

## **Pseudo-Panel Estimates of U.S. Saving and Wealth Accumulation**

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## **Abstract**

Empirical analysis of U.S. income, saving and wealth dynamics has been constrained by a lack of high-quality and comprehensive household-level panel data. This paper analyzes saving and wealth accumulation using a pseudo-panel approach, tracking *types* of agents over the lifecycle and across time through a series of cross-section snapshots. The main source data is the Survey of Consumer Finances (SCF). The SCF captures the top of the wealth distribution using a sampling strategy based on administrative records, and the survey has detailed balance sheet components and the capital incomes associated with financial assets. The SCF also has the information about the interfamily transfers and labor incomes needed to rearrange the intertemporal budget constraint and thus solve for saving. We combine the SCF snapshots with detailed aggregate income and wealth time-series, making it possible to study sources of wealth change across and within cohort groups over time. Consistent with results using individual-level panel data from economies with administrative registries, the pseudo-panel shows the importance of capital gains in accounting for wealth change over the lifecycle, especially for the very wealthy.

Keywords: Household income, consumption, saving, wealth

JEL Codes: D14, H55, J32

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## 1. Introduction

Understanding the joint distribution of income, consumption, and wealth is essential for answering two overarching questions in economics. First, rising wealth inequality has led to increased theoretical and empirical work exploring the role of income and saving dynamics in explaining wealth concentration, with varying emergent explanations. Some explanations for wealth concentration rely on differences in characteristics like patience or individual ability, while other explanations focus on factors such as heterogeneity in realized incomes. Second, there is great interest in the comovement of consumption with income and wealth in response to new information at business cycle frequencies. In particular, workhorse macroeconomic models predict that consumption responses are basically linear in income and wealth shocks, with perhaps small divergences from linearity attributable to liquidity constraints for certain types of agents.

Studying these wealth concentration and business cycle questions requires a particular type of data that is sorely missing for the U.S. economy. The data that economists would like to have for studying such questions is a large representative panel with well-measured household-level data on incomes, consumption (or saving), and wealth. Such data (or reasonably close approximations) do exist for administrative “registry” countries such as Sweden and Norway, but they are not available for the U.S. economy. Some available U.S. data sets each have key pieces of the overall puzzle, but no one data set has all of the pieces in one place. As such, the answers provided to the two overarching questions posed above are generally very dependent on which of the incomplete data sets are used, and how.

The main contribution of this paper is to combine available U.S. micro and macro data in order to recover the joint distribution of income, consumption, and wealth across groups and time. The empirical framework is a pseudo-panel, which means we are tracking *types* of agents over the lifecycle and across time through a series of cross-section snapshots. The main source data is from the triennial Survey of Consumer Finances (SCF) for 1995 through 2016. The SCF captures the top of the wealth distribution using a sampling and validation approach based on administrative data.<sup>1</sup> The SCF also includes direct estimates of disaggregated balance sheet components and the capital incomes associated with each type of wealth, the measures of interfamily transfers needed to complete the intertemporal budget constraint, labor incomes, and key demographic variables.

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<sup>1</sup> For a description of the latest SCF results and a discussion of the administrative data sampling and validation, see Bricker et al. (2017).

We combine the survey snapshots with other micro data and detailed aggregate income and wealth time-series, and thus we are able to benchmark the joint distributions of income, saving, and wealth over the two decades (and seven subperiods) spanned by the 1995 through 2016 SCF data sets.

Consistent with recent studies using administrative registries for other industrial economies, the pseudo-panel wealth change accounting framework presented here focuses attention on the role of asset prices and heterogeneity in rates of return to capital when considering differences in saving over the lifecycle and across time. For example, Bach, Calvet, and Sodini (2017) and Fagerang, Holm, Moll, and Natvik (2018) show that the accounting treatment and estimates of the capital gains component of wealth change is key for interpreting the extent to which differences in savings behavior per se versus heterogeneity in (say) income processes is the key to understanding wealth inequality. We are able to show the same relationships at the agent-type level in the U.S. using the pseudo-panel approach. In addition, the fact that we observe capital income and wealth for the same households allows us to directly test the assumptions required to solve for saving across capitalized income fractile groups, as in Saez and Zucman (2016).<sup>2</sup>

The first important data innovation required to build the pseudo-panel is reconciling the micro and macro data for the various intertemporal budget constraint components, which makes it possible to tie the results back to the macroeconomic aggregates and distributional outcomes of interest. The sum of net interfamily transfers across agent types is zero, by construction, so the key is reconciling micro and macro saving, capital gains, and wealth change. We show that the SCF micro data generally line up very well with comparable National Income and Product Account (NIPA) and Financial Account (FA) income and wealth aggregates, so for most income and wealth components we can simply use proportional scaling to reproduce the aggregate intertemporal budget constraint precisely. There are two wealth components—owner occupied housing and non-corporate businesses—for which market prices are not easily observed, and for which SCF respondents (in aggregate) report higher market values. We interpret the differences between the aggregated micro values and published macro as disagreement between government statisticians

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<sup>2</sup> The Saez and Zucman (2016) capitalized income approach to measuring wealth concentration is sensitive to heterogeneity in the rate of return to capital, as explained by Kopczuk (2015), Bricker, Henriques, Krimmel, and Sabelhaus (2016), and Bricker, Henriques, and Hansen (2018). For the purposes of measuring saving, the key point is that the bias from assuming homogeneous returns in the capitalization model maps directly into biased saving estimates. There are no independent estimates of wealth and income with which to properly separate saving out of income from capital gains, even in the absence of movement across wealth fractiles.

and SCF respondents about cumulated capital gains on those assets.<sup>3</sup> Thus, in our decomposition of wealth change, saving summed across agent types matches published aggregates, while capital gains (on housing and owned businesses) are slightly higher.

A second important data innovation here is explicit accounting for interfamily transfers in the intertemporal budget constraint, including both bequests/inheritances at death and *inter vivos* transfers. The SCF includes respondent-reported values for inheritances and gifts received, and for *inter vivos* transfers made. We complete the between-agent type interfamily transfer flows by estimating bequests made using a model of differential mortality applied to beginning of period wealth holdings. The simulated bequests are validated by showing that the distribution of estimated bequests made lines up very well with the distribution of reported inheritances received. In the empirical work, we show that accounting for the heterogeneity in transfers made and received is important for the decomposition of wealth change into component sources at various points in the lifecycle.

The lifecycle patterns of wealth accumulation that emerge from the pseudo-panel disaggregation provide new insights about U.S. saving and wealth dynamics. We focus on decomposing the change in wealth at every age and for various agent types into three components: conventionally measured “active” saving, capital gains, and net interfamily transfers received. Similar to individual-level panel data from economies with administrative registries, the pseudo-panel shows the importance of capital gains in accounting for wealth change over the lifecycle, especially for the very wealthy. Active saving and net interfamily transfers both play important roles in determining wealth change at various points in the lifecycle, but the patterns also clearly vary across the measures of lifetime resources (permanent income and education) we use to distinguish agent types.

In the empirical results we consider the sources of wealth change relative to three different lifecycle benchmarks: conventionally measured income, wealth levels, and income plus wealth.

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<sup>3</sup> It may seem obvious that the published macro aggregates are more precise than the micro data, and indeed much of the work that involves synthesizing micro and macro data makes that assumption. However, it is important to remember that the government aggregates are estimates, and, for example, the Federal Reserve will soon be implementing a new methodology for Financial Account housing values that closes much of the existing gap relative to the SCF. This is empirically important because Bricker et al. (2016) show that some of the divergence between SCF and capitalized income wealth concentration (as reported by Saez and Zucman (2016)) is attributable to aggregate home values. We argue below that the SCF respondent-reported values are at least as valid as the published aggregates, and in any event, those estimates are consistent with what respondents really believe about asset values.

The ratio of active saving to income is what most would consider a saving rate, because it is the same concept as the personal saving rate in the National Income and Product Accounts (NIPA). In contrast to the sorts of conceptually-inconsistent saving rates generally measured using cash-flow concepts in available micro data, our pseudo-panel active saving shows a clear hump shape over the life cycle, turning negative between ages 50 and 60.<sup>4</sup> The pseudo-panel decomposition also makes it clear why wealth itself does not decline at older ages: capital gains and net transfers received by surviving agents are more than enough to offset negative active saving.

The decomposition of wealth change at various lifecycle stages is also instructive for understanding the joint distribution of income, consumption, and wealth across agent types. Low permanent income and lower-education agents have very low active savings during their working years, which is unsurprising in hindsight given the low levels of observed wealth for those agent types at any point in time. Indeed, the wealth owned by lower-income agents is mostly in the form of housing, and most of the growth in that wealth in the past two decades is because of house price appreciation. The highest permanent income and education groups do exhibit the highest active saving (relative to income) at younger ages, roughly double that of the “middle” income and education groups. However, the negative active saving at older ages holds for all agent types, and the growing ratio of capital gains on accumulated wealth to income by age is the key to understanding why the wealth of the wealthiest agent types (relative to income) continues to grow over the lifecycle.

In addition to wealth change decomposition relative to income, we also show how the component sources of wealth change vary relative to wealth and wealth plus income over the lifecycle, and again for the different agent types. The patterns of wealth change relative to wealth levels that emerge are consistent with the findings in similar decompositions using administrative registry data, as reported by Bach, Calvet, and Sodini (2017). The decomposition of wealth change relative to wealth plus income generates the types of testable relationships that emerge from a forward-looking model in which agents are optimally consuming some fraction of their total resources: current income plus marketable wealth. The pseudo-panel decomposition shows substantial heterogeneity in active saving over the lifecycle and across different type of agents.

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<sup>4</sup> The conceptual inconsistencies in cash flow saving estimates are mostly due to the treatment of retirement income. Pension payments and withdrawals from IRAs and 401(k) accounts are not part of (conventionally measured) income, they represent the drawing down of an existing asset.

That is, differences in propensities to consume out of total available resources do show up in the pseudo-panel. However, the leap from that observation to asserting we have shown differences in behavior across types of agents is not direct, because the observations about capital gains in the wealth accounting framework should also be considered.

This paper contributes directly to the empirical literature on wealth inequality dynamics. The theory laying out the candidate explanations for wealth concentration (above and beyond labor income concentration) is well described by Gabaix et al. (2016), Benhabib et al. (2015, 2017), and Benhabib and Bisson (2016). However, there are open questions about how any given combination of income processes and heterogeneity across agents come together to generate the observed skewness in wealth holdings. Some empirical models, dating back to Krusell and Smith (1998) but as recently as Carroll et al (2017), rely on heterogeneity in discount rates or direct preferences for current versus future consumption in order to generate realistic wealth distributions. Some direct empirical analysis, such as Fagerang, et al. (2016), finds that heterogeneity in the rate of return to capital is a key explanation for deviations from the predictions of Bewley-type models. Some models such as Casteneda et al. (2003), De Nardi et al. (2016), De Nardi and Fella (2017) rely on non-standard stochastic labor income processes to solve the wealth concentration mystery. Although we find evidence of heterogeneity in savings behavior, our results are consistent with the idea that behavior relative to conventionally measured income will never fully explain wealth concentration, because the fraction of wealth change explained by saving out of conventionally measured income is a relatively small component of wealth change.

The results here are also informative for the more general empirical literature on levels and trends in inequality, as captured by different data sets and for different concepts. The available U.S. micro-level data has provided a wide range of estimates for levels and trends in inequality for income, consumption, and wealth. Some of the differences in levels and trends are to be expected, because theory suggests (for example) that consumption should be more equally distributed than income and wealth due to consumption smoothing and insurance across families. However, some of the differences are due to the sorts of population coverage, conceptual, and measurement problems described by Attanasio and Pistaferri (2016). The focus in this paper is on using the identities that link the various concepts together at the micro level, and on bringing to bear different types of micro and macro data. By focusing on the complete joint distributions and the relationship between micro and macro variables, we reconcile those measurement

problems and improve understanding about the distinct trends in and relationship between income, consumption, and wealth inequality.<sup>5</sup>

A final contribution of the paper is improving our understanding of key empirical joint distributions that are currently influencing economic policy and forecasting. Disaggregated data on income, consumption, and wealth across agent types has been used to gauge differences in behavior at business cycle frequencies. The pseudo-panel data generated here can in principle be used to inform those same questions, which in principle will help understand and affect macro outcomes by incorporating the heterogeneity in circumstances and/or behavior over time. For example, a great deal of attention has been paid to the borrowing and spending behavior of different types of agents during the U.S. housing boom, and how spending behavior changed in the subsequent bust. In particular, Mian and Sufi (2011) argue that the availability of credit to lower-income households was a substantial contributor to the boom and bust. The pseudo-panel approach here can be used to investigate differences in borrowing and spending before, during, and after the financial crisis. Indeed, previous work by Devlin-Foltz and Sabelhaus (2016) using the same SCF data used here provides evidence against simple stories about credit availability and default across agent types, because increased borrowing against rising home values and decreased post-crisis spending were widespread across the income distribution.

The rest of the paper is organized as follows. In Section 2 we introduce our intertemporal budget constraint accounting framework, and disaggregate the various sources of wealth change using the reconciled micro and macro data that we will rely on to implement the pseudo-panel analysis. Section 3 focuses on some empirical observations about interfamily transfers, and our approach to accounting for transfers made and received given unobserved bequests and the tremendous heterogeneity in those flows. In Section 4 we introduce our pseudo-panel methodology for disaggregating wealth change, focusing on how the available data in the SCF is used to estimate interfamily transfers, capital gains, and other budget constraint components. Sections 5 and 6 present our estimates of saving and wealth change across the lifecycle, by age, permanent income, and education.

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<sup>5</sup> In related work, Fisher et al. (2016a, 2016b) also look at the joint distribution of income, consumption, and wealth using various survey data sets, including the SCF, but they do not focus on the household budget identity that ties the concepts together.



## 2. The Intertemporal Budget Constraint in Micro and Macro Data

The textbook household intertemporal budget constraint is the starting point for measuring saving and wealth dynamics. The budget constraint links wealth change on the left hand side to saving—disposable income minus consumption—on the right hand side. However, the term “saving” itself is inherent in the specific concepts built into the two sides of the budget constraint, and the pseudo-panel disaggregation is inherently driven by the income, consumption, and wealth concepts in the micro and macro data.<sup>6</sup> The ultimate goal of this paper is to disentangle the sources of household wealth change across well-defined agent types, so establishing the conceptual relationship between the micro and macro measures is a crucial first step. In this section we discuss the concept of saving from the perspectives of both sides of the intertemporal budget constraint, and describe how the Survey of Consumer Finances (SCF) data can be used in conjunction with published aggregates for disaggregating aggregate wealth change.

### *Saving in the NIPA and FA*

The most widely referenced measure of aggregate household saving is based on the right-hand side of the intertemporal budget constraint, as in the National Income and Product Accounts (NIPA).<sup>7</sup> In very broad terms, the concept of saving ( $S_t$ ) in the NIPA is just disposable income ( $Y_t$ ) minus consumption ( $C_t$ ):

$$S_t = Y_t - C_t$$

The most important thing to note from a budget identity perspective is that the NIPA concept of saving does not include capital gains, which we will show is a key driver of wealth change over the lifecycle and across time. The decision not to include capital gains derives from the idea that NIPA seeks to quantify the incomes derived from current production, not the change in wealth. In that sense, NIPA saving is the share of household incomes derived from current production

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<sup>6</sup> See Online Appendix 1 for a detailed discussion of the adjustments made to the NIPA, FA, and SCF data to create the reconciled data sets described in this section.

<sup>7</sup> See [www.bea.gov/iTable/index\\_nipa.cfm](http://www.bea.gov/iTable/index_nipa.cfm).

that is invested in productive capital, not the change in claims to economic resources as represented by the change in marketable household wealth.

The Financial Accounts (FA) concept of aggregate household saving begins with the left-hand side of the budget constraint, which is the change in wealth ( $W_t - W_{t-1}$ ).<sup>8</sup> The household sector of the FA focuses on quantifying the balance sheet position (net worth) of households at any given point in time, and it is straight-forward to difference the point estimates to solve for change in net worth over time. However, in order to conceptually match NIPA saving, only the component of net worth change attributable to saving out of current production is counted.<sup>9</sup> In FA parlance, it is the “net investment” in assets and “net change” in liabilities that is conceptually consistent with NIPA saving ( $S_t$ ). The residual component of wealth change is capital gains, which, in the language of the FA, is “holding gains” on existing assets ( $G_t$ ). The basic FA wealth change identity is thus:

$$W_t = W_{t-1} + S_t + G_t$$

We can rewrite the identities for change in wealth and flow saving in the form of the usual intertemporal household budget constraint:

$$W_t - W_{t-1} - G_t = Y_t - C_t$$

Note, however, that creating a concept of saving that counts holding gains as a component of income (realized holding gains are part of income under the income tax, for example) simply involves moving all or some of  $G_t$  to the other side of the identity.

Although the household budget constraint is an identity in principle, even conceptually reconciled NIPA and SCF household saving estimates diverge in practice.<sup>10</sup> In general, the conceptually-equivalent FA saving rate fluctuates more than its NIPA counterpart (Figure 1). Both measures show that savings, has been on average, about 6 percent of disposable income

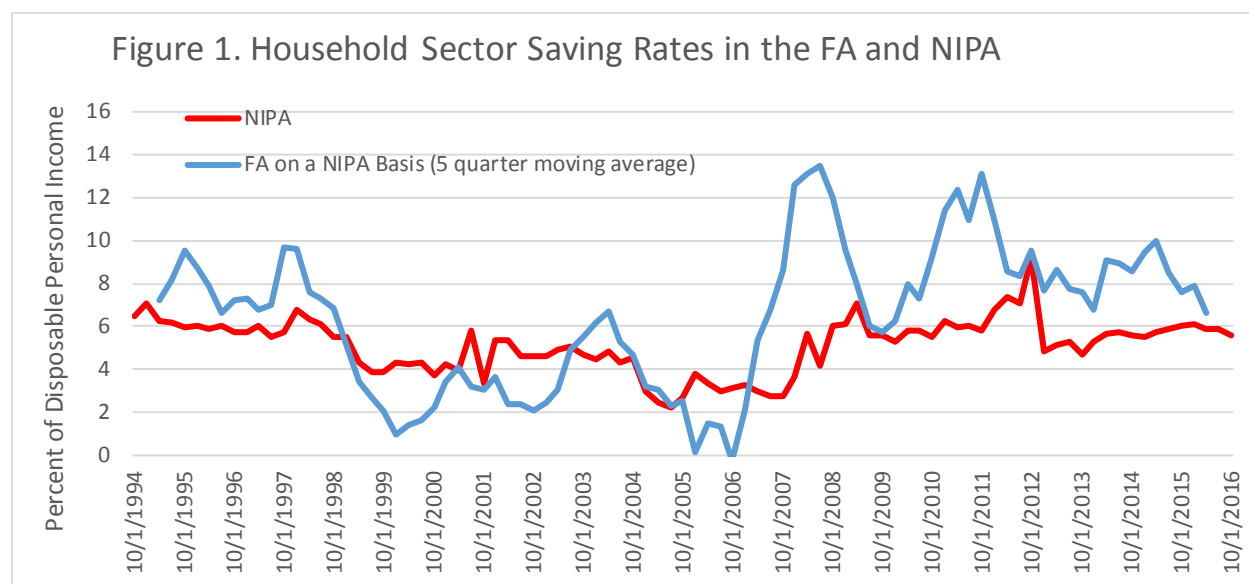
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<sup>8</sup> The FA data is described in the Federal Reserve’s Z1 release, see [www.federalreserve.gov/releases/z1/current/](http://www.federalreserve.gov/releases/z1/current/).

