

WEALTH AND WELFARE OVER THE LIFECYCLE AND OVER THE BUSINESS CYCLE

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Abstract

This paper presents several stylized facts on how households allocate wealth among asset classes, how portfolio allocation changes over the lifecycle and over the business cycle, and how portfolio and income are related. The paper combines various survey data to show that household income and portfolio allocation are highly correlated especially for middle income households. Asset accumulation have an inverted-V shape over the lifecycle whereas debt is front-loaded in working ages. Income and consumption follow a hump-shape over the lifecycle. Old households hold assets in liquid forms. As for the business cycle, the Great Recession has devastating effects on the welfare of households such that both networth and consumption declined, and poverty rates increased. The effect is more severe for non-white, low educated and female headed households.

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1 INTRODUCTION

This paper aims at presenting the key features of household portfolios and explores the income-portfolio allocation gradient of household wealth allocation. Moreover, the paper presents stylized facts on household portfolios and household welfare over the business cycle for years 1999-2015.

Households save for consumption smoothing purposes, or to have precautionary savings for income and health uncertainty or due to retirement or bequest motives. The relation between income and household savings decisions is explored in many angles in macroeconomics and finance literatures. The income changes can be anticipated such as retirement. Therefore, many households save for their retirement. The income can also change unexpectedly during a household's working lives through layoffs, unemployment, disability etc. When there is income uncertainty, prudent agents tend to accumulate buffer stocks called precautionary savings. This savings incentive increase as the uncertainty in income process increases. Moreover, there are health shocks or other spending shocks can arise through the lifetime of households and these also provide an important motivation for savings.

Although the motivation for saving is well understood in the literature, it is much less clear how and why households hold a particular type of portfolio including variety of assets with different features. Some assets are more in liquid forms such that they have small or zero transaction cost both in terms of pecuniary or time. Some assets are riskier such that their return varies depending on the state of the economy. Some assets such as housing provide for sheltering needs for human beings, so are essential part of household portfolios. In this regard, the role of liquid and illiquid assets for saving purposes is different. Households usually accumulate liquid assets to buffer against negative income shocks such as unemployment or eligibility loss in a public support program or expense shocks such as unexpected health expenses, increased consumer expenses due to moving, repair etc. On the other hand, illiquid assets are accumulated for long-term goals such as retirement or children's higher education

expenses etc.

This paper asks the relationship between household earnings and their asset allocation over the lifecycle and business cycle. What types of households hold a certain type of asset is an interesting question to explore. This question is addressed using two household surveys in the United States: Panel Study of Income Dynamics and Survey of Consumer Finances. These two source give similar information about assets and income relationship. However there is an important dimension that they differ: the share of liquid assets in household portfolio is increasing with income for some range in PSID whereas it is declining with income in SCF.

The paper presents several features of household portfolios over the lifecycle and over the business cycle and the interaction of asset allocation with income. The stylized facts are summarized as:

Asset accumulation have an inverted-V shape over the lifecycle. This observation is not true when considering most liquid assets. Older households prefer holding their assets in liquid form such as in checking and savings accounts. On the other hand, home equity, other real estates, annuity/IRA accounts are sharply decumulated after the retirement age 65. The preference of old households for liquid assets is also observed in liquidity share in net wealth. The liquid to networth ratio has a U shape throughout the lifecycle with a large flat region in mid-ages. The share increase after retirement. On the other hand, home equity share in wealth declines after retirement. Debt is front loaded in the lifecycle. Young households accumulate debt rapidly early in working life, then pay off their debt slowly throughout their remaining life.

As for the wealth-income gradient, there is a strong positive correlation with income and asset holdings for middle income households. The portfolio allocation behavior of households below and above log incomes 10-11 greatly differ from the very low income households. Debt to income ratio, liquid assets to income ratio, debt share in networth, liquidity share in networth reverse correlation above log income 10, which corresponds approximately 22,000 \$ annual household income. The findings in PSID and SCF are similar except for liquidity share

and debt to income share for some subsample of households.

Income follows a hump-shape over the lifecycle. Consumption has a very similar shape with income even after controlling for family size and composition which points to the lack of perfect consumption smoothing. An exception is the healthcare expenditures which is steadily increasing over the lifecycle with a level drop around retirement age, possibly due to the eligibility of Medicare at age 65.

An interesting observation is the correlation of income with health status of families which is measured with two illness indices and a hospitalization index for the head and spouse of the household. Even after taking age effects out, income is strongly negatively correlated with the number of chronic illnesses in the family. However, the causation can be in both direction such that low income leads to worse self care and more illnesses on the one hand, and low health makes workers unproductive or unable to work on the other hand.

Besides income and consumption, an important measure for average household welfare in the economy is poverty rate among households. I use poverty thresholds provided by the U.S. Census Bureau to calculate *Income Poverty* rate in the PSID sample. Additionally, I construct the fraction of households that have savings below the poverty threshold and call it *Asset Poverty* rate. This latter rate measures whether households have enough assets worth of a year's income. For 1999-2015 time period, 35.57 % households have incomes below the poverty threshold and 46.99 % households do not have enough assets worth of a year's income. Only 11.48 % of households that experience income poverty have assets above asset poverty level. 24.1 % of households experience income poverty as well as asset poverty. Looking at the effect of Great Recession, poverty rates increase from 2007 to 2011. Also, the empirical findings indicate a clear drop in networth from 2007 to 2009 which is present across the distribution of wealth. According to the PSID sample, non-white households, female headed households and low educated households experienced the biggest downturn in their net wealth and liquid assets during the recession.

