HOUSEHOLD INCOME, DEMAND, AND SAVING: DERIVING MACRO DATA WITH MICRO DATA CONCEPTS

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We develop adjustments to align the NIPA measures of key household variables with cash flow concepts that reflect household budgets and actual demand generated by households. The adjusted variables have substantially different behaviors across time than NIPA measures of household spending and saving. Furthermore, household income aggregated from micro data sets like the CPS, SCF, and PSID differs significantly from NIPA personal income. But the micro survey data likely reflect cash flow concepts rather than NIPA definitions. Indeed the adjusted cash flow measure of income eliminates much of the gap between micro data income variables and NIPA household income.

1. INTRODUCTION

This paper takes aim at two measurement issues that constrain research on the channels of transmission for credit, income, and spending shocks in the U.S. household sector: (1) the lack of correspondence between National Income and Product Accounts (NIPA) aggregate measures and appropriately weighted microeconomic data; and (2) the conceptual differences between NIPA measures of household income and spending that cause these variables to deviate from measures of household-sector cash flows. We meet these twin objectives by creating new macro series for the U.S. household sector—using only publicly available NIPA data—that conforms the "macro data" to a "micro concept." The primary guiding principle for the "micro concept" is that we measure only market-based cash transactions under the control of households. These are the items that households

would identify when queried about their income and spending in the survey instruments used to produce micro-level data sets. Our secondary guiding principle is to differentiate between demand and non-demand expenditures of the household sector, where the former are defined as the exchange of cash for newly produced final goods and services. The adjustments we propose eliminate imputed consumption items in NIPA personal consumption expenditure (PCE) that do not generate cash flows for businesses. We adjust NIPA disposable personal income (DPI) to correspond to the cash flows households actually receive and can choose to deploy as spending or saving. We also integrate the construction of new owner-occupied homes into the household sector demand measure in a consistent way. By adhering to the two guiding principles, we generate a measure of the demand coming from the household sector and the income spent at the discretion of households available to pay for that demand. We find that these adjusted measures match the corresponding variables from the micro data sets much better than do the standard NIPA measures, because they reflect the actual cash receipts and expenditures of households.

As shown by Fixler and Johnson (2012), no two data sets chosen from among the Current Population Survey (CPS), the NIPA, the Congressional Budget Office, and the IRS Statistics of Income conform to exactly the same concept of income. Fixler and Johnson (2012) work on methods to adjust the CPS to match the NIPA. Katz (2012) presents methods similar to ours for adjusting the NIPA to match the CPS. Bosworth *et al.* (2007) adjust NIPA income to match the Survey of Consumer Finances (SCF) and CPS. All three of those efforts focus exclusively on income. Since consumption and saving are also crucial for macroeconomic analysis, it is valuable to extend these studies by adjusting the entire NIPA household account to a micro concept while preserving the identities that link income, expenditure, and saving. In this regard, we are taking up the torch once carried by Ruggles and Ruggles (1986, p. 247), who proposed aligning the concepts in the national accounts and micro data: "Ways and means need to be found of bringing the definitions of income, expenditure, and related concepts used in the macro and micro data into congruence, if the integration of social and economic microdata with the macro accounts is to progress."

We follow Katz (2012) in modifying the NIPA household flows to a micro concept rather than adjusting a single survey to better match the NIPA conventions for two reasons. First, adjusting the NIPA allows for comparison to all micro data sets because the measurement concepts used in the various micro sources are conceptually similar. Second, although the NIPA are the most widely used and cited measures of the U.S. economy they are not necessarily the appropriate measures for all purposes. We argue here that the adjusted measures are more useful than standard NIPA measures of the household sector for some purposes, particularly for understanding the magnitude of changes in household demand and the accumulation (or, more accurately, decumulation) of financial saving.

The adjustments we propose change important aspects of macro fluctuations in the household sector. For example, our measure of adjusted household demand relative to adjusted household income declines much more than NIPA PCE to DPI during the Great Recession. Our methods also show a much greater decline in various measures of the adjusted saving rate prior to the Great Recession, compared with the widely discussed NIPA personal saving rate.

In Section 2, we discuss the framework that guides our adjustments to the NIPA. In Section 3, we evaluate the success of our adjustments in aligning the macro data with the micro data. Section 4 interprets a variety of the new variables to show how the adjustments matter for understanding aggregate behavior of the U.S. household sector. We conclude in Section 5.

2. Measurement Objectives and Overview of the Adjustments

We propose adjustments that align household income with the actual cash flows that households control and expenditures that measure cash payments for current production plus cash transfers out of the household sector. This objective is different from that of the BEA and our proposals should be viewed as complements to rather than criticisms of methods used in constructing the NIPA accounts. Indeed, by adjusting macro date to the micro cash flow concept, the adjusted variables no longer measure the value that the economy allocates to the household sector, which would be one way to describe what the NIPA household sector variables capture. Instead, the adjusted variables measure actual cash flows of household income and outlays.

The NIPA data respect a basic accounting identity that we maintain with each adjustment:

(1) Disposable Household Income = Consumption + Investment + Transfers and Interest + Household Financial Saving.