<sup>9</sup> Gale and Sabelhaus (1999) provide more details on the theoretical and empirical relationship between FA and NIPA aggregate saving rates.

<sup>10</sup> Financial Accounts Table F.6 provides the reconciliation between NIPA and FA saving needed to produce this figure. The largest component of the reconciliation involves removing investment in consumer durables from the FA measures.

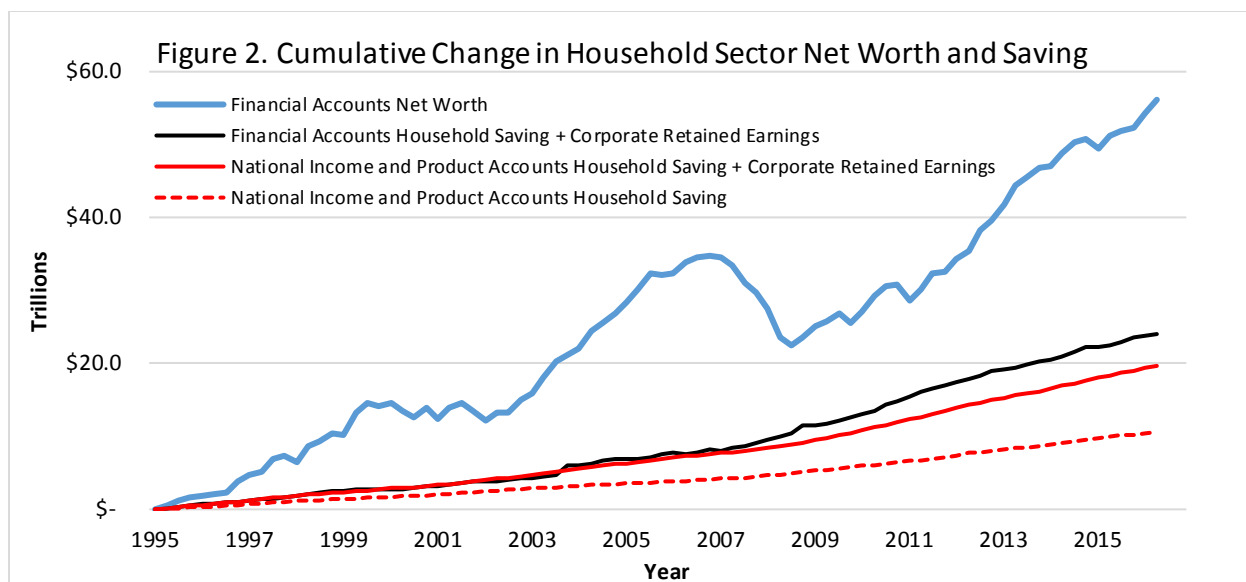
over the past two decades. Also, both series show the same trend decline in saving rates between the mid-1990s and mid-2000s, but the FA decline is more dramatic, both starting at a higher level and ending lower. The increase in FA saving post financial crisis is also somewhat more dramatic, returning back to the relatively higher levels observed in the mid-1990s.<sup>11</sup>



### *The Saving Component of Aggregate Wealth Change*

The concept of saving in the NIPA (which is conceptually the same as net investment less net borrowing in the FA) does not include capital gains. Further perspective on the saving component of wealth change is provided by considering how cumulated flow saving compares to aggregate wealth change over time (Figure 2). The chart shows four measures of cumulated wealth change over the period 1995Q1 through 2016Q4. The top (blue) line is the cumulative change in household sector net worth, which is \$56.2 trillion for the past two decades. The bottom (red dotted line) is cumulated NIPA personal saving, which is \$10.6 trillion over the same period. Thus, in the most narrow sense, saving accounts for less than 20 percent of household wealth change during this period, which suggests capital gains accounts for more than 80 percent of the total.

<sup>11</sup> The NIPA comprehensive revision released in July 2018 includes an upward revision to the personal saving rate of roughly two percentage points in recent years. When the time series is available this chart will be updated, and much of the post financial crisis divergence will disappear.



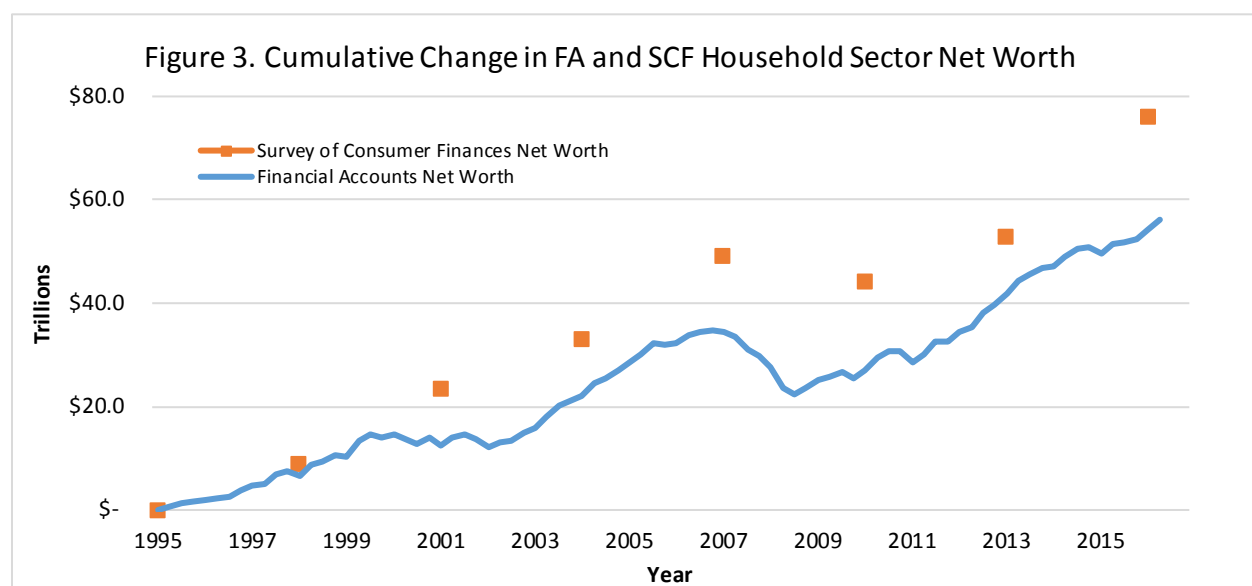
The other two lines on Figure 2 show that the relationship between wealth change and saving is perhaps not so stark. When disaggregating wealth change into capital gains versus saving, it is important to consider corporate saving (retained earnings) because such saving represents an increase in wealth that shows up in asset prices but reflects (conceptually) saving behavior. The sum of cumulated personal and corporate saving in the NIPA (the solid red line) is \$19.7 trillion over the period, which lowers the capital gains share of wealth change to about 65 percent. Finally, the statistical discrepancies between NIPA and FA are noticeable when cumulating over such a long period. The solid black line—FA household saving plus NIPA retained earnings—brings the share of wealth change accounted for by gains down to just under 60 percent.

The FA and NIPA data show that most of aggregate household sector wealth change is accounted for by capital gains, and not by conventionally measured saving. That same relationship has to hold in aggregated micro data as well, but it does not mean that gains dominate wealth change across agent types and at all points in the lifecycle. Indeed, to the extent that particular types of agents at particular points in the lifecycle are acquiring net assets, other types of agents at other points in the lifecycle may have an even higher ratio of capital gains to saving. In order to use the micro data to disaggregate wealth change across agent types and lifecycle stages, we first must reconcile aggregate household sector balance sheets in the micro and macro data.

### *Reconciling Micro and Macro Balance Sheets*

The methodology for collecting micro and macro data on household sector wealth are very different, and even on a conceptually adjusted basis, there are residual differences in aggregated totals. In particular, in recent years, household net worth in the SCF exceeds the FA published measure on a conceptually adjusted basis.<sup>12</sup> However, we show in this section that assets with easily observed market prices in the SCF micro data line up very well with published FA aggregates, as do household sector liabilities. Indeed, most of the differences in aggregate net worth are attributable to two balance sheet categories where market prices are not easily observed by national account statisticians, owner occupied housing and non-corporate business.

Household sector net worth in the SCF micro data grew much faster than the FA published aggregate over the 1995 through 2016 period (Figure 3). While FA aggregate household sector net worth (the blue line, from Figure 2) grew \$56.2 trillion over the past two decades, the SCF (marked by the squares) grew nearly \$80 trillion. Based on the idea that the SCF is a survey with sampling and measurement variability, other research has suggested that the SCF is not capturing the value of key balance sheet components properly, and the solution is to benchmark the SCF values (using proportional scaling) to the published FA aggregates.<sup>13</sup>



<sup>12</sup> See online appendix 1 for a detailed discussion of the steps taken to reconcile SCF and FA balance sheet components. That appendix is largely based on the work of Dettling et al. (2015), but see also Bricker et al. (2016).

<sup>13</sup> See, for example, Saez and Zucman (2016), Maki and Palumbo (2000), Sabelhaus and Pence (1999), and Cynamon and Fazzari (2016).

A closer look at the divergence between SCF and FA balance sheet categories for 2016 suggests more a nuanced explanation and an alternative approach to reconciliation (Table 1). In the balance sheet categories such as financial assets and liabilities where market prices are either easily observed or not relevant, the totals line up quite well.<sup>14</sup> The SCF is conducted over the entire year, so we compare aggregates to both beginning and ending quarterly FA values. The roughly \$20 trillion divergence between the SCF and FA net worth in 2016 is almost entirely accounted for by real estate (the SCF finds about \$6 trillion more) and non-corporate business (the SCF finds about \$10 trillion more). Although quantitatively less important, the SCF also finds higher values for owned vehicles of about \$1 trillion.

<b>Table 1. Household Net Worth in the Financial Accounts and Survey of Consumer Finances (Trillions)</b>					
<b>Balance Sheet Category</b>	<b>2016 Survey of Consumer Finances</b>	<b>Financial Accounts</b>		<b>Ratio SCF/FA</b>	
		<b>2016 Q1</b>	<b>2017 Q1</b>	<b>2016 Q1</b>	<b>2017 Q1</b>
Financial Assets	\$ 61.0	\$ 56.1	\$ 60.9	109%	100%
+ Real Estate	\$ 28.8	\$ 21.9	\$ 23.4	131%	123%
+ Non Corporate Business	\$ 21.9	\$ 10.6	\$ 11.2	208%	196%
+ Vehicles	\$ 2.8	\$ 1.7	\$ 1.8	164%	158%
- Liabilities	\$ (12.3)	\$ (13.3)	\$ (13.8)	93%	90%
= Net Worth	\$ 102.1	\$ 77.0	\$ 83.5	133%	122%
Notes: The 2016 SCF field period ran from the beginning of 2016 Q2 through the end of 2017 Q1. Detailed reconciliation of SCF and FA balance sheet concepts is in online appendix 1.					

It may seem obvious that there is a right and wrong answer here, and the FA embodies the truth against which to benchmark the survey totals. However, a more careful consideration of the approach used by FA in the asset categories with difficult to observe market prices suggest an alternative interpretation. In the case of owned real estate, the FA is currently in the process of changing the methodology used to value those assets. The current FA vintage uses a repeat sales house price index applied to (survey-based) benchmarked house values from the early 2000s. That approach will likely (and soon) be replaced by an Automated Valuation Model (AVM) based on Zillow data. That change in methodology is shown to eliminate much of the gap

<sup>14</sup> Some of the residual difference in liabilities is attributable to how certain types of debt are captured in the SCF. In particular, the SCF is missing some student debt for individuals outside the sample frame (living in student housing) and some of the household debt (in an FA accounting framework) of individuals running owned businesses. There are also likely unresolved issues with revolving credit, insofar as the source data for the FA is from financial institutions that do not distinguish convenience use of credit cards from true revolving debt outstanding.

between FA and SCF housing values, raising the FA to be much closer to the SCF.<sup>15</sup> Similarly, the source data used to value non-corporate businesses is also subject to debate, at least for our purposes of disentangling net investment from capital gains. Some of the assets owned by non-corporate businesses are also real estate, so the same property valuation questions show up in that category as well. In addition, the FA also uses small business tax returns to assign valuations. Thus, any changes in tax accounting principles not properly incorporated will affect the published aggregates. Finally, the method used by FA to value vehicles is to multiply price indexes multiplied by real stocks, and either input could be problematic. In the SCF, car valuations are from published Blue Book reports on a vehicle-by-vehicle basis.

For our purposes, the disagreement about aggregate totals for assets with difficult to observe market prices is more than just a debate about measuring the level of national wealth. The differences come down to what the national accountants and survey respondents *think* the assets are worth, and the implications (for most purposes) do not go any further than that. For our purpose, however, we have to make a decision about what those differences mean. We choose to not benchmark SCF housing, owned businesses, and vehicles to FA aggregates, and thus implicitly assume that the differences in within-category wealth change over time is due to differences in (perceived) capital gains.<sup>16</sup> That is, we benchmark the aggregate pseudo-panel net investment in each asset type to the FA, and then solve for the capital gains as a residual.

The accounting for aggregate wealth change that comes out of this particular approach to micro/macro reconciliation gives somewhat more weight to the contribution of capital gains, most importantly for owner occupied housing and non-corporate businesses. From an agent-type and lifecycle perspective, benchmarking (say) housing to the FA would reduce wealth in the middle of the age and wealth distribution for whom housing is most important.<sup>17</sup> Before turning to the formal decomposition of wealth change into the macro components (saving and capital gains), we turn next to the key micro component in the intertemporal budget constraint needed to complete the pseudo-panel wealth accounting: interfamily transfers.

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<sup>15</sup> Presentation by Eric Nielson of the Federal Reserve Board at the NBER/CRIW meetings in July 2018. Replace this with a citation to the FEDS paper when that is released.

<sup>16</sup> We do benchmark the financial asset and liability categories, because those differences are likely attributable to sampling and measurement variability, or conceptual differences.

<sup>17</sup> Bricker et al. (2016) directly assess how the decision to benchmark affects wealth concentration estimates.

### 3. Accounting for Interfamily Transfers

Interfamily transfers are a sizable component of the total change in household wealth. In aggregate, total U.S. interfamily transfers in a given year are nearly the same size as all of NIPA personal saving.<sup>18</sup> The important question for the data is whether direct interfamily transfers of cash and assets in the form of inheritances and gifts is well captured in the SCF data, which we show to be the case.<sup>19</sup> In this section we focus on the fact that the size distribution of direct interfamily transfers is highly skewed, and that inheritance and gift recipients tend to be wealthier, higher-income and more educated than the average person in the economy, resulting in highly concentrated flows of interfamily transfers.<sup>20</sup> Thus, accounting for interfamily transfers has first-order implications for our estimates of saving and wealth change across agent types.

#### *Interfamily Transfers by Size of Transfer*

Interfamily transfers are a widespread phenomenon, with an average of roughly 2 million households receiving either an inheritance or a substantial gift each year. However, these sorts of wealth transfers are also highly skewed. Figure 4 focuses on the distribution of inheritances received.<sup>21</sup> The left panel shows that most inheritances are relatively small, with about half of all inheritances in amounts less than \$50,000. However, the total share of dollars transferred in those amounts of less than \$50,000 is also relatively small, accounting for just over 5 percent of total inheritances. At the other end of the size distribution, transfers of \$1,000,000 or more account for only about 2 percent of the number of transfers at death, but 40 percent of total dollars transferred. Substantial gifts of money and assets from one living person to another—*inter vivos* transfers—are even more skewed than inheritances, as shown in Figure 5.<sup>22</sup> More

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<sup>18</sup> See Feiveson and Sabelhaus (2018).

<sup>19</sup> Online Appendix 2 describes how we used the SCF along with estate tax and mortality data to benchmark the reported inheritances and *inter vivos* gifts received against predicted bequests and reported transfers made. The key validation exercise on transfers at death involves comparing reported inheritance distribution to a simulated distribution based on SCF wealth holdings and (differentiated) mortality rates. The two distributions and aggregate flows are nearly identical, which indicates that the survey is doing a good job capturing transfers at death.

<sup>20</sup> The focus here is on direct transfers because we are disaggregating wealth change, but other indirect forms of wealth transmission are also certainly important. The SCF does contain questions that shed light on some of these channels, such as investment in education and inclusion in lucrative family businesses. See Feiveson and Sabelhaus (2018) for a discussion of how important these indirect channels are likely to be for explaining intergenerational wealth correlations.

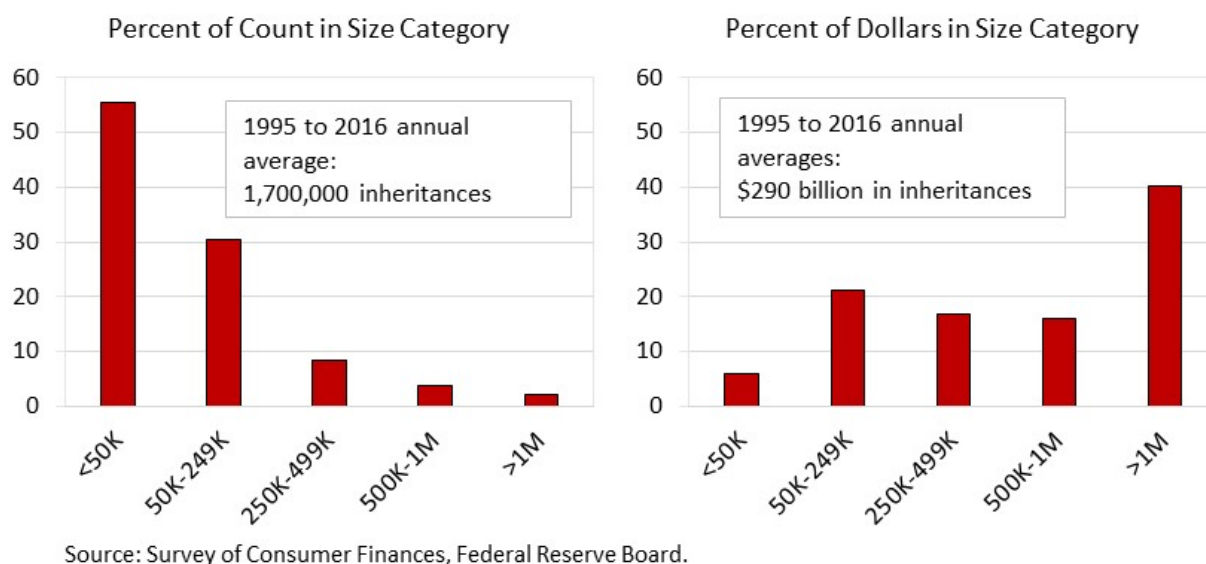
<sup>21</sup> The inheritance measure in the SCF excludes transfers to surviving spouses, consistent with the notation above.