RELATED LITERATURE. This paper complement portfolio allocation literature in macroeconomics and household finance by providing recent features of household portfolio choices over the lifecycle and wealth and welfare changes over the business cycle.

Savings are the main tools that individuals can use to self-insure against fluctuations in their earnings, so to sustain a smooth consumption over time. Consumption smoothing over lifecycle is one of the key facts observed in data. Many studies show that, although the earnings and wealth vary, consumption is relatively smooth. According to Permanent Income Hypothesis(PIH) developed by Friedman [1957], an individual's consumption is determined by the present discounted value of lifetime income, not by income in each period. Similarly, Life-Cycle Hypothesis (LCH) by Ando and Modigliani [1963] states that individuals save in early periods of their lifetime based on their earnings in order to consume when they are retired so that they can maintain stable lifestyle over their lives.

Coexistence of different types of assets is not much addressed in economics literature. The literature on asset composition is recently developing, most portfolio models include only one or two assets. Similarly the literature on the relationship between different assets and income is still premature. Poterba and Samwick [2001] analyze the relationship between age and composition of household portfolios using data from Survey of Consumer Finances(SCF). They find significant differences in asset accumulation between households with different ages as well as cohorts. They conclude that analyzing household wealth as identical savings is not supported by the data. They argue that institutional factors, asset liquidity and investor tastes are important determinants of asset demand. Another comprehensive household survey, Panel Study of Income Dynamics (PSID), provides a unique panel dataset for various household level variables. Wealth and savings are analyzed in PSID sample by Bosworth, Anders et al. [2008] for 1984-2005 period. McCarthy [2004] provide a literature review on household portfolio allocation by summarizing models and empirical facts from various countries. Similar to Poterba and Samwick [2001] and Bosworth, Anders et al. [2008], I empirically analyze savings and portfolio allocation of households using both SCF and PSID for recent time periods 1999-

2015. Each dataset have their own advantages. PSID follows households over many periods, however it underrepresents high wealth households. In this regard, SCF draws high income households using tax records which provide more information about the upper tail of the income and wealth distribution.

There are a few empirical papers which focus on liquid assets and their importance in family wellbeing. These papers show the importance of liquid assets in confronting adversity after a negative income or expense shock. Despite that one of the main purpose of household savings is to cushion against negative shocks, many households lack enough resources to do so. Mills and Amick [2010] argue that holding a modest amount of liquid assets plays a buffer stock role which is significantly related to lowering material hardship. Similarly, McKernan, Ratcliffe and Vinopal [2009] find that material hardship after a negative life event is more pronounced for liquid-asset poor families. Yıldız [2019] shows that the lack of liquid resources may lead to very different intertemporal allocation of consumption for healthcare expenditures compared to nondurable goods. In this paper, I provide empirical evidence for the liquidity of household portfolios to understand the type of the households with more liquid assets in their portfolios.

Poverty is an important indicator for households wellbeing. Lack of having enough income or enough assets drives households into economic hardship especially during recession times. Some households are even more vulnerable to negative economic environment. Hoynes, Page and Stevens [2006] show that non elderly poverty rate fails to decline even when wages and GDP per capita were increasing over the period 1959-2003. I show how poverty rate changes over the period 1999-2015 which includes one of the most severe economic downturn in US economic history, the Great Recession.

2 DATA

There are two sources of household survey data. The first one which is the 1999-2015 waves of Panel Study of Income Dynamics (PSID). Starting from 1968, PSID collected data on demographics, employment, asset holdings, expenditures and health factors of 5,000 U.S. households over their life course and their children (SRC sample). Later, more samples added as to represent Latino population and lower income levels (Latino and SEO sample). The survey initially collected food, childcare and housing expenditures, however, after 1999 more comprehensive expenditure categories are added. The empirical analysis in the present paper incorporates all households excluding SEO and Latino samples.

The consumption data uses the aggregated consumption variables imputed by the PSID staff in the main family files. These variables span food, housing, transportation, education, childcare and health-care expenditures and their subcategories. Healthcare expenditure consists of health insurance premiums paid by household and out-of-pocket health-care spending. The wealth variable used in this analysis is all assets net of debt, including home equity. Disposable income is calculated as family unit federal taxable income minus federal, state and social security taxes plus credits. Marginal tax rates and the variables in disposable income calculations are estimated using NBER's TAXSIM simulator.

I constructed health indices using the categorization employed by ?, however the index construction serves a different purpose in the sense that I construct them as a measure of family health status rather than to identify health shocks. Instead, I use the hospitalization index as a proxy for a health shock. Specifically, acute illnesses consists of stroke, heart attack, and cancer. Chronic illnesses consist of diabetes, lung disease, heart disease, psychological problems, arthritis, asthma, memory loss, and learning disorder. The index is the sum of the existence of each illness for head and spouse combined. Acute and chronic health indices indicate the state of health in the family. Hospitalization index takes values 0, 1 or 2 if either one of head or spouse (1), both (2) or none (0) of them is hospitalized during previous calendar

year.

