (see Meyer and Mittag (2019)) could yield improved estimates for receipt of other government programs. Similar methods could be used to adjust for the underreporting of interest and dividends and the level of employer contributions to retirement and health care.

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14. See Sen (1997) for a discussion of these properties.

15. For example, the top 1 percent measure by CBO and PSZ increases 76 percent and 68 percent, respectively, between 1979 and 2016.

Why: The purpose of the measure

Each of the choices—what, who, where, when, why, and how—has different implications for the levels and trends of inequality. As a result, researchers need to decide on the purpose of their evaluation when making these choices, whether it is to answer questions about overall changes in inequality, the redistributive impacts of government taxes and transfers, or the differences between annual and permanent income. Each of these questions may require different data and inequality measures. The CBO purpose is to examine the impact of taxes on the distribution of income, and hence, choose the appropriate income measure that includes capital gains. Other research tries to obtain a better measure of economic well-being and adjusts income to account for disposable or discretionary income.

The BEA purpose is to distribute the aggregate measure of income to households. As PI is about 87 percent of GDI, focusing on PI goes a long way in explaining how aggregate income is distributed. Hence, household income (and by extension, PI) is chosen. Another purpose of the exercise would be to assess economic well-being. Jorgenson and Slesnick (2014) construct a more general measure of economic well-being that uses expenditure patterns.

PI may include income that may not best represent household well-being. For example, research has examined whether allocating the actual costs of Medicare and Medicaid per recipient increases household well-being. However, these are included in the NIPA aggregates, and therefore, need to be distributed. It could be that there is a more restricted measure of income to use for assessing the distribution of economic well-being; however, for the purpose of distributing changes in growth, changes in PI and its distribution are more closely related to measured growth.

One purpose of the prototype estimates is to create a decomposition of income that can be related to growth. The comparisons below use real PI (adjusted by the PCE price index), as used in previous BEA/OBE analyses, for households adjusted by the square root equivalence scale. The prototype estimates span 2007 to 2016, using the most recent data available. Using CPS as the base and adjusting using multiple data sources, we produce the shares of income for deciles, quintiles, the top 5 percent, and the top 1 percent, along with the Gini coefficients.

Comparisons

It is useful to compare BEA prototype estimates to other research estimates to place the prototype estimates into context. Since the annual Census estimates are used by many researchers, we include household money income in the comparisons. The CBO has multiple income measures that consider both taxes and transfers. The PSZ and AS measures are post-transfer NI measures in addition to their published pretax and transfer NI.[16]

16. Using the microdata on the PSZ website, we can create a Gini coefficient for the NI measure, along with a post-transfer NI measure, which is closer to the AS post-transfer measure and the BEA PI measure. The estimated PSZ top 1 percent shares are almost perfectly correlated with the published PZS shares. Using similar methods in CBO (2018), we use the CBO online tables to construct a measure of post-transfer income without capital gains, which is ranked by before tax and transfer income.

While the increases in real mean and median income over the past 40 years can be different for different measures (CBO 2018; Semega et al. 2019), the 2007–2016 period shows more similar trends across measures. Table 5 shows the changes in the real mean and median using a variety of methods.[17] As shown in the technical document, household PI is 53 percent higher than Census money income (because it includes in-kind government transfers, employer benefits, and other income from financial assets). Table 5 highlights the importance of a comprehensive income measure like PI by showing that median PI increases 6.1 percent over this 9-year period, compared to an increase of only 0.1 percent for median money income. Alternatively, the mean equivalent PI increases 9.3 percent, while mean money income increased 4.4 percent.[18] Table 5 also shows that over the post-recessionary period (2009–2016), the mean and median for the prototype measure increase more than those using the CBO or PSZ methods.

As shown in table 4, there are many components in PI that are not included in Census money income. In addition, the technical document shows that the CPS measure can only account for 65 percent of PI. Many items, such as imputed interest and rental equivalence, need to be allocated using an alternative measure of income. In many cases, our approach uses the distribution of variables in the CPS as well as the distribution of related variables in other data sources to distribute NI totals for variables such as imputed interest, wages for supplemental compensation, and so on—details of which are provided in the technical document. This choice of base level can have a large impact on the distribution as shown by AS and PSZ for nontaxed capital income or unreported income.