<sup>22</sup> The SCF treatment of *inter vivos* transfers is somewhat limited for conceptual reasons, because some respondents report making transfers that include in-kind payments (such as tuition and other college expenses) while the survey

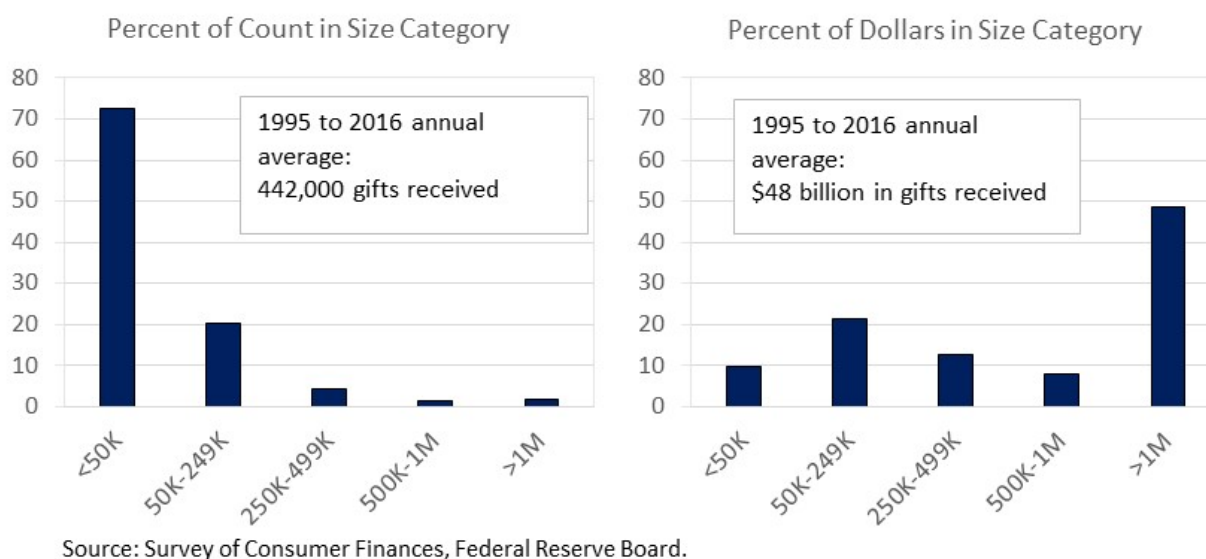


than 70 percent of *inter vivos* gifts reported are less than \$50,000, but the relatively few gifts in amounts greater than \$1,000,000 account for almost half of the total dollars received.

**Figure 4: Size Distribution of Inheritances**



**Figure 5: Size Distribution of *inter vivos* Transfers**



does not attempt to capture the receipt of such transfers. The *inter vivos* transfers in Figure 5 are limited to respondent-reported receipt of large gifts of financial and tangible assets.

Together, annual inheritances and *inter vivos* transfers averaged about \$350 billion (2016 dollars) per year in the period 1995 to 2016. Thus, as noted above, interfamily transfers are the same order of magnitude of total household-sector saving as measured in the NIPA.

### *Characteristics of Transfer Recipients*

The role of transfers in wealth accounting will depend crucially on the characteristics and circumstances of transfer recipients. Even a highly skewed distribution of transfers has the potential to decrease wealth concentration, if, for example, those transfers are received by families experiencing negative income or wealth shocks. However, since transfers are often between family members in similar income or wealth classes, the smoothing role is likely limited. Indeed, we find that the recipients of interfamily transfers are much more likely to be college-educated, high-income, and high-wealth, as shown in the Table 2.<sup>23</sup>

**Table 2: Characteristics of Transfer Recipients**

	Population	Inheritance/ Inter Vivos Gift Recipients
Age (Years)	50	49
Median Income (2016 \$)	54,000	74,000
Median Net Worth (2016 \$)	97,000	267,000
White (Percent)	73%	88%
College-Educated (Percent)	30%	43%

Note: Pooled over SCF surveys 1995 to 2016.

Source: Survey of Consumer Finances, Federal Reserve Board.

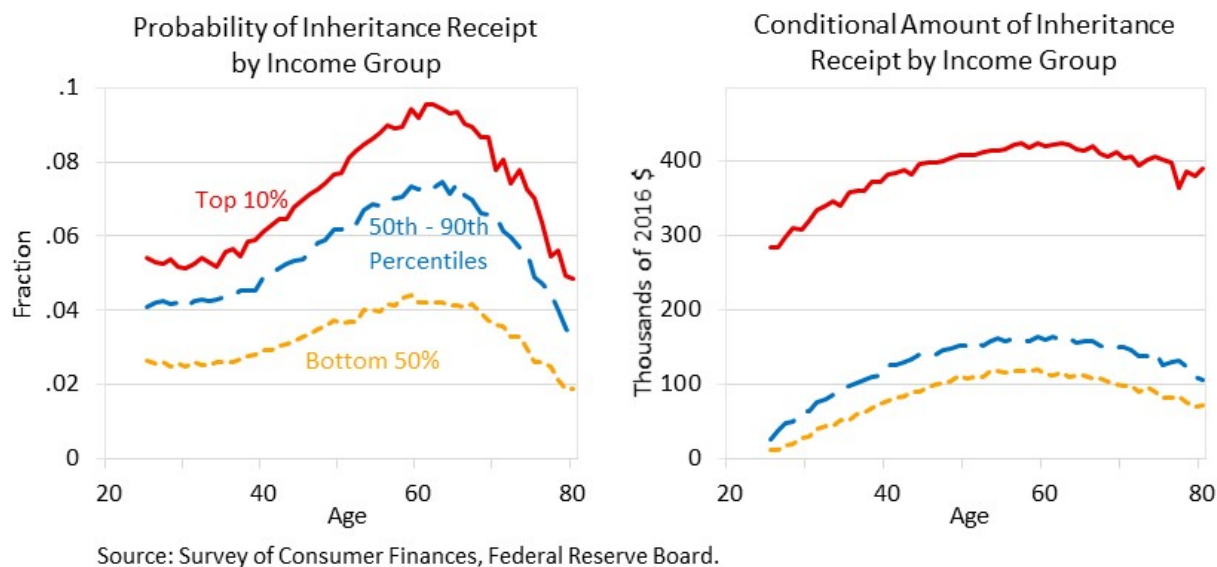
Interfamily transfers are strongly associated with life events that tend to occur around certain ages, for example, the death of a parent. As such, it is instructive to look at lifecycle profiles of transfer receipt by age.<sup>24</sup> As before, we look separately at inheritances and *inter vivos* transfers, and we focus on differences in transfers received across the income distribution. The

<sup>23</sup> Income here is defined as the amount of annual income that respondents report “usually” receiving each year. This measure of income is more stable over time than current income and tends to be a closer proxy to permanent income for households.

<sup>24</sup> These profiles are estimated using regressions (logit for the probability, and OLS for the conditional amount) against cubic polynomials in age and dummies for income and education groups.

left panel of Figure 6 shows the probability of having received an inheritance over the past 3 years by age and income. Inheritance receipt peaks at around age 60 for all income groups, consistent with observed generational age gaps (around 20 years) and lifespans (around 80 years). In addition to the age pattern, Figure 6 shows that the probability of receiving an inheritance for those in the top 10 percent of the income distribution is twice the probability of receipt for those in the bottom half of the distribution.<sup>25</sup> The right panel shows that the amount of inheritance receipt, conditional on receiving a transfer, is almost four times as large for those in the top of the income distribution than those at the bottom of the distribution. Similar differentials exist across education and wealth groupings.

**Figure 6: Inheritance Receipt by Age and Income**

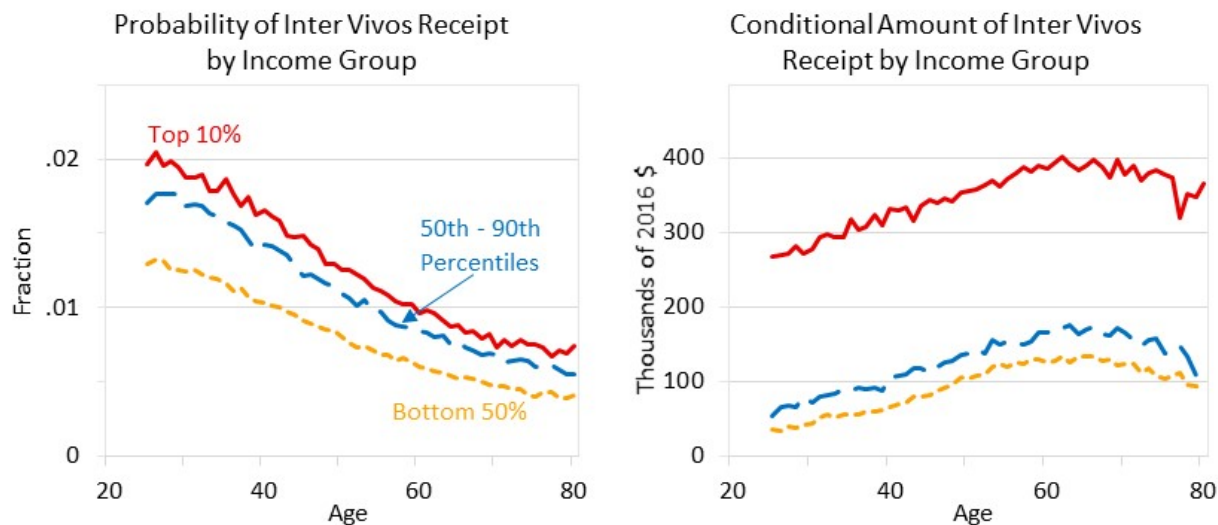


The lifecycle pattern of *inter vivos* transfer receipt is very different than the pattern for inheritances. As shown in the left panel of Figure 7, the probability of receiving an *inter vivos* transfer peaks for individuals in their mid-20s—when many households receiving a helping hand from their parents—after which it declines. While individuals in the top of the income distribution are more likely to receive *inter vivos* transfers than those in the bottom half of the distribution, the differentials in the probabilities are not as pronounced as those for inheritances. However, the differences in the amounts received are again substantial—as shown in the right

<sup>25</sup> The income percentiles along with the net worth percentiles (used later) are calculated for each age using quantile regressions. Thus, the “top 10 percent” refers to those households that are in the top 10 percent of the income (or net worth) distribution conditional on the age of the household head.

panel for Figure 7, conditional on receiving an *inter vivos* transfer, those in the top 10 percent of the income distribution receive three times the amount of those in the bottom 90 percent of the distribution.

**Figure 7: *Inter vivos* Transfer Receipt by Age and Income**



Source: Survey of Consumer Finances, Federal Reserve Board.

The observations about direct interfamily transfers by age and income motivate our decisions about accounting for those flows in the pseudo-panel wealth accounting. In particular, in order to capture the tremendous heterogeneity in interfamily transfers, we use the SCF reported values for inheritances and *inter vivos* transfers received for each three-year subperiod between the SCF survey waves.<sup>26</sup> The values for inheritances received are scaled to match the total of mortality-adjusted expected bequests, which does not suffer from the same level of sampling variability. The values for *inter vivos* transfers made reported in the survey are scaled to match the reports of transfers received, in order to avoid the issue of in-kind transfers such as education expenses. The heterogeneity in receipt by income help motivate our choice of permanent income groups for disentangling the sources of wealth change over the lifecycle, which we turn to in the next section.

<sup>26</sup> In future work, in order to further reduce the potential effects of sampling variability on the interfamily transfer estimates, we will explore the feasibility of using the pooled regressions underlying figures 6 and 7 to improve the precision of the estimated transfers received by age, income, and pre-transfer wealth.

#### 4. Pseudo-Panel Methodology

The Survey of Consumer Finances (SCF) provides a series of representative and comprehensive snapshots of household balance sheets every three years. In this section we explain our methodology for disaggregating saving and wealth change across groups (agent types and birth cohorts) and time.<sup>27</sup> Agent “type” is kept intentionally vague at this point, but individual characteristics that do not change over time (such as educational attainment) or move slowly over time (such as permanent income) are the sorts of “types” the reader should initially have in mind. Relative to other types of research using pseudo-panel analysis, the biggest complications arise when measuring saving are because of (1) wealth transfers *between* groups, and (2) we only observe wealth holdings and incomes of individuals in the SCF if they are either the head of household or spouse/partner of the head of household.<sup>28</sup>

The explanation of our methodology begins with what we observe in the SCF micro data, and what we are trying to estimate. For each individual (head or spouse) we observe their net worth at time  $t$ , which we denote  $w_{it}$ . Although we will ultimately divide SCF net worth into several categories of wealth for assigning capital gains, we suppress the wealth type superscript and look only at total net worth to keep the notation simpler at this point. Most components of net worth in the SCF are reported as jointly owned when a spouse/partner is present, so we divide those equally. Incomes, transfers, and taxes are also divided equally.<sup>29</sup> We also observe a vector of characteristics for every head and spouse, including the type of agent ( $j$ ), their birth cohort ( $c$ ), their marital/partner status ( $m_{it} = 1$  if spouse/partner present, 0 otherwise), and the values of agent type and cohort for their spouse ( $j_s, c_s$ ) if they have a spouse. We will also use other demographic and economic variables ( $x_{it}$ ) that vary *within* agent type and cohort and affect differential mortality and the receipt of inheritances.

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<sup>27</sup> Two notable earlier papers using a simpler pseudo-panel approach are Sabelhaus and Pence (1999) and Maki and Palumbo (2001).

<sup>28</sup> The SCF survey unit is a household, but detailed data is only collected on the Primary Economic Unit (PEU). Persons living in the unit who are reported as not financially interdependent, including roommates and adult children, are in the Non Primary Economic Unit (NPEU). The SCF collects only limited and highly aggregated data on individuals in the NPEU.

<sup>29</sup> See Online Appendix 1 for a discussion of SCF income concepts and how taxes are estimated. The SCF does have information about earned incomes of the head and spouse separately, but for our purposes, it makes sense to treat those as completely shared resources. Note that some unobserved components of income (in kind transfers such as Medicare and Medicaid) show up on both sides of the saving equation. Thus they don’t affect the level of saving, but they do affect the rate of saving if they are missing from the denominator.

## *Timing*

The goal of the exercise is to estimate savings and consumption across agent types using the balance sheet identity—namely, that the change in wealth can be decomposed between active savings, gains, and net transfers to that group. (In the aggregate, the transfers net to zero.) To back out active savings from this identity, we need to use the SCF to get estimates of the size and allocation of transfers (including bequests) and capital gains. Both of these depend on the timing of when the assets are required, and, as such, it is important to lay out the assumptions about timing we make when describing the pseudo-panel saving estimates:

- At the beginning of each three year period some individuals die, with a probability that depends on their agent type, cohort, and their own idiosyncratic characteristics associated with differential mortality within their type and cohort group.
- Non-mortality related entry and exit into an agent type and cohort group between  $t$  and  $t+3$  also occurs at the beginning of the period. For example, children will move out of their parent's home, and become the head or spouse in a new household that is observed in the next survey wave.<sup>30</sup> We assume they bring zero wealth into the group total when they become a head or spouse at the beginning of the period, and we want to count their saving *during* the period and thus include them in the denominator when measuring average saving (along with average market income, transfers, taxes, and consumption). Also, older people may exit from head or spouse status if they (say) move in with their children. We assume that if they had any wealth, it is bequeathed, meaning their wealth effectively gets the same treatment as if they died.
- Last, and consistent with the timing of deaths and entry/exit, all wealth is transferred (bequests made and received, as well as inter vivos gifts made and received) at the beginning of the three year period, which implies that the capital gains that will accrue on that transferred wealth during the three year period will be credited to the group receiving the bequest at the beginning of the current three-year period, as opposed to the group that owned the wealth at the end of the previous three-year period. The key assumption when

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<sup>30</sup> The SCF has very little information about income and wealth on household members other than the head and spouse. In addition to children, non-surveyed roommates will also transition to head or spouse. In the SCF, only one roommate in a household will be in the PEU.

separating the change in wealth into the “active” saving and capital gains components is that the capital gains *rate* is fixed by asset type and time period.

### *Estimating bequests*

The distribution of bequests made is part deterministic, and part estimated. The deterministic part is associated with spousal bequests, because we know the agent type and cohort of every married individual’s spouse. The estimated part is due to bequests from single individuals who die. The bequests made by single individuals are put into a bequest “pool” from non-spouses which is then allocated across all potential heirs, using an inheritance function that captures both the probability of receiving an inheritance and the amount received. As with the mortality function, the inheritance function has some features that are common to all members of agent type  $j$  and cohort  $c$ , at time  $t$ , but there could also be heterogeneity within agent types.

Denote every individual’s probability of death between time  $t$  and time  $t+3$  using  $d(j,c,t,x_{it})$ , where  $j$ =agent type,  $c$ =cohort,  $t$ = year, and  $x_{it}$  is the vector of individual characteristics that affect differential mortality. Then, the total amount of bequests at death *made* by agents of type  $j$  in cohort  $c$ , at time  $t$  is given by,

$$B_{jc(t,t+3)}^- = \sum_{i \in j,c} w_{it} d(j,c,t,x_{it})$$

Total bequests made by all individuals ( $B_{(t,t+3)}^-$ ) because of death is just the sum over all agent and cohort types, which is,

$$B_{(t,t+3)}^- = \sum_j \sum_c B_{jc(t,t+3)}^-$$

Since our final goal is to measure the savings across a 3-year period of the survivors—i.e. those individuals who did not die in that time period—it is useful to define the wealth of the survivors in group  $j,c$  in time  $t$ :

$$W_{jct}^{\text{survivors}} = W_{jct} - B_{(t,t+3)}^-$$

### Estimating net transfers

The next step is to determine the amount of bequests *received* by the surviving individuals in each cohort and agent type group. Those bequests that accrue to agent type  $js$  and cohort  $cs$  at time  $t$  through the direct spousal link is:

$$B_{js,cs,(t,t+3)}^{+sp} = \sum_i w_{it} d(j,c,t,x_{it}) m_{it} (1-d^s(js,cs,t,x_{it}^s))$$

Where  $js$  and  $cs$  are the observed agent type and cohort of the *spouse* of individual  $i$ , and  $d^s(js,cs,t,x_{it}^s)$  is the mortality function for the spouse (the spouse has to be alive in order to receive the bequest). The total pool of non-spousal bequests is then given by,

$$B_{(t,t+3)}^{+ns} = B_{(t,t+3)}^{-} - \sum_j \sum_c B_{jc(t,t+3)}^{+sp}$$

These remaining bequests are distributed across all other surviving individuals.<sup>31</sup>

Non-spousal bequests are allocated across agent type and cohort groups using inheritance functions,  $b^{+ns}(j,c,t,x_{it})$ , which, like the mortality functions, have both group-level and individual-specific inputs. These functions are derived from the self-reports of inheritances received in the SCF. The mortality-adjusted inheritance function of individual  $i$  is  $b^{+ns}(j,c,t,x_{it}) * (1 - d(j,c,t,x_{it}))$ . The condition on inheritances received is simply that the sum across all individuals equals the pool of non-spousal bequests,  $B_{(t,t+3)}^{+ns}$ . That is,

$$B_{(t,t+3)}^{+ns} = \sum_{j,c} \sum_i b^{+ns}(j,c,t,x_{it}) (1 - d(j,c,t,x_{it}))$$

The amount of non-spousal bequests received by the  $j, c$  group at time  $t$  ( $B_{jct}^{+ns}$ ) is then just the sum of these calibrated amounts for individuals of agent type  $j$  in cohort  $c$ .