The sample consists of families where heads are in working ages between 25-65. The health variables are constructed using head and spouse health conditions. Income, consumption and wealth variables are at the household level. I trimmed the data if food consumption grows or shrinks more than 400%. I also dropped observations if a household has a negative checking/saving account or negative stocks, which is possibly due to the imputation of wealth variables. All nominal variables are deflated to 2010 dollars using CPI-U. Food variables are deflated using food CPI and healthcare expenditure variables are deflated using medical CPI.

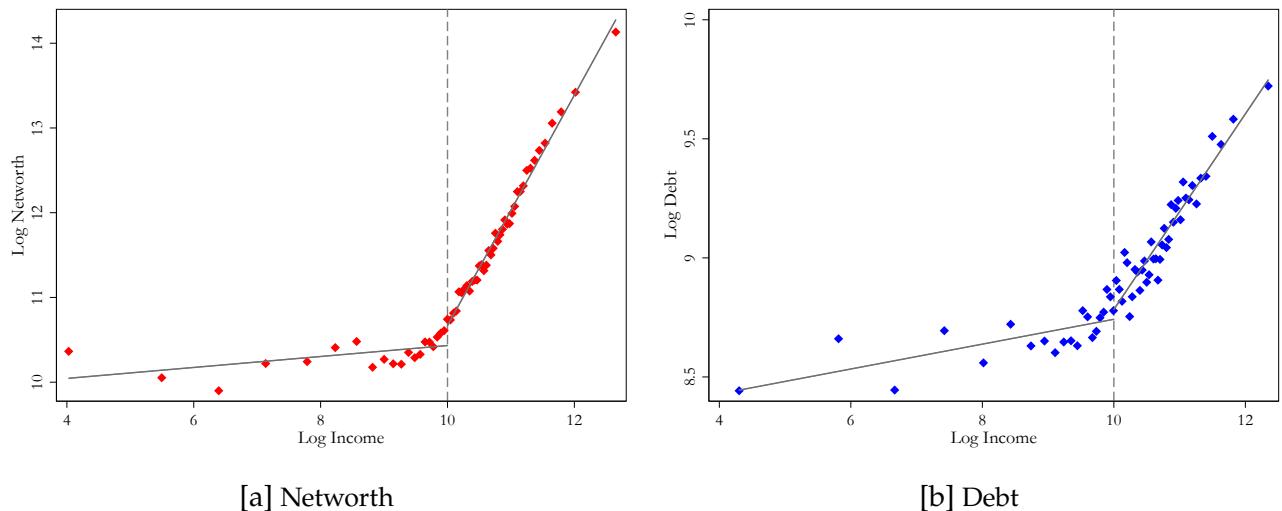
The second data source is 2010 Survey of Consumer Finances (SCF). SCF is a richer source of wealth data and I used it to explore wealth and income relationship in the paper. This survey is a triennial statistical survey of demographics, income and balance sheets of U.S. households. An information feature of SCF is that it draws high income households disproportionately using tax records. This makes SCF a good representation for the upper tail of the income distribution. Moreover, the survey has a rich set of questions on asset holdings and covers a variety of household types which makes it as an attractive source for portfolio allocation studies. In SCF analysis in the paper, liquid assets are defined as the sum of checking account, savings account, money market accounts(money market deposit accounts and money market mutual funds) and call accounts at brokerages. Income is total income before taxes and deductions which include wage income, business income, income from interest earning investments, sales of stocks, bonds and real estate, rent income and transfer income such as unemployment and child support.

3 WELFARE OVER THE LIFECYCLE

3.1 WEALTH-INCOME GRADIENT IN PSID

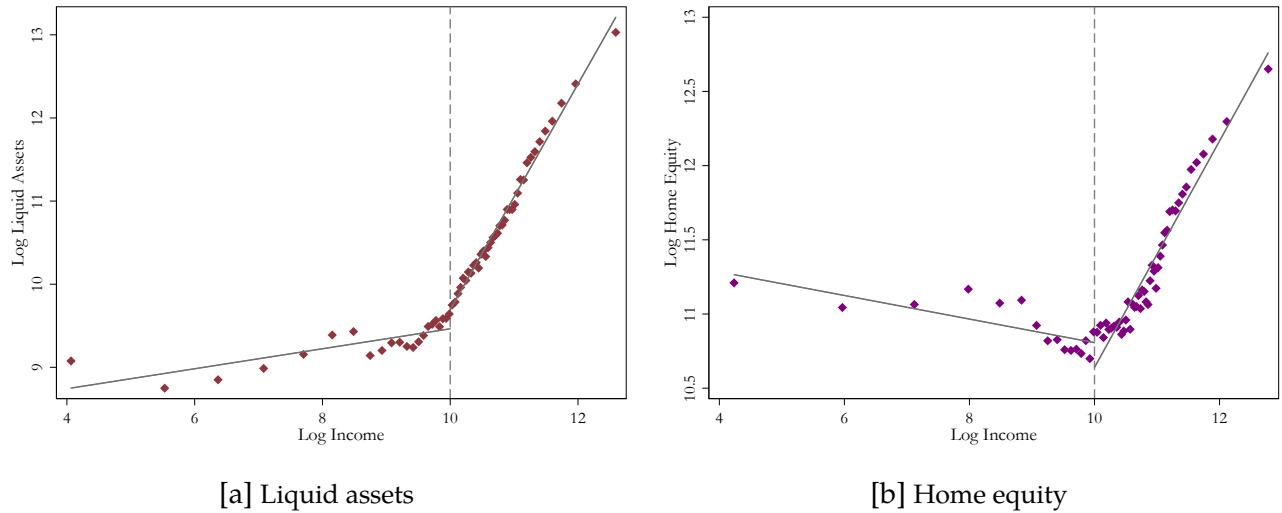
The income is highly correlated with the level of wealth for relatively high income earners. As can be assessed from Figure 1 and Figure 2, the correlation between income and networth or liquid assets and also between income and debt is very small for log income below around 10 which corresponds to an annual disposable income of 22026.47 \$. Then, there is a linear relation between log income and log net wealth and log debt above incomes around log 10. For home equity, the correlation seems to be slightly negative below income log 10.