Disposable income is net of income taxes from all levels of government.[1] It includes labor compensation, capital income,[2] and transfers from other sectors (including government). Consumption consists of demand for final goods and services. Household investment is the accumulation of newly produced real assets. For our purposes, we limit household investment to new construction of owner-occupied housing, which means that we treat non-housing durable spending as part of consumption (following the BEA convention). Transfers and interest are household cash outlays that do not purchase final output. Financial saving is a residual, the net accumulation of claims by the household sector on other parts of the national and global economy (we define gross saving as financial saving plus household investment). *Outlays* are the sum of all household cash expenditures and grants (consumption, investment, transfers, and interest) and *household demand* is the purchase of final goods and services (consumption and investment).

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[1]Sales taxes are part of consumption. Property taxes are discussed in more detail in the online appendix.

[2]As in the NIPA, capital gains are not included. One could make the case that realized capital gains are cash income under the control of households. We exclude realized capital gains from our primary adjusted measure of income here for practical reasons, however, to facilitate comparisons. For example, we compare various measures of saving rates to the NIPA personal saving rate. Including realized capital gains as both income and saving would confuse this comparison. Also, capital gains data are not readily available from BEA sources. (When we include income with realized capital gains for comparisons to micro surveys we use a series obtained by splicing data from the U.S. Department of the Treasury, Office of Tax Analysis (2012) for the years 1954–2009 and from the Congressional Budget Office (2013) for the years 1995–2013. The CBO data for the years 2012 and 2013 are projected values.)

TABLE 1
SUMMARY OF DATA ADJUSTMENTS (2013 ANNUAL VALUES)

Category	Disposable Income	Consumption	Household Investment	Transfers and Interest	Financial Saving
NIPA data	12,505.1	11,484.3		412.7	608.1
Owner-occupied housing	−527.9	−1,067.9	320.7	333.8	−114.5
Financial services	−691.0	−228.9			−462.1
Defined benefit pensions	−163.1				−163.1
Third-party paid medical services	−1,655.3	−1,655.3			
Non-profit sector	−125.7	−427.9		250.8	51.4
Other	−217.4	−32.8			−184.6
Adjusted data	9,124.7	8,071.5	320.7	997.3	−264.8

Note: The data in this table come from adding up the detailed line-by-line adjustments in each category as shown in Table A1 in the online appendix.

The NIPA data series that are the starting point for our adjustments satisfy equation (1), but some explanation is called for. There is no household investment component in the NIPA. All residential construction is included in the investment sector in the NIPA, and NIPA household demand equals personal consumption expenditure (PCE). NIPA personal saving is defined as the residual from NIPA DPI after subtracting PCE and personal transfers and personal interest payments. Most important for our purposes, the NIPA definitions of the variables in equation (1) include significant non-cash components, both additions and subtractions, that cause the measures of income and expenditures to deviate from the cash flow measures recognized in household budgets, reported by households in survey instruments, and that create the revenues received by businesses that produce output to meet household demand. To clearly differentiate the adjusted cash flow measures we propose from standard NIPA concepts, in what follows we add "adjusted" in front of any variable that refers to an adjusted cash flow concept, such as "adjusted household demand."

Table 1 summarizes the adjustments by major category using a double-entry method which assures that the accounting identity in equation (1) holds before and after each separate adjustment. The columns of the table correspond to the terms in equation (1). The table gives 2013 values, the final full year available in the data used for this study. The first row shows the source data from the NIPA; the final row gives adjusted values, which are equal to the original data plus the adjustments in the middle rows.

The detailed logic and data sources for the adjustments are described in the online appendix; we provide a very brief summary here. For owner-occupied housing we remove the effect of imputed homeowner rent from both income and consumption. Mortgage interest is added to the adjusted transfers and interest category rather than treated as an expense subtracted from the imputed income earned by home owners from paying rent to themselves.[3] The adjustments for free

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[3]Note that mortgage interest is not included in the NIPA personal interest variable. The adjustments proposed here make the treatment of mortgage interest the same as other personal interest payments in the adjusted variables.

financial services eliminate both the interest income that the BEA imputes to holders of accounts in financial institutions and life insurance companies as well as the imputed consumption of the services that these institutions provide without charging explicit fees.[4] The contributions by employers to defined benefit pension plans, and the earnings on defined-benefit pension reserves, are treated as personal income and saving in the NIPA accounts. These flows, however, are not under the control of households and changes in asset values affect firm rather than household balance sheets. We remove the cash flows into defined benefit pensions from our adjusted measures and we add the actual cash benefits paid from these plans to the household sector from employers and the government.[5] A large part of medical expenditure is not paid for by households. We remove medical care payments made by employers, Medicare, and Medicaid from both income and personal consumption. Of course, these expenditures are both demand and output; if taken out of the household sector they would need to be accounted for elsewhere in a full system of accounts.

Table 1 also shows the effects of removing the non-profit sector. This has an almost negligible effect on disposable income but larger effects on consumption and especially transfers. The large effect on transfers arises because household contributions to non-profit organizations disappear in the NIPA aggregates because non-profits are integrated with the households into what the BEA calls the personal sector. We make a variety of other miscellaneous adjustments as described in detail in the online appendix and summarized in Table 1.

The adjustments can be significant. For example, 2013 NIPA disposable income is $12.5 trillion while our adjusted disposable income is $9.1 trillion. The adjustments also have important effects on the way household sector measures move over time and how they correspond to aggregates derived "bottom up" from household surveys, as we discuss in the subsequent sections.

