

INEQUALITY OF INCOME *AND* CONSUMPTION IN THE U.S.:
MEASURING THE TRENDS IN INEQUALITY FROM 1984 TO
2011 FOR THE SAME INDIVIDUALS

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This paper examines the distribution of income and consumption in the U.S. using one dataset that obtains measures of both income and consumption from the same set of individuals. We develop a set of inequality measures that show the increase in inequality during the past 27 years using the 1984–2011 Consumer Expenditure Survey. We find that the trends in income and consumption inequality are similar between 1984 and 2006, and diverge during and after the Great Recession. For the entire 27-year period we find that consumption inequality increases almost as much as does income inequality.

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INTRODUCTION

The year 2011 will be remembered as the year when the idea of income inequality migrated from seminar rooms in colleges and think tanks to Zuccotti Park and main streets across America. (Sawhill, 2012)

What is making people sit up now is recent evidence that the richest 1 percent of American families appears to have reaped most of the gains from the prosperity of the last decade and a half. (Nasar, 1992)

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While there has been an increased interest in inequality, and especially the differences in trends for the top 1 percent vs. the other 99 percent, this increase in inequality is not a new issue. Twenty years ago, Nasar (1992) highlighted similar differences in referring to an estimate by the Congressional Budget Office, and Krugman (1992) introduced the “staircase vs. picket fence” analogy. He showed that the change in income gains between 1973 and 1993 followed a staircase pattern with income growth rates increasing with income quintiles, a pattern that has been highlighted by many recent studies, including the latest CBO (2011) report. He also showed that the income growth rates were similar for all quintiles from 1947 to 1973, creating a picket fence pattern across the quintiles.

Recent research shows that income inequality has increased over the past three decades in the U.S. and in most rich nations (Burkhauser *et al.*, 2010; Atkinson *et al.*, 2011; CBO, 2011; OECD, 2011; Smeeding and Thompson, 2011; Kenworthy and Smeeding, 2013). And most research suggests that this increase is mainly due to the larger increase in income at the very top of the distribution (see CBO, 2011; Saez, 2012). Researchers, however, dispute the extent of the increase. The extent of the increase depends on the resource measure used (income or consumption), the definition of the resource measure (e.g., market income or after-tax income), and the population of interest.

This paper examines the distribution of income and consumption in the U.S. using data that obtains measures of both income and consumption from the same set of individuals. We replicate the existing measures of consumption inequality in the U.S. and their properties. We then develop a set of inequality measures that demonstrate the increase in consumption and income inequality during the past 27 years using the 1984–2011 Consumer Expenditure (CE) Survey.

The dispute over whether income or consumption should be preferred as a measure of economic well-being is discussed in the National Academy of Sciences (NAS) report on poverty measurement (Citro and Michael, 1995 p. 36). The NAS report argues:

Conceptually, an income definition is more appropriate to the view that what matters is a family’s ability to attain a living standard above the poverty level by means of its own resources. . . . In contrast to an income definition, an expenditure (or consumption) definition is more appropriate to the view that what matters is someone’s actual standard of living, regardless of how it is attained. In practice the availability of high-quality data is often a prime determinant of whether an income- or expenditure-based family resource definition is used.

We agree with this statement and we would extend it to inequality measurement.¹ In cases where both measures are available, both income and consumption are important indicators for the level of and trend in economic well-being.

¹Borroah and McGregor (1992) suggest that consumption should be used as a measure of the standard of living and that income should be used as a measure of the level of resources. Others may argue that net worth is an equally important measure of well-being. For an attempt to capture the flow value of net worth and income but not consumption, see Smeeding and Thompson (2011). The conjoint distribution of consumption, income, and wealth for the same individuals has yet to be produced, but is clearly the next step in this line of research.

Attanasio *et al.* (2010) also argue that research should consider the joint distribution of income and consumption. Both resource measures provide useful information by themselves and in combination with one another. When measures of inequality and economic well-being show the same levels and trends using both income and consumption, the conclusions on inequality are clear. When the levels and/or trends are different, the conclusions are less clear, but useful information and an avenue for future research can be provided.

We examine the trend in the distribution of these measures from 1984 to 2011. We show that while the level of and changes in inequality differ for each measure, inequality increases for all measures over this period and, as expected, consumption inequality is lower than income inequality. Differing from other recent research, we find that the trends in income and consumption inequality are similar between 1984 and 2006, and diverge during and after the Great Recession (between 2006 and 2011). For the entire 27-year period we find that consumption inequality increases almost as much as does income inequality. Nevertheless, given the differences in the trends in inequality, using measures of both income and consumption provides useful information to all interested parties regardless of their preference for one measure over the other.

Our analysis differs from the most recent studies of consumption inequality (Heathcote *et al.*, 2010; Attanasio *et al.*, 2012; Perri and Steinberg, 2012; Meyer and Sullivan, 2013) by not restricting the sample to specific demographic groups, by using a more complete measure of consumption, and by using measures of income and consumption that are consistent with each other, where both income and consumption are taken from the same households in a single survey. Previous studies (e.g., Heathcote *et al.*, 2010; Attanasio *et al.*, 2012) restrict their samples to the working age population and use only a subset of consumption, and Meyer and Sullivan (2013) remove health care and education from consumption. Our study contributes to the literature by providing a more complete measure of consumption without sample restrictions that is better linked to disposable income, in order to more fully capture the levels and trends in the distribution. While our paper deals only with the U.S., it presents a model and a template for other nations also interested in the distribution of well-being in their populations.

The paper is organized as follows. The next section evaluates the issues associated with choosing a measure of economic well-being to assess the level of and trend in inequality, and examines the recent literature on inequality measurement. Section 2 presents our methodology, our measures of income and consumption, and a description of the CE Survey data. Section 3 presents the levels of and trends in inequality. Section 4 concludes.