Figure 1 Networth and Debt in PSID



Notes: The figure plots networth and debt against disposable income for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans. Income is total income after taxes plus credits.

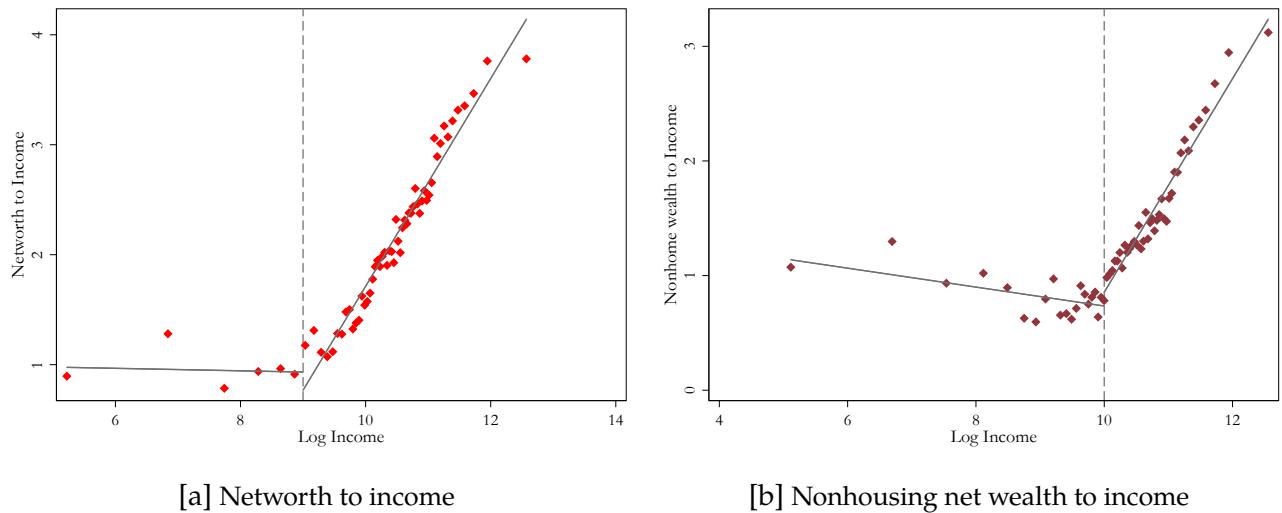
Figure 2 Liquid assets and Home equity in PSID



Notes: The figure plots liquid assets and home equity against disposable income for households in 1999-2015 waves of PSID. Liquid assets are defined very broadly for PSID data and are defined as the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Income is total income after taxes plus credits.