Comparing the changes in mean and median provides an insight into the distribution. If the mean rises more than the median, this suggests that the top of the distribution is pulling away from the median and increasing inequality. For all these measures, the methods for distributing imputed income is critical. Chart 3 compares the Gini coefficient for a variety of measures—the BEA prototype estimate, Census money income, CBO pretax and transfer income, and PSZ national income. The choice of summary measure makes a difference for both the levels and trends in inequality. Much research uses the Gini coefficient to summarize the changes in the distribution over time. It is also less sensitive to changes that occur at the top and bottom of the distribution. For example, the top 1 percent share is more volatile than the Gini (or the top 5 percent share), even though all three show similar trends over this period. Since the top 1 percent share uses approximately 700 households in the CPS, it can be subject to measurement error.[19]

The main purpose of the BEA prototype measure is to estimate the distribution of the overall PI and the changes in PI over time; hence, the prototype estimates examine the full distribution (by decile, quintile, top 1 percent, and 5 percent) (table 1). With these estimates, we can determine how much of the increase in growth accrues to the top and bottom of the distribution, and how differences in the growths or transfer

17. All measures are converted to real dollars using the PCE price index. Census measures are for households; BEA and AS use equivalized income; and PSZ uses per adult income.

18. The 9.3 percent increase in mean equivalized PI is similar to the 9.1 percent increase in per household personal income.

19. In annual Census reports of money income inequality for households, the margin of error for the top 5 percent shares is 0.4.

payments, differently impact the shares accruing to the top or bottom of the distribution (chart 2). Though we can say what percentage of income accrues to what portion of the distribution (that is, share of the top 1 percent for example), we cannot follow the same individuals over time. Accordingly, though we can say that the share of the top 1% was 12.7% in 2007 vs. 11.7% in 2009, we cannot say that the same households had more PI in 2007 than in 2009. To capture whether incomes grew for those in the top 1% over time, we would need to have access to detailed panel data in order to follow the same individuals throughout the period.

Table 6 presents the shares for the top 1 percent using a variety of methods and measures. Comparing the top 1 percent shares for PI and AS shows that, even using different methods, these shares are similar over this period. Focusing only on the top of the distribution can mask many of the changes that occur at other points in the distribution. They all display similar trends, all falling over the recessionary period and then rising, each showing a bump up in 2012 due to a change in reporting.

The CBO measure falls significantly more between 2007 and 2009; however, the changes during the post-recessionary period (2009–2015) are similar across all measures. Even with different methods, the share of the top 1 percent for the BEA and PSZ measures increases 10.3 and 9.8 percent, respectively. PSZ argue it is more important to examine concentration of income at the top since increases in concentration that can impact the level of overall growth in GDP (see Krueger (2012); Fisher et al. (2019)). The PSZ measures for pretax and transfer NI and post-transfer NI are similar and also similar to the trends in the BEA measure. The CBO and AS measures show a slight fall in the share of the top 1 percent over this period. Table 6 shows that the levels of the AS and BEA measures are similar, even though they use different methods and data. The levels for both PSZ measures yield much larger shares for the top 1 percent. As AS show, the larger shares for PSZ are mainly due to the methods used to allocate some income components not reported in the tax data (see also Piketty, Saez, and Zucman (2019)).

Finally, chart 1 shows the decomposition of growth across quintiles (and for the top 1 percent) for each year. If the share of income accruing to the top 1 percent (or any quintile) increases, that means this group received a disproportionate share of growth in income over the same period. For example, table 6 shows that the share of the top 1 percent decreases in both PSZ and BEA measures over the 2007–2016 period.

In contrast, the prototype estimates show that the share of PI accruing to the top quintile increased from 51.2 percent to 52.2 percent, while the share accruing to the bottom quintile fell, from 5.7 percent to 5.6 percent. For the top quintile to increase and the bottom to decrease, the growth must be distributed more to the top than the bottom. It turns out that of the 17.9 percent growth experienced over this 9-year period, 58 percent of this growth was experienced by the top quintile. Though we cannot know that those in the top quintile in 2007 were the same as those in 2016, we can say that their share of the distribution went up from 51.2% in 2007 to 52.2% in 2016. This represents a real average increase of $28,360 for those households in the top quintile. For those in the bottom quintile, however, their share of the distribution went down from 5.7% to 5.6%. Since real personal income did increase over the period, this still represents a real average per household gain of $2,257. These decompositions highlight the value of examining growth and its distribution using a consistent measure of PI.