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<sup>31</sup> The distributed bequests are also adjusted for estate taxes and other costs. Online appendix 2 has details about how those adjustments are implemented.



Similarly, we defined  $V_{jc(t,t+3)}^+$  as the *inter vivos* transfers received by the j,c group and  $V_{jc(t,t+3)}^-$  to be the *inter vivos* transfers given by the j,c group. As with bequests received, these are calculated from the self-reports of respondents as described in the appendix. Thus, the total net transfers received by the survivors of the j, c group at time t is:

$$T_{jc(t,t+3)} = B_{jc(t,t+3)}^{+sp} + B_{jc(t,t+3)}^{+ns} + V_{jc(t,t+3)}^+ - V_{jc(t,t+3)}^-$$

### *Estimating Capital Gains*

The last step when working with the change in total wealth for the groups comprised of agent types j and cohorts c is to determine the capital gains ( $G_{jc(t,t+3)}$ ) accruing to each group. At this point, we (trivially) expand our notation to include asset and liability categories, adding a superscript z to each wealth variable when we intend to break it down into different categories. If we assume that each asset and liability category has its own capital gains rate ( $g_{(t,t+3)}^z$ ) estimated (as described above) using aggregate data on asset prices, then the total capital gains earned by the survivors in group j, c between time t and t+3 is,

$$G_{jc(t,t+3)} = \sum_z (W_{jct}^{survivors,z} + T_{jc(t,t+3)}^z) g_{(t,t+3)}^z$$

### *Disaggregating the Change in Wealth*

Finally, with all pieces in place, we can now use the balance sheet identity to back out active savings for each group:

$$S_{jc(t,t+3)} = W_{jct+3} - W_{jct}^{survivors} - T_{jc(t,t+3)} - G_{jc(t,t+3)}$$

The active saving of survivors is the difference between their wealth in time  $t+3$  and their wealth in time  $t$  minus their other sources of wealth flows, namely their net transfers and their capital gains. Note that if we aggregate this identity across all groups, total *inter vivos* transfers given and received offset, as do the bequests given (which is subtracted from the survivors' wealth) and the inheritances received, leaving the aggregate identity in the macro data. That is, aggregate savings is equal to the change in wealth minus total capital gains. Thus, group-level saving rates

estimated using the above equation will add up to the aggregates familiar to macroeconomists. (Since we assume that death occurs at the beginning of the 3-year period, the active saving of non-survivors is zero, which is why the active saving of survivors adds to the aggregate.)

Having solved for active saving, the above equation can be rearranged to show that the change in wealth for a particular cohort and agent-type group can be decomposed into activating savings, net transfers, and capital gains:

$$W_{jct+3} - W_{jct}^{\text{survivors}} = S_{jc(t,t+3)} + T_{jc(t,t+3)} + G_{jc(t,t+3)}$$

This is precisely the decomposition we will take to the pseudo-panel for the empirical results presented in the next two sections.

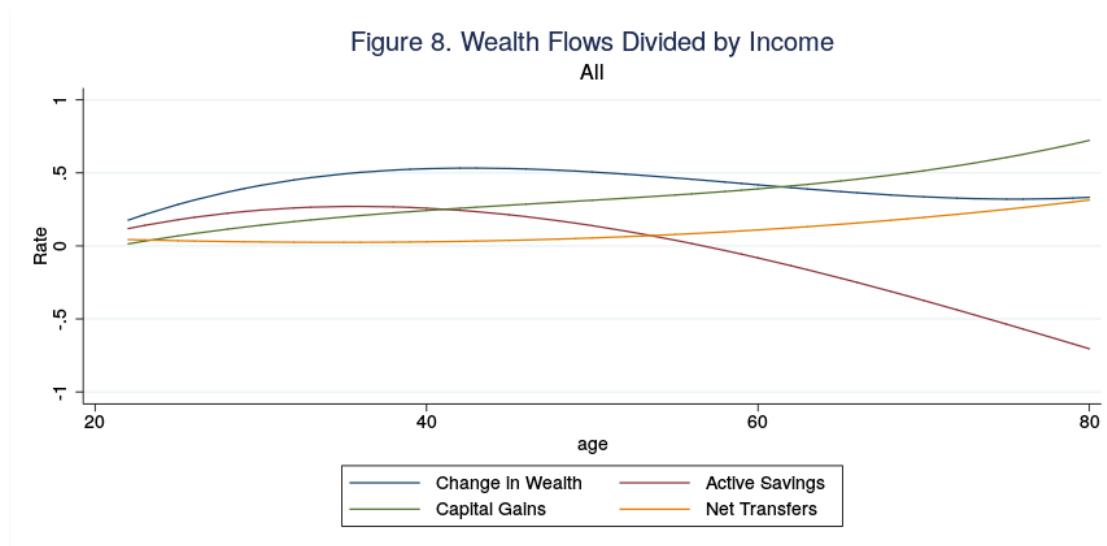
## 5. Sources of Wealth Change over the Lifecycle

In this section, we present the results when we use 10-year birth year cohorts as the starting point for grouping, as discussed in the pseudo-panel methodology described in Section 3. For each cohort, and in each survey year, we first estimate their net interfamily transfers and their capital gains, and then back out their active savings using the identity presented at the end of that section—i.e. that their saving is equal to their change in wealth less their net interfamily transfers received and less their capital gains.

For now, we focus on movements over the lifecycle rather than over time. As such, we pool the years 1995 through 2016 together, and then fit their normalized wealth flows to a cubic polynomial in age. The results in which wealth flows are normalized by income are showed first in Figure 8.<sup>32</sup> The blue line shows the change in survivors' wealth divided by income, and the other three lines show the three components of this change: savings divided by income (the red line), gains divided by income (the green line) and transfers divided by income (the orange line).

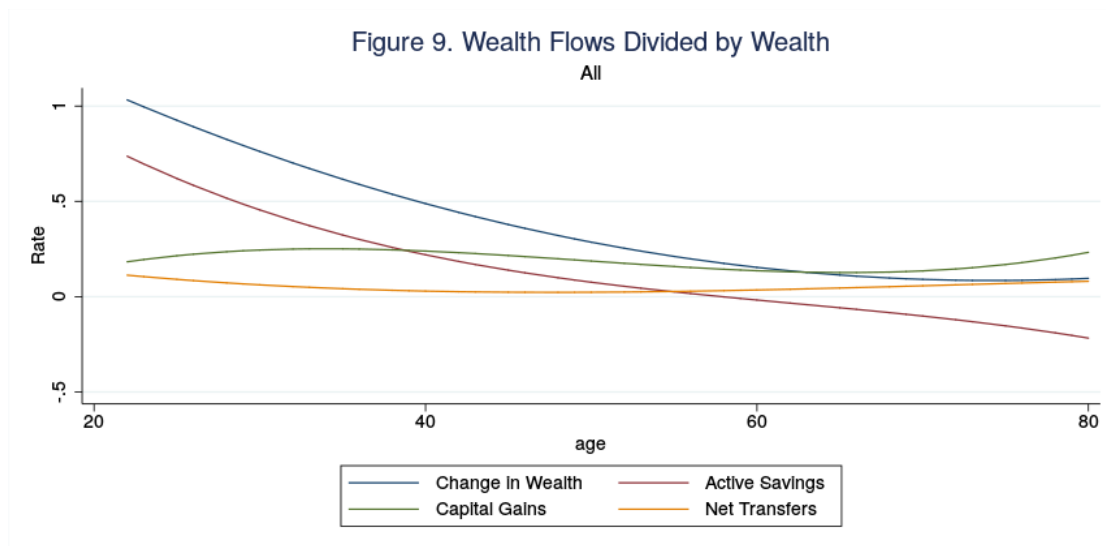
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<sup>32</sup> The SCF concept of income used is not the same as the NIPA concept of disposable personal income. The main differences are that Medicare and Medicaid transfers and imputations (such as owner-occupied rent) are not included, and taxes are not subtracted from the total.

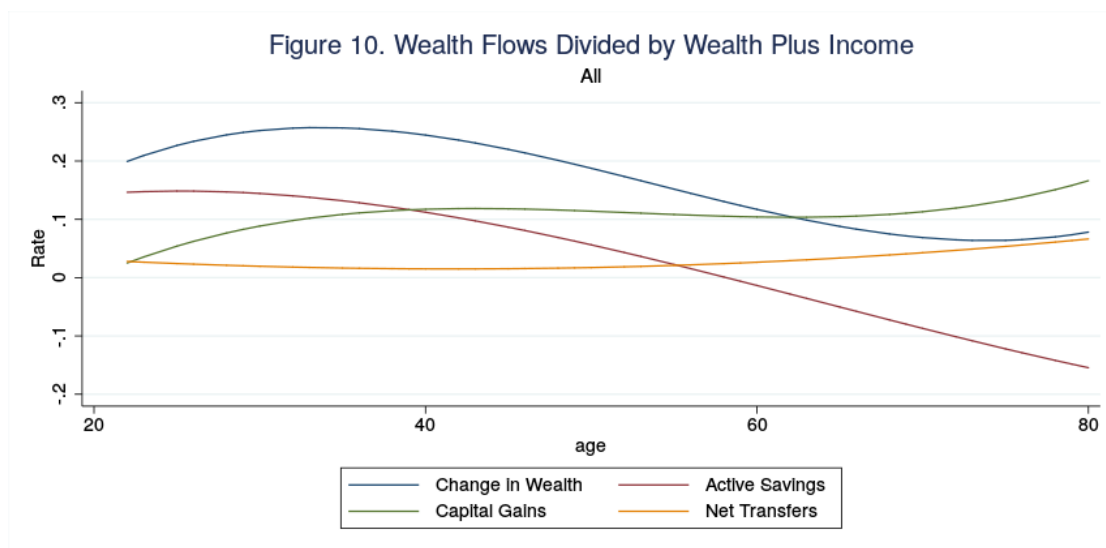


The advantage of dividing by income is that the saving rate seen is close in concept to the saving rate reported in the National Income and Product Accounts. As shown by the red line, this saving rate, on average, is positive and large for early ages, peaking at about 30 percent at the age of 35. After this time, it falls rapidly, entering into negative territory around the age of 55 after which it falls quite dramatically to close to -100 percent of income. Despite these substantial active dissavings, however, the change in wealth experienced on average never dips below zero, even later in life. This underscores the importance of capital gains, whose contribution to the change in wealth grows with age. In addition, the contribution of net interfamily transfers kicks up at the end of life—this occurs because an individual inherits their spouse’s wealth if their spouse dies, effectively bumping up their per capita wealth holdings. The pronounced pattern of active savings over the lifecycle emphasizes the importance of considering the distribution of ages when analyzing wealth accumulation.

In Figure 9, we show the wealth flows normalized by wealth rather than by income. This normalization is suggested in a recent paper by Bach, Calvet, and Sodini (2017). Here, the gains rate remains roughly constant over the lifecycle at about 20 percent over a 3-year period. Active saving is a large percentage of wealth early in the lifecycle, which is driven by low denominators (near-zero wealth) at younger ages. Net transfers are smaller and roughly constant throughout the lifecycle, although with slightly higher percentages at the beginning of life (due to *inter vivos* transfers) and then again later in life (when both non-spousal and spousal inheritances are received).



Because the flows, when dividing by wealth or income, are either pushed up by near-zero wealth at the beginning of the lifecycle, or by near-zero income at the end of the lifecycle, we turn to one other normalization factor: that of income plus wealth, or the measure of current resources used in forward-looking lifecycle models. These results are shown in Figure 10. Active saving as a fraction of income plus wealth falls over the lifecycle, while capital gains increases over the lifecycle.



All told, these findings lead to two main conclusions. The first is the importance of capital gains in lifecycle wealth accumulation, and the second is the stark movement of active savings over the lifecycle.

## **6. Lifecycle Wealth Accumulation by Permanent Income and Education**

In this section, we further divide the population into agent types within cohorts. In Figure 11, we first look at the wealth flows, normalized by income, of those individuals in the top 10 percent of permanent income (conditional on age). Their active savings are roughly 50 percent of income at the beginning of the lifecycle, after which savings declines and turns negative at about the age of 55. Again, gains are an important contributor to their wealth accumulation, and increasingly so over the lifecycle. Figure 12 shows the wealth flows, normalized by income, for those individuals in the 40<sup>th</sup> to 90<sup>th</sup> percentiles of permanent income, while Figure 13 shows the wealth flow for those in the bottom half of the distribution. The saving rates of those in the middle of the distribution are lower than the top 10 percent, while the saving rates of those in the bottom half of the distribution are near zero over most of their lifecycles. At the end of the lifecycle, those in the bottom half of the distribution nevertheless dissave as they spend down their wealth accumulated through capital gains earlier in their lifecycles.

Figure 11. Wealth Flows Divided by Income  
Top 10% of Permanent Income

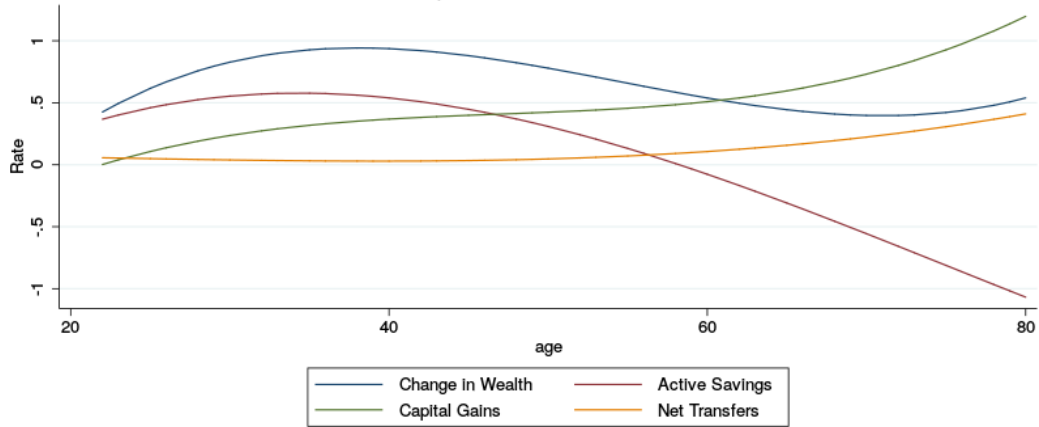


Figure 12. Wealth Flows Divided by Income  
40th to 90th Percentiles of Permanent Income

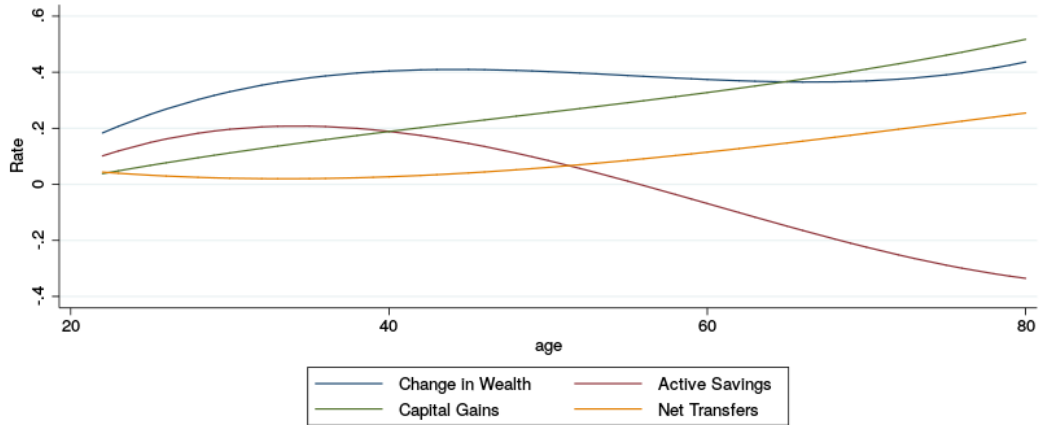
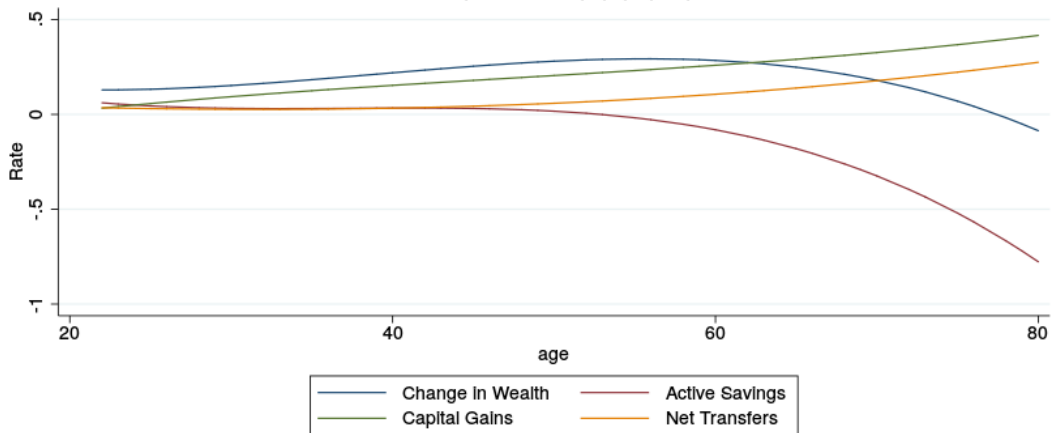


Figure 13. Wealth Flows Divided by Income  
Bottom 50% of Permanent Income



The saving rates seen near the end of the lifecycle are somewhat distorted due to the low income numbers post-retirement. So we turn to Figures 14, 15, and 16 to see the same results with wealth in the denominator. We now see that gains are roughly constant as a percent of wealth over the lifecycle, and the differences across permanent income groups are not substantial. This lack of differentiation does not hold across asset classes—i.e. the lower income individuals rely more on capital gains from their real estate holdings, while the top 10 percent depend instead on equity and noncorporate business holdings. Differences in the active savings rates early in the lifecycle are harder to interpret since wealth is close to zero for individuals at the start of their adult life in the bottom 90 percent of the permanent income distribution, pushing up their estimated saving rates. To get a better understanding of how individuals spend out of their available resources, we turn to Figure 17, 18, and 19, when wealth plus income is in the denominator. The patterns here are quite clear: Again, early in life, active saving rates are higher for those in the 10 percent of the distribution and near-zero for those in the bottom of the distribution. Later in life, active savings become negative for all three subgroups. Capital gains are increasingly important throughout the lifecycle for all three groups.

One underlying assumption in the above figures is that an individual's membership in one of the three permanent income groups—the top 10 percent, the middle, or the bottom half—does not change over their lifecycle. If instead, individuals move between income groups, the patterns shown would not accurately represent their wealth flows. In particular, active saving rates seen among the high permanent income group would be somewhat biased upward, and the active saving rates seen by the bottom half of the permanent income group would be biased downward. In the next set of figures, we focus instead on a subgroup that is arguably more stable over the lifecycle: education. We divide individuals into three groups: 4-year college completers, those who attended some college or 2-year degrees, and individuals with at most a high school degree. Figures 20, 21, and 22 show the wealth flows, normalized by income, for these three groups. As with the permanent income groups, we show the wealth flows normalized by wealth in Figures 23, 24, and 25, and the wealth flows normalized by wealth plus income in Figures 26, 27, 28. The patterns are broadly similar to those seen in the permanent income groupings.