1. RECENT LITERATURE ON CONSUMPTION AND INCOME INEQUALITY

Most inequality studies use annual income data because of its convenience and comparability over time and across nations (e.g., Karoly, 1993; Gottschalk and Smeeding, 1997; Burkhauser *et al.*, 2010; Atkinson *et al.*, 2011; CBO, 2011; Smeeding and Thompson, 2011; Thompson and Smeeding, 2013; DeBacker *et al.*, 2013). While there is agreement that inequality increased using various measures of annual income, the magnitude of the increase depends on the income measure used

and the unit of observation. For example, the Census Bureau estimates that the inequality, using the Gini coefficient, of pre-tax cash income for households (adjusted for family size) increased 19 percent between 1979 and 2010. CBO (2012) estimates an increase of 21.6 percent for market income inequality (between 1979 and 2009) and a 19.0 percent increase in the inequality for after-tax-and-transfer income. Finally Saez (2012), using the share of taxable income obtained by the top 1 percent, shows that the share of income obtained by the top 1 percent doubled between 1979 and 2009.

A difficulty with using annual income to measure inequality is that if everyone goes through a life-cycle current-income path in which income is low when young, higher in middle age, and low again when old, then annual snapshots of income would suggest greater inequality than that which actually exists in permanent income. It could be that all visible differences in the level of and trend in inequality may be attributable to demographics alone.² In addition, people may experience many transitory changes in income that would cause the distribution of annual income to indicate more inequality than actually exists. Gottschalk and Moffitt (2009) find that about one-half of the increase in income inequality during the 1980s resulted from changes in transitory income. DeBacker *et al.* (2013) use a panel of tax returns to examine the permanent and the transitory parts of the cross-sectional variance in income from 1987 to 2009 for all taxpayers and find that permanent variance contributed the bulk of the increase in household income inequality. Thus, annual income may be a poor proxy for permanent income.

Economists have suggested that consumption may be a more appropriate indicator of permanent income. Danziger and Taussig (1979), Cutler and Katz (1991), Slesnick (1991), and Johnson and Shipp (1997) were amongst the first to show different trends in income and consumption inequality. Slesnick (1991) and Cutler and Katz (1991) demonstrated that consumption inequality was lower than income inequality, and that the increase in both income and consumption inequality was similar during the 1980s. Later, Krueger and Perri (2006) identified the divergent trends in income and consumption inequality during the 1990s.³ Most recent research shows that consumption inequality is less than income inequality, and its increase is less than the increase in income inequality (see Johnson and Shipp, 1997; Krueger and Perri, 2006; Blundell *et al.*, 2008; Heathcote *et al.*, 2010; Petev *et al.*, 2011; Meyer and Sullivan, 2013). A key similarity among these studies is that much of the increase in income inequality occurred in the early 1980s. Heathcote *et al.* (2010) found that between 1980 and 2006, income inequality increased about twice as much as consumption inequality. However, such a conclusion depends on the starting and ending point and on the data series, as restricting the data to the change between 1984 and 2006 yields similar increases in inequality. Further, the restriction to post-1984 data is not arbitrary because the CE data were changing dramatically between 1980 and 1984, as described below.

²Deaton and Paxson (1994) discuss the importance of life-cycle effects in inequality measurement.

³Research shows that this pattern holds across countries—permanent shocks translate into consumption changes, while transitory shocks do not (see Brugiavin and Weber, 2011).

Three studies find similar increases in consumption and income inequality by adjusting the CE Interview Survey data, which is used by most research on consumption inequality, or by using an alternative data source. First, Attanasio *et al.* (2006) use the CE Diary Survey (a weekly record of expenditures) to calculate inequality, and find that consumption inequality rises much more rapidly than that using the standard CE Interview Survey. Second, Aguiar and Bils (2011) adjust the expenditure data in the CE Interview Survey for underreporting by using the Engel curves estimated using the 1972–73 CE Interview Survey and obtain larger increases in inequality, with consumption inequality increasing about the same rate as income inequality between 1980 and 2007. Third, Attanasio *et al.* (2012) estimate consumption in the Panel Study of Income Dynamics (PSID) using various methodologies and find that consumption and income inequality rise by about the same percentage between 1980 and 2010.

In addition to finding similar increases in income and consumption inequality, these three papers claim that the CE Interview Survey data are flawed. Attanasio *et al.* (2012) claim that the CE Interview Survey suffers from serious non-classical measurement error and that the increase in consumption inequality is underestimated. Aguiar and Bils (2011) make a similar claim and both papers attempt to adjust the data by changing the expenditure patterns between low and high income households. Both suggest that the decline in the ratio between CE and the Personal Consumption Expenditures (PCE) is the result of increased underreporting at the higher end of the distribution. Bee *et al.* (2014) conduct a validation study of the CE Survey and show that for some of the large expenditure categories the CE survey displays a high and constant share of expenditures relative to the national accounts. Even if it was agreed that the consumption data were problematic, in order to properly compare the adjusted consumption data to the income data, the income data would also need to be adjusted (see Fixler and Johnson, 2014).

As with income, there is no single agreed upon definition of consumption. Our measure is most similar to the measures used in the early papers (Cutler and Katz, 1991; Slesnick, 2001), and is similar to our previous research (see Johnson *et al.*, 2005; Fisher and Johnson, 2006; Fisher *et al.*, 2013c). We use total consumption, including the service flows from vehicles and owned homes. Other recent studies measure non-durable spending, but there is also no consistent definition of non-durable spending. For example, Heathcote *et al.* (2010) include medical care while Attanasio *et al.* (2012) exclude medical care, and Meyer and Sullivan (2013) use total consumption less medical care and less education. Most, but not all, research limits the sample to urban households and to those that are considered complete income reporters by the CE Survey.⁴

2. METHODOLOGY AND DATA

Given the many different definitions of income and consumption in the literature, it is important to use a consistent theoretical framework to define these

⁴The online appendix (Table A3) provides detailed comparisons of the alternative consumption measures used by the research mentioned in this paper.

measures. This section describes how we define income and consumption and how we use the CE Survey data. But first we provide justification for looking at both income and consumption.

