

NOT FOR DISTRIBUTION

What Money Can Buy:

A Joint Distribution of Personal Income and Personal Consumption Expenditures

Marina Gindelsky*

U.S. Bureau of Economic Analysis

Robert Martin

U.S. Bureau of Labor Statistics

April 2024

Abstract

The U.S. Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS) have recently constructed a new joint distribution of personal income and personal consumption expenditures. As a prototype exercise for 2017 (with recently updated results to include 2004-2022), this is the first such joint distribution for the U.S., consistent with national accounts. By developing a new methodology to link these distributions, BEA and BLS will allow users to analyze the distributions of income and consumption expenditures for the same quantiles and create a distribution of personal saving. Though such linkages are challenging and have limitations, this exercise presents an important step in bridging that gap for national accounts.

JEL Codes: D31, E21, I31

Keywords: income distribution, inequality, consumption

Acknowledgements and disclaimers: Any views expressed here are those of the authors and not necessarily those of the Bureau of Economic Analysis or Bureau of Labor Statistics.

*Corresponding Author: Marina Gindelsky. Office of the Chief Economist, 4500 Silver Hill Rd. Suitland, MD 20746: marina.gindelsky@bea.gov.

I. Introduction

Income disparities dominate headlines, but household perceptions of inequality may also be driven by consumption. Together, income and consumption are key determinants of well-being. By evaluating both for the same households, we can gain insights into how tax and transfer policies will impact their relative rankings and spending patterns. These household-level effects will then add up to economy-wide impacts. However, within a national accounts framework, there are limitations to analyses constructing a joint income-consumption distribution for households in the United States.

Interest in producing distributional estimates consistent with macro totals has grown with the work of Stiglitz et al. (2009), as part of the international push to go beyond GDP in an emphasis on well-being. The report emphasizes that the joint distribution of income, consumption, and wealth better captures household living standards. As a result of this report, two research groups at the Organisation for Economic Co-operation and Development (OECD) were founded over the next few years to promote the international research into constructing such measures; (1) The Expert Group on Disparities in National Accounts (EGDNA) and (2) The Income-Consumption-Wealth group (EGICW). Participation in these groups has motivated a decade of work in this area by encouraging researchers and statistical agencies to construct joint distributions and distribute national accounts totals to households¹.

In the spirit of the EGDNA group, the Bureau of Economic Analysis (BEA) has produced a [distribution of personal income \(PI\) and disposable PI \(DPI\)](#), and the Bureau of Labor Statistics (BLS) has produced a [distribution of personal consumption expenditure \(PCE\)](#). These are the national accounts concepts most closely related to the resources households have available for consumption (Gindelsky 2022a). These distributions make it possible to link macroeconomic growth to (micro) households.

There have been two very recent (and related) analyses which have constructed a joint distribution of income, consumption, and wealth for the U.S.: Fisher et al. (2022) and calculations for the U.S. by Fisher et al. in Balestra and Oehler (2023) (ICW publication). This work has been done from a micro framework perspective and most closely follows the recommendations of the EGICW Task Force (OECD (2013) and more recent OECD (2023) report. Although the two analyses have slightly different income, consumption, and wealth concepts, they share a core methodology based on the Survey of Consumer Finances (SCF), with some consumption elements imputed using the Consumer Expenditure Survey (CE).² The authors concluded that multi-dimensional inequality indeed increased

¹ As interest in these topics developed, Ruiz (2011) created a foundational OECD framework which proposes a method to calculate nested Atkinson indices the joint distribution of income, consumption, and wealth. Using this framework, Garner and Short (2013), construct multidimensional measures of economic well-being in the U.S. based on income, consumption, and wealth (using the Consumer Expenditure Survey) and find they offer more complete depictions than analysis along single dimensions alone. Specifically, examining only consumption (rather than the joint distribution) leads to an overestimation of well-being, since it is more equally distributed in the population. Additional studies on consumption inequality, such as decompositions by spending component and demographics, include Garner (1993) and Garner et al. (2003).

² As in other distributional exercises (see below), here the term “consumption” is used as shorthand to mean “consumption expenditure”. However, these two concepts are not quite equal. For instance, as measured in the national accounts and microdata, consumption expenditures do not include inter-household transfers of goods or services. While this distinction is unlikely to significantly impact the overall conclusions drawn from this analysis, it may have some distinct impact on estimates for those in the lower half of the distribution, or demographic disaggregation. Garner et al. (2023) compute a consumption measure which also includes flow-of-service values for vehicles and owner-occupied housing, as well as in-kind transfers. Also not included in consumption expenditures is home production; however, consumption would include the value of home-produced goods and services (see related Armstrong et al. 2022).

faster than one-dimensional inequality owing to the overlap of households at the top.³ Prior to constructing the most recent joint distribution of income, consumption and wealth, Fisher et al. published a series of papers on this topic (2015, 2016, 2018, 2020) where they investigate the relationships between income inequality, consumption inequality, and wealth inequality independently and jointly.

In contrast to the work based strictly on a micro framework, the joint distribution results presented in the current paper are based on a macro national accounts framework. However, like the studies that are solely micro-based, this research also incorporates micro household level data and thus, we expect to find similar results regarding the joint distribution of income and consumption. As our exercise is based on a different base dataset for income (Annual Social and Economic Supplement of the Current Population Survey, hereafter referred to as “CPS”) but the same CE data with both scaled to National Income and Product Accounts (NIPA), the cross-shares may indeed look different. However, our exercise has the same general results as the Fisher et al. (2022) series of analyses based on the Panel Survey of Income Dynamics (PSID)⁴: (1) The Marginal Propensity to Consume (MPC) varies throughout the income distribution, being higher for those for lower incomes and lower for upper incomes (Fisher et al. 2020); and (2) consumption inequality and income inequality have different patterns and determinants and should therefore be considered jointly to understand well-being (Garner and Short 2013).⁵ Consumption inequality has not increased as fast as income inequality increased in recent decades in the U.S. (especially among the top 1%) given government transfers and smoothing behavior, but both tend to be higher among younger householders, those with less education, and non-White householders (Fisher et al. 2015, 2016, 2018).⁶ Moreover, Garner et al. (2024) examined consumption inequality during the COVID pandemic; consumption inequality trends differently from inequality of DPI due primarily to changes in consumption at the top of the distribution (i.e., reduced consumption of food away from home and entertainment). These changes can be juxtaposed against the gains in income from transfers for bottom quintiles, when considering the impact on the joint distribution.

The Garner and Short (2013), Fisher et al. and related papers (see footnotes 3 and 4) illustrate the recent work done on this topic, motivated by Stiglitz et al. (2009) and the benefits of constructing a joint distribution which allows us to study the interrelationship between income and consumption. A well-measured joint distribution could have important implications for understanding the causes of limited intergenerational mobility and

³ There are a few other analyses which use the CE instead of the PSID. Aguiar and Bils (2015) find that though it appears that income inequality increased significantly faster than consumption inequality from an initial review of the data, there is much less divergence between the two measures than it appears when considering an Engel curve approach. The authors explain this by considering the shift in consumption away from necessities and towards more “luxury” goods by high income households. Krueger and Perri (2006) use the CE to investigate a pre-2000 relationship between consumption and inequality and also find that income inequality increased faster than consumption inequality, but that the difference during this period was driven specifically by divergence between the two measures *within-group* (i.e., within a race, education, or sex), rather than between the groups. They model this relationship and hypothesize that it is tied to risk-sharing within groups, and its relationship to borrowing.

⁴ Also using the PSID for 1968-2011, Attanasio and Pistaferri (2014) found that income and consumption inequality sometimes moved in the same direction and sometimes in different directions throughout this period, depending on the economic factors at play. However, the consumption information in the PSID is limited.

⁵ Blundell et al. (2008) impute elements of the CE to the PSID (mainly 1980s) to investigate the extent to which income shocks translate to consumption. They find “partial insurance” for permanent shocks, and almost complete insurance for transitory, emphasizing the role of shock persistence, rather than level, on the trends.

⁶ A recent paper (building on several previous analyses) by Meyer and Sullivan (2023) finds that unlike income inequality (using the CPS), consumption inequality (using the CE) only increased in the top half of the distribution (1961-2017). Meyer argues that consumption better reflects economic well-being (better measured, more related other well-being measures).

macroeconomic policy responses to business cycle fluctuations (See Krueger et al. (2016) for a discussion of how heterogeneity has implications for macroeconomic effects.)⁷

In this exercise, we combine the work of the EGDNA and EGICW to construct a joint distribution of income and consumption in a national accounts framework. We use the CPS as the dataset for income sources and CE for consumption sources (building on earlier work by Garner and Short (2013) who used CE for both) to produce a joint distribution of income and consumption, and subsequently personal saving (PS), for 2017, with results recently extended for 2004-2022. These datasets were chosen since they are the basis for the separately produced distributions of PI and PCE. Unlike the SCF⁸, the CPS and CE do not oversample to ensure that the top tail of their respective distributions are represented. Thus, as an approximation, tail-adjustment strategies are employed to produce microdata that we believe better represent the top 5% of “true” income and consumption distributions. However, the CE and CPS richness and detail allow us to produce disaggregated distributions of PI and PCE, and subsequently dive deep into the sources of inequality, independently and jointly. This is key for understanding the impact a policy change may have on overall household well-being, as reflected in a national accounts framework.

The results of this exercise confirm that overall income is distributed significantly less equally than consumption, even when scaling to NIPA totals, and that there is significant agreement in distributional ranking. That is about half of households are within the same decile (or next higher or lower decile) (e.g., decile 3 in consumption, but decile 2 or 4 if ranked by income), and 72% are in the same (or neighboring) quintile. Consumption is 2.6 times higher than income for those in the bottom 10% of DPI, consistent with models which suggest significant debt (or drawing down of assets) for those with lower incomes. However, income for those in the top 1% of DPI is 6 times higher than consumption.⁹ Those in the middle of the distribution have income approximately equal to consumption, with the result that PS is negative for the bottom half of the distribution. However, the likely primary reason for the negative PS likely stems the exclusion of retirement income (and other income sources) from PI, in addition to debt.

There are a few key limitations to our analysis, which we explore in more detail in the discussion section. First, there is a considerable degree of uncertainty in any analysis which involves linking two different datasets on observables, but we believe we have taken steps to mitigate this measurement error. Second, we have adjusted both the income and consumption distributions to better reflect what we believe to be top values, but our results will be sensitive to our assumptions. Finally, this paper does not provide estimates of wealth, thus not fully bridging the gap between ICW and EGDNA.

This paper proceeds as follows. Section 2 discusses the data and methodology, with the results presented in Section 3. Sections 4 discusses and concludes.

⁷ More broadly, construction of a joint distribution helps us to estimate the intertemporal budget constraint (Fisher et al. 2022), with subsequent implications for the differences in the MPC throughout the distribution (also see Kaplan and Violante 2014 for a model). Since households smooth consumption, we do not expect them to necessarily be in the same positions in the independent distributions, or the joint distribution.⁷ Estimating the joint distribution also sheds light on debt accumulation and causes of divergence in income and consumption over time (as analyzed by Fisher et al. 2022).