Inequality and Growth

Examining the distribution of the national accounts informs the relationship between economic growth and inequality in society. Simon Kuznets discussed this in his American Economic Association Presidential Address by asking, "Does inequality in the distribution of income increase or decrease in the course of a country's economic growth?" The hypothesis that inequality rises and then falls with growth has been examined in many countries.[20] The relationship between macroeconomic growth and income inequality has also been the focus of many recent studies (Boushey and Clemens 2018; OECD 2014; Ostry 2014), with no consensus on the relationship. In fact, an OECD report (OECD 2012) suggested that "...no general consensus has emerged and the empirical evidence is rather inconclusive."

Led by the creation of the World Inequality Database and PSZ, new efforts around the world have started to develop internationally consistent distributional measures that are also consistent with measures of economic growth in the national accounts. Interest in the relationship between growth in GDP and the changes in household income is highlighted by the fact that growth in GDP per capita outpaces the changes in median household income. For example, the annual Census release of real median household income (Semega et al. 2019) shows an increase of 15 percent between 1979 and 2018, compared to an increase of 89 percent for real per capital GDP (and real per capita PI increased slightly more at 103 percent).

However, some of the difference in inequality trends can be accounted for by the different price indexes used, the use of household or per capita measures, and the use of the mean versus the median. Since per capita PI is more like a mean (or average) than a median, it would be more appropriate to compare mean household income adjusted by the PCE price index to average PI per household (instead of per person). This yields more similar increases, yet the measures are far apart. The remaining difference is in the definition of income, as PI contains much more income.

Regarding the increases in inequality, there is considerable agreement that there has been an increase in inequality in the United States during the past 30 years (CBO 2018; Johnson and Smeeding 2014). There is, however, considerable disagreement regarding the size of the increase (PSZ; AS; CBO; Johnson and Smeeding 2014). For example, researchers and the public focus on the annual release of inequality estimates by the Census Bureau (Semega et al. 2019). However, the regular release of income distribution statistics from CBO (2018) shows larger increases in inequality. Finally, the recent results from PSZ show an even larger increase in inequality.[21] As with all comparisons of inequality measures, we keep in mind that all of these measures use different definitions of income. While the levels and trends of NI and PI are similar, slight differences in definitions and methods can yield different distributional properties.

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20. See Gallo (2002) and de Dominicis, Floras, and DeGroot (2008) for discussions of the empirical research examining the inverted U-shaped inequality hypothesis.

21. Between 1979 and 2016, the Gini for money income (Semega, et al. 2019) increased 18 percent; the CBO measure increased 25 percent; and the PSZ measure increased 30 percent.

Conclusion

The what, who, where, when, why, and how of inequality measurement demonstrates the importance of measurement choices. For BEA, the purpose (or the why) is to distribute the aggregate PI, and hence, many of these measurement choices are predetermined. Even though the prototype estimates use a different income measure and method than other estimates (for example, Census, AS, PSZ, and CBO), many of the trends in inequality are similar for this short 9-year period. As expected, the real mean and median for the prototype measure of PI increase more than the real mean and median for Census money income. In addition, over the post-recession period (2009–2016), all measures show similar increases. The trends in the shares for the top 1 percent for the prototype measure are similar to those for the PSZ and AS post-transfer measures for the 2009–2015 period. Finally, the trends in the Gini coefficient for the prototype measure are similar to the trends for the CBO and PSZ measures.