Why Income and Consumption?

The *Report by the Commission on the Measurement of Economic Performance and Social Progress* (Stiglitz *et al.*, 2009, p. 114) states: “Income and its distribution are meaningful ways to assess living standards. Another candidate is consumption and its distribution among individuals. While correlated with income, consumption and its distribution are not necessarily identical to income and several reasons account for this.” The report also states: “Empirical research has repeatedly shown that the distribution of consumption can be quite different from the distribution of income. Indeed, the most pertinent measures of the distribution of material living standards are probably based on *jointly* considering the income, consumption, and wealth position of households or individuals” (Stiglitz *et al.*, 2009, p. 33).

Which measure is “best” depends mostly on how economic well-being is viewed and the purpose for using the measure. Economic theory suggests that a household’s well-being (as measured by the household’s utility) depends on the household’s characteristics and its consumption levels. The life-cycle/permanent-income hypothesis (LCPIH) suggests that the household’s well-being depends on the current-income stream that occurs over the household’s lifetime. The LCPIH assumes households can smooth consumption through personal savings or credit markets. As a consequence, households should change their consumption plans in response to permanent shocks to income and react to the annuitized value of transitory shocks if there is uncertainty. At the other extreme, assuming that households have access to complete markets in which they are able to completely insure against any shocks, then consumption should not react to either permanent or transitory income shocks. If households have access to some insurance mechanism (formal or informal), they will be able to smooth out, at least in part, income shocks. Over the life-cycle, the LCPIH indicates that a household smooths consumption so that even if income varies significantly over the life-cycle, consumption is less variable than income from year to year. This theory suggests that consumption data should be used as the preferred measure of permanent income and household well-being. Blundell and Preston (1998) caution that consumption is only clearly superior for within cohort comparisons. When measuring across cohorts, the superiority of consumption as a measure of well-being is diminished.

In a world of perfect information, with access to liquid assets and no borrowing constraints and with accurate cross-sectional surveys that measure both income and consumption, the best measure of permanent income would be consumption. But because foresight is imperfect, borrowing constraints exist, and perfect surveys do not exist, both annual income *and* consumption are needed to obtain an approximation of economic well-being. Neither measure alone captures the economic well-being of all households by itself.

As stated by the NAS report (Citro and Michael, 1995, p. 36), “In practice the availability of high-quality data is often a prime determinant of whether an income- or expenditure-based family resource definition is used.” Given that all

survey data are noisy, our view is that both income and consumption are needed to determine accurately the trend in inequality and economic well-being, and to detect true signals of trends in inequality from noisy data. If income and consumption inequality trends agree, we can have more confidence in the conclusion, and if the trends diverge, we have different directions for further research.

Two additional reasons to use income and consumption are the hump-shaped age-income profile and potential measurement error in income and consumption. First, the hump-shaped income and consumption profile reflects the LCPIH, with income rising until middle age and then falling, and consumption following a similar, although less pronounced, hump-shaped pattern. With these patterns, younger ages have consumption greater than annual income (and greater than the average lifetime income), which suggests that consumption is a better proxy for unobserved permanent income. Similarly, older ages consume more than their annual income, again suggesting that consumption is a preferred measure. Second, if there is measurement error in income, for example for the self-employed, consumption may be a better proxy for permanent income at all ages (assuming no measurement error in consumption). However, if consumption is underreported, for example among the high income households (that motivates the methodology of Aguiar and Bils, 2011; Attanasio *et al.*, 2012), then income may be a better proxy for permanent income assuming there is no measurement error in income.⁵ A problem with using cross-sectional data is that the data do not reflect the lifetime pattern of either income or consumption, but reflect rather an annual snapshot of either (or both). We show that both income and consumption provide “signal” information about the distribution of household resources and the trend in inequality over time.⁶

What Are Income and Consumption and How Are They Measured?

To compare well-being using income and consumption measures, income and consumption must be constructed using a consistent framework. The most comprehensive concept of income and consumption is drawn from the suggestions of Haig and Simons, where income represents the capacity to consume without drawing down net worth. Haig (1921, p. 24) stated that income was “the money value of the net accretion to one’s economic power between two points of time,” and Simons (1938, p. 50) defined personal income 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.”

Economists have used the equation that income (Y) equals consumption (C) plus the change in net worth (ΔW) as the working definition of Haig-Simons income. In an attempt to relate all three components, the Canberra Group Handbook on Household Income Statistics (Canberra Group, 2011, p. 10) states:

⁵If the measurement errors in consumption and income are highly correlated, there is no additional information from studying both income and consumption.

⁶Fisher *et al.* (2012) suggest that using the maximum and minimum of income and consumption can be useful to adjust for potential measurement error, and yield additional measures of inequality that could be bounds on the true inequality of economic resources.

“Household income receipts are available for current consumption and do not reduce the net worth of the household through a reduction of its cash, the disposal of its other financial or non-financial assets or an increase in its liabilities.” Similarly, the Systems of National Accounts (SNA, 2009, p. 160) defines household income as “. . . the maximum amount that a household or other unit can afford to spend on consumption goods or services during the accounting period without having to finance its expenditures by reducing its cash, by disposing of other financial or non-financial assets or by increasing its liabilities.” However, no studies use this definition to the fullest extent.⁷ No household survey has the necessary variables to create a full measure of Haig–Simons income. Most studies of income include the money income but do not examine changes in asset values and only a few examine the impact of capital gains or the return on accumulated assets (e.g., Piketty and Saez, 2003; CBO, 2011; Smeeding and Thompson, 2011; Armour *et al.*, 2013).

Using the equation, $Y = C + \Delta W$, income and consumption are directly related; the measurement of income depends on the extent to which it is used for current consumption. Once income is determined using the Haig–Simons definition, consumption can be obtained as income less the change in net worth. Incomplete measure of income and wealth, however, can make measuring consumption difficult using this method.