⁸ "The Survey of Consumer Finances (SCF) overcomes both problems by oversampling at the top using administrative data derived from income tax records, and by verifying that the top is represented using targeted response rates in several high-end strata. The list sample ensures that the SCF has adequate representation of the upper tail of the wealth distribution and adequate representation of sparsely held assets." See more [here](#).

⁹ When ranked on consumption, the differences between income and consumption for a given decile are smaller, which is unsurprising given the flatter shape of the distribution.

2. Data and Methods

A. The CPS and CE

The first step in constructing a joint distribution of income and consumption is integrating the two datasets. Our initial analysis was constructed for 2017, and detailed results are presented for this year. However, we have recently extended the series to cover 2004-2022. The CPS contains many income variables for the distribution of PI (and subsequently DPI), while the CE contains many of the consumption items necessary for distributing PCE. Though the CE contains several income questions as well, its fundamental role is to serve as a detailed expenditure survey (unlike consumption and income survey data in other countries). It is the richness of this consumption data which motivates researchers to impute consumption items using the CE, even if there is some consumption data in another survey.

As the CPS is designed to be a labor force survey, there are several advantages to using the CPS for the income calculation.¹⁰ First, it is the survey presently used by BEA for the distribution of PI, with an established and well-researched methodology. This facilitates its use in the joint distribution. Next, the relevant household sample size of the CPS (67,859) is significantly greater than that of the CE (roughly 5,000 each collection quarter, though we use a subsample of 8,238 consumer units with at least two quarterly interviews and expenditures occurring between November 2016 and February 2018). Also, the CPS has more disaggregated sources of income, which are relevant for distributing some narrowly defined elements of PI to the right households. Its sample size allows for significant variation within the more detailed sources. Finally, the recall period is the previous calendar year. The survey is conducted when households are (theoretically) preparing their income tax returns to enhance recall of these target questions. Accordingly, official income inequality estimates of the Census Bureau derive from this survey.

The core methodologies for allocating PI (and DPI) to households and PCE to consumer units were developed prior to this exercise by BEA and BLS respectively. These methodologies are both based on an equalized ranking of households/consumer units (division by the square root of household (or consumer unit) size) are described in detail separately on the [BEA](#) and [BLS](#) websites. For the joint distributional analysis, we generally sourced all income components from the CPS and all consumption components from the CE. However, we made two exceptions which are intended to harmonize overlapping DPI and PCE components in order to improve estimates of PS at the household level. First, instead of using the CE for all health-related expenditures, we used CPS values for the health items they have in common. Second, instead of using the imputation method described in Gindelsky (2022a), we distributed rental income of owner-occupiers using CE rental equivalence values. These changes to the distributions of DPI and PCE have been used as inputs to calculate the PS distribution.

The original CPS and CE surveys understate income and consumption in the aggregate (even accounting for definitional mismatch and scope, see Passero et al. (2014)) when compared to national accounts totals (Rothbaum 2015). It's possible that a significant portion of this gap is due to either (a) missing high income/consumption households, or (b) under response. Tax gap studies (DeBacker et al. 2020) show that much of the missing income is at the top (presumably the top 5%, see Fisher and Johnson (2022)). The BEA exercise adjusts for this missing income by using information from the IRS's Statistics on Income dataset (see detailed description [here](#)). However, there is no comparable administrative data available to suggest an appropriate distribution for consumption. To avoid underestimation of inequality, we follow the suggestion in Zwijnenburg, et. al (2022) and construct a type-I Pareto distribution. This distribution is applied to the top 5% of total spending after adjustments and imputations, but before scaling to match the NIPA totals (comparable to the BEA technique of adjusting CPS responses prior to

¹⁰ Recall: this exercise uses CPS as shorthand for CPS ASEC, the March survey whose purpose is to collect detailed income information.

scaling to the NIPA totals). A shape parameter of 2 was chosen based on Zwijnenburg, et. al (2022) and our judgement on the relationship between income and consumption observed in the CE and SCF.

B. Constructing a Comparable Measure of Income

Once PCE is allocated across all consumer units in the CE, we impute CU level PCE to households in the CPS. We do this by linking the CE and CPS using multiple imputation and treating PCE at the CE level as “missing” for the households in the CPS. The first step in the process is to produce income deciles using a comparable income concept for both the CE and CPS. Although consumer units and households are not the same, for this exercise we treat them as sufficiently comparable.¹¹

Linking the CE and CPS using income data that have not been adjusted to match national account definitions presents significant challenges. For instance, the recall periods are different for the CE and CPS; the CPS reference period is the calendar year while the reference period for CE collected income is the twelve months prior to the consumer unit’s first or fourth interview. In part due to these differences, the income distributions tend to differ across the two surveys even for a narrow category like wages and salaries. Distributions of wages (and other important income sources) in the CE are shifted to the left relative to the CPS.

Our solution is to base our imputation procedure on a new income variable which we construct for this project. We call this constructed variable “comparable income,” and its distribution lines up relatively well across the two surveys (see Figure 1). However, there are important income sources not included in comparable income which results in a slightly worse match at the tails of the distribution. Comparable income is 80% of PI in aggregate (2017) and is distributed similarly (see Figure A1). Comparable income is formed by distributing selected NIPA amounts separately to observations in the CPS and CE using the methods from the BEA exercise (linked above). The measure includes some income sources (earnings, interest/dividends, and some transfers) which are collected in both surveys and which we have scaled to match NIPA totals included in PI and government accounts (see Appendix Table A1 for a full list). There are items (such as WIC) for which we must distribute NIPA totals with no corresponding CE information. For these items, we distribute the NIPA total to each CU with income sources that we presume are correlated, such as SNAP. We impute other unreported sources, such as tax credits, using TAXSIM.

C. Assigning CU-Level PCE to CPS ASEC Households: Multiple Imputation

Once comparable income is estimated for each unit of observation in the CE and CPS, they are ranked on equalized comparable income, and assigned to deciles (in each respective survey). We then estimate separate models for each decile of equalized comparable income using the CE. Specifically, we use multiple imputation with predictive mean matching, which uses PCE values from consumer units in the CE as imputed PCE values for households in the CPS rather than using model predictions. Doing so allows us to better preserve the distribution of PCE from the CE data.

For each income decile (see Figure 1), total PCE (at the CU level) is modeled as a function of demographic and income source indicators. Predicted values form measures of distance between observations in each survey, with the match being chosen from the five “closest” CE observations to each CPS observation. Matches are only made within deciles.

¹¹ In the CE, a consumer unit is defined as persons who share housing and make joint financial decisions, whether or not they are related (see [BLS](#) for complete definition). One residence can contain multiple CUs. About 97.5% of consumer units in our sample belong to households with a single consumer unit.

The chosen CE observation's vector of PCE values is assigned to the CPS observation.¹² As is done with the multiple imputation method, we compute statistics (e.g., the share of total PCE accounted for by the bottom 10% of equivalized PI) five times using the CPS (once for each of the multiple imputations of PCE). Computing results for each imputation better preserves the distribution of the original PCE estimates from the CE data. In our results, we report the averages of the five estimates for each statistic.

D. Computing Distributional Estimates

After the joint distribution of DPI and PCE has been constructed, we are able to compute a series of PS as in NIPA Table 2.1, line 34. We subtract PCE and personal outlays (interest payments and current transfer payments) from DPI to arrive at PS.¹³ All distributional statistics are computed for an equivalized concept. This is done in order to ensure comparability of households of different sizes to each other. Which concept is used for ranking households is of great significance (i.e., comparing DPI and PCE when ranking on PCE or on DPI). This will be shown in the next section. We construct quantiles, including deciles and the top 1% and top 5% directly from the CPS, with PCE and PS imputed to each household. As described above, the CPS is the much larger dataset and the most appropriate choice for these computations. As we use the public version of the CPS, we do not have concerns about data privacy stemming from the original estimation done using the internal CE.

3. Results

(a) Independent Distributions

We can first start by briefly reviewing the independent distributions of income and consumption, in order to establish a baseline for examining the joint distribution. Distributional results for PI and DPI are available on the [BEA website](#) for 2000-2022 (2022 is provisional). As our focus here is relating income to consumption, we use DPI as the relevant income concept. Thus, Tables 1a (2017) and 1b (2004-2022) reprint the BEA distributional results. Similarly, Tables 2a (2017) and 2b (2004-2022) are the published [BLS](#) distributional PCE results.

An initial glance at these results shows that, as expected, DPI is significantly more unequal than PCE. As discussed in the methodology section, though we have tax microdata and audit studies which inform our understanding of the share of top incomes, we have no such data for consumption as noted earlier. Thus, while we have chosen a Pareto parameter, which we believe to be reasonable, there is presently no way to validate this assumption.

There is significant variation underlying the aggregated income and consumption distributions. As shown in Table 1a, proprietor's income and income receipts on assets (interest and dividends) are distributed far more unequally than the other income items, and of course government social benefits are distributed the most equally (a significantly higher share at the bottom than other income items). Looking at the relative contributions of the components to income overall, it's clear that the overall distribution looks mostly like the distribution for compensation (63% of PI). The unequal distributions of interest and dividends and proprietor's income are mostly offset by the much more equal distribution of government social benefits.

As seen in Table 2a, for PCE, the distributions of goods and services look fairly similar, and like the overall distribution of PCE. However, durable goods are distributed significantly more unequally than nondurable goods

¹² We use Stata's "mi impute pmm" command (StataCorp, 2021) with five imputations.

¹³ Personal interest payments are distributed according to interest payments as reported by respondents in CE. Personal current transfer payments are partially distributed using payment info in CE (including license/registration fees) where available. The remainder is allocated to be distributionally neutral.

(particularly the fairly equal food and gasoline). Among services, health care is most equally distributed. However, this may be a very conservative allocation because it reflects a somewhat coarse distribution strategy which must impute and allocate the values of Medicare and Medicaid to households, in addition to employer premiums, using state averages from the National Health Expenditures survey (Garner et al. 2022). The distribution also includes out of pocket medical goods and services expenditures collected by the CE, which show significantly more variation. An unequal distribution can reflect true inequality in the expenditure or reflect (1) significant underreporting resulting in skew (as in the case of recreation goods and services) or (2) items that are out of scope for the survey, but still present in PCE (as in the case of financial services).

(b) Joint Distribution

Turning to the joint distribution, it is useful to first start with the distribution of PCE, ranked on equivalized DPI. Table 3 shows this distribution by major PCE category, becoming the analog of Table 2a (summary statistics in Table A3). This table shows what share of consumption households in a given income quantile have collectively (i.e., the lowest income households (bottom 10%) consume 4.7% of PCE, while the top 10% consume 21.4%). If we compare the distributions in Table 2a to Table 3, we can see how by ranking on DPI (see Table A2 for PI), rather than consumption, we see a much more equal distribution of most items (see Figure 2 for a comparison of shares with different rankings). This highlights the principle that while consumption itself is unequally distributed, there is a pattern wherein households at the bottom likely consume more than their income (by means of debt or withdrawal from savings), proportionally, while those at the top consume less (keeping in mind the fact that income and consumption are defined in a national accounts framework here).