Table 1. Major Components of Personal Income by Decile, 2016

Line	Income component	Total (Billions of dollars)	0–10% (percent)	10%–20% (percent)	20%–30% (percent)	30%-40% (percent)	40%-50% (percent)	50%-60% (percent)	60%-70% (percent)	70%-80% (percent)	80%-90% (percent)	90%-100% (percent)
1	Personal income	16,121.2	2.1	3.5	4.4	5.2	6.1	7.2	8.6	10.6	14.6	37.6
2	Household income	16,116.6	2.1	3.5	4.4	5.2	6.1	7.1	8.6	10.7	14.6	37.6
3	Compensation of employees	9,960.3	1.2	2.2	3.1	4.0	5.4	7.7	10.5	13.9	18.6	33.4
4	Proprietors' income with inventory valuation	1,423.7	0.2	0.3	0.6	0.7	1.3	2.2	3.7	6.3	13.5	71.2
5	Rental income of households with capital consumption adjustment	669.1	2.0	3.6	4.8	5.7	6.3	6.9	8.4	10.1	13.7	38.6
6	Household income receipts on assets	2,469.2	0.8	0.9	1.2	1.6	2.1	3.1	4.6	6.6	11.2	67.9
7	Household interest income	1,437.7	1.2	1.5	1.9	2.4	3.2	4.5	6.5	9.2	14.5	55.0
8	Household dividend income	1,031.5	0.1	0.2	0.2	0.4	0.7	1.2	2.0	3.2	6.9	84.9
9	Household current transfer receipts	2,834.2	6.9	11.0	12.5	13.9	13.9	11.4	9.1	7.3	6.9	7.1
10	Government social benefits	2,691.9	6.3	11.2	12.7	14.2	14.1	11.5	9.2	7.1	6.7	6.9
11	From business (net)	40.5	9.0	9.1	9.3	9.8	10.1	10.3	10.5	10.5	10.6	10.9
12	From nonprofit institutions	101.8	21.7	8.5	5.7	7.4	7.8	7.7	7.6	11.6	11.0	11.0
13	*Less*: Contributions for government social insurance, domestic	1,239.9	1.4	2.4	3.3	4.1	5.5	7.9	10.8	14.2	19.2	31.2

Note. This table represents the breakdown of household income by component as in National Income and Product Accounts Table 2.9 (lines 22–33). Personal income (line 1) = Household income (line 2) – Household current transfer receipts from nonprofits + Nonprofit institution income – Nonprofit institution transfer receipts from households. Households have been ranked by equivalized personal income and correspondingly assigned to deciles in the distribution. The total of each item (row) is 100%.

Table 2. Decomposition of Personal Income for Households (2016)

Line	Income concept	Totals ($B)	Household average (equivalized)	Real household average (equivalized) (2012=100)
1	Money income (Census)	10,494.6	54,392.1	52,254.4
2	Adjusted money income	11,850.9	61,214.5	58,808.6
3	*Transfers*	1,299.0	7,466.4	7,172.9
4	***Plus:*** Financial	1,963.2	10,010.6	9,617.1
5	***Plus:*** Health	1,935.6	10,137.5	9,739.1
6	*Transfers*	1,243.9	6,705.9	6,442.4
7	***Plus:*** Other transfers (net)	366.9	1,665.4	1,600.0
8	***Equals:*** **Household income**	16,116.6	83,027.9	79,764.8
	Plus: **NPISH (net)**	...	...	...
9	***Equals:*** **Personal income**	16,121.2	83,052.2	79,788.1

NPISH Nonprofit institutions serving households

Note. This table represents the steps to the construction of Personal Income as described in the Methodology document, with totals and averages by household for each category. Personal income (line 9) = Household income (line 8) – Household current transfer receipts from nonprofits + nonprofit institution income – nonprofit institution transfer receipts from households. Household income (line 8) = Adjusted money income (line 2) + financial sources of income (line 4) + health sources of income (line 5) + other transfers (net) (line 7). "Other transfers (net)" includes the net of all transfers that are not already included above as part of adjusted money income and health respectively. Households have been ranked by equivalized personal income and correspondingly assigned to deciles in the distribution. NPISH (net) represents a statistical aggregate used to move from household income to personal income.

Table 3. Inequality Metrics (2016)

Line	Inequality metric	Household income	Personal income
1	Mean (2016)	$127,683.2	$127,719.2
2	Mean ($2012)	$122,665.0	$122,699.5
3	Equivalized mean (2016)	$83,027.9	$83,052.2
4	Equivalized mean ($2012)	$79,764.8	$79,788.1
5	Median (2016)	$84,727.2	$85,042.5
6	Median ($2012)	$81,397.3	$81,700.2
7	Equivalized median (2016)	$55,579.5	$55,778.1
8	Equivalized median ($2012)	$53,395.1	$53,585.9
9	0–20%	5.5%	5.6%
10	20%–40%	9.6%	9.6%
11	40%–60%	13.2%	13.3%
12	60%–80%	19.3%	19.3%
13	80%–100%	52.3%	52.2%
14	80%–99%	39.6%	39.5%
15	Top 1%	12.7%	12.6%
16	Top 5%	27.0%	27.0%
17	90/10	5.617	5.559
18	Gini index	0.446	0.445

Note. All income shares and inequality metrics are calculated from equivalized income and identical for nominal and real measures. Real numbers are in 2012 dollars.