3. Comparing NIPA and Adjusted Macro Measures with Micro Data Sources

This section considers how the adjusted macro measures correspond to estimates of aggregate household sector variables constructed from appropriately weighted microeconomic data sources. It is well known that the aggregate income implied by micro data sources is less than NIPA personal income measures (e.g., Roemer, 2000; Ruser et al., 2004; Katz, 2012). We expect the cash flow macro measures to close at least part of the gap between the NIPA data and variables based on micro surveys by aligning the underlying concepts. Figure 1 presents three comparisons of the aggregate per capita income estimated from major micro surveys with corresponding measures derived from both the NIPA personal income variable (lighter lines) and our adjusted cash flow measures of income

[4]An anonymous referee notes that these imputed services are an important part of the output of the financial sector. We agree with this point and it is appropriate to measure this output in GDP. But the payments for these services are not cash expenditures of the household sector and would not be reported as such in surveys.
[5]We do not make adjustments for defined contribution pension plans because payments into these plans and earnings on their balances are largely, if not completely, under the control of the households who benefit from them.
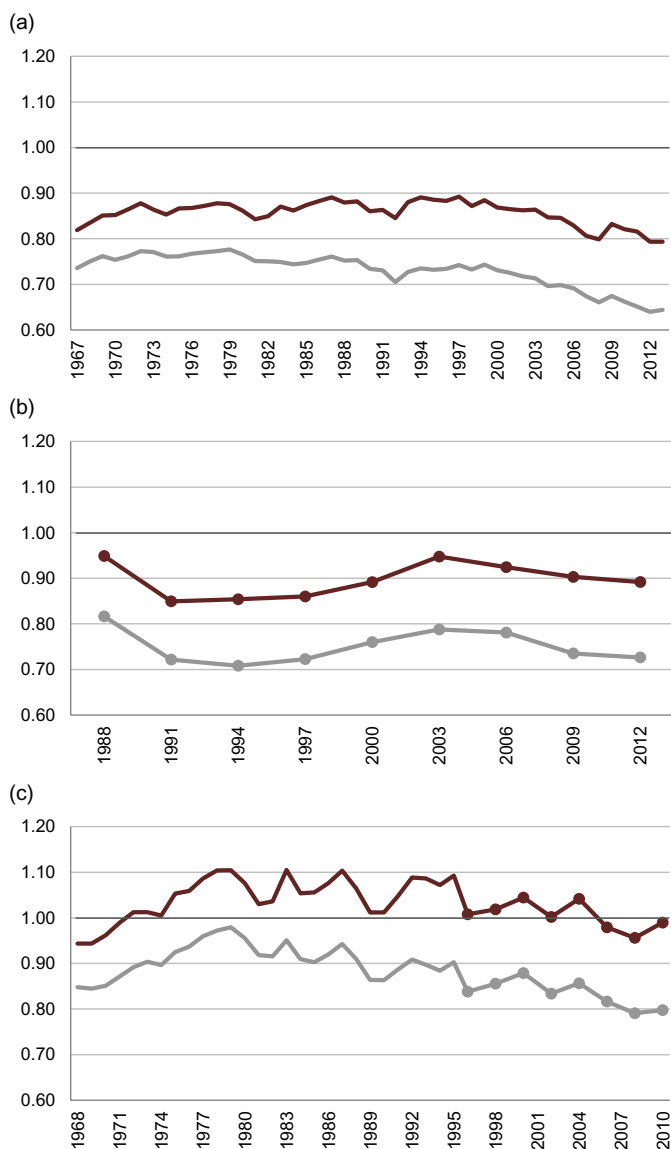
Figure 1. Ratios of Per Capita, Pre-Tax CPS, SCF, and PSID Income to NIPA Personal Income and Per Capita, Pre-tax Adjusted Income. Ratios to NIPA measures are depicted by the lighter lines while the adjusted measures are plotted with darker lines. Dots indicate data available at frequencies greater than one year.

(darker lines).[6] If the micro data were an unbiased estimate of the aggregate data, these ratios would fluctuate around 1.0. Like other researchers, however, we find that the micro data typically underestimate the aggregates by a substantial

[6]We use the U.S. mid-period population (B230RC0) figure from the NIPA to convert series from aggregate to per capita.

amount. The discrepancies are much smaller with our adjusted measures, as we now describe in some detail for each micro data source.

The CPS administered by the U.S. Census Bureau (2014) since 1942 is the primary source of labor force statistics in the U.S. Using weights provided with the survey, one can generate national data estimates from the CPS. Each March, the CPS includes supplemental questions asking about income received the previous year. Those data were the basis of a study by Katz (2012), attempting to reconcile the CPS and BEA measures of household income.

CPS money income is a pre-tax measure, so the NIPA and adjusted measures are presented on a pre-tax basis as well. The average of the ratio of per capita CPS money income to per capita NIPA personal income is 73.1 percent over the period 1969–2013, while the average ratio using our new adjusted measure is 85.7 percent.[7] Figure 1a plots the ratios of CPS per capita income to both NIPA and adjusted per capita income (pre-tax). The greater conformity of the CPS figures to our adjusted income measure is immediately evident. This finding confirms our hypothesis that the adjusted measures correspond more closely to the way that households actually report their finances in surveys. We note, however, that the CPS income measure remains well below even our adjusted income variable. This discrepancy is well known. In its documentation about the CPS income measurement, the Census website states that income data "obtained in household interviews are subject to various types of reporting errors which tend to produce an understatement of income."