Figure 3a shows the distribution of PCE (broken down into durables, nondurables, and services) vs. PI and DPI, with each series ranked on equivalized DPI (see Table A4 for summary statistics). Those in the top quintile of DPI in 2017 had 35.5% of PCE (compared to 47.8% of DPI) (Table 1b). Not only is the share of PCE much lower for the top quintile (especially for nondurable goods), but the share of the bottom quintile is almost twice as high (10.4% for PCE vs. 6% for DPI). The shares of the middle two quintiles are more comparable. Figure 3b shows the means and medians of DPI and PCE in levels ranked on DPI and the means of the top 1% and top 5% in the table below the chart. The corresponding chart/table ranked on PCE is in the Appendix Figure A2, in addition to the ratio of PCE to DPI by decile.

Another way to look at the joint distribution is by examining the cross-shares in Tables 4a-c, similar to those presented in the OECD EGICW exercise (Balestra and Oehler (2023)). In Table 4a, each cell in the table represents the share of households in each respective income-consumption quantile. The quintile-level table compared with the OECD results is presented in the Appendix. We can see that only 4% of households are in the top decile of both income and consumption (11% in the top joint-quintile). About 1/5 of households are in the same income & consumption deciles, but about half are within (same or adjacent) a decile. Compared to the OECD results, our results are a little less concentrated at the top (Table A4). We can see the share of income in each bucket (Table 4b) and share of consumption (Table 4c) to further get a sense of the distribution. For example, 4% of the households are in the top joint decile and have 13% of DPI and PCE, whereas 2.7% of households are in the lowest joint decile and have less than 1% of both income and consumption. However, the top 5% appears less concentrated in the joint distribution than the independent distributions: 1.5% of households are in the top 5% of both income and consumption and have 5.8% of income and 5.4% of consumption.

(c) Personal Saving

One of the fundamental advantages of constructing a joint distribution for households is to examine the distribution of PS. Figure 4a plots real median PS by equivalized DPI quintile. PS are negative for the bottom half of

the distribution (bottom three quintiles, except 2020-2021 for the 40-60%). Accordingly, in Figure 4b, the distribution of PS, only the top three deciles have a positive share of PS. There are a few explanations we can identify for the strong negative PS at the bottom of the distribution.

First, there are sources of income that households have available for expenditure, but are not conceptually included in PI, such as retirement income and capital gains. Of particular relevance for lower income households is retirement income (not social security, which is included). The inclusion of (accurate) retirement income in this distribution would significantly increase income for households by 5-10%, especially at the bottom.¹⁴

Second, many households finance their consumption by taking on debt. Households can finance large purchases, such as vehicles, with loans, rather than full cash outlays. However, the full value of the item is reflected in PCE. Additionally, households can take on debt to finance consumption more generally. While we cannot isolate an effect of debt on a specific purchase, we can consider some overall patterns. Credit card balances were approximately 6% of family income, according to the 2019 SCF, while debt service payments are 10% of DPI in aggregate. Moreover, while many households in the lower portions of the distribution do not have credit cards, some have payday loans with very high interest rates, regarding in large debt servicing costs. While, we cannot accurately measure debt for each household, its likely that many households do have a significant share of consumption financed by debt.

(d) Time Trends

Before examining the joint distribution of DPI and PCE, we can note the overall trends in both measures since 2004 in Tables 1b and 2b. Though there's some volatility, overall inequality of both DPI (Table 1b) and PCE (Table 2b) have fallen from 2004-2022. However, the two series have not always trended together. Though overall inequality fell from 2019-2021 for both DPI and PCE, it fell three times as much for DPI (Gini drop of 0.017 vs. 0.005). Real mean DPI grew more (7.3%) than real mean PCE (4.7%) over those three years, as did real median DPI (10.1% vs. 3.6% for PCE). These differences are largely attributable to the ways in which DPI and PCE were impacted by the pandemic. DPI rose significantly for households in the lower half of the distribution due to the significant expansions of unemployment insurance and the child tax credit, in addition to Economic Impact Payments. However, these changes did not necessarily result in proportional changes in spending.

Figure 4a shows that real median income for the bottom quintile grew much more than consumer expenditure, as well as for the top quintile, especially during the last decade when the gap became significantly wider. Figure 4b shows the relative flatness of PS within the quintiles, with some business cycle variation. The primary volatility occurs during the pandemic when the ratio between income and consumption rises and then falls, as discussed above. This is consistent with the findings of Garner et al. (2024), who find that consumption fell disproportionately for households at the top. Generally, the ratio of income to consumption rises slightly throughout the time period for the bottom quintile while falling for the others, but the trend is not substantial. The differences in these trends by quantile illustrate the importance of examining the joint distribution rather than just the individual distributions.

¹⁴ Since retirement income is underreported in survey data, this is likely an underestimate of the impact. Bee and Mitchell (2017) showed that administrative totals for retirement disbursements about double CPS survey estimates for 2012, before the recent redesign. Starting in 2018, the CPS has more nuanced retirement questions and values (Semega and Welniak 2015) which significantly increased incomes from retirement sources, but likely still underestimate administrative totals.

4. Discussion and Conclusion

The primary advantage of constructing a joint distribution of income and consumption is the ability to assess the impact of economic changes, whether they are structural, policy/tax, or business cycle related, simultaneously on income and consumption, and subsequently calculate saving.¹⁵ By scaling to national accounts totals, we can directly connect the micro distribution with the macroeconomic trends, connecting the work of the OECD EGDNA and ICW groups.

Our primary findings confirm that consumption is distributed significantly more equally than income and that there is significant heterogeneity depending on the sources of consumption and income, with durable goods distributed significantly more unequally than nondurable goods and services. The top quintile (when ranked on equivalized DPI) has 33% of PCE (compared to 48% of DPI), while the bottom quintile has 12% of PCE (compared to 6% of DPI). We find that there is considerable agreement between deciles of income and consumption (about half of households are within a decile), but a quarter of households are more than one quintile away. Moreover, examining the distribution during a period of economic turbulence (the COVID pandemic) does not change the fundamental relationships present in 2017, highlighting their salience. It does, however, show the importance of examining the joint distribution, which contains insights that cannot be gleaned from solely examining the independent ones.

There are several limitations to our analysis. First, there is always going to be measurement error associated with any kind of imputation or statistical match, no matter how well-constructed or rigorously applied. We simply do not observe the joint distribution of DPI and PCE. Analysis of any matched dataset proceeds under the (fundamentally untestable) assumption that the key variables of interest (in our case, DPI and PCE) are statistically independent conditional on the comparable variables used in the linking procedure.¹⁶ We explored several matching techniques and found our chosen procedure to be the best at preserving the marginal distribution of PCE as well as the joint distribution of PCE and comparable income. We judged the latter to be a high priority as income is an important determinant of spending. To the extent that there is leftover dependence between income and consumption after conditioning on our matching variables, our results could understate, for example, the inequality in PCE when ranked by equivalized DPI. While we have done our best to evaluate our statistical match, this remains a significant shortfall of any exercise involving a joint distribution estimated from two datasets which do not have the possibility of matching households exactly.¹⁷

Second, there is considerable uncertainty concerning inequality at the top of the consumption distribution. While we suspect that the CE underestimates consumption at the top, at present there is no clear way to directly correct for this. The results will be fairly sensitive to the shape parameter of the Pareto distribution chosen. For instance, a shape parameter of 1.7 increases the top 1%'s share of PCE by over 3 percentage points. Future research could seek to apply the methods of Zwijnenburg, et. al (2022) to fit another shape parameter to the distribution, or else make a different adjustment.

Finally, while a central goal of this exercise is to scale to national accounts, and DPI is the NIPA concept most closely tied to the resources available to households, it nevertheless has a dozen sources of income which are

¹⁶ For a discussion of conditional independence in statistical matching, see, e.g., Moriarty and Scheuren (2003).

¹⁷ Rubin (1986) proposed (later refined by Moriarty and Scheuren, 2003) a parametric approach to dataset linking based on the multivariate normal distribution which builds in uncertainty about the conditional independence assumption. We are unaware of such techniques being used for income-expenditure dataset linking, but it is a potential avenue for future research.

imputed (such as imputed interest on pensions) and cannot be directly used by households for consumption. Similarly, PCE also has some imputed or implicit components (such as values for health care or insurance) which are not “consumed” in the traditional sense. Though definitionally appropriate, these imputed components will lead to a somewhat weaker relationship between PI and PCE than might be observed from examining a household balance sheet.

We believe that this analysis represents an important (if incomplete) next step in measuring well-being by considering joint distributions in a national accounts framework. Using methodologies based on both the OECD EGDNA and ICW groups, we are partially bridging the gap between these two important lines of research. Although we have not yet been able to estimate the wealth dimension, there are several key results of the income-consumption relationship we believe to be salient. It is important to continue work in this area, improve the methodology, and extend the time series backwards to assess the trends.

Tables and Figures

Table 1a: Components of Disposable Personal Income by Decile (2017)

Category	Total (\$B)	% of PI	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
Compensation of employees	\$10,424	62.6%	1.0%	2.7%	3.6%	4.8%	6.1%	8.2%	10.9%	13.6%	17.9%	31.3%
Proprietors' income with inventory valuation	\$1,429	8.6%	-0.2%	0.2%	0.3%	0.5%	1.0%	1.7%	2.9%	4.9%	9.2%	79.5%
Rental income of households with capital consumption adjustment	\$633	3.8%	1.7%	4.0%	5.5%	6.5%	7.9%	9.0%	10.1%	12.7%	15.2%	27.4%
Household income receipts on assets	\$2,555	15.3%	0.5%	0.8%	1.2%	1.8%	2.9%	4.2%	5.9%	8.7%	14.0%	60.2%
Household interest income	\$1,446	8.7%	0.7%	1.1%	1.5%	2.3%	3.7%	5.1%	7.0%	9.8%	15.6%	53.3%
Household dividend income	\$1,109	6.7%	0.2%	0.4%	0.7%	1.1%	1.9%	3.0%	4.5%	7.2%	11.7%	69.3%
Household current transfer receipts	\$2,919	17.5%	6.9%	10.0%	11.5%	12.0%	11.9%	11.5%	9.9%	9.2%	8.7%	8.5%
Government social benefits	\$2,784	16.7%	6.6%	10.2%	11.8%	12.2%	12.2%	11.5%	10.0%	9.1%	8.5%	8.1%
From business (net)	\$29	0.2%	1.8%	3.5%	4.4%	5.2%	6.3%	7.6%	9.2%	11.3%	14.8%	36.0%
From nonprofit institutions	\$106	0.6%	16.4%	6.0%	6.3%	8.3%	5.9%	10.4%	8.3%	13.1%	12.2%	13.2%
Less: Contributions for government social insurance, domestic	\$1,299	7.8%	0.9%	2.8%	3.7%	4.8%	6.1%	8.2%	11.0%	13.9%	18.4%	30.0%
Household income	\$16,662	100.0%	1.9%	3.5%	4.4%	5.3%	6.3%	7.6%	9.2%	11.3%	14.8%	35.8%
Personal income	\$16,663	100.0%	1.8%	3.5%	4.4%	5.2%	6.3%	7.6%	9.2%	11.3%	14.8%	36.0%
Less: Taxes	\$2,049	12.3%	0.3%	0.8%	1.2%	1.9%	2.9%	4.5%	6.8%	9.9%	15.6%	56.3%
Disposable personal income	\$14,614	87.7%	2.0%	3.9%	4.9%	5.7%	6.8%	8.0%	9.6%	11.4%	14.7%	33.1%