Table 4. Comparison of Income Concepts

Source	Personal income (BEA)	Money income (Census)	Pretax/ transfer (CBO)	Pretax national income (PSZ; AS)[1]
Employment income	Yes	Yes	Yes	Yes
Employer contribution to social security	No[2]	No	Yes	No[3]; Yes
Employee contribution to social security	No[2]	Yes	Yes	No[3]; Yes
Employer-provided benefits	Yes	No	Yes	Yes
Business income (including self-employment)	Yes	Yes	Yes	Yes
Investment income	Yes	Yes	Yes	Yes
Imputed interest on investments	Yes	No	No	No
Corporate profits (retained earnings and taxes)	No	No	No	Yes
Government cash transfers	Yes	Yes	Yes[4]	Yes; No[5]
Social security disbursements	Yes	Yes	Yes	Yes; No[6]
In-kind government transfers	Yes	No	Yes[4]	No
Retirement income disbursements	No	Yes	Yes	No
Interest on retirement income	Yes	No	No	No
Cash assistance from others	No	Yes	Yes	No[7]
Realized capital gains	No	No	Yes	No
Imputed rent	Yes	No	No	Yes

1. This is the pretax and transfer measure. AS and PSZ also produce post-tax and transfer national income.
2. Since employer and employee contributions are both added and subtracted they are effectively absent.
3. PSZ exclude social security contributions.
4. CBO pretax/transfer measure includes Medicare and social insurance programs, and creates a post tax/transfer measure that includes means-tested cash and in-kind transfers.
5. AS exclude all cash transfers; PSZ include social insurance programs similar to CBO.
6. AS exclude social security disbursements.
7. AS deduct alimony paid and include alimony received.

Table 5. Percent Changes in Real Mean and Median for Various Measures, 2007-2016

	BEA personal income		Census money income		CBO pretax and transfer		PSZ national income	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
% change 2007–12	–1.8%	0.9%	3.8%	7.7%	4.3%	3.4%	0.2%	5.2%
% change 2012–16	7.3%	7.1%	8.3%	7.8%	3.4%	7.5%	3.4%	4.9%
% change 2007–16	9.3%	6.1%	4.4%	0.1%	–0.9%	3.9%	3.2%	–0.3%
% change 2009–15	12.9%	7.4%	6.8%	3.9%	8.5%	5.1%	11.2%	5.1%

Note. All income shares and inequality metrics are calculated from equivalized income and identical for nominal and real measures. Real numbers are in 2012 dollars.

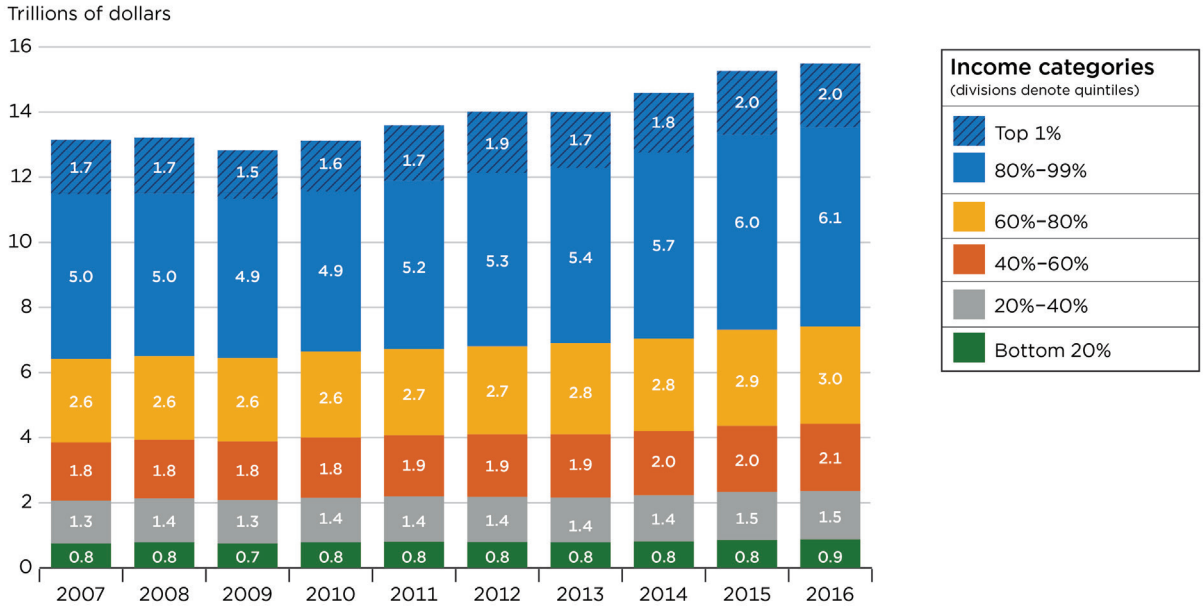
Table 6. Top 1 Percent Shares for Various Measures, 2007-2016