The SCF (Federal Reserve Board, 2014) gathers detailed information about household balance sheets and income every three years. Though the first wave of the SCF was conducted in 1962, most researchers use the triennial surveys from 1989 and onward due to the stability of the survey definitions during that time period. The SCF reports mean family income, including capital gains, for the year preceding each of its triennial waves from 1989 to 2013 and also reports the number of families in the survey. We estimate the aggregate income implied by the SCF by multiplying mean family income and the number of families represented by the survey.[8] In order to put the NIPA and our adjusted income measures on the same basis, we use our pre-tax adjusted income measure and NIPA personal income with realized capital gains added to both. The ratio of aggregate income generated from SCF data to NIPA personal income averages 75.1 percent across the nine observations from 1988 to 2012, while the average ratio using the new adjusted measure is 89.7 percent.

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[7]The gap between adjusted and CPS income in Figure 2 widened noticeably in the early 2000s. One possible explanation is under-reporting of high incomes in the CPS coupled with rising income share at the top of the distribution. This explanation is consistent with the larger drop of adjusted income during the Great Recession compared with the drop in CPS income.

[8]Again, data are pre-tax. Households are asked about their income in the year preceding the survey. For example, the relevant income comparison date for the survey taken in 2013 is actually 2012. Furthermore, since the SCF uses the CPI to deflate the previous-year income into the year of the survey, we reverse this adjustment when we shift it back to the actual year. The number of families represented by each survey comes from combining numbers given in the appendices of the *Federal Reserve Bulletin* articles announcing the 1992, 2003, and 2013 waves of the Survey of Consumer Finances (Kennickell and Starr-McCluer, 1994; Aizcorbe *et al*., 2003; Bricker *et al*., 2014).

The Panel Study of Income Dynamics (PSID, 2014) is a longitudinal study of a representative sample of U.S. individuals and their family units that began in 1968. The survey was conducted annually through 1997 and biennially thereafter. The most recent wave of the PSID available as of the writing of this paper, 2011, includes close to 9,000 households. From the PSID, we use pre-tax income. In order to put the NIPA and our adjusted income measures on the same basis, we use our pre-tax adjusted income measure and NIPA personal income. The ratio of per capita PSID income to per capita NIPA personal income averages 89.1 percent from 1968 to 2010, while the average ratio using the adjusted measure is 103.7 percent, the closest correspondence of the three surveys analyzed here.

The adjustments of income to a cash flow basis developed here do not close the entire gap between the NIPA personal income measure and the implied aggregate income measures derived from micro surveys. But restating income on a cash flow basis removes at least half of the discrepancy; and almost all of the difference for the PSID. One cannot be sure about the source of the remaining differences. The fact that the micro measures remain somewhat below the adjusted aggregate measures for almost all observations suggests that the discrepancies are not the result of random measurement error only. It also seems likely that the survey measures somewhat understate high incomes.

4. Adjusted Variables and the Macroeconomics of the Household Sector

The dynamics of spending, borrowing, and saving of the household sector clearly have important implications for understanding macroeconomic conditions. In particular, many analysts link the events that led up to and triggered the U.S. Great Recession to trends in household sector aggregates. Figure 2 provides an overview of the U.S. household sector based on the adjusted variables developed in this paper. It shows the shares of adjusted disposable income accounted for by adjusted consumption, household investment in new owner-occupied structures, and adjusted transfers and interest. The sum of these three items defines the adjusted outlay rate, the ratio of total cash spending of the household sector as a share of disposable cash inflows (the top line in Figure 2).

Perhaps the most striking observation from Figure 2 is the regime change that occurs roughly halfway through our data period. The adjusted outlay rate in the first half is roughly constant and usually below 100 percent, which means that the household sector accumulated net financial assets during most of these years. The outlay rate crosses 100 percent in 1983 and remains above 100 percent in all subsequent years other than 2012, when it dips just below 100 percent. From the late 1970s to the eve of the Great Recession, not surprisingly in light of the evidence for the cash outlay rate, household leverage grew dramatically. Figure 3 shows two measures of the household debt–income ratio. The lower line in the figure is the well-known ratio of household debt to NIPA disposable income. The upper line is the ratio of household debt to our adjusted measure of cash income.[9] It seems clear that the cash income measure is the more relevant concept of income available to