Table 1b: DPI Inequality Metrics

Inequality Metric	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mean (\$2017)	\$99,108	\$99,357	\$101,521	\$103,217	\$104,490	\$104,418	\$105,368	\$105,507	\$107,184
Median (\$2017)	\$71,956	\$71,965	\$72,561	\$74,788	\$75,589	\$76,369	\$77,998	\$76,231	\$76,325
0-20% Share	5.6%	5.5%	5.8%	5.8%	5.8%	5.9%	5.9%	5.8%	5.7%
20-40% Share	10.4%	10.4%	10.4%	10.5%	10.4%	10.7%	10.9%	10.6%	10.4%
40-60% Share	14.9%	14.9%	14.7%	14.9%	14.9%	14.9%	15.1%	14.8%	14.6%
60-80% Share	21.4%	21.3%	21.0%	21.3%	21.2%	21.4%	21.3%	21.1%	20.9%
80-100% Share	47.8%	47.9%	48.1%	47.5%	47.7%	47.1%	46.8%	47.7%	48.3%
Top 1% Share	11.4%	11.3%	12.2%	11.4%	11.3%	10.7%	10.8%	11.6%	12.4%
Top 5% Share	23.2%	23.2%	23.8%	23.2%	23.2%	22.5%	22.4%	23.5%	24.1%
Gini Index	0.416	0.415	0.416	0.411	0.412	0.408	0.404	0.413	0.419
90/10 Ratio	5.26	5.31	5.08	5.08	5.05	5.19	5.05	5.1	5.18

Inequality Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean (\$2017)	\$105,221	\$107,425	\$110,544	\$112,278	\$114,542	\$117,693	\$121,503	\$127,723	\$130,427	\$122,412
Median (\$2017)	\$77,065	\$77,347	\$80,177	\$81,128	\$82,370	\$85,044	\$88,327	\$94,484	\$97,247	\$88,665
0-20% Share	5.8%	5.6%	5.9%	5.9%	5.9%	5.8%	5.8%	6.1%	6.1%	5.8%
20-40% Share	10.6%	10.6%	10.6%	10.7%	10.6%	10.6%	10.6%	11.0%	11.1%	10.7%
40-60% Share	15.0%	14.8%	14.9%	14.8%	14.8%	14.9%	15.0%	15.2%	15.4%	14.9%
60-80% Share	21.2%	21.1%	21.2%	21.0%	21.0%	20.9%	21.2%	21.1%	21.0%	20.6%
80-100% Share	47.4%	47.9%	47.4%	47.6%	47.8%	47.9%	47.5%	46.7%	46.4%	47.9%
Top 1% Share	11.4%	11.7%	11.5%	11.3%	11.5%	11.7%	11.1%	10.9%	11.2%	[11.3%-12.1%]
Top 5% Share	23.1%	23.3%	23.2%	23.2%	23.2%	23.6%	22.9%	22.3%	22.7%	[23.6%-24.2%]
Gini Index	0.407	0.412	0.405	0.403	0.411	0.410	0.400	0.385	0.383	0.399
90/10 Ratio	5.06	5.15	4.92	4.86	4.9	4.87	4.84	4.45	4.15	4.61

Notes: These tables are reprinted from the BEA website from the December 2022 release. For full methodology and details, please see the [BEA](#) landing page.

Table 2a: Personal Consumption Expenditures by Major Type of Product and Decile (2017)

Category	Total (\$B)	% of PCE	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
Goods	4,212	32%	3.7%	5.3%	6.0%	7.0%	7.7%	8.9%	9.9%	11.3%	13.7%	26.5%
Durable goods	1,416	11%	1.3%	2.4%	2.8%	4.2%	4.7%	6.8%	8.3%	11.0%	16.5%	42.0%
Motor vehicles & parts	529	4%	0.3%	0.8%	0.9%	2.8%	2.7%	6.1%	7.4%	12.3%	18.8%	47.9%
Furnishings & durable household equip	319	2%	2.2%	3.7%	4.8%	6.0%	7.7%	8.6%	11.4%	12.5%	15.1%	28.1%
Recreational goods & vehicles	376	3%	1.4%	2.5%	2.8%	3.5%	3.8%	5.2%	6.0%	7.7%	14.6%	52.4%
Other durables	192	1%	2.4%	4.5%	5.2%	6.5%	6.7%	8.6%	10.0%	11.5%	15.8%	28.9%
Nondurable goods	2,796	21%	5.0%	6.7%	7.6%	8.4%	9.2%	9.9%	10.7%	11.4%	12.3%	18.7%
Food & beverages for off-premises cons	1,010	8%	6.4%	7.7%	8.4%	8.8%	9.1%	9.7%	10.4%	10.6%	11.5%	17.4%
Clothing & footwear	401	3%	4.8%	6.1%	6.9%	7.5%	8.6%	9.4%	10.5%	11.6%	12.9%	21.7%
Gasoline & other energy	324	2%	4.8%	7.5%	8.0%	8.5%	9.3%	10.1%	10.8%	10.9%	12.4%	17.7%
Other	1,061	8%	3.7%	5.8%	7.0%	8.2%	9.4%	10.3%	11.1%	12.3%	12.9%	19.1%
Services	9,078	68%	3.3%	5.0%	6.1%	6.8%	7.8%	8.6%	9.8%	11.2%	13.4%	28.1%
Household consumption expenditures	8,682	65%	3.3%	5.0%	6.1%	6.8%	7.8%	8.6%	9.8%	11.2%	13.4%	28.1%
Housing & utilities	2,350	18%	3.8%	5.3%	6.0%	6.6%	7.5%	8.3%	9.6%	11.2%	13.0%	28.6%
Health care	2,245	17%	3.9%	6.7%	8.5%	9.8%	9.9%	10.5%	10.9%	11.1%	11.7%	17.1%
Transportation	429	3%	2.8%	4.0%	5.0%	6.1%	7.3%	8.5%	10.3%	12.9%	14.5%	28.5%
Recreation	555	4%	2.0%	3.3%	4.3%	5.1%	6.5%	7.9%	9.3%	12.1%	15.6%	33.7%
Food & accommodations	913	7%	3.0%	4.1%	4.9%	5.5%	6.9%	7.8%	9.6%	11.4%	15.2%	31.6%
Financial services & insurance	1,073	8%	2.0%	3.4%	4.4%	5.0%	6.5%	7.3%	9.2%	10.7%	13.7%	37.8%
Other	1,115	8%	3.1%	4.4%	5.4%	5.5%	6.7%	7.8%	8.7%	10.3%	14.3%	33.9%
NPISH	396	3%	3.4%	5.1%	6.1%	6.9%	7.7%	8.7%	9.8%	11.2%	13.5%	27.6%
PCE less NPISH	12,894	97%	3.4%	5.1%	6.1%	6.9%	7.7%	8.7%	9.8%	11.2%	13.5%	27.6%
Personal Consumption Expenditures (PCE)	13,291	100%	3.4%	5.1%	6.1%	6.9%	7.7%	8.7%	9.8%	11.2%	13.5%	27.6%

Table 2b: PCE Inequality Metrics

Inequality Metric	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mean (\$2017)	\$88,889	\$91,085	\$92,604	\$93,686	\$93,485	\$92,035	\$93,762	\$94,588	\$94,100
Median (\$2017)	\$70,124	\$73,078	\$74,484	\$74,442	\$75,029	\$73,300	\$75,984	\$76,658	\$75,672
0-20% Share	8.3%	8.5%	8.5%	8.4%	8.5%	8.6%	8.8%	8.9%	8.5%
20-40% Share	12.4%	12.8%	12.8%	12.8%	13.0%	13.0%	13.1%	13.1%	13.1%
40-60% Share	16.2%	16.3%	16.5%	16.3%	16.5%	16.2%	16.3%	16.4%	16.5%
60-80% Share	21.4%	21.1%	21.0%	20.9%	20.8%	21.0%	21.2%	21.1%	21.1%
80-100% Share	41.8%	41.3%	41.1%	41.6%	41.3%	41.2%	40.6%	40.6%	40.9%
Top 1% Share	9.0%	8.8%	8.8%	8.5%	9.1%	8.8%	8.4%	8.6%	8.4%
Top 5% Share	19.6%	19.2%	19.2%	19.3%	19.5%	19.4%	18.7%	18.8%	19.0%
Gini Index	0.336	0.329	0.331	0.332	0.335	0.330	0.327	0.323	0.331
90/10 Ratio	0.259	0.234	0.259	0.246	0.269	0.250	0.236	0.230	0.242

Inequality Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Mean (\$2017)	\$94,663	\$96,472	\$98,511	\$100,022	\$102,371	\$104,097	\$105,489	\$103,326	\$110,407	\$112,621
Median (\$2017)	\$75,917	\$77,060	\$79,427	\$80,157	\$82,838	\$83,268	\$84,650	\$84,282	\$87,737	\$90,677
0-20% Share	8.5%	8.5%	8.7%	8.6%	8.5%	8.5%	8.9%	9.4%	8.9%	8.8%
20-40% Share	13.0%	12.8%	12.8%	12.9%	12.9%	12.9%	13.1%	13.5%	12.8%	13.1%
40-60% Share	16.4%	16.5%	16.4%	16.2%	16.4%	16.2%	16.5%	16.7%	16.3%	16.4%
60-80% Share	21.1%	20.9%	21.0%	21.0%	21.0%	21.1%	21.0%	20.7%	20.6%	21.0%
80-100% Share	41.0%	41.4%	41.2%	41.3%	41.1%	41.3%	40.6%	39.7%	41.3%	40.7%
Top 1% Share	8.6%	8.7%	8.5%	8.7%	8.8%	8.7%	8.8%	8.0%	9.1%	8.8%
Top 5% Share	19.0%	19.2%	19.2%	19.4%	19.3%	19.3%	19.3%	18.4%	19.8%	18.9%
Gini Index	0.329	0.335	0.330	0.331	0.332	0.333	0.325	0.311	0.320	0.326
90/10 Ratio	0.240	0.260	0.245	0.248	0.252	0.262	0.251	0.227	0.230	0.261

Notes: These tables resemble tables from the BLS website. For full methodology and details, please see the [BLS](#) landing page, though the methodology has been updated since the December 2022 release. Real values are based on PCE price index.