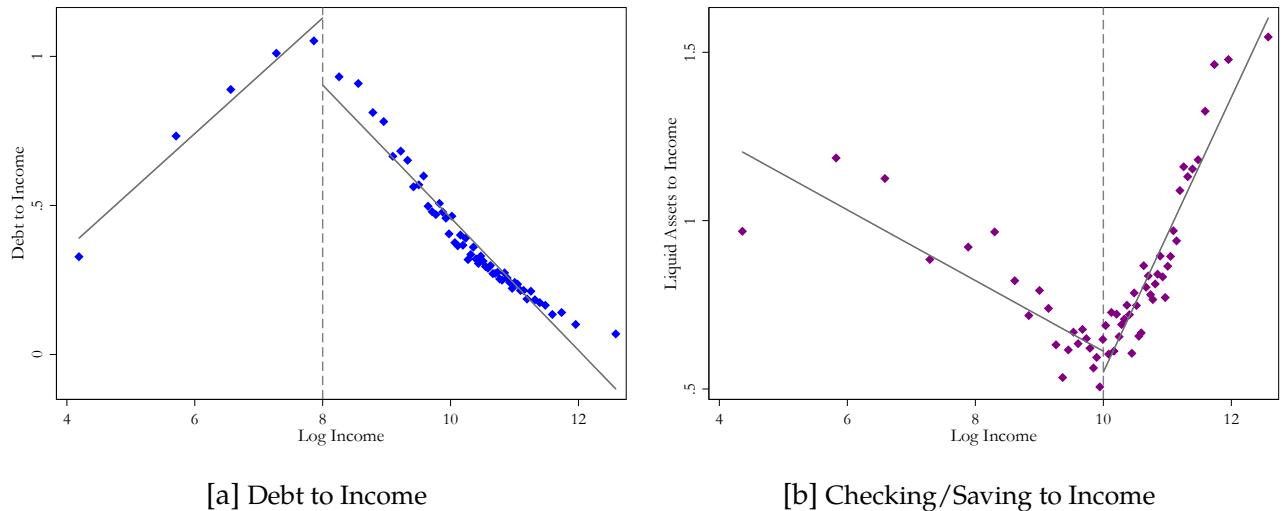
Similar patterns arise for net wealth to income (both including and excluding home equity) and log income correlation in figure 3. There is a positive correlation above around log income 9 which is around 8103.08 \$. Figure 4 reveals an interesting reversal of the correlation between log income and debt to income ratio. For low income earners, the debt to income ratio has a positive association with income. This can be because low income households might be increasingly borrowing while expecting an increase in their incomes to smooth out the consumption. The association reverses at around log income 8. Note that this is actually a very low level of income and corresponds to around 2980.95 \$ annual disposable income.

Figure 3 Wealth to Income Ratio in PSID



Notes: The figure plots networth to income ratio and nonhousing wealth to income ratio against disposable income for households in 1999-2015 waves of PSID. Income is total income after taxes plus credits.

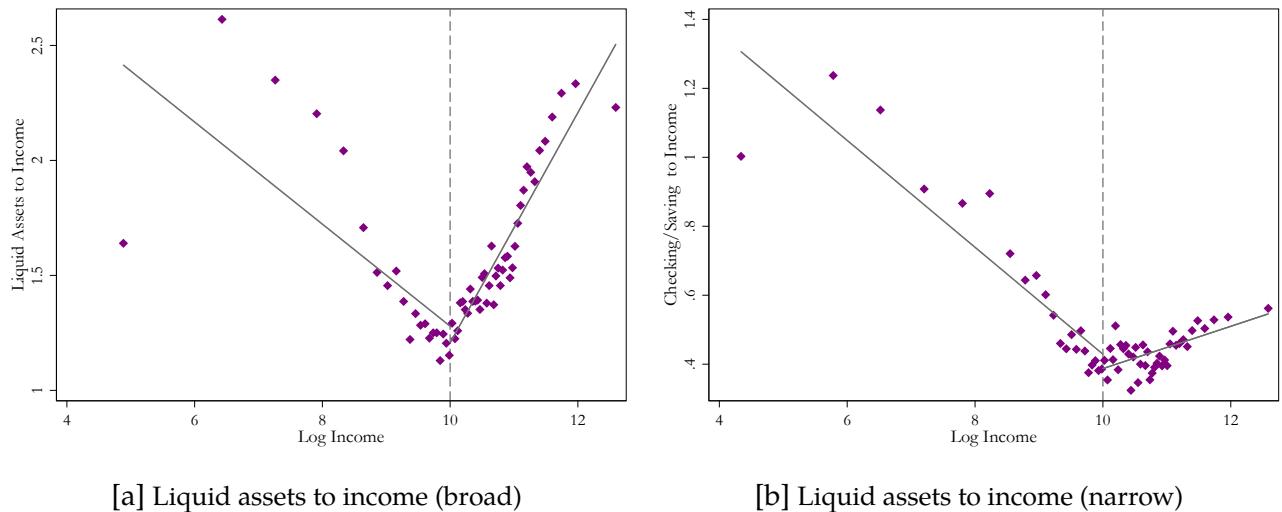
Figure 4 Debt to Income and Checking/Savings to Income Ratio in PSID



Notes: The figure plots debt to income ratio and checking/savings to income ratio against disposable income for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans. Income is total income after taxes plus credits.

Liquid assets to income ratio also reverses the sign of the relationship above log 10 annual income. The reason can be a temporary income loss for some households who have some small savings. I used both narrow and broad definition of liquid assets as there is not a consensus in the literature for what constitutes as a liquid asset. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets. In the narrowest definition for liquidity, checking and savings account are the truly liquid assets. Therefore, this negative relationship holds for assets excluding business value, real estate and home equity. Above log 10 income, the relationship becomes positive similar to networth to income ratio. All three definitions reveal similar patterns.