Figure 14. Wealth Flows Divided by Wealth  
Top 10% of Permanent Income

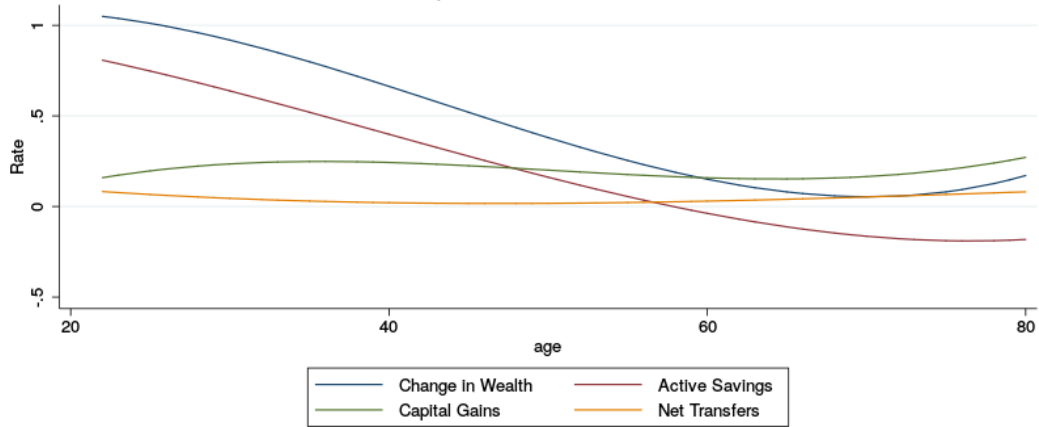


Figure 15. Wealth Flows Divided by Wealth  
40th to 90th Percentiles of Permanent Income

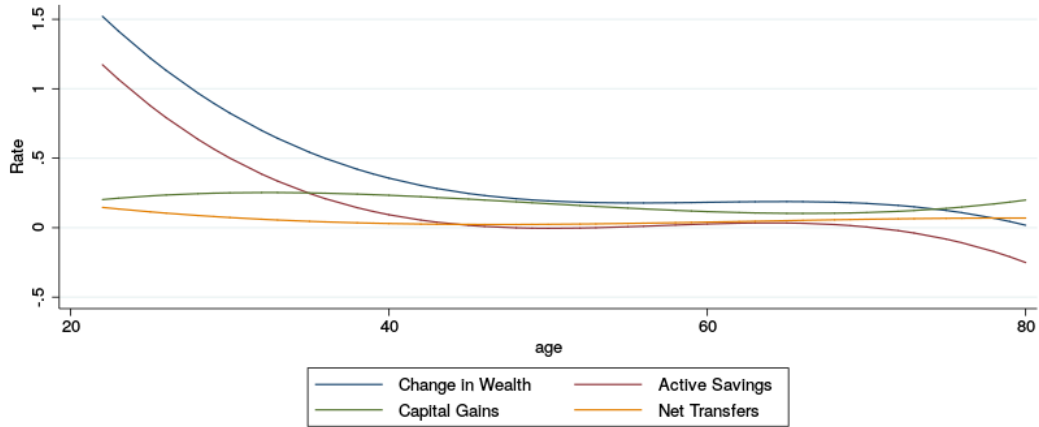


Figure 16. Wealth Flows Divided by Wealth  
Bottom 50% of Permanent Income

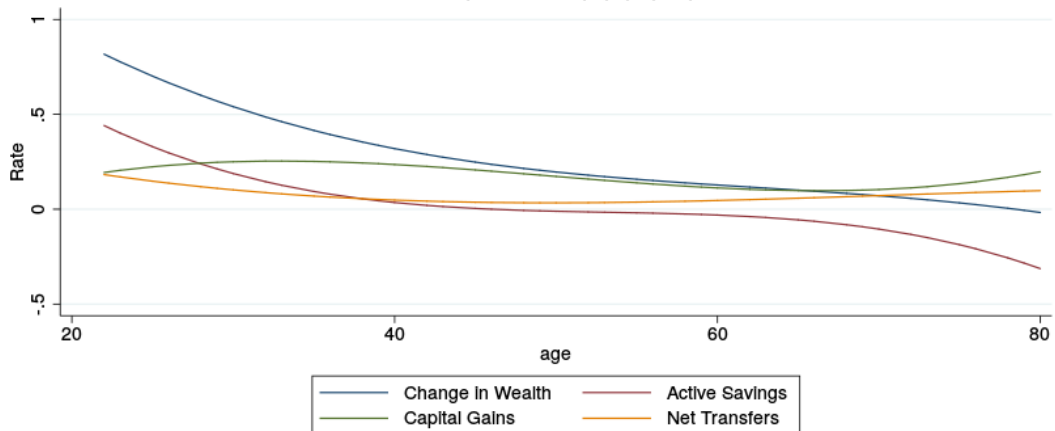




Figure 17. Wealth Flows Divided by Wealth Plus Income  
Top 10% of Permanent Income

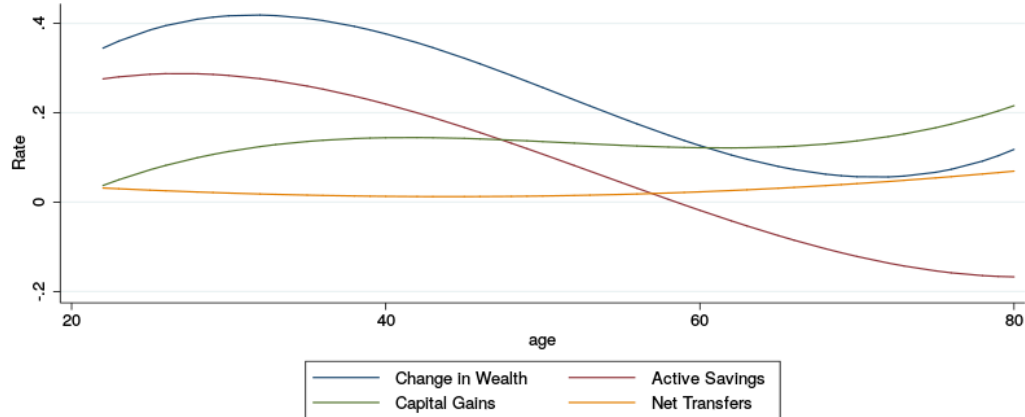


Figure 18. Wealth Flows Divided by Wealth Plus Income  
40th to 90th Percentiles of Permanent Income

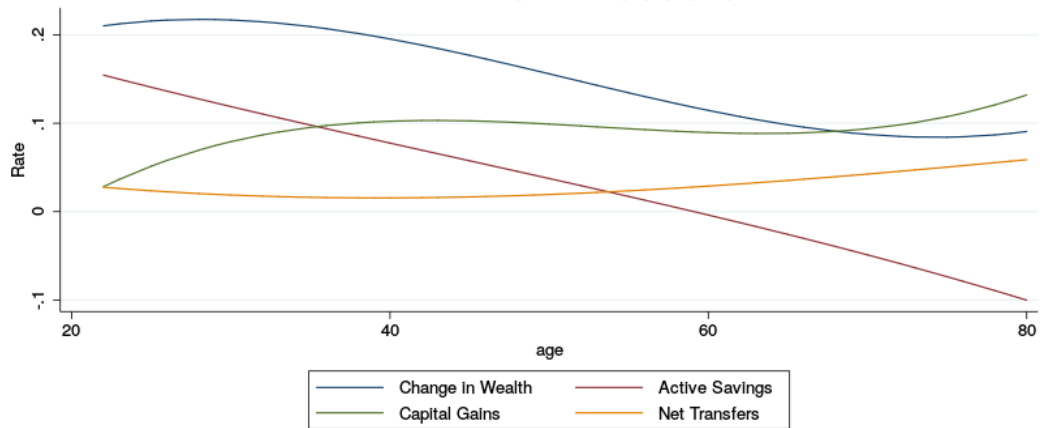


Figure 19. Wealth Flows Divided by Wealth Plus Income  
Bottom 50% of Permanent Income

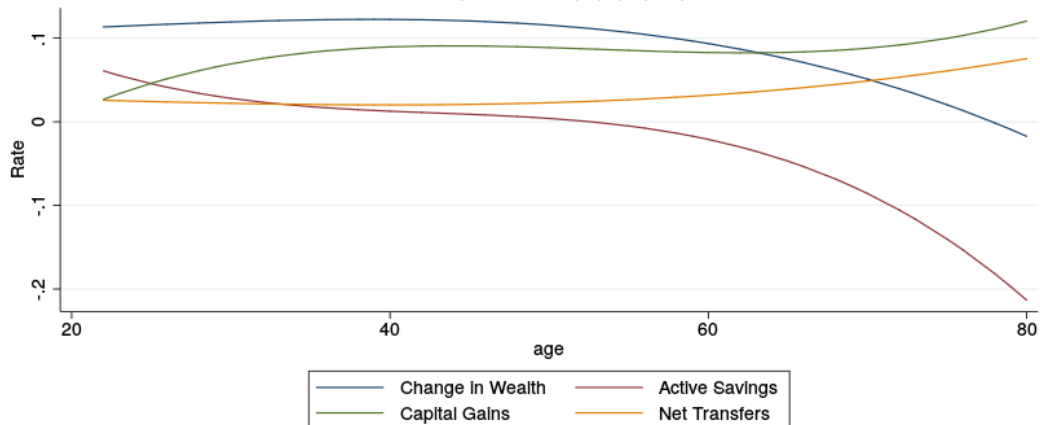


Figure 20. Wealth Flows Divided by Income  
4-year College Degree

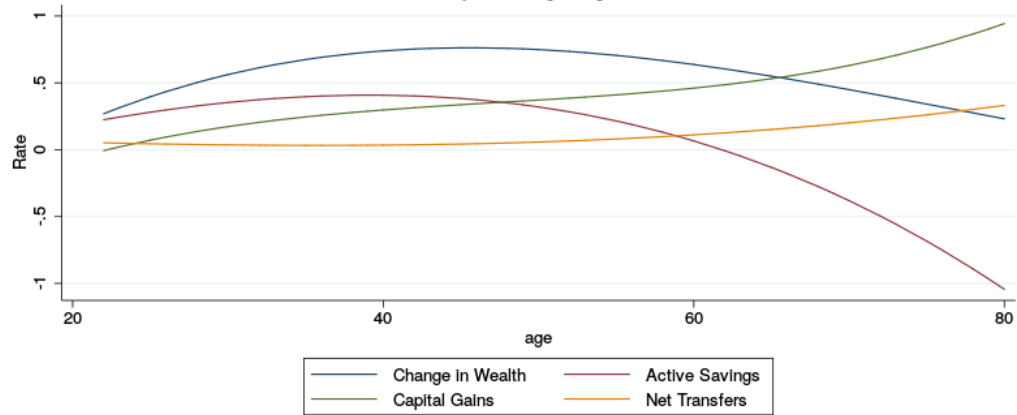


Figure 21. Wealth Flows Divided by Income  
Some College or 2-year College Degree

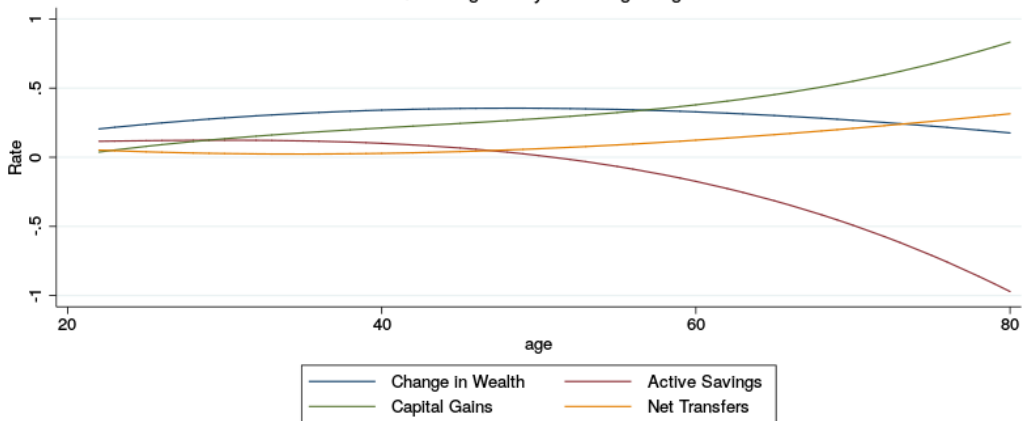


Figure 22. Wealth Flows Divided by Income  
High School or Less

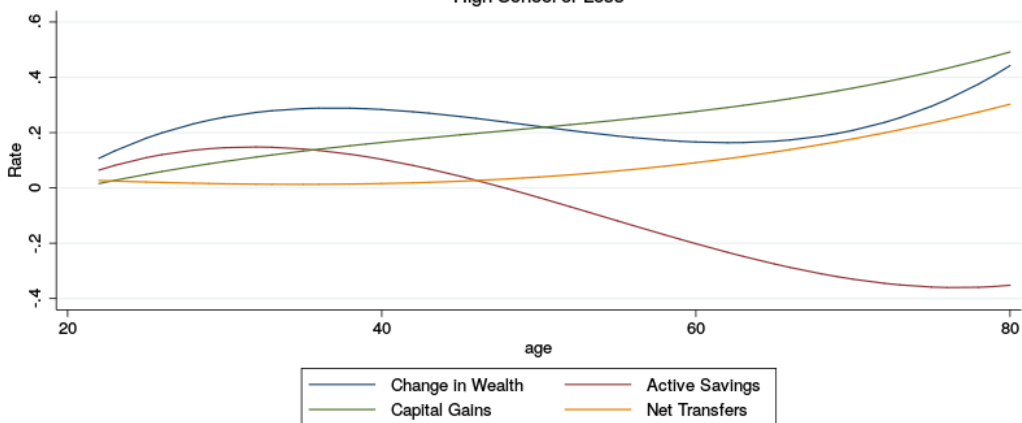


Figure 23. Wealth Flows Divided by Wealth  
4-year College Degree

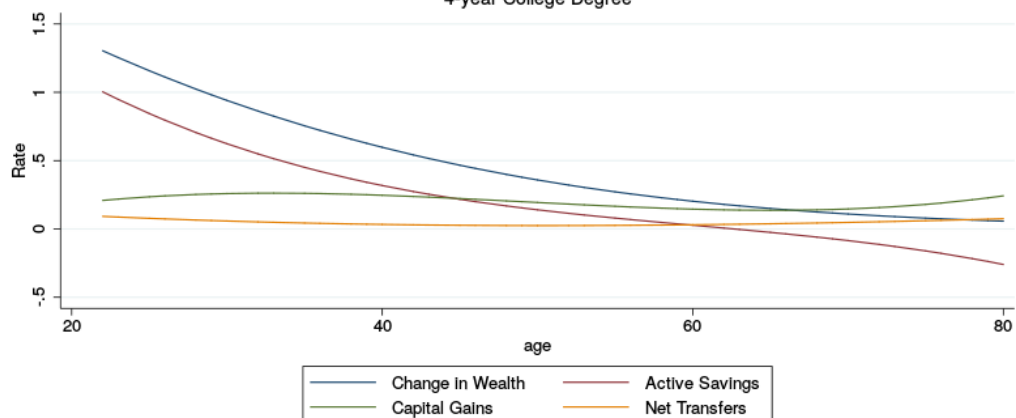


Figure 24. Wealth Flows Divided by Wealth  
Some College or 2-year College Degree

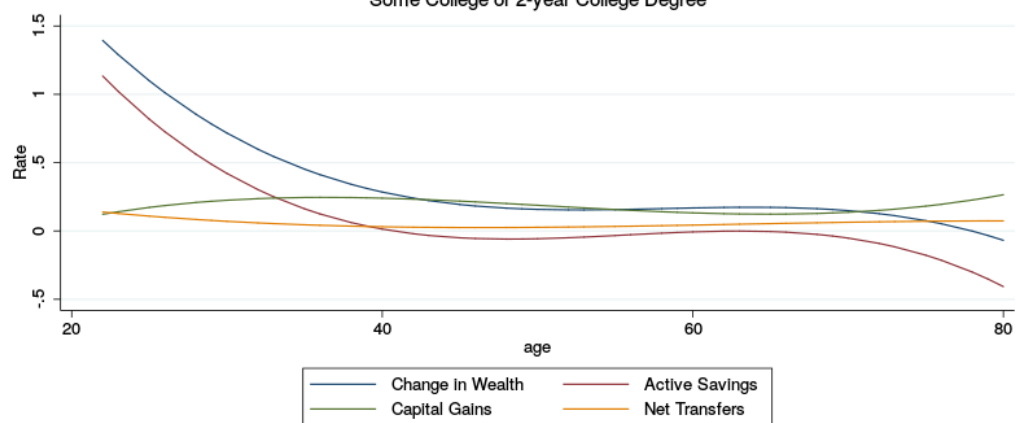


Figure 25. Wealth Flows Divided by Wealth  
High School or Less

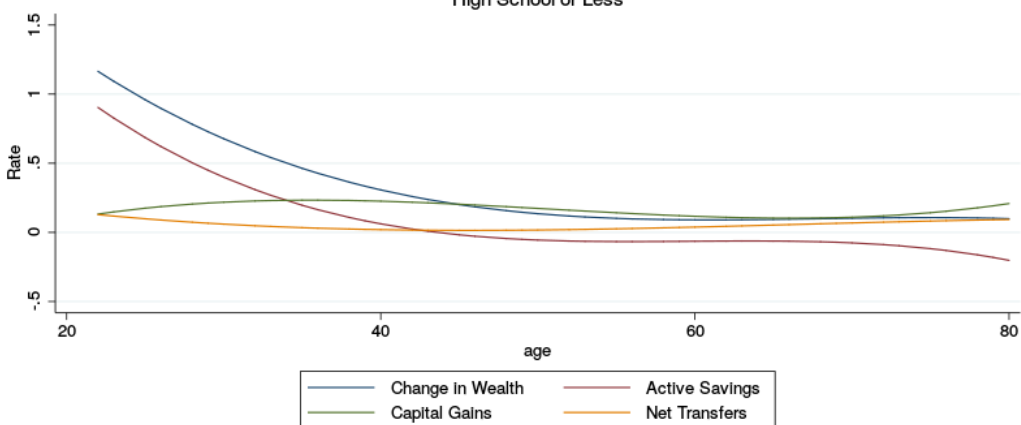


Figure 26. Wealth Flows Divided by Wealth Plus Income  
4-year College Degree

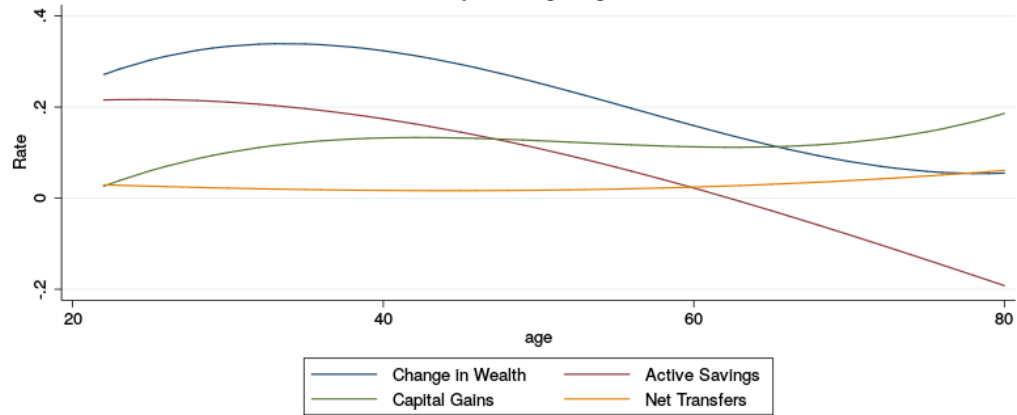


Figure 27. Wealth Flows Divided by Wealth Plus Income  
Some College or 2-year College Degree