Table 3: PCE Shares by Decile of Equivalentized DPI (2017)

Category	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
Goods	4.9%	5.9%	6.7%	7.7%	8.8%	9.7%	10.6%	11.9%	14.1%	19.7%
Durable goods	3.3%	4.2%	5.0%	6.4%	7.9%	9.2%	10.4%	12.3%	16.4%	24.8%
Motor vehicles & parts	3.1%	4.5%	5.3%	6.7%	8.2%	9.3%	10.8%	12.6%	14.7%	24.9%
Furnishings & durable household equip	3.5%	4.4%	5.5%	6.7%	7.9%	9.4%	11.1%	13.0%	15.6%	22.9%
Recreational goods & vehicles	2.6%	3.2%	3.8%	5.4%	7.4%	9.0%	9.5%	12.2%	20.4%	26.5%
Other durables	4.7%	5.1%	6.0%	7.4%	8.3%	9.0%	9.8%	10.9%	14.6%	24.3%
Nondurable goods	5.7%	6.7%	7.6%	8.4%	9.2%	10.0%	10.8%	11.6%	12.9%	17.1%
Food & beverages for off-premises cons	6.7%	7.5%	8.0%	8.6%	9.3%	9.9%	10.5%	11.1%	12.1%	16.3%
Clothing & footwear	4.7%	5.7%	6.3%	7.0%	7.9%	9.1%	10.4%	12.1%	14.8%	21.9%
Gasoline & other energy	5.2%	6.3%	7.3%	8.3%	9.4%	10.4%	11.6%	12.6%	13.3%	15.6%
Other	5.3%	6.6%	7.7%	8.7%	9.5%	10.3%	10.9%	11.8%	12.8%	16.5%
Services	4.7%	5.6%	6.5%	7.4%	8.4%	9.4%	10.3%	11.5%	14.1%	22.2%
Household cons expenditures	4.6%	5.5%	6.5%	7.4%	8.4%	9.4%	10.3%	11.5%	14.1%	22.2%
Housing & utilities	5.2%	5.7%	6.5%	7.3%	8.1%	9.0%	10.2%	11.3%	14.0%	22.8%
Health care	5.1%	7.3%	8.6%	9.5%	10.2%	11.0%	10.9%	11.3%	11.8%	14.3%
Transportation	4.3%	5.0%	5.8%	6.9%	8.2%	9.2%	10.4%	11.9%	14.6%	23.8%
Recreation	4.0%	4.4%	5.2%	6.0%	7.2%	8.3%	9.7%	11.8%	15.9%	27.5%
Food & accommodations	4.2%	4.4%	5.1%	6.1%	7.4%	8.8%	10.3%	11.9%	15.3%	26.5%
Financial services & insurance	3.1%	4.0%	5.2%	6.3%	7.9%	8.8%	10.0%	11.8%	16.8%	26.1%
Other	4.9%	4.8%	5.6%	6.4%	7.5%	8.6%	9.8%	11.3%	14.7%	26.5%
PCE less NPISH	4.7%	5.7%	6.6%	7.5%	8.5%	9.5%	10.4%	11.6%	14.1%	21.4%
NPISH	5.4%	6.2%	6.9%	7.6%	8.5%	9.3%	10.2%	11.3%	13.7%	20.9%
Personal Consumption Expenditures (PCE)	4.7%	5.7%	6.6%	7.5%	8.5%	9.5%	10.4%	11.6%	14.1%	21.4%

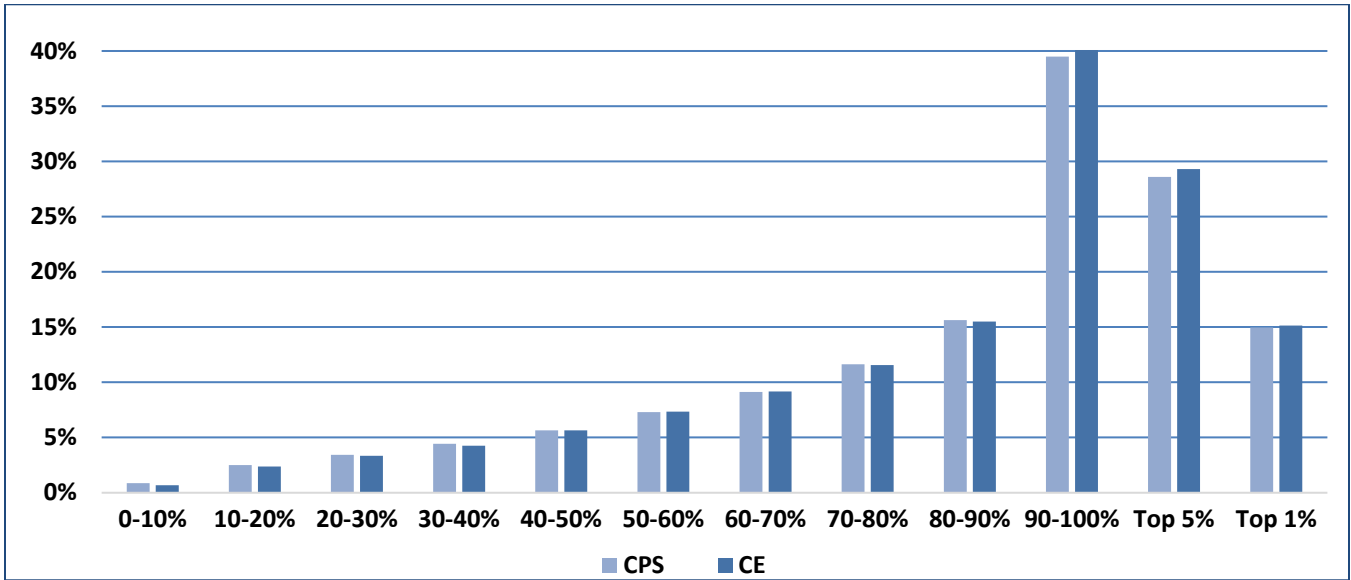
Notes: This table is shares of PCE, ranked on equivalentized Disposable Personal Income, and calculated in the CPS.

Table 4: Personal Income (PI) and Personal Consumption Expenditure (PCE) Matrix (2017)

		Personal Consumption Expenditure Quantiles											
		0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	Top 5%	Top 1%
Personal Income Quantiles	(a) Share of Households												
	0-10%	4.4%	1.8%	1.1%	0.7%	0.5%	0.4%	0.4%	0.3%	0.3%	0.1%	0.0%	0.0%
	10-20%	2.6%	2.3%	1.6%	1.1%	0.8%	0.6%	0.4%	0.3%	0.2%	0.1%	0.0%	0.0%
	20-30%	1.2%	2.0%	1.8%	1.5%	1.2%	0.8%	0.6%	0.4%	0.3%	0.2%	0.0%	0.0%
	30-40%	0.7%	1.4%	1.6%	1.6%	1.4%	1.1%	0.9%	0.6%	0.5%	0.3%	0.1%	0.0%
	40-50%	0.4%	0.9%	1.3%	1.5%	1.5%	1.3%	1.1%	0.9%	0.6%	0.4%	0.2%	0.0%
	50-60%	0.3%	0.6%	0.9%	1.3%	1.4%	1.6%	1.4%	1.1%	0.8%	0.6%	0.2%	0.0%
	60-70%	0.2%	0.5%	0.7%	1.0%	1.3%	1.5%	1.5%	1.4%	1.1%	0.8%	0.3%	0.0%
	70-80%	0.1%	0.3%	0.5%	0.7%	1.0%	1.3%	1.6%	1.8%	1.6%	1.1%	0.5%	0.1%
	80-90%	0.1%	0.2%	0.3%	0.5%	0.7%	0.9%	1.3%	1.8%	2.2%	2.1%	1.0%	0.2%
	90-100%	0.0%	0.1%	0.1%	0.2%	0.3%	0.5%	0.8%	1.3%	2.3%	4.3%	2.6%	0.7%
	Top 5%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.4%	0.6%	1.1%	2.4%	1.5%	0.4%
	Top 1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.4%	0.3%	0.1%
	(b) Share of DPI												
	0-10%	0.6%	0.4%	0.3%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
	10-20%	0.9%	0.7%	0.6%	0.5%	0.3%	0.3%	0.2%	0.2%	0.1%	0.1%	0.0%	0.0%
	20-30%	0.9%	0.8%	0.7%	0.6%	0.5%	0.4%	0.3%	0.3%	0.2%	0.1%	0.0%	0.0%
	30-40%	0.8%	0.8%	0.8%	0.7%	0.7%	0.5%	0.5%	0.4%	0.3%	0.2%	0.1%	0.0%
	40-50%	0.7%	0.8%	0.9%	0.9%	0.8%	0.7%	0.6%	0.6%	0.5%	0.3%	0.1%	0.0%
	50-60%	0.6%	0.8%	0.9%	1.0%	1.0%	1.0%	0.9%	0.8%	0.6%	0.4%	0.2%	0.0%
	60-70%	0.4%	0.7%	0.9%	1.0%	1.3%	1.3%	1.3%	1.2%	0.9%	0.6%	0.3%	0.0%
	70-80%	0.3%	0.5%	0.7%	1.0%	1.3%	1.5%	1.7%	1.7%	1.5%	1.2%	0.5%	0.1%
	80-90%	0.2%	0.5%	0.7%	0.9%	1.2%	1.5%	2.0%	2.3%	2.6%	2.8%	1.4%	0.3%
	90-100%	0.2%	0.4%	0.6%	0.9%	1.2%	2.4%	3.1%	4.2%	7.3%	12.8%	7.8%	1.6%
	Top 5%	0.1%	0.3%	0.4%	0.6%	0.8%	1.7%	2.2%	2.8%	5.0%	9.5%	5.8%	1.2%
	Top 1%	0.1%	0.1%	0.2%	0.3%	0.4%	1.0%	1.2%	1.3%	2.3%	4.7%	2.9%	0.5%
	(c) Share of PCE												
	0-10%	0.8%	0.7%	0.7%	0.6%	0.5%	0.5%	0.4%	0.5%	0.5%	0.4%	0.2%	0.0%
	10-20%	0.8%	0.9%	0.8%	0.8%	0.6%	0.6%	0.5%	0.5%	0.4%	0.4%	0.2%	0.0%
	20-30%	0.6%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.6%	0.5%	0.6%	0.3%	0.1%
	30-40%	0.5%	0.7%	0.8%	0.8%	0.9%	0.8%	0.8%	0.8%	0.7%	0.8%	0.4%	0.1%
	40-50%	0.3%	0.6%	0.8%	0.9%	0.9%	1.0%	0.9%	1.0%	0.9%	1.1%	0.6%	0.2%
	50-60%	0.3%	0.5%	0.7%	0.9%	1.0%	1.1%	1.1%	1.2%	1.1%	1.4%	0.8%	0.2%
60-70%	0.2%	0.4%	0.6%	0.8%	1.1%	1.2%	1.4%	1.5%	1.3%	1.7%	1.1%	0.3%	
70-80%	0.1%	0.2%	0.4%	0.6%	0.9%	1.2%	1.5%	1.7%	1.9%	3.0%	1.9%	0.8%	
80-90%	0.1%	0.2%	0.3%	0.4%	0.6%	0.9%	1.4%	1.9%	2.6%	5.9%	4.2%	2.2%	
90-100%	0.0%	0.1%	0.1%	0.2%	0.3%	0.6%	0.9%	1.6%	3.3%	12.8%	10.1%	5.3%	
Top 5%	0.0%	0.0%	0.0%	0.1%	0.1%	0.3%	0.4%	0.7%	1.6%	6.9%	5.4%	2.7%	
Top 1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	1.5%	1.2%	0.6%	