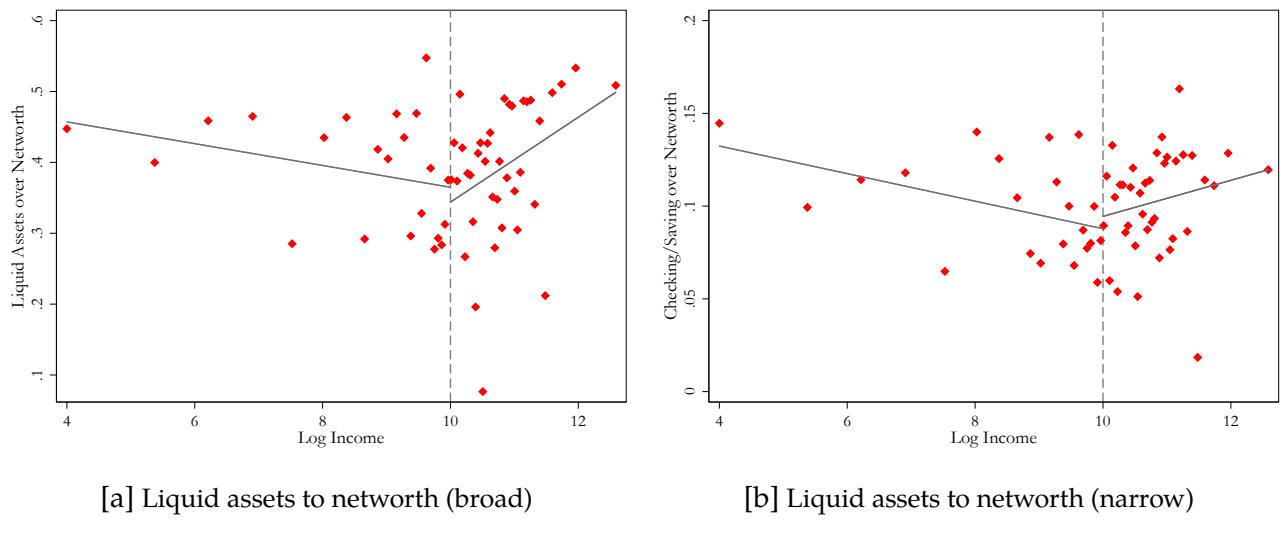
Figure 5 Liquid assets to income in PSID



Notes: The figure plots the ratio of liquid assets to income against disposable income for households in 1999-2015 waves of PSID. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets. Income is total income after taxes plus credits.

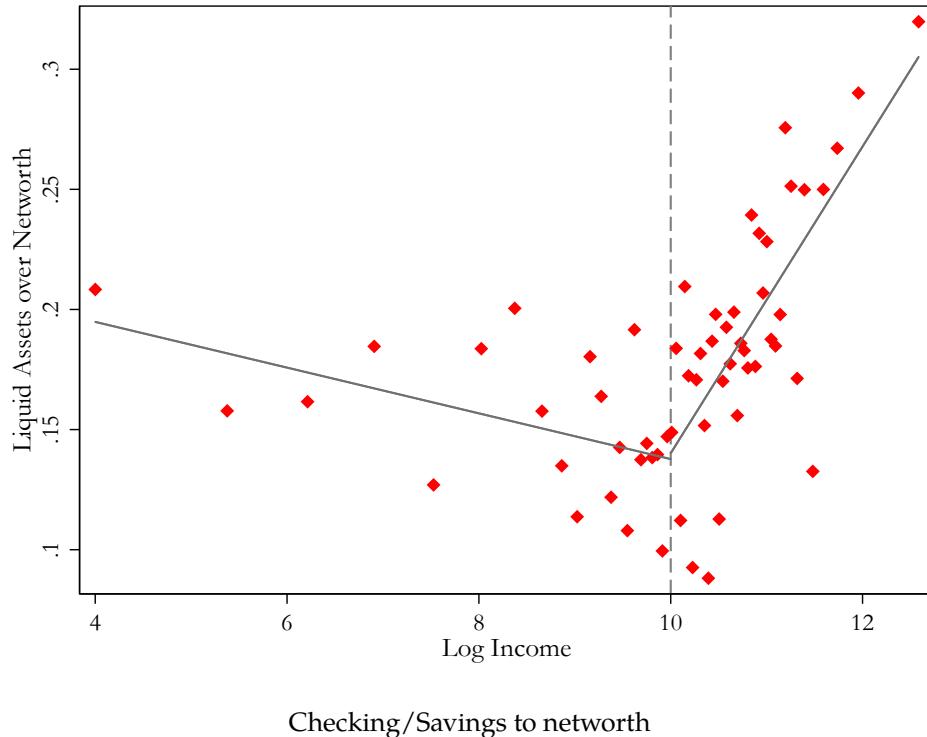
Next, I look at the composition of wealth in US households. For the PSID sample, the share of liquid assets have a small positive correlation with income for relatively high income households as is given in Figure 6. Figure 7 plots the share of checking and savings account amount in net wealth. The relationship is stronger in this case. For very low income households, the share declines with income. Above log income 10, the correlation is positive. This result is interesting since it is known that high wealth households invest in either financial assets or real estate. However, it is important to note that PSID does not include households from upper distribution of income and wealth. Hence, the positive association is driven by middle income households.

Figure 6 Liquidity share in wealth in PSID



Notes: The figure plots the ratio of liquid assets to networth against disposable income for households in 1999-2015 waves of PSID. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets. Income is total income after taxes plus credits.