While consumption is usually measured with observed expenditures (with adjustments for the service flows from housing and durable goods), the change in wealth is composed of changes in observed wealth (as in changes in savings, interest, etc.) and unobserved wealth (unrealized capital gains, stock price gains, and house value gains). Increases in observed wealth could yield increases in income and/or consumption. If the observed changes are not included in income (e.g., capital gains), then the residual changes in consumption will not match the changes in income. This measurement error is only magnified with unobservable changes. While interest, dividends, rents, and royalties are measured, many other items (e.g., capital gains, imputed returns on retirement assets) are not included, and depletions in (or additions to) savings are also excluded.

Perri and Steinberg (2012, p. 9) provide the following example: “Consider two households with the same income but very different shocks to the value of their wealth. Looking only at income would not inform us about distributional changes between them, but looking at consumption would, as the households would adjust their consumption in response to changes in their net wealth. More concretely, when housing prices fall, households feel less wealthy and spend less—even when their salaries and other income streams do not change.” Alternatively, increases in house prices can have a wealth effect causing households to increase spending.⁸

As a result, measured consumption can become uncorrelated with measured income, and fluctuations in consumption can be independent of fluctuations in income. If income and consumption are consistently and completely measured, the

⁷Smeeding and Thompson (2011) discuss the Haig–Simons income measure and construct a “More Complete Income” measure that attempts to account for the realized and unrealized returns on asset income.

⁸For instance, Pew Charitable Trusts (2011) find strong evidence that the increases in home values in the mid-2000s led to much higher expenditures on education.

difference between income and consumption will be the change in wealth, and deviations in $Y-C$ will be given by the unmeasured changes in wealth. If income and consumption are measured with error, the changes in wealth can exacerbate this measurement error.

Our goal is to have measures of disposable income and consumption that are accurate and as closely linked as possible (given the data limitations) to compare their annual changes and distributions and to obtain a resource measure that best reflects the annual level of the economic well-being of households. Our measure of consumption is similar to that in Cutler and Katz (1991) and Slesnick (2001), and includes more than just non-durables (as in Heathcote *et al.*, 2010). Meyer and Sullivan (2013) use a measure of consumption that excludes education and health care suggesting that education is an investment and health care spending can simply represent poor health. We use this more complete measure of consumption because removing items from consumption, while leaving income unadjusted, distorts the relationship between income, consumption, and the change in net worth. It may also bias the measurement of consumption inequality if high income households are more likely to spend on durables such as expensive automobiles or home electronics or spend large amounts on elective medical procedures or college education for their children.

The CE Survey Data

We use the only dataset in the U.S. that contains yearly income and consumption–expenditure information, the CE Interview Survey data, to compute measures of consumption and income inequality.⁹ The CE survey has been a continuing quarterly survey since 1980. Data are collected from consumer units¹⁰ five times over a 13-month period. The second through fifth interviews are used to collect expenditures for the previous three months; for example, a consumer unit that is visited in March reports expenditures for December, January, and February.¹¹

We begin our analysis in 1984 as this is the first year with the most consistently comparable data over time. Although the continuous CE Survey began in 1980, all variables were not consistently collected between 1980 and 1984 (e.g., rental equivalence) and the sample excluded rural households in 1982 and 1983. In addition, as mentioned above, much of the increase in consumption inequality occurs in this early 1980–84 period, which could be the result of the changes in the CE Survey.

We examine four different resource measures: income, disposable income, expenditures, and consumption. Income is the money income from employment,

⁹The Panel Study of Income Dynamics (PSID) has included income since 1968 and began including most consumption components since 1999. Since 1997, the PSID surveys individuals every other year.

¹⁰A consumer unit comprises members of a household who are related or share at least two out of three major expenditures—housing, food, and other living expenses. A person living alone is a single consumer unit. While the terms consumer unit and households are used interchangeably in this paper, there are households consisting of more than one consumer unit; approximately 3 percent more consumer units than households.

¹¹The first interview is used to “bound” the interview and prevent reporting of expenditures in the wrong time period. Data reported in the first interview are not released or used in any estimation.

investment, government transfers, and inter-household transfers of money. Disposable income is money income, plus the value of food stamps and federal tax credits, less the cost of federal and state income taxes, FICA taxes, and property taxes. Expenditures are spending on all goods and services for current consumption, but excluding life insurance, pensions, and cash contributions. Consumption is total expenditures minus the purchase price of vehicles, minus the expenditures for home-ownership, plus the service flow from vehicles, plus the reported rental equivalence of home-ownership, plus the value of federal government rental assistance. As with other research on consumption, we do not include goods obtained through barter, home production, or in-kind gifts from other households or organizations because the data are not available. In contrast to other research, however, our measure of consumption includes all other components of consumption—expenditures that are used for current consumption, and does not exclude education, health care expenses or other durable goods. The specific techniques used to create our consumption and income measures are discussed in the online appendix.

Although our measures of income and consumption do not use the complete Haig–Simons definition, we use a measure of disposable income used in many studies and provide a more complete measure of consumption than previous research that is better linked to disposable income in order to more fully capture the levels and trends in the distribution. These measures include the income used to purchase current consumption, excluding only capital gains and the depletion of savings, and the consumption measure attempts to capture all current consumption.¹² We include in-kind transfers for food (e.g., SNAP) in the income measure and food consumption in the consumption measure, but do not include all in-kind benefits (such as employer or government provided health care). We only include rental equivalence value in the consumption measure and not the income measure in order to create a consistent measure of housing consumption between owners and renters. As a result, our measures of disposable income and consumption are in balance and in the spirit of the Haig–Simons identity.