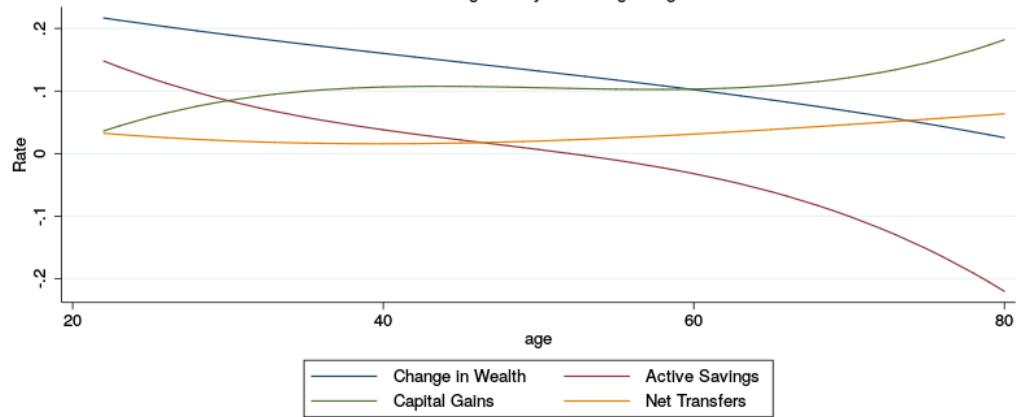
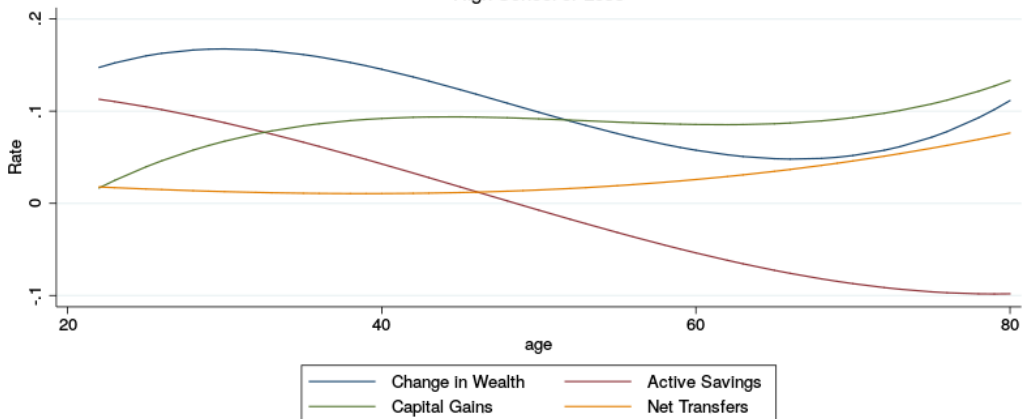


Figure 28. Wealth Flows Divided by Wealth Plus Income  
High School or Less



## 7. Conclusions

This paper presents the first set of results from a new approach to disaggregating the change in wealth over the lifecycle for U.S. households. The approach is a pseudo-panel methodology, in which series of cross-section snapshots are used in conjunction with aggregate time-series to measure the contributions of active saving, capital gains, and interfamily transfers to overall wealth change by age and for various agent types. The estimates presented here are largely consistent with the lessons from individual level panel data in the northern European “registry” countries where such data exists. In particular, the disaggregation here emphasizes the role of capital gains in accounting for wealth change over most of the life cycle, with active savings playing a large positive role early in life, and a substantial negative role later.

The specific estimates presented here are based on one particular way to construct the pseudo-panel, fitting functional representations to measured changes for overlapping ten-year birth cohorts. However, the method can (and will be) generalized to more flexible specifications, such as kernel-smoothed profiles. In addition, the lifecycle estimates here are for the entire period spanned by our data (1995 through 2016) but the pseudo-panels can be estimated for each of the seven three-year sub-periods within that overall span as well. In that sense, the pseudo-panel approach can be used to disaggregate wealth change (and consumption and saving) over the lifecycle and business cycle frequencies for the various agent types.

In addition to refining and extending the pseudo-panel methodology, the steps required to synthesize the micro and macro data focus attention on conceptual aspects of lifecycle decision-making and measuring economic well-being that will guide this project going forward. The narrow focus on marketable wealth and the corresponding treatment of various income sources suggests that any distributional analysis based on those concepts will be missing the impact of important policies at lifecycle frequencies.<sup>33</sup> There is a direct connection between these sorts of measurement issues and saving rates: low and middle-income families do most of their lifecycle saving through social insurance, so measuring the change in net present value of social insurance on an accrual basis could fundamentally change inferences about overall saving behavior.<sup>34</sup>

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<sup>33</sup> The current state of market-based distributional analysis is well captured in the DINA approach of Piketty et al. (2018). Their cross-section estimates show that economic well-being for the young and middle-income families who are facing higher social insurance taxes is decreasing over time, while economic well-being for the older cohorts is rising. That divergence would not be observed in a comprehensive lifecycle measure.

<sup>34</sup> Devlin-Foltz, Henriques, and Sabelhaus (2016) show that counting future Social Security benefits in household wealth has a first-order equalizing impact on the distribution of retirement resources.

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## **Online Appendix 1. Reconciling Aggregate and Survey-Based Saving and Wealth Measures**

This appendix is under construction. Coming soon!

### *Overview*

{Explain what appendix will do}

### *NIPA Concepts and Adjustments*

{List and describe}

### *FA Concepts and Adjustments*

{List and describe}

### *SCF Concepts and Adjustments*

{List and describe}

### *Trends in Reconciled Aggregates*

{Show results and describe}

## Online Appendix 2. Modeling Interfamily Transfers in the Survey of Consumer Finances

### Overview

This appendix provides details about the data and methods used to estimate interfamily transfers. The goal is to quantify two different types of transfers (bequests/inheritances versus *inter vivos* transfers) from two different perspectives (who is receiving the transfer versus who is making the transfer). This two-by-two view of interfamily transfers makes it possible to check the internal consistency of the estimated flows, and to identify the demographic and economic characteristics of families making and receiving transfers. The primary data source is the triennial Survey of Consumer Finances (SCF) for the eight waves conducted between 1995 and 2016.<sup>35</sup> We also use published estate tax data from IRS, cohort mortality rates from the Social Security Administration (SSA) and estimates of demographic mortality differentials from the Congressional Budget Office (CBO). The overall strategy is summarized in the table below:

SCF Interfamily Transfers Estimation Strategy		
	Bequests/Inheritances	<i>Inter vivos</i> Gifts and Support
<b>Transfers Received</b>	<ul style="list-style-type: none"><li>• Reported inheritances received during previous three years from inheritance and gift module</li><li>• Reported inheritance income in previous year from income module “other income” question code 12</li><li>• Supplemented with incremental information about real estate and business assets received in previous three years as inheritance or gifts (i.e. not purchased)</li></ul>	<ul style="list-style-type: none"><li>• Reported alimony and child support received in previous year from income module support question</li><li>• Reported other forms of support and gifts received in previous year from income module “other income” question codes 14, 28</li><li>• Reported gifts received during previous three years from inheritance and gift module</li></ul>
<b>Transfers Made</b>	<ul style="list-style-type: none"><li>• Estimated using survey year wealth holdings multiplied by demographically-adjusted (i.e. differential) three-year cumulative mortality rates</li><li>• Bequests assigned to surviving spouse if present otherwise divided equally by number of children</li></ul>	<ul style="list-style-type: none"><li>• Reported alimony and child support paid in previous year from income module follow-up</li><li>• Reported other support paid and substantial gifts made in previous year from income module follow-up</li></ul>

The summary table above reveals a number of important aspects of the estimation strategy, each covered in more detail in the subsequent sections. A few preliminary observations are worth noting:

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<sup>35</sup> For an introduction to the SCF and overview of 2016 results, see Jesse Bricker, Lisa J. Dettling, Alice Henriques, Joanne W. Hsu, Lindsay Jacobs, Kevin B. Moore, Sarah Pack, John Sabelhaus, Jeffrey Thompson, and Richard A. Windle. 2017. “Changes in U.S. Family Finances from 2013 to 2016: Evidence from the Survey of Consumer Finances,” *Federal Reserve Bulletin*, 103(3). Available at [www.federalreserve.gov/publications/files/scf17.pdf](http://www.federalreserve.gov/publications/files/scf17.pdf).

- The SCF directly measures three of the four cells in the two-by-two matrix, but the fourth (bequests made at death) has to be estimated because of the inherent difficulties with interviewing the deceased (or the representatives of their estates). The SCF concept of inheritances received does not include spousal transfers, so we distinguish bequests made at death by single people from those of married couples.
- There are key timing differences in the period over which various flows are measured. Inheritances and large gifts received can in principle be measured over a respondent's lifetime, because the questions are worded to cover inheritances and gifts *ever* received. In practice we use a three year look-back period for most of our inheritance and gift analysis, in order to span the time periods between surveys. However, most of the other flows in the two-by-two matrix are for the "previous" year (meaning survey year -1) the timing of which coincides with the SCF core income module questions.
- Various flows are intermingled and captured in different parts of the survey, and there is some redundancy that serves as back up for capturing potentially missed transfers. For example, *inter vivos* transfers received are captured in the inheritance module (if the respondent reports the amount as a substantial gift) and/or in the income module (as regular alimony or child support income or as a component of "other" income). Also, in the real estate and business modules, respondents are asked whether they purchased the asset or received it as a gift or inheritance. In principle, those transfers should be captured in the inheritance module as well, but in some cases there is incremental information in the asset section because the transfer is not captured in the inheritance module.
- Alimony and child support paid and received are both asked about separately in the SCF, so in principle the *inter vivos* column be separated between child support/alimony and other forms of *inter vivos* transfers. However, there is potential overlap with other forms of regular support that are captured using the SCF "other" income variable or the income module follow-up about support provided and "substantial" gifts to others.
- The only substantial conceptual gap between transfers made and received is in the *inter vivos* category. Reported "other support paid" and "substantial gifts made" is an order of magnitude larger than the corresponding reported *inter vivos* receipts, where measured receipts include lifetime substantial gifts received in the inheritance and gift module plus the amount of other support during the past year in the income module. The key to reconciling this divergence is the failure of the survey to capture support received. For example, college students and their parents may view those "transfers" differently.

The remainder of this appendix provides details about how estimated bequests are measured, how the SSA baseline mortality rates and the CBO differential mortality model were applied to the SCF cross-sections, how the relevant SCF modules were used to construct our estimated transfer flows, and the specific wording of SCF questions.

### *Estimating Bequests Made at Death*

Bequests made at death from the giver's perspective are not captured in the SCF survey, so we estimate bequests using SCF wealth holdings, cohort mortality rates from the Social Security

Administration (SSA), and mortality differentials estimated by the Congressional Budget Office (CBO) for their long-term microsimulation (CBOLT) model. The bequest estimates are generated in a way that conceptually matches what is being observed on the inheritance side, which makes it possible to check the internal consistency of transfers at death from the perspective of transfers made and received. In particular, one can look at the number of transfers and dollars transferred by size of bequest made and inheritance received to see if they line up.

The most important conceptual adjustment involves who makes bequests. The SCF “inheritances received” module instructs respondents to explicitly rule out transfers received from a deceased spouse, so we differentiate between bequests of single people and those of married couples. This distinction is also consistent with the IRS estate tax data we use to adjust bequests, because most non-taxable estates claim the one-time spouse deduction, and thus we use only the data from taxable estates to estimate deductions (more below). In short, bequests are only (probabilistically) generated if a single person dies or both members of the couple die in the same three-year period. Otherwise, in a married couple, the bequest if one member dies (meaning half of the family’s net worth) is designated to be a transfer to the surviving spouse. The fraction of estimated transfers at death going to spouses is generally about 10 to 25 percent higher than the estimated amount going to bequests in every three-year time period. That is, just under half of wealth-weighted deaths generate bequests, and the rest generate spousal transfers.

### *Adjusted Bequests*

The starting point for estimating the level of bequests made is SCF net worth. The concept of wealth we use to estimate bequests begins with the SCF “Bulletin” net worth measure, which does not count non-transferable wealth such as the present value of defined-benefit pensions.<sup>36</sup> In addition to directly transferable assets, we also add the face value of life insurance to the potential estate.

There are three adjustments that drive a wedge between potential bequests made and inheritances received, particularly for wealthy decedents. All estates face some basic costs, such as funerals and expenses associated with distributing real assets. In addition, high end estates often make large charitable contributions, pay very high fees for executors and lawyers, and pay estate taxes. We use data on funeral expenses and other costs to adjust expected bequests for the vast majority of SCF cases, and we use data from the IRS Statistics of Income (SOI) to more carefully adjust predicted bequests for high end estates.

The definition of high end estates for our purposes is largely driven by estate tax rules and the associated data published by SOI.<sup>37</sup> Estate tax rules have varied over time, but the data are published in a consistent way back to 1995. In 2016, for example, the estate tax filing threshold was \$5 million, having risen from \$600,000 in 2003 and earlier. According to SOI, there were about 12,000 estates that filed in 2016, but of those, only about 5,000 were taxable. Much of the gap between taxable and non-taxable estate counts is accounted for by spousal deductions,

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<sup>36</sup> The “Bulletin” net worth concept is so named because that definition is the one published as the top line wealth number in the triennial SCF publications in the *Federal Reserve Bulletin*. The SCF *Bulletin* concepts are defined in the SAS macro available at [www.federalreserve.gov/econres/files/bulletin.macro.txt](http://www.federalreserve.gov/econres/files/bulletin.macro.txt).

<sup>37</sup> Available at <https://www.irs.gov/statistics/soi-tax-stats-estate-tax-statistics>.

because estates where one member of the couple dies generally choose to pay no tax by using the spousal deduction. In that sense, the SOI taxable estates data is closest to our estimates, because we only generate expected bequests for single people and married couples that both die in the same year. The 5,000 taxable estates above \$5 million accounted for something like \$108 billion in wealth transfers, but of that, \$23 billion was spousal transfers (some couples choose to pay some of the tax when only one member of the couple dies, to avoid the progressive rate structure) so the relevant benchmark for gross estates above \$5 million in 2016 is something like \$85 billion. Our corresponding estimate of gross estates in the SCF is a bit higher, but that is somewhat expected, because assets (especially business holdings with no observable market price) are generally valued below market for estate tax purposes.

We use published SOI estate tax data to generate four adjustments applied to SCF predicted bequests above the filing threshold in each year. The published SOI data has gross estate size classes that vary by year. For example, in 2016 there are five size classes ranging from less than \$5 million to \$50 million or more. In the earlier years there are as many as eight size classes, ranging from less than \$1 million to \$20 million or more. For each gross estate size class in each year, we compute (1) the fraction of estates that claim a charitable deduction, (2) the charitable deduction as a percent of gross estates for those that claim the charitable deduction, (3) the ratio of legal, funeral, and other administrative costs to gross estate, and (4) the ratio of estate tax liability to taxable estate (the effective tax rate).

The four adjustments are then applied to our SCF predicted bequests. We first compute the SCF gross estate, which involves adding debts back to net worth (debts are a deduction in the published SOI tables). We then use the computed ratios for the given gross estate size class to subtract charitable contributions by probabilistically assigning a deduction using the fraction claiming, and the amount of the deduction using the ratio of charitable deductions to gross estates for those estates assigned a charitable deduction. Next, we subtract the funeral, legal, and other expenses as a fraction of gross estates. Then, we subtract the (known) SCF debts, solving for the taxable estate. At that point we apply the effective tax rate for the given gross estate size class, solving for estate tax liability. The net bequest to be distributed is then SCF net worth minus charitable deductions, legal and other costs, and estate tax liability. Finally, we divide the bequest by the number of children in order to generate an expected inheritance distribution.

For estates below the range covered by estate taxes—an increasing fraction because of rising estate tax thresholds—we make two simple adjustments when solving for bequests. The first is to assume \$10,000 (2016 dollars) in funeral/burial costs (based on data from the National Funeral Directors' Association). The second is to assume the greater of \$10,000 or 5 percent of gross estate for administrative costs, legal fees, realtor fees, and other deductions. The 5 percent number comes from inspecting the bottom of the estate tax range, where (for example) legal and administrative fees dominate charitable deductions as a fraction of gross estates.

## Differential Mortality Adjustment

Demographic information about individuals is also used to compute the estimates of wealth that is (probabilistically) bequeathed, through a differential mortality adjustment. The mortality rates applied to SCF wealth holdings begin with SSA published cohort death rates by age and sex.<sup>38</sup> The published rates are measures of cohort death rates for given years (which we convert to cohort/age combinations) and we convert those to three year dates rates by first computing three year conditional survival rates then subtracting those from one.

However, there is a well-known problem with using average cohort/sex death rates by age generally referred to as “differential” mortality, meaning socio-economic status is negatively correlated with mortality. Failure to adjust for differential mortality would, in particular, generate too much in the way of estimated bequests at any point in time.<sup>39</sup>

Congressional Budget Office (CBOLT) Mortality Differentials						
Control Variable	Male			Female		
	35-49	50-64	65-75	30-49	50-64	65-75
Income quintile 5	0.40	0.73	0.90	0.49	0.71	0.81
Income quintile 4	0.54	0.82	0.96	0.75	0.76	0.96
Income quintile 3	0.83	0.79	0.99	0.79	0.92	0.99
Income quintile 2	1.16	1.07	1.05	1.04	1.09	1.09
Income quintile 1	2.07	1.60	1.10	1.96	1.53	1.15
Less than high school	1.56	1.36	1.23	1.61	1.48	1.26
High school graduate	1.11	1.05	0.98	1.12	0.89	0.91
Some College	0.97	0.89	0.90	0.78	0.82	0.81
College graduate	0.55	0.64	0.62	0.58	0.64	0.68
Never Married	1.95	1.66	1.42	1.92	1.60	1.16
Married	0.72	0.85	0.90	0.75	0.81	0.83
Separated/Divorced	1.56	1.46	1.53	1.35	1.32	1.26
Widowed	1.53	1.93	1.26	1.53	1.44	1.16
White	0.90	0.95	0.98	0.93	0.93	0.96
Black	1.74	1.58	1.35	1.53	1.58	1.42
Other race	1.13	0.79	0.76	0.89	1.01	0.88
Hispanic	0.98	0.93	0.93	0.92	0.99	1.07

<sup>38</sup> The SSA data used is available at [www.ssa.gov/OACT/HistEst/Death/2017/DeathProbabilities2017.html](http://www.ssa.gov/OACT/HistEst/Death/2017/DeathProbabilities2017.html). The Stata code for computing three year death rates is available from the authors upon request.