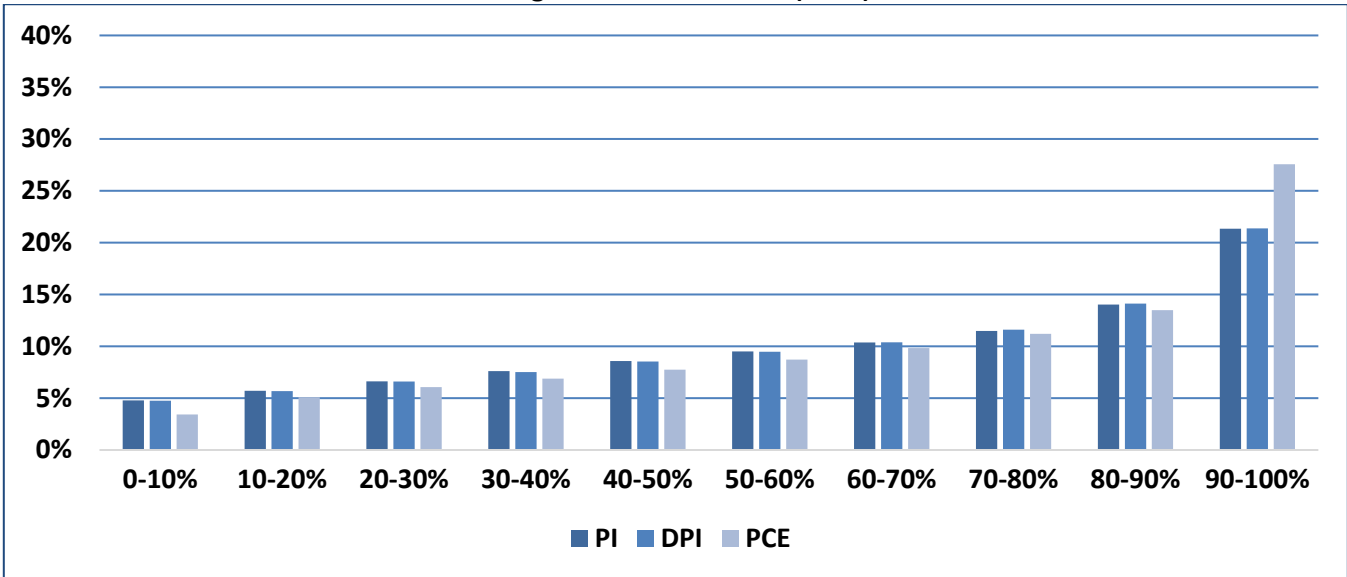
Notes: In panel (a), each cell represents the share of households in each PI & PCE quantile. In panel (b) each cell represents the share of PI for households in each PI & PCE quantile. In panel (c) each cell represents the share of PCE for households in each PI & PCE quantile. Each panel is constructed on a distribution ranked on equalized DPI & PCE.

Figure 1: Distribution of Comparable Income in the CPS vs. CE (2017)



Notes: The heights of the bars in this figure represent the share of “comparable income” held by each quantile as defined in section 3, when constructed (and equalized) in the CPS and CE respectively.

Figure 2: Shares of PCE (2017)



Notes: The heights of the bars in this figure represent the share of PCE held by the quantile when ranked by the equalized income (or consumption) concept in the legend below.

Figure 3a: Quintile Breakout (2017)

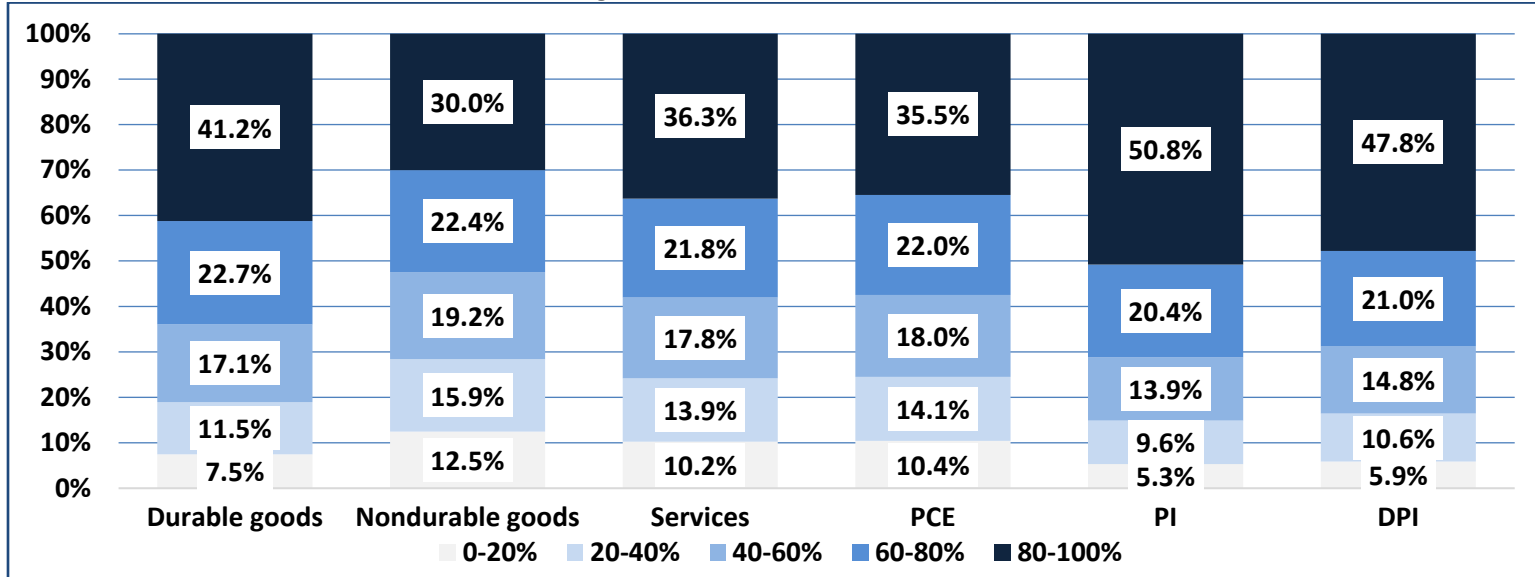
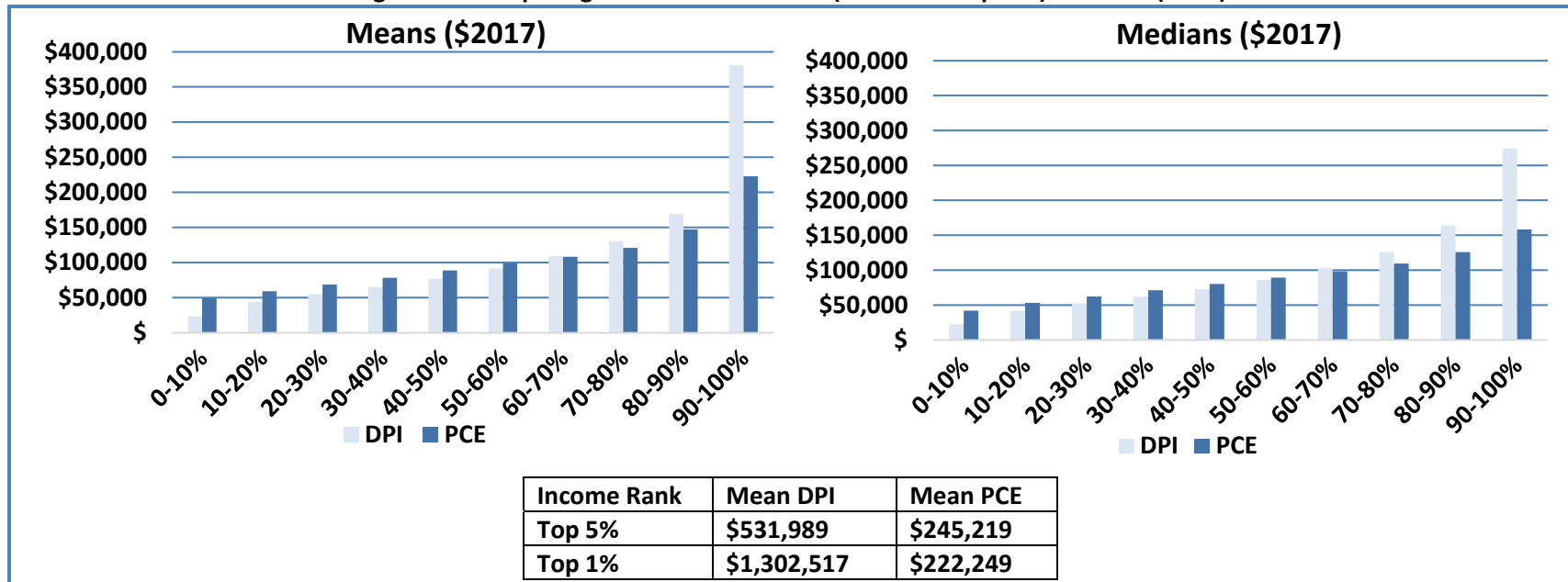
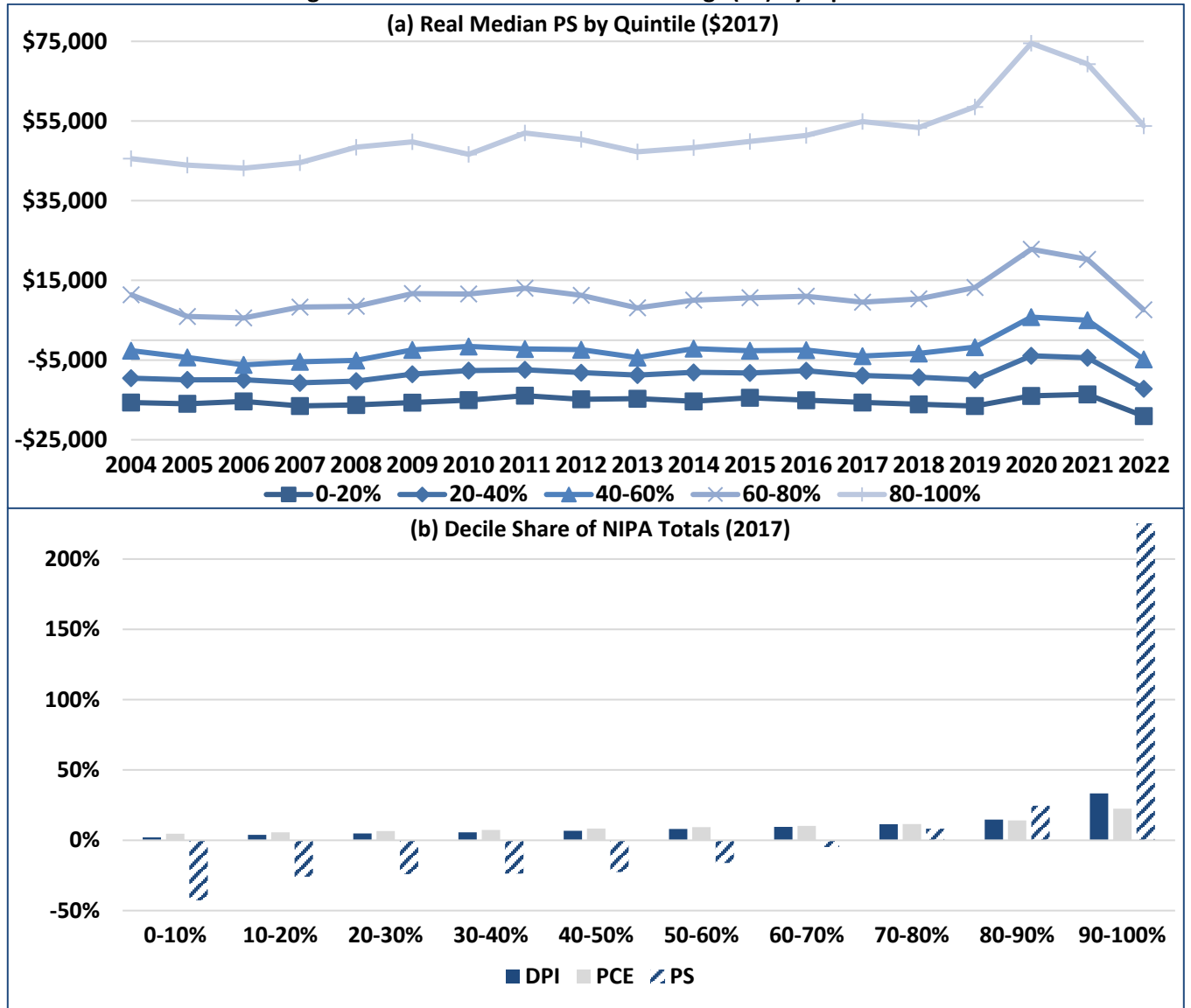