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[9]For consistency, the debt variable used for the adjusted ratio in Figure 3 excludes the estimated debt of the non-profit sector. See the online appendix for further details.
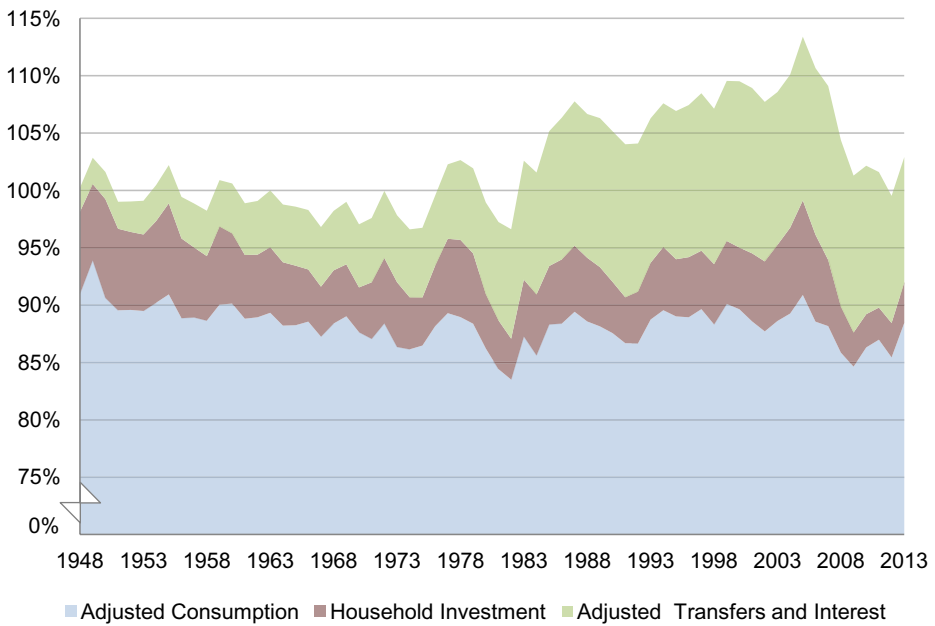
Figure 2. Household Expenditures as Shares of Adjusted Household Disposable Income
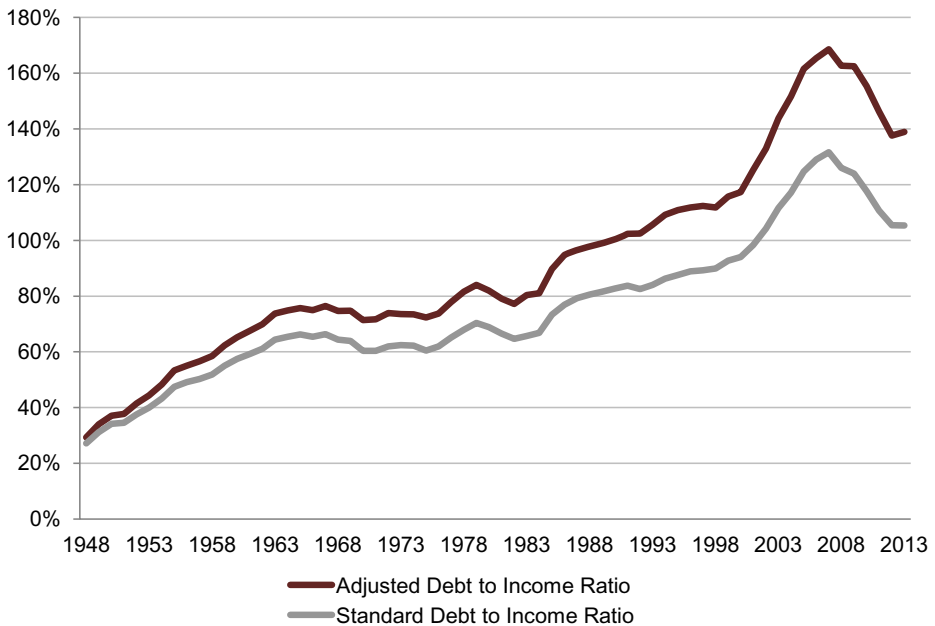

Figure 3. Two Measures of Personal Debt to Disposable Income

service debt. For example, households cannot use implicit income from renting their homes to themselves or Medicare payments for debt service or principal repayment. The adjusted ratio rises substantially more than the standard ratio, especially in the decade prior to the Great Recession. It is widely agreed that the financial dynamics of the household sector were ultimately unsustainable in these years, with the Great Recession as the result when debt accumulation reversed and the outlay rate collapsed. We now explore these phenomena in greater detail.

Conventional wisdom is that U.S. consumption spending increased relative to income in the decades leading up to the Great Recession. For example, Baily and Bosworth (2014, p. 14) state: "[b]etween the early 1980s and the end of the boom in 2007, Americans devoted ever-increasing shares of their incomes to consumption" (see also Lansing, 2005, figure 1). The implication of this conventional wisdom is that a rising consumption share of income was perhaps the primary source of household sector unsustainability. Our own work makes related arguments (Cynamon and Fazzari, 2013). These assessments rely on standard NIPA measures of PCE and disposable income. Referring back to Figure 2 presents a somewhat different picture based on our adjusted variables. Cash spending on consumer goods and services (excluding new homes) is fairly stable as a share of household cash income during the Great Moderation period from the middle 1980s to the eve of the Great Recession (the bottom line in Figure 2). Adding household investment to consumption gives household demand relative to cash income (the middle line in Figure 2). The demand rate is volatile during this period, but the demand rate has no obvious upward trend except for the spike in the middle 2000s associated with the most extreme years of the housing bubble.