<sup>39</sup> One other way to benchmark our estimates would be to compare the probabilistic bequests to actual bequests in estate tax data. However, substantial changes in estate taxes in the US in the time period we are considering has made it so very little of actual bequests will show up above the reporting threshold in recent years. In addition, differences in the valuation of various types of assets—especially closely-held businesses which are difficult to value—also makes a direct comparison with estate tax data problematic.

We adjust estimated bequests for mortality differentials using an approach developed by CBO for use in their long-term micro simulation model (CBOLT).<sup>40</sup> The table above shows CBO's estimates of mortality odds ratios by age, sex, and four sets of demographic characteristics. A value of one in the table means that the specific demographic group has the same mortality as the average for the given age/sex group. Higher income, higher education, married, and white groups all have lower mortality than average. Importantly, all of the socio-economic variables found by CBO to be correlated with mortality differentials—income, education, marital status, and race—are also available in the SCF micro data as well.<sup>41</sup>

A complication with simply implementing the mortality differentials is that CBO reports the odds-ratios independently across the four sets of socio-economic variables, so the four adjustments cannot be applied sequentially without adjusting for the fact that (for example) lower educated individuals also tend to be in lower income groups. In addition, since we use a different dataset from that which the CBO used for estimation, we cannot exactly match the odds ratios in the table above due to the variation in population weights within each category. We address this problem by first imposing that an individual's mortality odds ratio is the linear sum of coefficients applied to dummies for each variable in the table above, and by making the following three assumptions: 1) The relative mortality odds ratios for income quintiles must match the table exactly, 2) within every other broad category—that is, education, marital status, and race—the *difference* between the mortality odds ratios must be maintained (i.e. for a male in the 34-49 age bracket, the difference in the mortality differential between a college graduate and a person who did not complete college, all else equal, should be 1.01, or 1.56-0.55), and 3) the population-weighted sums of the coefficients within the non-income categories should equal zero. We estimate these coefficients separately for each age bracket, sex, and year.<sup>42</sup>

The next step is to normalize these odds ratios such that the weighted average of *relative* mortality rates across the socio-economic groups have to sum to the overall cohort mortality rate (the SSA value) for any given age and sex group. We do this by scaling the odds ratios in each age, sex, and year group by a factor such that the average differential mortality equals the reported mortality rates reported by the SSA. In practice, this procedure produces univariate odds ratios quite similar to those in the CBO analysis, as shown in the table below.

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<sup>40</sup> The CBO differential mortality model is described in Working Paper 2007-11, August 2007, available at <https://www.cbo.gov/publication/19096>.

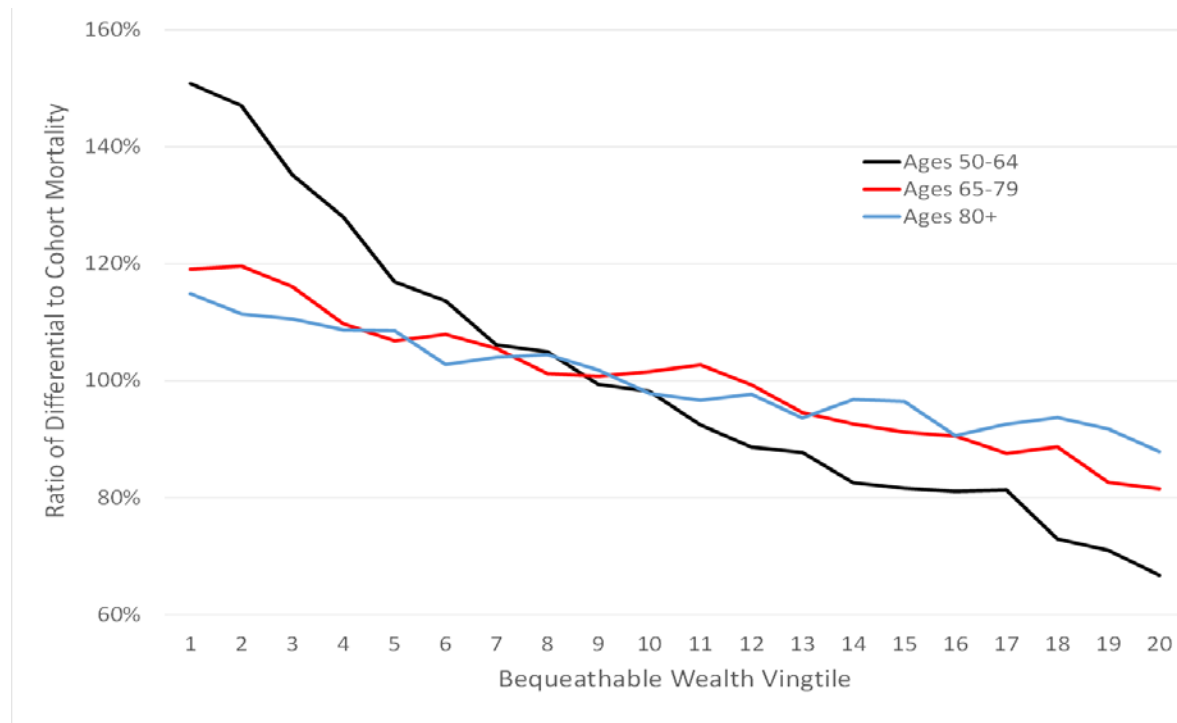
<sup>41</sup> The only notable difference between socio-economic measures is in the construction of the income variable. CBO's estimates are based on SSA earnings and death records linked to various Survey of Income and Program Participation (SIPP) data files. The income quintile variables used by CBO are based (appropriately) on earnings over the lifecycle, not the SIPP current year earnings, in order to identify the "permanent" income that should in principle be what drives differences in mortality. To best match that, the SCF income concept used is the "usual" income variable collected in the survey, after the previous year income has been measured. Basically, respondents are asked if the income in the previous year is what they usually received, and if not, what that usual value is. For a further discussion of the usual income concept, see Box 4 in the latest (2017) *Federal Reserve Bulletin* article about the SCF, cited above. Finally, the concept of income in both the CBO estimates and the SCF are per-capita, meaning married couple incomes are divided by two before the quintile classification is assigned.

<sup>42</sup> The Stata code for computing the differentials is available upon request. One pitfall of this linear estimation is that it does not constrain the resulting odds ratios for any particular person to be above zero. In practice, therefore, there are a few observations that fall in very low mortality types within the categories that have small negative values. We set these odds ratios equal to zero.

Simulated Mortality Ratios, Pooled over SCF years

Control Variable	Males			Females		
	35-49	50-64	65-75	30-49	50-64	65-75
Income quintile 5	0.43	0.71	0.80	0.53	0.68	0.72
Income quintile 4	0.56	0.79	0.87	0.76	0.72	0.89
Income quintile 3	0.84	0.78	0.98	0.78	0.91	0.98
Income quintile 2	1.17	1.07	1.10	1.02	1.09	1.15
Income quintile 1	1.98	1.64	1.24	1.90	1.58	1.26
Less than high school	1.58	1.46	1.42	1.71	1.63	1.46
High school graduate	1.17	1.14	1.06	1.24	1.04	0.98
Some College	1.05	0.96	0.90	0.87	0.94	0.79
College graduate	0.63	0.72	0.67	0.70	0.74	0.74
Never Married	1.81	1.57	1.33	1.71	1.48	1.20
Married	0.73	0.84	0.85	0.73	0.80	0.63
Separated/Divorced	1.62	1.41	1.18	1.39	1.27	0.90
Widowed	1.97	2.12	1.73	1.85	1.62	1.53
White	0.90	0.96	1.00	0.93	0.93	0.99
Black	1.70	1.54	1.15	1.47	1.54	1.24
Other race	1.05	0.74	0.70	0.85	0.90	0.64
Hispanic	0.90	0.88	0.82	0.92	0.96	0.94

As expected, implementing differential mortality introduces a negative correlation between mortality and wealth, because of the positive correlation between the socioeconomic variables and wealth. The chart below shows that the relationship between unadjusted and differential





mortality rates varies by wealth within three age groups. The higher ratios for lower wealth groups shows (for example) that individuals ages 50 to 64 at the bottom of the wealth distribution are almost twice as likely to die as those at the top of the distribution (relative differentials of 140 percent versus 70 percent). The gap shrinks with age (consistent with the underlying differential mortality inputs from CBO) but even among those 80 and older the mortality gap is around 50 percent.

The gross effect on expected bequests when shifting from unadjusted to differential mortality is about 20 percent, and consistent across the survey waves. Said differently, failure to adjust for differential mortality would lead us to *over predict* total wealth transfers made at death by about 20 percent. Having said that, much of that differential disappears when we look at net bequests *between* households, because more than half of death-related transfers in a given year go to spouses, and especially at younger ages where mortality differentials are most pronounced.

### *Measuring Inheritances and Substantial Gifts Received*

The starting point for capturing inheritances and substantial gifts received is the inheritance module that comes near the end of the SCF survey.<sup>43</sup> There is also (in some cases) supplemental information in the survey modules on real estate and owned businesses which both come in the early parts of the survey. In the real estate and business modules, respondents are asked how they obtained ownership of the asset, as part of the standard question battery, with “received as a gift or inheritance” as one of the options. In some cases those transfers are not captured again (as they should be) in the inheritance section. In addition, the question about “other” income in the SCF income module allows respondents to report an inheritance (cash or other financial assets only) received in the year preceding the survey year (to coincide with the timing of all other forms of income in the income module). Our comprehensive estimates of inheritances and substantial gifts received rely on information from all three parts of the survey.

### *SCF Primary Inheritance and Gifts Received Module*

The inheritances module has retrospective questions on lifetime transfers received, with up to three occurrences for which details are collected, and a “mop-up” question to capture all other transfers received. Respondents are asked to report any inheritances or “substantial assets in a trust or other form” that they “ever received.” The data collected on the first three inheritances includes type of transfer, value of transfer, year received, and from whom. Note that there is no inquiry about what specific asset(s) were transferred, meaning distinctions like real estate versus stocks and bonds or cash.

The type of transfer variable is key for our allocation between inheritances and *inter vivos* gifts received. The type variable includes inheritances, trusts, and transfer/gift. In our analysis, the transfer/gift types are allocated to *inter vivos*, and the other types are inheritances received. The

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<sup>43</sup> The specific question wording used for all of the key variables described here is listed in section 5 below, along with the relevant possible answers (the “code frame”) when the answers are not dollar amounts or years. The question wording for the variables here has not evolved in the period we are using. The question wording and other key survey information for any SCF wave can be accessed at <https://www.federalreserve.gov/econres/scfindex.htm>.

other key variable in the inheritance module for our analysis is the year in which the transfer as received.

As noted, the SCF captures details (including type and year received) for the three largest inheritances or gifts ever received (beginning with the largest). The mop-up covers all remaining inheritances and gifts, and these are not negligible. For example, in the 2016 survey, the aggregate values for the first three lifetime inheritances received were \$4.2t, \$704b, and \$159b, respectively. The value of the mop-up inheritances or gifts ever received is \$272b, which is about 5 percent of the first three. The mop up is currently not included in our bequests received measures, because there is no obvious way to impute type or year received, but the fact that most of the measures we are working with only include inheritances and gifts received in the past three years suggests this is likely not a substantial omission.

### *SCF Real Estate and Business Modules*

The biggest adjustments we make to the inheritances received estimates come from the real estate and owned business modules of the SCF, which appear near the beginning of the survey. For every type of real estate and business asset, there are questions about when and “how” the asset was obtained. In the case of real estate, the respondent is prompted by questions about what the asset was worth when it was obtained, and that cues a question for the interviewer to record the asset as having been purchased or received as a gift/inheritance. There is no distinction between gifts versus inheritances at the level of individual assets—they are lumped together as gift/inheritance. In the case of owned businesses, respondents are asked about sources of funds for investment in the business, with “inheritance” and “given” included in the code frame along with answers like “borrowed” and “used own funds.”

For both the real estate and business transfers, there should be a connection to the questions about inheritances and gifts received in the inheritance module (described above). In particular, if the respondent reports receiving a real property transfer in a given year, SCF protocol intends that there will be a corresponding inheritance or gift recorded for that year, though the specific asset may be a component of a larger reported inheritance that bundles multiple assets. Thus, the relationship is asymmetric, because a given inheritance may include both the real property being captured and other assets transferred at the same time. That is, reported inheritances should be at least as large as the real property received in a given inheritance year.

SCF cases undergo a rigorous review or “editing” process that captures and corrects many of these inconsistencies, but some do slip through, particularly in earlier waves when the editing software was less effective at capturing situations where (say) a respondent reported a house or business being received through inheritance but then failed to include that inheritance when they entered the inheritance module. Or, in some cases (and this is where timing within the survey matters) respondents may feel as though they are being asked a second time about the same event, even though the survey is trying to capture other details about that event, and (admittedly in some cases because they have been through a long and grueling interview already) are reluctant to answer the inheritance questions. This leads to situations where the sum of inheritances or gifts the respondent reports having received as real estate or businesses in a given year exceeds the total amount of reported inheritances and gifts in that year. In these cases, we

take on the incremental information from the real estate and business questions by marking the excess amounts as inheritances.

### *SCF Income Module*

In addition to the adjustments for real asset transfers captured in the asset modules but missing from the inheritance module, there is a second type of potential inconsistency for “unaccounted” inheritances when the respondent reports income from an inheritance in the income section but fails to include that in the inheritance module.

Inheritances of non-property (financial assets and cash) are included in the SCF income concept if received in the year prior to the survey, which is the same time frame for measuring the other income flows (and, we will see, most *inter vivos* transfers). The income section actually occurs before the inheritance section, so most often the inconsistencies arise because respondents do not include the financial asset inheritances and gifts as part of income, but then they report the prior year inheritance in the inheritance module. Thus, most of the case review/editing that occurs for this inconsistency goes the other way, meaning the reported inheritance is added to other components of income in SCF post-production.

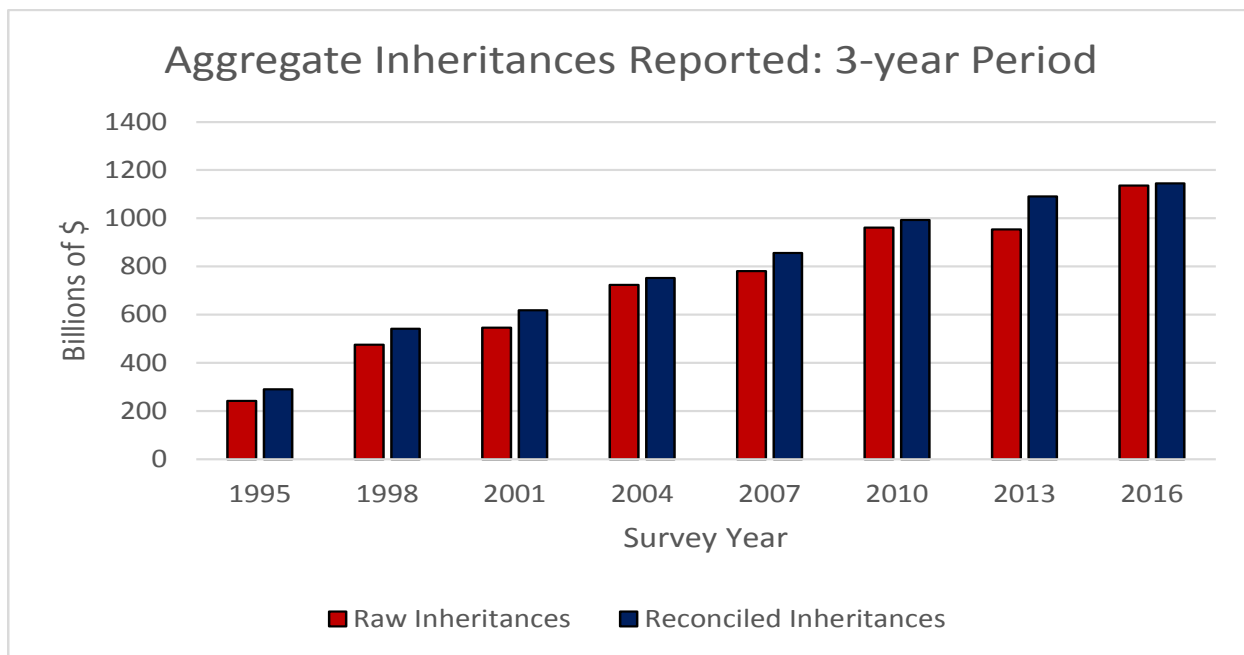
However, there are cases that go in the other direction, where the income from an inheritance is reported in the income section but not in the inheritance section. As with real asset inconsistencies, we add those flows to the reported inheritances.

### *Reconciled Inheritances and Gifts Received*

In practice, the primary inheritance questions do a good job of capturing all inheritances and gifts, and the adjustments we made for incremental information from the assets and income modules add relatively little to the total inheritance estimates. This observation in large part reflects the key SCF processing decision during case review: inconsistencies between the real estate/business and inheritance sections are flagged before the case is subject to review, and the inconsistencies are largely edited out before the final micro data is released to the public. The editing relies on interviewer notes as well as the underlying data itself.<sup>44</sup> The figure below shows the 3-year aggregates of both the “raw inheritance” aggregates—i.e. those estimated from the primary inheritance and gifts questions alone—and the “reconciled inheritances”, which are those that use the incremental information from the asset price questions. We use the “reconciled inheritances” for all of the estimates shown below.

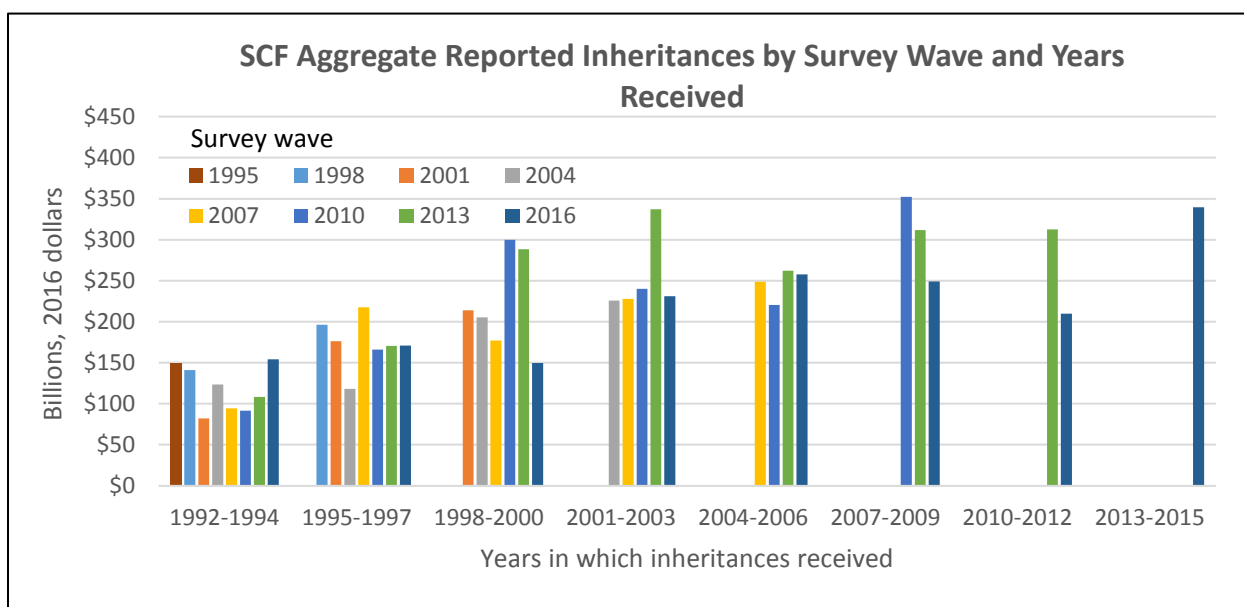
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<sup>44</sup> The inheritance module comes near the end of a long survey, and many respondents are rather exhausted. They may answer, for example, “I already told you about the inherited real estate.” The interviewer can make that note, keep the interview moving, and SCF staff then uses the information from the earlier module to fill in the missing inheritance.