Figure 3b: Comparing Means and Medians (ranked on Eq. DPI) in Levels (2017)



Notes: Figure 3a shows the quintile breakout within each income (or consumption category) when ranked on equivalized DPI. Figure 3b shows the means and medians of DPI and PCE for each quintile, determined by ranking on equivalized DPI.

Figure 4: Distribution of Personal Savings (PS) by Eq. DPI



Notes: Figure 4a shows the distribution of PS by equivalized DPI quintile, in \$2017, for 2004-2022. Figure 4b ranks all households by equivalized DPI decile and then shows the respective shares of DPI, PCE, and PS for each decile.

References

- Aguiar, M. and M. Bils. 2015. "Has Consumption Inequality Mirrored Income Inequality," *American Economic Review*, 105, 2725–56.
- Armstrong, G., Cho, C., Garner, T. I., Matsumoto, B., Munoz, J., & Schild, J. 2022. "Building a consumption poverty measure: Initial results following recommendations of a federal interagency working group." *AEA Papers and Proceedings*. Vol. 112: May.
- Attanasio, O. and L. Pistaferri, 2014. "Consumption Inequality over the Last Half Century: Some Evidence Using the New PSID Consumption Measure," *American Economic Review*, 104, 122–6.
- Balestra, C. and F. Oehler. 2023. "Measuring the Joint Distribution of Household Income, Consumption and Wealth at the Micro Level." *OECD Papers on Well-being and Inequalities*, OECD Publishing: Paris, 11, pp. 1-109.
- Bee, A. and J. Mitchell. 2017. "Do Older Americans Have More Income Than We Think?" Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association, 110, pp. 1-85.
- Blundell, R., L. Pistaferri, and I. Preston, 2008. "Consumption Inequality and Partial Insurance," *American Economic Review*, 98, 1887–92.
- DeBacker, Jason, Bradley Heim, Anh Tran, and Alexander Yuskavage. 2020. "Tax Noncompliance and Measures of Income Inequality." *Tax Notes* 166 (7): 1103– 1118.
- Fisher, J., Johnson, D. Latner, J., Smeeding, T. and J. Thompson. 2016. "Inequality and Mobility using Income, Consumption, and Wealth for the Same Individuals," *RSF Journal of the Social Sciences*, 2, 44–58.
- Fisher, J., Johnson, D. and T. Smeeding, 2015. "Inequality of Income and Consumption in the U.S.: Measuring the Trends in Inequality from 1984 to 2011 for the Same Individuals," *Review of Income and Wealth*, 61, 630–50.
- Fisher, J., Johnson, D., Smeeding, T. and J. Thompson, 2018. "The Demography of Inequality: Income, Consumption, and Wealth, 1989–2013" PSC Research Report No. 18-890, July.
- Fisher, J., Johnson, D., Smeeding, T. and J. Thompson, 2020. "Estimating the Marginal Propensity to Consume Using the Distributions of Income, Consumption, and Wealth," *Journal of Macroeconomics*, 65, 103218.
- Fisher, J., Johnson, D., Smeeding, T. and J. Thompson, 2022. "Inequality in 3-D: Income, Consumption, and Wealth." *Review of Income and Wealth*, 68, 1, pp.16-42.
- Garner, T. 1993. "Consumer Expenditures and Inequality: An Analysis Based on Decomposition of the Gini Coefficient." *The Review of Economics and Statistics* 75.1, pp. 134-138, MIT Press.
- Garner, T., Matsumoto, B., and J. Schild. 2024. "Consumption Inequality During and After the COVID-19 Pandemic". BLS Working Paper. March.
- Garner, T., Matsumoto, B., Schild, J., Curtin, S. and A. Safir. 2023. "Developing a consumption measure, with example of use for poverty and inequality analysis: a new research product from BLS." *Monthly Labor Review*. April.

Garner, T., Ruiz-Castillo, J., and S. Mercedes. 2003. "The Influence of Demographics and Household-Specific Price Indices on Consumption-Based Inequality and Welfare: A Comparison of Spain and the United States." *Southern Economic Journal* 70.1. pp. 22-48. Southern Economic Association.

Garner, T. and K. S. Short. 2013. "A Multi-dimensional Measure of Economic Well-Being for the U.S.: The Material Condition Index" in Joint Statistical Meetings Proceedings August 2013, Alexandria, Virginia: American Statistical Association, pp. 294-308 (Link to [BLS working paper version](#)).

Gindelsky, M. 2022a. "Technical Document: An Updated Methodology for Distributing Personal Income." BEA Technical Paper. December 15, 2022.

Gindelsky, M. 2022b. "Do transfers lower inequality between households? Demographic evidence from Distributional National Accounts." *Economic Inquiry*. 60: 3. Pp. 1233-1257.

Kaplan, G., and G. Violante. 2014. "A Model of the Consumption Response to Fiscal Stimulus Payments," *Econometrica*, 82, 1199–239.

Krueger, D. and F. Perri, 2006. "Does Income Inequality Lead to Consumption Inequality? Evidence and Theory." *The Review of Economic Studies*. Vol. 73: 1. January. Pp. 163-193.

Krueger, D., Mitman, K. and F. Perri. 2016. "Macroeconomics and Household Heterogeneity." *Handbook of Macroeconomics*. Vol. 2. Pp. 843-921.

McCully, C. 2014. "Integration of Micro and Macro Data on Consumer Income and Expenditures," in *Measuring Economic Stability and Progress*, D. Jorgenson, J. S.Landefeld, and P. Schreyer, editors, University of Chicago Press.

Meyer, B. and J.X. Sullivan. 2023. "Consumption and Income Inequality in the U.S. Since the 1960s." *Journal of Political Economy*. Vol. 131. No. 2. February.

Moriarty, C. and F. Scheuren. 2003. "A Note on Rubin's Statistical Matching Using File Concatenation with Adjusted Weights and Multiple Imputations." *Journal of Business and Economic Statistics* 21.1, pp. 65-73.

Passero, W., Garner, T. I., & McCully, C. (2014). *Understanding the Relationship: CE Survey and PCE*. In *Improving the Measurement of Consumer Expenditures* (pp. 181-203). University of Chicago Press.

Rassier, D., Aten, B., Figueroa, E., Kublashvili, S., Smith, B. and J. York. 2021. "Improved Measures of Housing Services for the U.S. Economic Accounts." BEA Working Paper. May 2021.

Rothbaum, J. 2015. "Comparing Income Aggregates: How do the CPS and ACS Match the National Income and Product Accounts, 2007-2012." SEHSD Working Paper 2015-01. Census Bureau Working Papers. January.

Rubin, Donald. 1986. "Statistical Matching Using File Concatenation with Adjusted Weights and Multiple Imputations". *Journal of Business and Economic Statistics*. 4.1, pp. 87-94.

Ruiz, N. 2011. "Measuring the Joint Distribution of Household's Income, Consumption, and Wealth Using Nested Atkinson Measures." OECD Statistics Working Paper. No. 2011/05. Paris: OECD

Semega, J. L., and E. Welniak Jr. 2015. "The Effects of the Changes to the Current Population Survey Annual Social and Economic Supplement on Estimates of Income." Census Bureau Working Paper. January.

Stiglitz, J.E., Sen, A. and J. Fitoussi. 2009. "Report by the Commission on the Measurement of Economic Performance and Social Progress." United Nations Press, 2009.

Zwijnenburg, J., Grilli, J. and P. Engelbrecht. "Pareto Tail Estimation in the Presence of Missing Rich in Compiling Distributional National Accounts." Paper prepared for the 37th IARIW General Conference, August 22-26, 2022.

Appendix Tables and Figures

Table A1: Constructing a Comparable Income across the CE and CPS for Linking

NIPA Table and Line	NIPA Categories	CPS ASEC Variables	CE Variables
Table 2.1, line 3	Wages and Salaries	hwsval	fsalarym
Table 2.1, line 10 + 11	Self-employment	hseval, hfrval	fsmpfrxm
Table 7.9, line 2	Net Rental Income	hrntval	Netrentm
Table 2.9, line 27:28	Interest and Dividends	hintval, hdivval	intrdvxm
Table 3.12, line 5	Social Security	hssval	frretirm
Table 3.12, line 23 + 36	Supplemental Security Income	hssival	fssixm
Table 3.12, line 7 + 14 +17	Unemployment Insurance + Veteran's Benefits	hucval, hvetval	othregxm
Internal table	Earned Income Tax Credit	eit_cred	from TAXSIM (TTX2 file)
Internal table	Child Tax Credit	ctc_crd + actc_crd	from TAXSIM (TTX2 file)
Internal table	Welfare + WIC + Food Stamps	hpawval, hfdval, hrnumwic	jfs_amtm, welfarem, fam_size

Notes: This table shows the NIPA items used to create comparable income and the CPS & CE variables from 2017 that correspond to those. Other years use similar information where there has been a survey change and these variables are not available.