To match the income and consumption for each household and obtain annual measures of consumption, we only use those consumer units who participated in the survey for all four expenditure-interview quarters. In this manner, we obtain the income and consumption for the same 12-month period. We do not restrict our sample by age, tenure, or income reporting status. Previous papers restricted their samples to “complete income reporters” as defined by the CE Survey. Fisher (2006) finds that incomplete income reporters have lower consumption than complete income reporters, which may affect any conclusions about the level of and trend in inequality.

The CE Survey began imputing income in 2004 but did not impute previous years. We replicate the Bureau of Labor Statistics (BLS) method as closely as

¹²The CE Survey does not include realized capital gains, and Armour *et al.* (2013) show that including capital gains affects the trends in income inequality. Lacking capital gains is a limitation of our results. However, Armour *et al.* show that the top 5 percent of the income distribution receive the vast majority of capital gains, and it is likely that the CE Survey misses the top 5 percent, as found in Sabelhaus *et al.* (2014). This would indicate that our results are more representative of the bottom 95 percent of the distribution.

possible and impute all unreported income sources for 1984–2011, and therefore we do not restrict our sample by income reporter status. See the online appendix for a detailed description of the imputation methodology.¹³ By imputing income, we treat the income data the same way the consumption data are treated, as the consumption data are also imputed in the CE Survey; while previous research has removed incomplete income reporters, no previous research has removed incomplete consumption reporters.

As the households who remain in the sample for four quarters are more likely to be homeowners and older households, we follow the procedures in Sabelhaus (1993) and Fisher and Johnson (2006) to re-weight the sample to represent the quarterly sample. For after-tax income we use the National Bureau of Economic Research's (NBER) TAXSIM program (see Feenberg and Coutts, 1993)¹⁴ to estimate federal, state, and FICA taxes and tax credits such as the Earned Income Tax Credit. All values are equivalized using the square root of household size (see Buhmann *et al.*, 1988) and the weights are adjusted to reflect person weights. Finally, all values are adjusted to 2010 dollars using the CPI-U-RS.¹⁵

Table A1 (in the online appendix) shows the means for these resource measures over time, which shows that they all increase during the 1984–2011 period. There is a convergence in percentage terms between income and disposable income, which suggests a decrease in the average tax rate during this period. Similarly, the increased gap between disposable income and consumption indicates a falling average propensity to consume (APC). The fact that consumption is almost always lower than expenditures suggests that the service flow from vehicles and the rental equivalence value of home-ownership are lower on average than the spending on these items (and the imputed value of subsidized housing has a relatively minor impact on the overall means). The main impact of using consumption is that it produces a tighter distribution and lower inequality than using expenditures.

3. THE LEVELS AND TRENDS IN INEQUALITY

To obtain a summary measure of these changes in inequality, we use the Gini index. The Gini index is the most commonly used measure of inequality and satisfies all of the key properties of an inequality index, including the important principle of transfers (see Sen, 1997). Many previous studies use the variance (or standard deviation) of logs. This measure, however, does not satisfy the principle of transfers; it is a consistent measure of inequality only for log normal distributions. Similar to previous work and consistent with the LCPIH, the levels of consumption inequality (using the Gini) are slightly lower than those for income. The trends, however, are similar during the 1984–2011 period.

¹³We impute five implicates. We use the mean of the five implicates as our estimate of income. Using the mean lowers the level of inequality but the trend in inequality is the same if we used the mean Gini of the five implicates.

¹⁴<http://www.nber.org/taxsim/>. See online appendix for a description of how taxes were estimated using TAXSIM.

¹⁵Others suggest that this is an overestimate of inflation (Johnson, 2004; Broda and Weinstein, 2008; Gordon and Dew-Becker, 2008; Meyer and Sullivan, 2011).

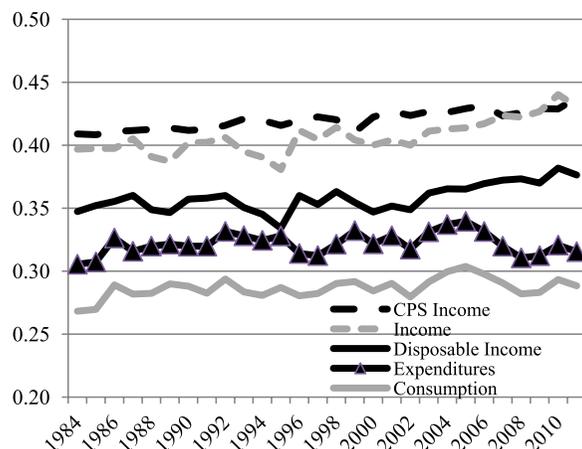


Figure 1. The Trends in Income and Consumption Inequality Using the Gini Coefficient (1984–2011)

Based on authors' calculations from the public use Current Population Survey (1985–2012) and Consumer Expenditure Interview Survey (1984–2011).

Figure 1 shows the Gini index for income, disposable income, expenditures, and consumption and compares these to the Gini obtained using income from the CPS.¹⁶ As shown, the CE income Gini shows similar trends to the Gini index for income in the CPS, with fairly close end points in 1984 and 2011.¹⁷ While the Gini for income using CPS data increases 7.0 percent between 1985 and 2010, the CE income Gini increases 8.5 percent; however, the CE income Gini is more volatile because of the smaller sample size in the CE as compared to the CPS.

Figure 1 shows that disposable income inequality and consumption inequality broadly track each other between 1984 and 2006, but diverge during the past five years. There is volatility in the year-to-year estimates, but a lot of the volatility is due to the smaller sample sizes in the CE Survey. Figure 2 shows that all of the changes in inequality between 1984 and 2006 are within the 95 percent confidence intervals, suggesting that the disposable income and consumption inequality tracked each other during this period. To be specific between 1984 and 2006, consumption inequality increases 11.0 percent, while disposable income inequality increases 6.4 percent. Over the entire period, however, disposable income inequality increased 8.4 percent, while consumption inequality increased 7.5 percent (about 90 percent of the increase in disposable income). Due to the smaller sample

¹⁶The CPS data changed the collection method in 1994 to computer-assisted data collection and adjusted the income reporting limits. To account for these changes, following Atkinson *et al.* (2011) and Burkhauser *et al.* (2010), the Gini coefficient for 1993 is set equal to that in 1992 and all previous years are adjusted by the same factor.