#### *“Look Back” Period for Measuring Inheritances and Substantial Gifts Received*

Our top-line estimates for inheritances and substantial gifts received are based on a three-year look-back period, though for some questions we do rely on lifetime transfers ever received. Because the SCF inheritance module is retrospective over the respondent’s lifetime, we are able to compare the aggregate amount of inheritances received in a given observation period across survey waves to look for signs of reporting anomalies. In the chart below, we compare the amounts reported to have been received in all of the three-year periods covered by the survey waves that we use in this analysis:



There are two reasons why inheritances reported for a given three-year period may decline as we move further away from the observation period. First, some of the people who received an inheritance or substantial gift in a given observation period will have died before the next survey is conducted, so by definition their transfers received are not counted. Second, respondent recall about inheritances and gifts likely deteriorates with time. On the other hand, it is also possible that reported inheritances for a given time period will rise as we move further away from that time period, because of sampling variability and possibly because of improvements in how SCF cases are reviewed.<sup>45</sup>

The chart confirms that in general aggregate reported inheritances and gifts do tend to decline as we move further away from the period for which inheritances are being measured. The left-most bar in each observation period is the survey wave that occurs right at the end of the observation period (consistent with a three-year look back period), the next bar to the right is for the survey wave at  $t+3$  (looking back between  $t-4$  and  $t-6$ ), then  $t+6$ , etc. With a few exceptions, reported inheritances are at least as high in the waves closest to the three-year observation period as in other waves, and in a few cases (the period 2007-09 as captured in the 2010, 2013, and 2016 surveys, for example) there is a notable deterioration as we move further away from the adjacent three-year period. However, the observations are generally in the ballpark for all waves covering a given observation period, which suggests that recall and survivorship bias are probably not too large, which means that the part of our analysis based on lifetime recall is also robust.

### *Comparing Estimated Bequests Made and Reported Inheritances Received*

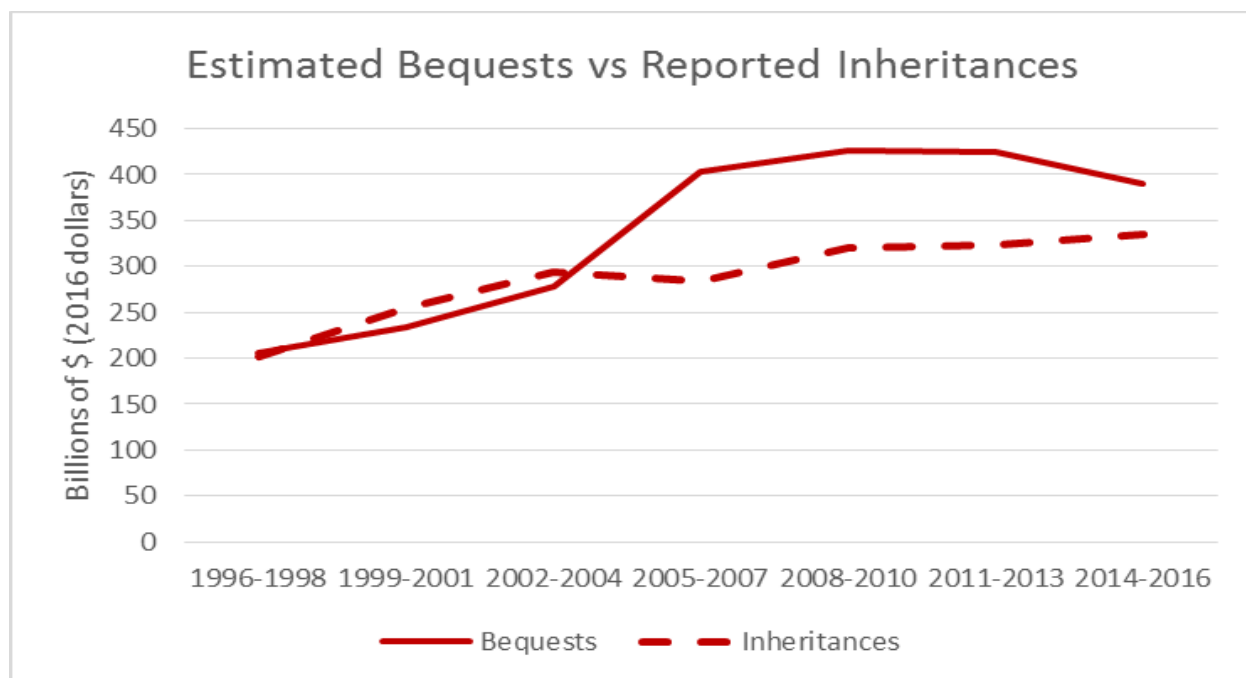
One goal of generating estimates of bequests made is to benchmark the reported values of inheritances received. The SCF is almost certainly the best micro data available for measuring inheritances received, because of the underlying sampling strategy (making sure high wealth households are included) and the substantial energy devoted to collecting inheritance information during the survey itself. However, there is still no way to know whether the inheritance amounts reported are reasonable; there are no administrative data against which to compare the estimates, except for the very high end where estates are subject to tax, and as noted above, even those comparisons are fraught with difficulty because of asset valuation considerations. In this section we compare reported inheritances against our estimates of bequests made using two tests. We look at the aggregate amounts given and received across three-year time periods, and the distribution of amounts bequeathed (adjusting for the number of likely recipients) and received within time periods. Both exercises are consistent in showing that the SCF does a very good job capturing inheritances received.

Summary statistics on bequests made and inheritances received for every three-year period between 1996 to 1998 and 2014 to 2016 are generated using the methods described above. Estimated bequests made are computed using the method described in section 2 (with a three-

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<sup>45</sup> As described above, SCF case review protocol calls for reconciliation of reported asset transfers (real estate and businesses) and the inheritance and gift module. Many respondents report having received property but then do not report that as an inheritance or gift, and the case is edited to correct for that discrepancy, a process that also often relies on interviewer case notes. All of this was done by hand in early waves of the SCF, and has become increasingly automated and more efficient in recent waves.

year cumulative mortality rate) applied to the SCF survey wealth at the beginning of the period. Reported inheritances received over the three year period are captured by the SCF survey conducted at the end of the period using a three-year look-back window. Both sets of estimates are annualized. The time series results are shown in the figure below:



Keeping in mind that the sources of these two series are independent from one another and many assumptions go into the bequest estimates, the similarity in levels and trends suggest that the aggregate inheritance flows are well captured in the SCF.

Given the focus of this research on explaining the concentration of wealth, it is even more important that we capture the distribution of inheritances received, and not just the aggregate totals. The univariate comparison of the two distributions requires one additional assumption on the bequest side. For any given estate, we need to know how many potential inheritances are generated when the individual dies. The SCF has data on the number of living children for each respondent, so we use that variable to divide the estate into equal size potential inheritances. If the number of children is zero, we leave the estate as one large bequest. Although the additional assumption adds yet another confounding factor to the bequest predictions, the counts and dollars transferred in each bequest/inheritance size class suggests that our approach is overall very effective, and (again) confirms that the SCF is doing a good job capturing inheritances received:

## Bequests and Inheritances by Size

	Percent of Total			
	Bequests		Inheritances	
	Count	Dollars	Count	Dollars
<50K	49	5	55	6
50K-299K	36	25	30	21
300K-599K	8	18	8	17
600K-1M	4	17	4	16
>1M	2	36	2	40
	(Thousands)	(Billions of \$)	(Thousands)	(Billions of \$)
Annualized Average	2,016	337	1,733	287

These data come from averaging the years 1995-2016 together, after having deflated nominal values into real 2016 dollars.

The overall counts and aggregates across the period 1995-2016 show that the generally close relationship between the dollar value of bequests made and inheritances received reported above—with bequests slightly higher on average—also holds for the counts of bequests made and inheritances received (2.0 million bequests made versus 1.7 million inheritances received per year). The distributional statistics are also very reassuring. Both sides of the bequest/inheritance suggest a large portion (36 and 40 percent) of inheritances occur at levels of \$1 million or above.<sup>46</sup> Although half of all inheritances and bequests are in the size range below \$25,000, both perspectives agree they account for only 5 to 6 percent of total dollars transferred at death.

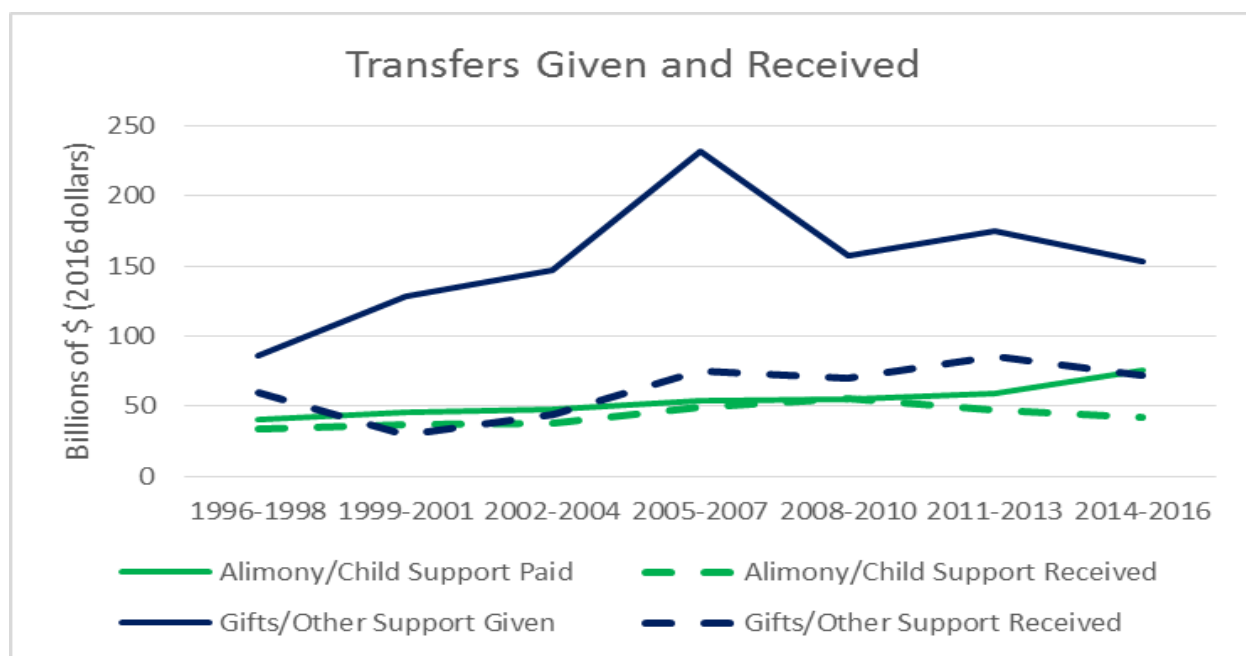
### *Reconciling Inter Vivos Transfers Made and Received*

The other components of the two-by-two interfamily transfer matrix are *inter vivos* transfers made and received. In principle, “substantial” *inter vivos* gifts received are captured in the inheritance section, as described above, so we can add those to other types of *inter vivos* transfers received (mostly income support from others) and thus capture all transfers received. Using another SCF question on substantial gifts made and support paid to others, we (again, in principle) can see *inter vivos* transfers from the giver perspective as well. However, conceptual differences between gifts and support made and received lead to divergence in the aggregates as well as difficulties with separating the flows from other types of support given and received. In this section we show that the divergence between gifts made and received is quite large, and discuss what that means for tracking interfamily transfers more generally.

<sup>46</sup> We also ran the following thought experiment. What if all expected bequests were assumed to go to only one recipient? The number of expected bequests made falls by more than half, well below the number of inheritances received, and the distribution of expected bequests shifts wildly, with about 60 percent of the dollars showing up in the \$1 million or higher category, which is much higher than the inheritance received share. The experiment underscores that the expected bequest distribution is sensitive to how we assume estates are divided, and puts the differences between our baseline numbers (36 percent and 40 percent above \$1 million) in perspective.

The SCF income module has two questions about income received (in the past year) that bear directly on transfers received. The first is about alimony and child support received. Alimony and child support received is a component of SCF *Bulletin* income, and runs about \$50 billion per year in recent waves. The second income module question involves the residual “other” income question. Two of the “other” income types (see the code frame in section 5 below) are for “other help/support” and “gifts, n.e.c.” Together, these amount to about \$20 billion in recent years, increasing from about \$6 billion in 1995. Anecdotally (based on interviewer comments and case review) this is probably a lot of parental support for adult children, but one cannot rule out that it also includes some misplaced alimony or child support.

The income module follow-up has two questions about transfers made to others, covering first alimony and child support paid, then other support paid and substantial gifts made. Separating alimony and child support paid from other gifts made allows us to compare alimony and child support flows head to head, which we do (green lines) in the chart below:



In general, the data suggest that alimony and child support are well captured, with the perspectives of payers and receivers well aligned (a univariate distribution, not shown, tells the same basic story). Again, we cannot be absolutely sure that some of what is being captured in those questions does not reflect other types of *inter vivos* transfers, or that the question about regular support paid might include some alimony and child support, but the separation of those flows from the other types of *inter vivos* transfers is certainly plausible. Given that, the “other” income captured in the income module is then plausibly the income transfers we would expect (along with substantial gifts received from the inheritance section) to line up with *inter vivos* transfers made.

The instructions for the second income module follow-up question on *inter vivos* transfers made explicitly tell the interviewer to make sure the respondent includes “substantial gifts” that they



made to others (excluding charities). The total reported transfer amounts are quite substantial, increasing from about \$60 billion in 1995 to nearly \$160 billion by 2016 (solid blue line in the chart above). This question provides the givers' perspective on the gifts received that are captured in the inheritance section, but also includes other types of support paid, so it will be larger than gifts received. Indeed, the transfers made should be directly comparable to the sum of gifts received as measured in the inheritance section (which range from \$30 billion to \$50 billion over time) and "other" support income measured in the income module (which, as noted above, is now running about \$20 billion per year, increasing from about \$6 billion in 1995). The sum of those two flows is shown using the blue dashed line in the figure above, and is generally about half the amount of reported *inter vivos* transfers made.

The gap between *inter vivos* transfers made and received is substantial, though consistent with our priors because we expect that many such gifts and transfers reported being made in the SCF will not (and should not) be reported as being received in the SCF. One common example makes the point: a parent helping to support a child living outside the household and attending college will likely think of the costs of tuition, room, and board as "regular support" paid, while the child on the receiving end will likely not report that as "income" received (though the survey would try to collect a regular parental cash stipend as part of "other" income).

In on-going work we are exploring methods for allocating the unmeasured transfers received, assuming that the transfers made are accurately reported. The approach will ultimately involve delving deeper into the structure of the SCF, because we know (for example) the relationship of the person to whom the gift was made and (if a child) the age of that child. We also know (from the inheritance module) the respondent's relationship with the person from whom the gift was received. Using these facts, combined with what we know about the univariate distributions of *inter vivos* transfers made, we can allocate the flows to transfers received.

### *SCF Question Wording and Code Frame Details*

#### ***Inheritances and Gifts Received***

*The primary inheritance section, which comes at the end of the survey, asks:*

X5801 Including any gifts or inheritances you may have already told me about, have you (or your {husband/wife/partner/spouse}) ever received an inheritance, or been given substantial assets in a trust or in some other form?

IF YES: Please do not include inheritances from a deceased spouse.

X5802 How many of these have you (or your {husband/wife/partner/spouse}) ever received?

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#1 refers to the first gift/inheritance  
#2 refers to the second gift/inheritance  
#3 refers to the third gift/inheritance

#4 refers to all remaining gifts/inheritances

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X5803(#1) Was that an inheritance, a trust, or something else?

X5808(#2)

X5813(#3)

1. \*INHERITANCE; life insurance; other settlements
2. \*TRUST
3. \*TRANSFER/GIFT
6. \*INHERITED TRUST
- 7. \*OTHER

X5804(#1) What was its approximate value at the time it was received?

X5809(#2)

X5814(#3)

X5805(#1) In what year was it received?

X5810(#2)

X5815(#3)

X5818(#4) How much altogether were any others you have received?

*There is also a possible entry for current year inheritances in the "other income" question in the primary income section:*

X5723 (Other than withdrawals from account-type pensions or IRAs you told me about earlier in the interview, did/Did) you (or anyone else) have income from any other sources?

X5725 What other sources?

12. Inheritance/gifts

*For housing and other real estate assets, the sequence about each property includes questions about the value of the property when it was acquired, and if the R indicates it was a gift or inheritance, that variable is checked. In the owned business section, the R is asked:*

X3108(#1) How did you (or your family living here) first acquire this

X3208(#2) business; was it bought or invested in, started by you, inherited, given to you, or some other way?

1. \*BOUGHT/INVEST
2. \*STARTED
3. \*INHERITED
4. \*GIVEN
5. \*JOINED/BECAME PARTNER/PROMOTION
10. Bought/invest and inherited
- 7. \*OTHER

### ***Regular Support Income Received***

*The primary income section includes the following questions:*

X5717 Did you (or anyone else) have income from child support or alimony which you (or your family here) received?

X5718 In total, what was your (family's) annual income from child support or alimony which you (or your family here) received in {Survey Year -1}, before deductions for taxes and anything else?

X5723 (Other than withdrawals from account-type pensions or IRAs you told me about earlier in the interview, did/Did) you (or anyone else) have income from any other sources?

X5725 What other sources?  
13. Other help/support from relatives  
28. Gift or support, n.e.c.

### ***Alimony and Child Support Paid***

*After the income section, there are some additional questions capturing transfers made:*

X5731 During {Survey Year -1}, did you (or anyone in your family living here) pay any alimony, separation payments, or child support?

X5732 Altogether, how much alimony and/or child support did you (and your family) pay in {Survey Year -1}?

### ***Other Support Paid and Substantial Gifts Made***

*Continuing after the alimony and child support paid questions, there is another round of questions to capture other types of support and substantial gifts:*

X5733 During {Survey Year -1}, did you (or anyone in your family living here) provide any (other) financial support for relatives or friends who do not live here?

Please do not include alimony or child support.  
INCLUDE SUBSTANTIAL GIFTS.

X5734 How much support did you (and your family) pay?