Table A2: PCE Shares by Decile of Equivalized Personal Income (2017)

Category	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
Personal Consumption Expenditures (PCE)	4.8%	5.7%	6.6%	7.6%	8.6%	9.5%	10.4%	11.5%	14.0%	21.3%
Goods	4.9%	5.8%	6.7%	7.8%	8.8%	9.7%	10.7%	11.8%	14.1%	19.7%
Durable goods	3.2%	4.1%	5.0%	6.6%	8.0%	9.0%	10.5%	12.1%	16.5%	24.8%
Motor vehicles & parts	3.0%	4.3%	5.4%	6.9%	8.2%	9.4%	11.1%	12.1%	14.7%	24.9%
Furnishings & durable household equipment	3.5%	4.4%	5.3%	6.7%	8.1%	9.3%	11.2%	12.8%	15.8%	22.9%
Recreational goods & vehicles	2.6%	3.0%	3.7%	5.9%	7.5%	8.4%	9.6%	12.2%	20.6%	26.5%
Other durables	4.7%	5.0%	6.1%	7.4%	8.5%	8.9%	9.6%	10.8%	14.6%	24.3%
Nondurable goods	5.7%	6.7%	7.6%	8.4%	9.2%	10.0%	10.8%	11.6%	12.9%	17.1%
Food & beverages for off-premises consumption	6.7%	7.4%	8.0%	8.6%	9.3%	10.0%	10.5%	11.0%	12.1%	16.4%
Clothing & footwear	4.7%	5.6%	6.3%	7.0%	7.9%	9.1%	10.5%	11.9%	14.9%	22.0%
Gasoline & other energy	5.2%	6.2%	7.3%	8.2%	9.4%	10.6%	11.7%	12.5%	13.3%	15.5%
Other	5.3%	6.6%	7.7%	8.8%	9.7%	10.3%	10.8%	11.7%	12.6%	16.4%
Services	4.7%	5.6%	6.6%	7.5%	8.5%	9.4%	10.2%	11.3%	14.0%	22.1%
Household cons expenditures	4.7%	5.6%	6.6%	7.5%	8.5%	9.4%	10.2%	11.4%	14.0%	22.2%
Housing & utilities	5.2%	5.7%	6.5%	7.4%	8.1%	9.1%	10.1%	11.3%	14.0%	22.6%
Health care	5.3%	7.6%	8.9%	9.8%	10.4%	10.8%	10.8%	11.1%	11.3%	14.0%
Transportation	4.3%	4.9%	5.7%	6.9%	8.1%	9.3%	10.4%	11.7%	14.6%	24.0%
Recreation	4.0%	4.4%	5.2%	6.0%	7.1%	8.3%	9.7%	11.7%	15.9%	27.6%
Food & accommodations	4.1%	4.4%	5.1%	6.1%	7.3%	8.9%	10.3%	11.8%	15.4%	26.7%
Financial services & insurance	3.1%	4.0%	5.2%	6.5%	7.9%	9.0%	9.7%	11.7%	16.8%	26.1%
Other	4.9%	4.7%	5.5%	6.4%	7.4%	8.7%	9.8%	11.1%	14.6%	26.7%
NPISH	5.4%	6.1%	6.9%	7.7%	8.5%	9.3%	10.1%	11.2%	13.7%	21.0%

Notes: This table represents the distribution of PCE, when ranked on equivalized personal income, rather than equivalized PCE or equivalized DPI.

Table A3: Summary Statistics for PCE by Category (2017)

Category	Total (\$B)	Mean	Median
Personal Consumption Expenditures (PCE)	13,291	104,170	83,729
Goods	4,212	33,015	24,787
Durable goods	1,416	11,098	3,475
Motor vehicles & parts	529	4,149	0
Furnishings & durable household equipment	319	2,502	999
Recreational goods & vehicles	376	2,945	361
Other durables	192	1,502	323
Nondurable goods	2,796	21,917	19,451
Food & beverages for off-premises consumption	1,010	7,920	6,816
Clothing & footwear	401	3,144	2,389
Gasoline & other energy	324	2,539	1,987
Other	1,061	8,314	6,941
Services	9,078	71,155	56,258
Household cons expenditures	8,682	68,048	53,707
Housing & utilities	2,350	18,420	13,696
Health care	2,245	17,598	14,701
Transportation	429	3,366	1,834
Recreation	555	4,352	2,555
Food & accommodations	913	7,158	4,397
Financial services & insurance	1,073	8,412	4,385
Other	1,115	8,743	4,710
NPISH	396	3,107	2,518
<i>Comparable Income (Constructed for the Exercise)</i>	<i>13,357</i>	<i>100,647</i>	<i>61,836</i>
Personal Income	16,663	130,600	90,001
Disposable Personal Income	14,614	114,542	82,042

Table A4: Comparison with OECD results

Our Results

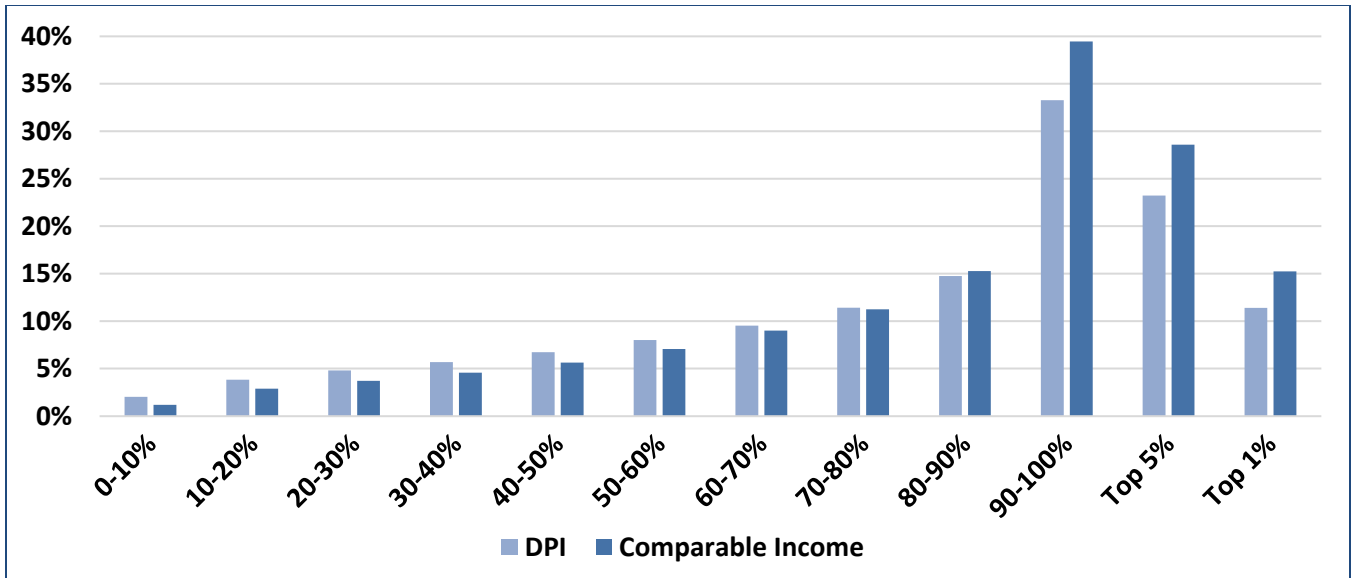
		Personal Consumption Expenditure Quintiles				
Personal Income Quintiles		0-20%	20-40%	40-60%	60-80%	80-100%
	0-20%	11.1%	4.5%	2.3%	1.4%	0.7%
	20-40%	5.3%	6.5%	4.5%	2.5%	1.3%
	40-60%	2.2%	5.0%	5.8%	4.5%	2.4%
	60-80%	1.1%	2.9%	5.1%	6.3%	4.6%
	80-100%	0.4%	1.1%	2.4%	5.2%	10.9%

OECD Results

		Consumption Expenditure Quintiles				
Income Quintiles		0-20%	20-40%	40-60%	60-80%	80-100%
	0-20%	10.3%	5.4%	2.8%	1.2%	0.3%
	20-40%	5.5%	5.4%	4.9%	3.1%	1.2%
	40-60%	2.8%	4.9%	5.2%	4.9%	2.3%
	60-80%	1.3%	3.4%	5.0%	5.6%	4.6%
	80-100%	0.2%	0.9%	2.1%	5.2%	11.6%

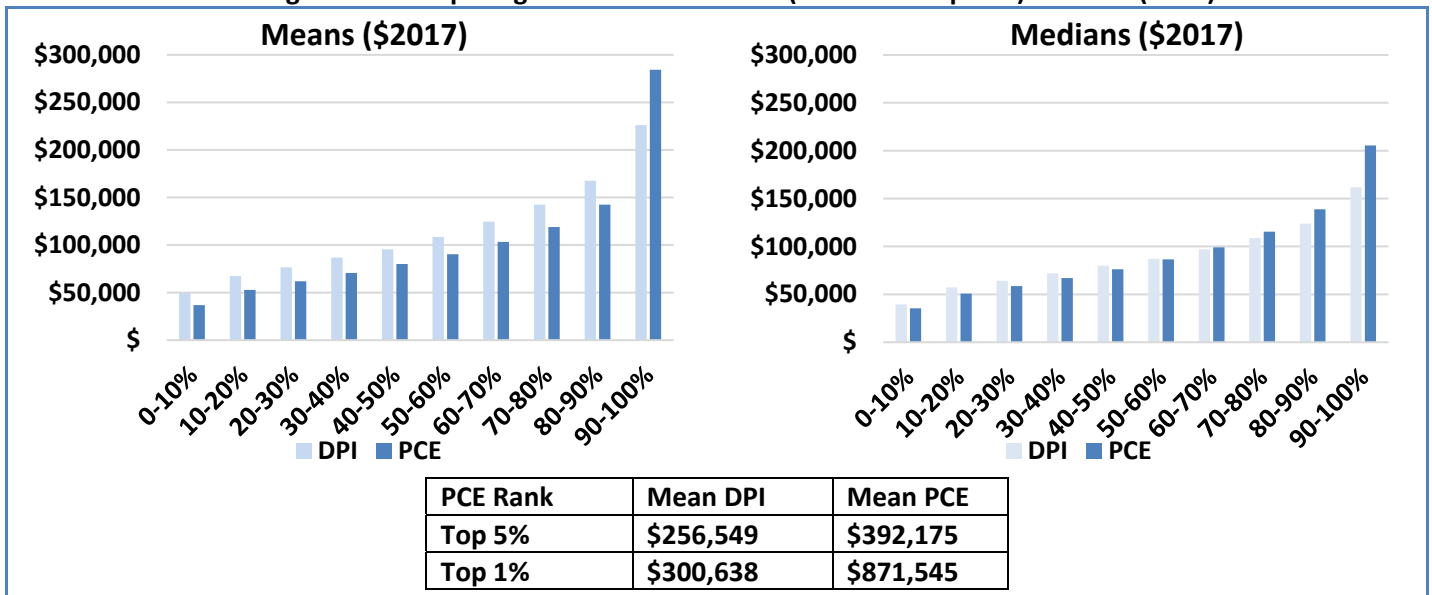
Notes: This figure compares the results in Table 4a, aggregated by quintile, and compared to U.S. results in Balestra and Oehler (2023).

Figure A1: How Comparable Income represents Disposable Personal Income



Notes: This figure shows the shares of comparable income for each quantile, with data ranked on equivalized DPI.

Figure A2: Comparing Means and Medians (ranked on Eq. PCE) in levels (2017)



Notes: This figure is the equivalent of Figure 3b, but ranked on equivalized PCE, rather than DPI