The clear source of the upward trend in the outlay rate is household transfers and interest relative to cash income (the difference between the top and middle lines in Figure 2). This category explodes in the late 1970s and 1980s due primarily to the rise in household interest payments. The main explanation for household sector financial fragility therefore seems to be that when interest rates rose, the household sector did not cut back on consumption or residential investment. Instead households borrowed more relative to their income and put the debt–income ratio on an unsustainable trend that ended with the Great Recession.[10]

The volatility of adjusted household demand demonstrates the critical importance of the spending of the household sector in almost all recent recessions. In particular, note the dramatic collapse in this ratio (the middle line in Figure 2) during both the early 1980s and the Great Recession. Even in the early 1990s recession, which is usually considered rather mild, there is a significant drop. (The 2001 recession is an exception; household demand relative to income was quite stable through this recession.) Greater volatility in adjusted household demand is also evident in the growth rates of demand itself. Around the five recessions since 1974, the lowest annual growth rate of adjusted household demand averages more than two full percentage points lower than NIPA PCE. The reason for this volatility is no mystery: the household demand variable integrates the residential

[10]This interpretation is also discussed in Mason and Jayadev (2014). In Cynamon and Fazzari (2015) we show that an additional factor pushing debt upward is a decline in the income growth of households in the bottom 95 percent of the income distribution. Slower income growth is not evident, however, in the aggregate data.
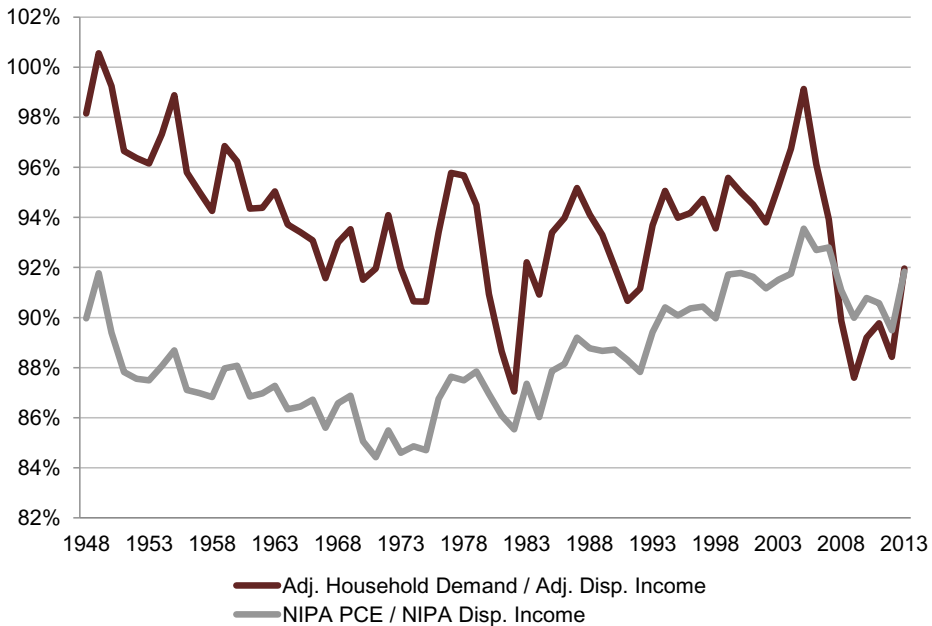
Figure 4. Household Demand to Disposable Income: NIPA and Adjusted Measures

construction sector with consumption. The early 1980s recession and the Great Recession were driven in large part by historic declines in residential construction, although the bottom line in Figure 2 shows that there were also significant declines in non-housing consumption demand.

We argue that the adjusted variables are more revealing about the role played by household demand in recessions compared with NIPA PCE. Implicit home-owners' rent may give a useful measure of the service flow from owner-occupied housing, but it does not generate cash flows and does not contribute to demand that motivates employment. Third-party medical payments and employer contributions to Social Security and defined-benefit pensions certainly matter for household welfare, but they are not cash flows at the disposal of the household sector. These items tend to smooth over changes driven by the cash flows that arise directly from household decisions. Our adjusted measures imply a much more severe collapse in the demand–income ratio in the early 1980s, early 1990s, and especially the Great Recession than one would infer from the ratio of NIPA PCE to NIPA disposable income, as is evident from the comparison in Figure 4. Indeed, the adjusted data much more strongly support the view that the Great Recession was the result of a historic collapse of demand in the household sector at the time when the expansion of household debt ended abruptly. In this recession, the household demand–income ratio collapsed from its highest values since the late 1950s to its lowest sustained values over our sample period.[11] This is not the case

[11]This ratio was a bit lower at its trough in 1982 (86.4 percent) than its trough in 2009 (87.6 percent), but 2008 through 2012 clearly is its weakest extended period in the data.
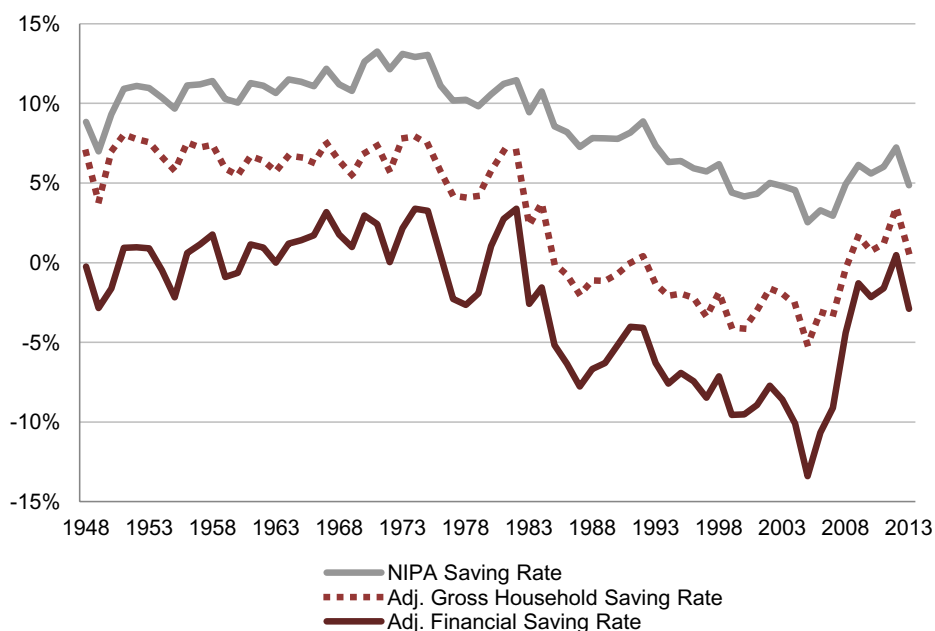
Figure 5. Alternative Saving Rates