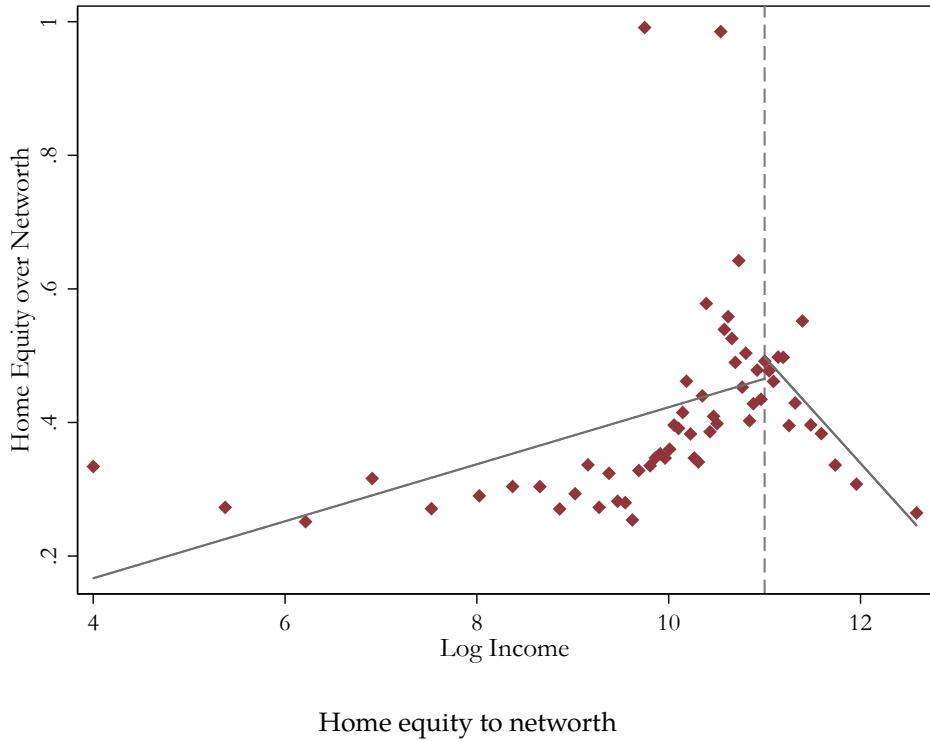
Figure 7 Checking/Savings share in wealth in PSID



Notes: The figure plots Checking/Savings account share in net wealth against disposable income for households in PSID. Income is total income after taxes plus credits.

Home equity share have a small positive correlation for low income earners until around log 11 (around 59874 \$ annual disposable income) at which the relationship reverses. This result is not surprising as residential house is the main assets most middle income households have and its value and the ability to pay mortgage is highly correlated with income.

Figure 8 Home equity share in wealth in PSID

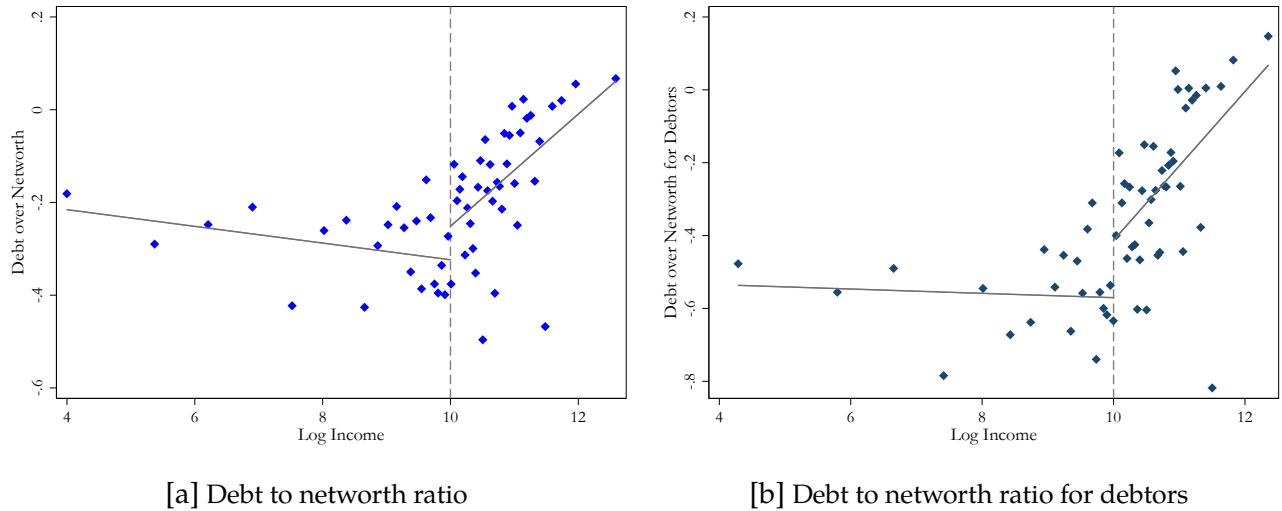


Notes: The figure plots home equity share in net wealth against disposable income for households in PSID. Income is total income after taxes plus credits.