¹⁷There was a change in top-coding in the 1996 CE Survey, which could impact the increase in inequality shown in Figure 1 between 1995 and 1996. Because of the similar decrease in inequality between 1995 and 1995, we asked BLS staff to estimate a Gini using internal (non-top-coded) before-tax income. With the internal data, the only difference is that there is a smaller decrease in inequality in 1995 than what we see with the public use data. The other years of data were basically unchanged, and hence the change in inequality between 1995 and 1996 is not due to the change in top-coding.

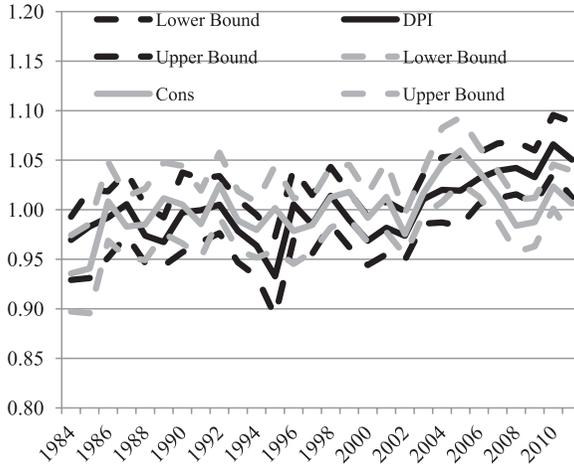


Figure 2. Gini De-Meaned Trend with 95% Confidence Intervals: Disposable Personal Income (DPI) and Consumption (1984–2011)

sizes in the CE, however, these estimates are more volatile and the standard errors are large.¹⁸ Figure 2 shows the margins of error around the Gini for disposable income and consumption. As the figure shows, the average margin of error is about 0.009 for consumption and 0.011 for income. Both margins of error are about 3 percent of their respective mean. As a result of the larger standard errors, the differences between the two series indicate that the increases between 1984 and 2006 are not statistically different.

We also examine the changes for other measures of inequality. Using the income and consumption at the 10th, 50th, and 90th percentiles, we can calculate the 90/10 percentile ratios and the 90/50 percentile ratios (see Table A2 in the online appendix). The relationship between the changes in income and consumption inequality during this period is similar. However, for the 90/10 ratio the consumption Gini falls over this period (by 2.2 percent), while the income Gini increases (by 5.9 percent). However, using the P90/P50 ratio shows a relationship similar to the Gini, with consumption inequality increasing at the same rate as the increase in disposable income inequality. Examining inequality using the mean log deviation and Thiel measure shows that the increase in consumption inequality is about 75 and 82 percent of the increase in income inequality, respectively.

Inequality in the Great Recession

An interesting aspect of Figure 1 is the behavior of the inequality around the period of the Great Recession, from 2006 to 2011.¹⁹ As shown in Figure 1, consumption inequality has fallen over the last five years. Consumption and

¹⁸See online appendix for sample sizes.

¹⁹The Great Recession started in 2007, but we date the start of it as 2006 in the CE data because of the way we construct our sample. To construct data for 2006, we use individuals whose last interview took place between July 2006 and June 2007. Therefore our 2006 data include half of 2007.

expenditure inequality fell after 2006, by 3.1 and 4.8 percent, respectively. The drop in consumption inequality was not statistically significant over the entire time period (2006–11), but the decrease in consumption inequality during the heart of the Great Recession was statistically significant, showing a 4.9 decrease from 2006 to 2009, followed by a leveling out in consumption inequality.²⁰

Prior research focused on the period from 2006 to 2009 and showed a fall in consumption inequality coupled with a rise in income inequality, and no change in disposable income inequality. Heathcote *et al.* (2010) extend their previous results to 2008, and find that consumption inequality peaks in 2005 and then steadily falls in 2006, 2007, and 2008. Petev *et al.* (2011) also find that inequality falls during 2007 and 2008, and Attanasio *et al.* (2012) find a fall between 2005 and 2010. Finally, Perri and Steinberg (2012) find that inequality changed very little from 2006 to 2010 using two measures, the ratio of the 95th to the 50th percentile and the ratio of the 50th to the 20th percentile.

Heathcote *et al.* (2010) are surprised by the consumption dynamics during the recession and suggest that this is due to a substantial fall in spending at the top of the consumption distribution and increased spending at the bottom of the distribution. And they point to Parker and Vissing-Jorgenson (2009) who show that high income and high consumption households respond to movements in aggregate income and consumption, which suggests that the recession could reduce inequality. Similarly, Dynan (2012) finds that consumption fell more for higher income households during the Great Recession, and Hurd and Rohwedder (2011) find similar falls for stockholders, who are largely high income households. As suggested by Heathcote *et al.* (2010), it is the increase for the 10th percentile together with the fall for the 90th percentile that drives these changes in consumption inequality between 2007 and 2009. However, these changes must be placed in context of the entire period, which shows consumption inequality fluctuating.

Our results confirm those in Heathcote *et al.* (2010) by showing that between 2006 and 2011 consumption fell 19.2 percent at the 90th percentile and only 8.7 percent at the 10th percentile, while the income decrease was similar at the top and bottom; falling 8.7 percent at the 10th percentile and 6.0 percent at the 90th percentile. Figure 3 provides additional context by displaying the growth rates by quintile in disposable income and consumption between 2006 and 2011. Income falls by a larger percentage for the bottom quintiles, with income in the bottom quintile experiencing a 12 percent decrease while income in the top quintile falls by just under 4 percent. As a result, income inequality increased because higher quintiles experienced a smaller percent decline in income during the Great Recession. The opposite pattern occurs for consumption, with consumption in the top quintile falling by 18 percent while consumption in the bottom quintile falls by 11 percent.