with the NIPA demand–income ratio in Figure 4; while the NIPA ratio also falls quite a bit in the Great Recession, it only reaches levels that look like the late 1990s and remains much above the long-run average.

Our adjusted measures also provide new insights into the evolution of U.S. household saving. The saving rate is defined as one minus the outlay rate. That is, the saving rate is the share of disposable income that is not spent on goods, services, or transfers and interest. With our adjusted variables, this definition of saving leads to a straightforward interpretation as the net, active accumulation of financial assets by the household sector. "Active" in this context means that the saving is the result of an explicit choice not to spend part of the disposable income, which contrasts with passive accumulation of assets that results from changes in asset prices. (Of course, both active and passive saving can be negative as well.)

The lowest line in Figure 5 is the financial saving rate calculated from our adjusted measures of outlays and disposable income. It is equal to 100 percent minus the outlay rate. The collapse of the financial saving rate corresponds to the widely recognized decline in the NIPA personal saving rate (the top line in Figure 5), but the decline is much steeper with our adjusted cash flow measures, and the large negative figures from the middle 1980s through 2008 are particularly striking.[12] Strongly negative financial saving, measured on a cash flow basis, is clearly linked with the rising balance sheet fragility of the household sector, which

[12]See the discussion in Guidolin and La Jeunesse (2007) for a survey of research on the falling personal saving rate. We also compared the saving rate derived from the Flow of Funds Accounts. This rate is usually somewhat higher than the NIPA personal saving rate, making its difference with our adjusted measures even larger.

further supports the conclusion that household sector finances were on an unsustainable path prior to the Great Recession. The marked rise in the financial saving rate as the recession unfolds is also striking. On the one hand, this shift should greatly slow deterioration of household balance sheets. On the other hand, the disappointing, stagnant recovery since the trough of the Great Recession raises the concern that the way the U.S. generates demand in recent years cannot support robust growth *without* a strongly negative household financial saving rate.

A natural question to ask is whether negative financial saving is offset by the accumulation of real assets, in particular owner-occupied homes. The adjusted gross household saving rate in Figure 5 (middle line) adds new residential construction to financial saving.[13] This rate is substantially higher than the financial saving rate, but even the extremes of the residential construction boom of the middle 2000s did not push the adjusted gross household saving rate into positive territory.

Another implication of a falling, and strongly negative, household saving rate from the 1980s through 2007 is that U.S. households may have compromised their ability to finance their retirement. One possible offset to this implication arises from the fact that our adjusted measures treat defined benefit pensions on a cash flow basis to the household sector. Cash flows set aside by employers to fund future defined-benefit pension commitments are not counted as household income or saving in our adjusted variables. Rather, we add defined-benefit pension payments to income when they are paid out. In steady state, flows in and out of defined-benefit pension funds would cancel. In a growing economy, however, the adjusted household-sector variables could exclude some net saving by the business sector that will ultimately be passed on to households as pension payments. But there is an important structural change to the U.S. pension system that goes in the opposite direction during the period of falling saving rates. The period in which the adjusted saving rates collapse corresponds to a massive shift from defined-benefit to defined-contribution retirement plans.[14] Our adjusted variables include defined-contribution cash flows as both income and saving, because we interpret these flows as under the control of households. Therefore, one would expect, other things being equal, that we might expect a substantial *rise* in the household financial saving rates in the second part of the period as the responsibility for accumulating assets for retirement shifts from the business to the household sector. That we find the opposite result reinforces concerns about retirement finance from the collapse in household saving rates.

The adjusted saving rate variables in Figure 5 also do not account for the accumulation of assets in the Social Security trust fund. The reason is that we treat the Social Security system on a cash basis: household contributions reduce adjusted disposable income while benefit payments add to income. In the 1980s the Social Security system began to run a surplus which could be viewed as saving on

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[13]We use the word "household" in labeling this concept to distinguish it from the NIPA measure of gross saving, which is a broader concept that includes assets accumulated in the business sector and is not comparable to our household sector measure.