	BEA - personal income	CBO - pretax and transfer	CBO - post transfer	PSZ - national income	PSZ - post transfer	AS - national income	AS - post transfer
2007	12.7%	19.1%	15.5%	19.6%	17.5%	14.6%	12.9%
2008	12.9%	16.4%	13.8%	19.2%	17.1%	14.0%	12.1%
2009	11.7%	13.7%	12.5%	18.4%	16.0%	13.1%	11.3%
2010	11.9%	15.3%	14.3%	19.8%	17.1%	14.3%	12.2%
2011	12.5%	15.1%	13.0%	19.5%	17.0%	13.8%	11.9%
2012	13.5%	17.8%	15.6%	20.7%	18.1%	15.2%	13.2%
2013	12.3%	15.4%	14.0%	19.3%	17.1%	13.9%	12.1%
2014	12.6%	16.7%	14.2%	19.9%	17.7%	14.3%	12.4%
2015	12.9%	16.6%	14.2%	19.8%	17.6%	14.1%	12.2%
2016	12.7%	15.8%	13.8%	19.3%	17.3%	--	--
% change 2007-12	5.9%	–6.8%	0.7%	5.7%	3.2%	4.2%	1.9%
% change 2012-16	–6.0%	–11.2%	–11.3%	–6.8%	–4.1%	--	--
% change 2007-16	–0.4%	–17.3%	–10.7%	–1.5%	–1.0%	--	--
% change 2009-15	10.3%	21.2%	13.8%	7.5%	9.8%	7.8%	8.4%

- Indicates not available

Chart 1. Real Personal Income by Income Category

(2012 = 100)



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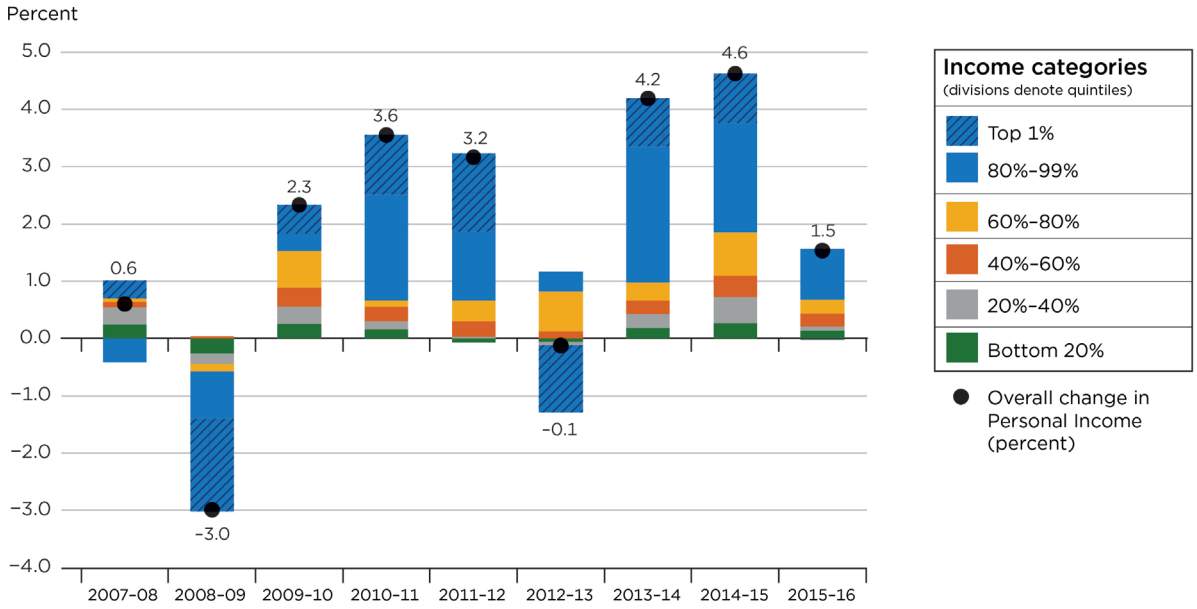
Note. This chart shows real ($2012) personal income allocated to each income category for each year in 2007–2016. The income categories corresponds to the share of income held by each income category and are as follows: 0–20 percent (first quintile), 20–40 percent (second quintile), 40–60 percent (third quintile), 60–80 percent (fourth quintile), 80–99 percent and top 1 percent (together these two make up the fifth quintile).