Because disposable income and consumption are not perfectly correlated, it may be the case that the individuals in the top income quintile differ from the people in the top consumption quintile.²¹ The increase and then decrease in

²⁰For more information about the CE Survey and its statistical reliability, see the BLS Handbook of Methods, Consumer Expenditures and Income at <http://www.bls.gov/opub/hom/homch16.htm>.

²¹About 60 percent of individuals in the top income quintile are also in the top consumption quintile.

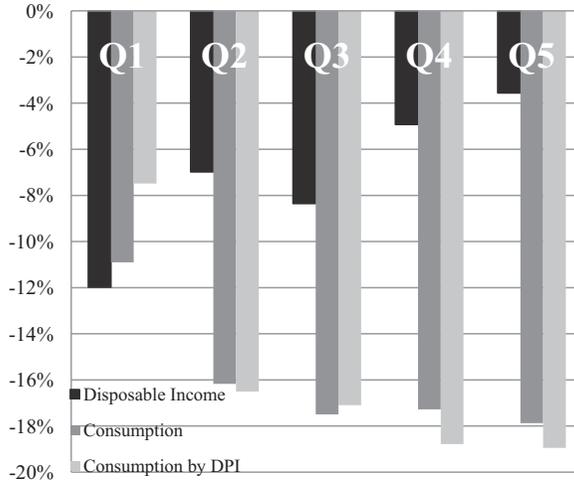


Figure 3. Percent Change in Resource Measure by Quintile, 2006–11

Note: The black bars represent the mean change in disposable personal income (DPI) by DPI quintile. The dark gray bars represent the mean change in consumption by consumption quintile. The light gray bars represent the mean change in consumption by disposable personal income quintile.

Source: Consumer Expenditure Surveys.

consumption could be coming from those lower in the disposable income distribution that were consuming by borrowing or consuming out of wealth, particularly housing equity. Except for Petev *et al.* (2011), most previous research used income and consumption from different surveys. One innovation in our research is using income and consumption from the same survey, which allows us to conduct the subsequent analysis that no other research has been able to do.

It is informative then to see whether the same pattern emerges when looking at the growth rates of consumption by disposable income quintile so that the individuals in the top quintile are identical. Figure 3 displays these results as well. The bottom disposable income quintile had the smallest drop in consumption at 7.5 percent, compared to an 11 percent drop in the consumption of those in the bottom consumption quintile. At the top of the disposable income distribution, the drop in consumption was 18.9 percent, compared to 17.9 percent for the top consumption quintile.

Higher income households are expected to have better tools, and sufficient wealth (or “buffer” wealth), to smooth their consumption during periods of lower income; however, during the Great Recession, many lost a large fraction of their wealth. Hence, to restore their buffer wealth, these individuals may have needed to save more, which would decrease their consumption growth, possibly by deferring purchases of durables (see Petev *et al.*, 2011). Further research will examine the impact of the recession and the resulting period following the recession on these outcomes (see Fisher *et al.*, 2013a).

Finally, we can also evaluate the changes in the APC over the 2006–11 period. According to the BEA, Personal Disposable Income and Personal Consumption

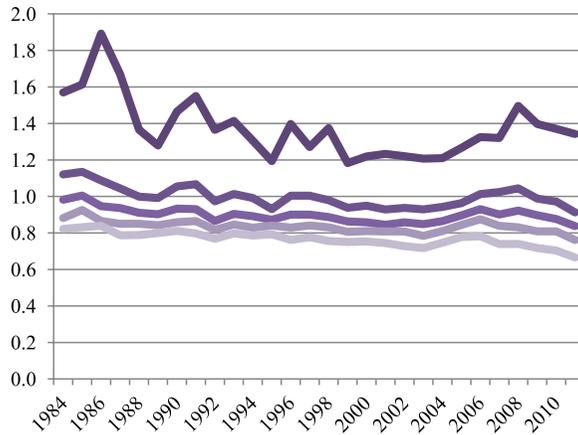


Figure 4. The Average Propensity to Consume by Disposable Income Quintile, 1984–2011

Note: Darker lines represent the lower income quintiles.

Source: Consumer Expenditure Surveys.

Expenditures (PCE) both increased after 2009, with consumption growing slightly faster and yielding a slight increase in the APC. Using the data from Figure 3 yields a fairly stable APC for the bottom quintile during the Great Recession, as seen in Figure 4. However, the higher quintiles all exhibited a decrease in the APC even though the top three quintiles were still all consuming less than their disposable income. These results suggest that despite the decrease in income, the households in the top quintiles of income actually increased savings.

Comparison to Previous Research

Finally, our analyses of the CE Survey allow us to reproduce the consumption measures used by others in recent research and compare them to our results. We can compare our results to recent estimates of Heathcote *et al.* (2010), Meyer and Sullivan (2013), Attanasio *et al.* (2012), Coibion *et al.* (2012), and Hassett and Mathur (2012). Here we use our data and sample to generate the measure of consumption used in the first three papers to see if our results are sensitive to the measure of consumption. In all cases, our estimates of their consumption measures demonstrate increases in consumption inequality that are similar to our results in Figure 1.

Figure 5 shows that our measure of non-durable consumption matches the measure in Heathcote *et al.* (2010) and Attanasio *et al.* (2012). Using our data and sample to create the Heathcote *et al.* (2010) measure of non-durable consumption, we find that the Gini increases by 9.7 percent between 1985 and 2006, compared to an increase of 11 percent for Heathcote *et al.* (2010).²²

²²The Gini coefficients for Heathcote *et al.* (2010) are obtained using their dataset posted at <http://ideas.repec.org/c/red/ccodes/09-214.html>.