[14]Between 1987 and 2007 participants in defined-contribution plans rose from 34.9 to 66.9 million workers while defined-benefit participants fell from 28.4 to 19.4 million (Treasury Inspector General for Tax Administration, 2010).

behalf of the household sector even though it does not appear directly on the household balance sheet. The annual surplus was not trivial in some years. It peaked at about 4 percent of adjusted disposable income in the early 1990s. But the surplus declined through the 1990s and 2000s. Adding this component to the adjusted financial saving rate would not change the result that this rate fell much more than the NIPA personal saving rate and reached large negative values prior to the Great Recession.[15]

In summarizing the aggregate saving behavior of the household sector, Lansing (2005) states:

> In coming decades, a growing fraction of U.S. workers will pass their peak earning years and approach retirement. In preparation, aging workers should be building their nest eggs and paying down debt. Instead, many of today's workers are saving almost nothing and taking on large amounts of adjustable-rate debt. . . . Failure to boost saving in the years ahead may lead to some painful adjustments in the future when many of today's workers could face difficulties maintaining their desired lifestyle in retirement.

The adjusted variables magnify these concerns, driving home the conclusion that the financial trends of the household sector in the years leading up to the Great Recession were unsustainable.

5. Conclusion

Two objectives motivate this study. First, we develop a consistent set of adjustments that improve the correspondence between macroeconomic measures of the income and expenditure of the household sector widely used microeconomic surveys. Second, we propose measures of key aggregate household-sector variables that reflect actual cash flows.

With respect to our first objective, we judge the adjustments successful. We compare our adjusted aggregate income measure to three surveys, the CPS, the SCF, and the PSID. In all three cases, the adjusted measure was much closer to the level of income generated by aggregating the micro data with appropriate sample weights. The NIPA household accounts intentionally differ in concept from the data gathered by household surveys, and for this reason one would expect that the resulting data differ substantially. By showing that a reconciliation of the underlying concepts substantially reduces the differences between the measures, we have provided reason for optimism about the validity of the micro data as a useful tool to disaggregate macro dynamics of the household sector, as long as the corresponding macro data are appropriately defined. For example, the measures here could add insights to the disaggregation of aggregate saving rates presented by

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[15]An additional measurement issue arises from corporate share buybacks as a means to distribute cash to the household sector. The proceeds from share repurchases are not included in NIPA disposable income or our adjusted household disposable income measures. Guidolin and La Jeunesse (2007) discuss how accounting for share buybacks raises both disposable income and saving. There are two measurement problems with making such an adjustment, however. First, there are no publicly available BEA data on share repurchases. Second, even if one gets data from other sources, there is no way to know what part of these cash flows goes to the household sector.

Maki and Palumbo (2001) or our own work on disaggregating aggregate consumption in Cynamon and Fazzari (2015).

With regard to our second objective, introducing an alternative perspective on the aggregate flows of the U.S. household sector, we believe that we have scored a second success. The adjusted measures correspond to a cash flow concept by removing large imputations that do not represent market transactions and do not create demand for market-produced goods and services. To the extent that important facts about the macro economy differ with the adjusted cash flow measures, we believe researchers, policy analysts, and forecasters should appreciate these differences. Furthermore, for research that uses aggregate household sector data in behavioral models it is possible that our cash flow measures may correspond more closely to the decision variables of the agents who are studied depending on the context of the research. For example, including implicit homeowners' rent or third-party medical payments in household income makes sense if one is interested in the flow of services available to the household sector. But for research that explores the relevance of income as the means to service debt, our cash flow measure would be more appropriate.

Our results do indeed identify some important distinctions in the aggregate features of the U.S. household sector when income, consumption, household investment, and saving are adjusted to the cash flow concept. Recessions are associated with deeper declines in household expenditure over the entire sample period. This is especially true for the Great Recession; our results strengthen the case that household spending was the cause of this historic collapse.

Furthermore, the adjustments expose possible reasons for even greater concern about household saving than has already been voiced, as both measures of saving we present decline more than the NIPA personal saving rate. Our adjustments lead us to examine the conceptually appealing household financial saving measure, revealing the active change in household *financial* net worth (excluding real assets and capital gains). From several perspectives, the trend of the U.S. household saving during the years of substantial household debt accumulation was strongly negative, and the reversion of saving rates to more normal levels during the Great Recession was unprecedented over the span of our data.

It is also important to be explicit about what our exercise does not do. We are not proposing a fully developed alternative system of national accounts. We have not addressed the business sector, particularly investment accounts. Clearly, our adjustments for housing would have implications for the investment accounts in a fully revised system. Nor have we extended the analysis to the government sector where presumably much of the third-party medical payments we have removed from the household sector could be placed. Our adjustments are limited to examining the household sector with the objective of measuring actual cash flows. We make the case that our adjusted measures are useful for some purposes, but we do not argue that they are in a general sense "better" measures than the corresponding variables in the NIPA.

We are not the only researchers taking another look at the national accounts in recent years. Notably, Stiglitz *et al.* (2009) suggest that GDP is not an ideal measure of social welfare and "the time is ripe for our measurement system to shift

emphasis from measuring economic production to measuring people's well-being." Our contribution is consistent but less grand: we argue that when the national accounts are adjusted to a cash flow basis that does not *try* to measure well-being, it can do a better job of measuring the effect of the household sector on important aspects of the aggregate economy. The cash flow concept also provides a much better link to microeconomic data which will help us better understand the aggregate implications of research that exploits household heterogeneity.

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SUPPORTING INFORMATION

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Appendix: Detailed Description of Reconciling NIPA Aggregate Household Sector Data to Micro Concepts