Chart 2. Annual Growth in Real Personal Income by Income Category

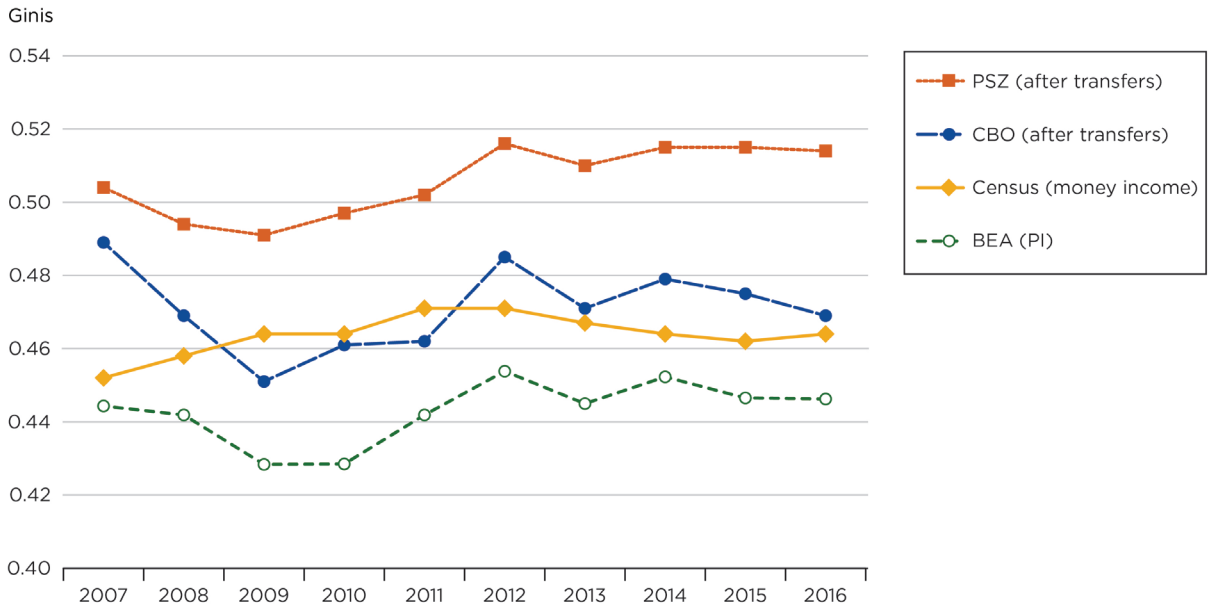
(2012 = 100)



U.S. Bureau of Economic Analysis

Note. This chart shows the annual growth in personal income for each quintile. The markers and labels represent total growth in Personal Income over the year (i.e., the height of the bar, including the negative portion). For example, from 2008-2009, though Personal Income fell by 3 percent overall, more than half of that fall (1.6 percentage points) was a decline in the incomes of the top 1 percent. Note: the fall of top shares in 2012 and subsequent rise in 2013 is primarily due to changes in the reporting on income due to tax law changes.

Chart 3. Gini Coefficients Using Various Measures,[1] 2007–2016



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1. PSZ series Gini is calculated using their Distributional National Accounts micro-files.

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