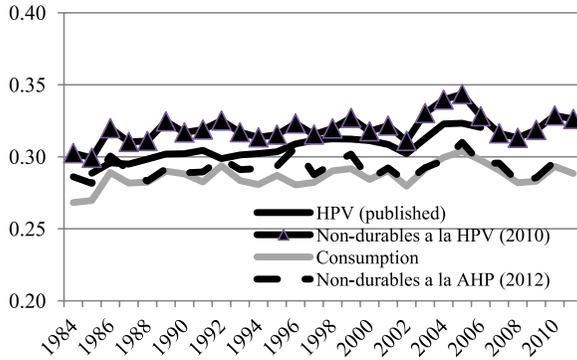


Figure 5. Comparing Heathcote *et al.* (2010) (HPV) and Attanasio *et al.* (2012) (AHP) measures of non-durables using Gini coefficient (1984–2011)

Attanasio *et al.* (2012) find that the inequality of non-durable expenditures increases only slightly in the CE Interview Survey, but increases much more so using the CE Diary Survey, similar to the results found in Attanasio *et al.* (2006). They find that between 1985 and 2005, the variance of the log of non-durable consumption increases about 3.5 percent in the CE Interview data, and about 9 percent using CE Diary data (basically 0.02 and 0.07 log points).²³ Attanasio *et al.* (2012) also claim that income inequality from the PSID increases about 20 percent and that non-durable consumption from the CE Interview Survey increases about half that amount. They use the variance of the log difference between food at home and entertainment expenditures to better reflect changes in the consumption of these items. Using this alternative measure, the increase using the Interview data is closer to the increase using the Diary data. Using our data and sample to estimate their measure of non-durable consumption, we find an increase of 5.0 percent (see Figure 5) between 1985 and 2006. As with our measures, all of their estimates show a smaller increase in consumption inequality than in income inequality.

Figure 6 shows our replication of the measure of consumption in Meyer and Sullivan (2013) and yields an increase in the ratio of the 90th and 10th percentiles of 5.6 percent between 1984 and 2006, compared to an increase of 10.5 percent for our consumption measure (see Figure 6). However, both measures of the 90/10 ratio demonstrate a decrease in inequality between the entire period, from 1984 to 2011, with the Meyer and Sullivan consumption measure showing a larger decrease.

Coibion *et al.* (2012) use a measure of quarterly consumption to examine the volatility of inequality. Their figure 1 shows that the Gini for after-tax income increases about 6.0 percent between 1985 and 2005, while the Gini for consumption increases 5.4 percent. Finally, Hassett and Mathur (2012) claim that consumption inequality has remained stable for the past 25 years. However, their figures 1 and 4 show a slight increase in consumption inequality between 1985

²³Changes are from figures 6, 9, 11a, and 11b in Attanasio *et al.* (2012).

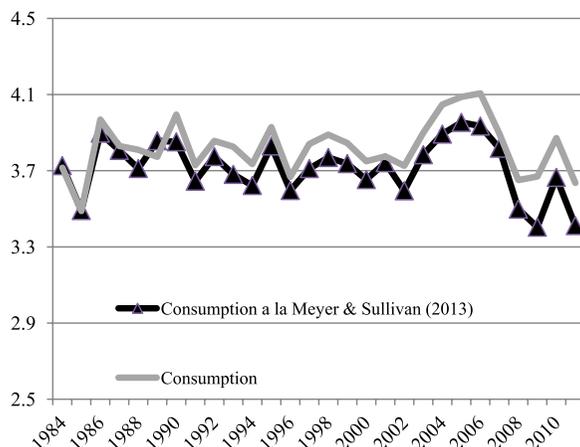


Figure 6. Comparing Meyer and Sullivan (2013) measure of consumption, using P90/P10 ratio (1984–2011)

and 2005. By approximating the data in their figure 4, we find that consumption inequality (at the consumer-unit level) increased about 8.5 percent between 1985 and 2005. We conclude that using consistent years and methods demonstrates that over this period consumption and income inequality have increased at similar rates.

4. CONCLUSION

We present evidence on the level and trend in inequality over the last 27 years in the U.S. using disposable income and consumption for the same sample of individuals from the CE Survey. Our sample includes all individuals, not just those that live in urban areas or those that are of working age. While consumption inequality is always lower than income inequality, income and consumption inequality increase at approximately the same rate between 1984 and 2011, with the measures diverging over the Great Recession. The full reasons for this divergence will only be known after post-recession data emerges (Fisher *et al.*, 2013a).

Our results contradict much of the existing research that finds that the increase in consumption inequality was less than the increase in income inequality during this time period. Three recent papers argue that the increase in consumption inequality mirrored the increase in income inequality, but those papers make significant adjustments to the CE Survey data or impute consumption in other surveys while making no adjustments for potential under-reporting of income. Our straightforward approach uses the entire CE Survey sample for both income and consumption and takes the consumption data as reported by the households. While we impute income for those households that do not report valid values for all of their components of income, the observed increase in income inequality in the CE matches the level and trend found in the CPS, the standard dataset used to measure earnings and income inequality.

Examining income and consumption together using the same sample provides an important contribution to the literature on the economic well-being of individuals. That the trends in the two measures are nearly identical provides even more confidence in the results.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table A1: Mean and Median Income from CE and CPS, and Mean Disposable Income, Consumption and Expenditures from CE (in 2010\$, using CPI-U-RS and equivalized)

Table A2: Medians, 10th and 90th percentiles for consumption and disposable income, (in 2010\$, using CPI-U-RS and equivalized)

Table A3: Comparison of Consumption Definitions by Terminology Used to Describe the Measure

Figure A1: CE and CPS Published income (2010\$) compared to our imputed income (1984–2011)

Figure A2: Gini with 95% Confidence Interval for CPS income and our imputed income (1984–2011)

Figure A3: Correlation between DPI and Consumption, and Sample Size, by year

Figure A4: Using the five implicates to calculate the Gini for Disposable Income (1984–2011)