The size of the debt relative to wealth is shown in Figure 9. The figure gives the plot of debt to networth against log income birth for all households, and for only debted households. There is a positive association above log income of 10. An important observation is that the ratio is negative for most households. This result is driven by the fact that some households have negative networth due to high debt relative to the value of their assets. Therefore, the ratio is very high for such households which drives the averages down. For high wealth households, the debt relative to their assets is very low that contributes low to simple arithmetic averages. Therefore Figure 9 mostly reflects the behavior of highly debted households (relative to their assets). High income means higher savings and higher wealth and lower debt which increase the ratio towards zero. This relationship is clear when we only consider households with positive networth as in Figure 10. Higher income is associated with lower debt and higher

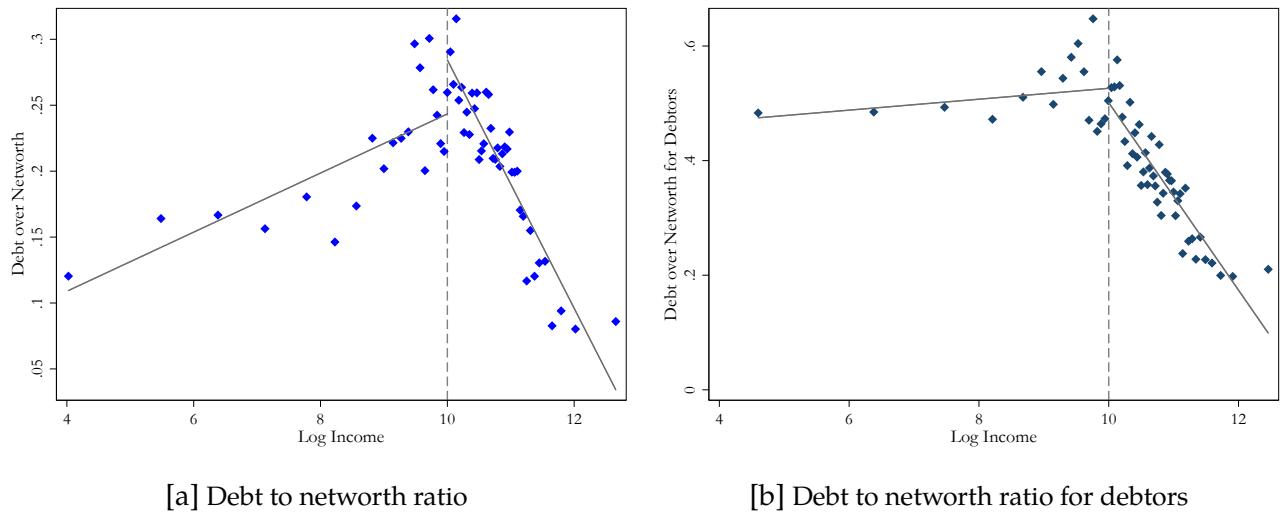
wealth, this translates into lower debt to wealth ratio when the ratio is positive.

Figure 9 Debt share in networth in PSID



Notes: The figure plots debt to networth ratio against disposable income for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans. Income is total income after taxes plus credits.

Figure 10 Debt share in networth for positive networth households in PSID

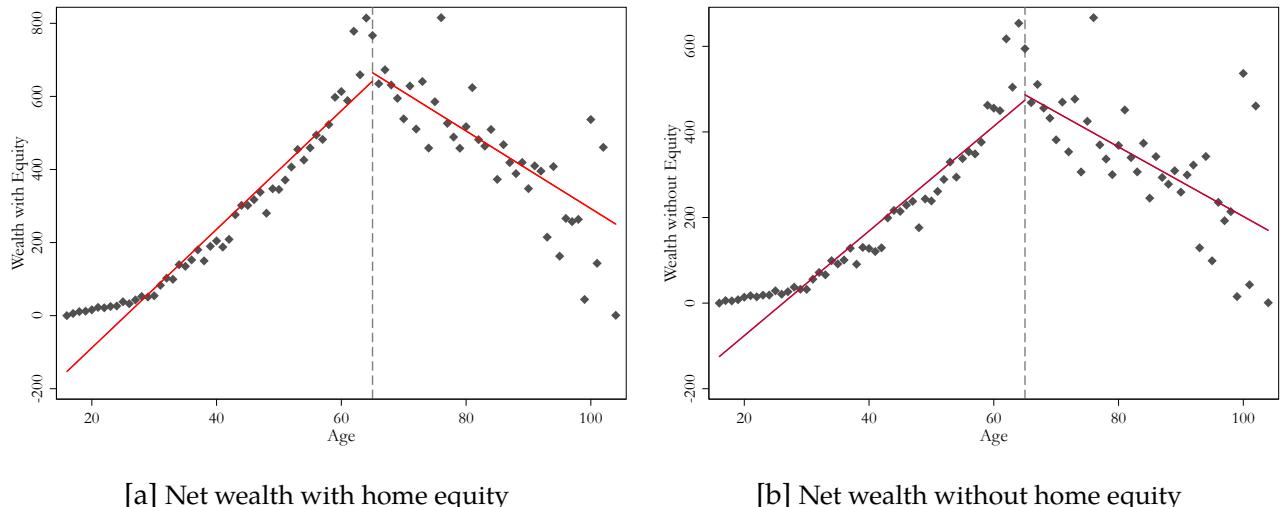


Notes: The figure plots debt to networth ratio against disposable income for positive networth values for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans. Income is total income after taxes plus credits.

3.2 AGE PROFILE IN PSID

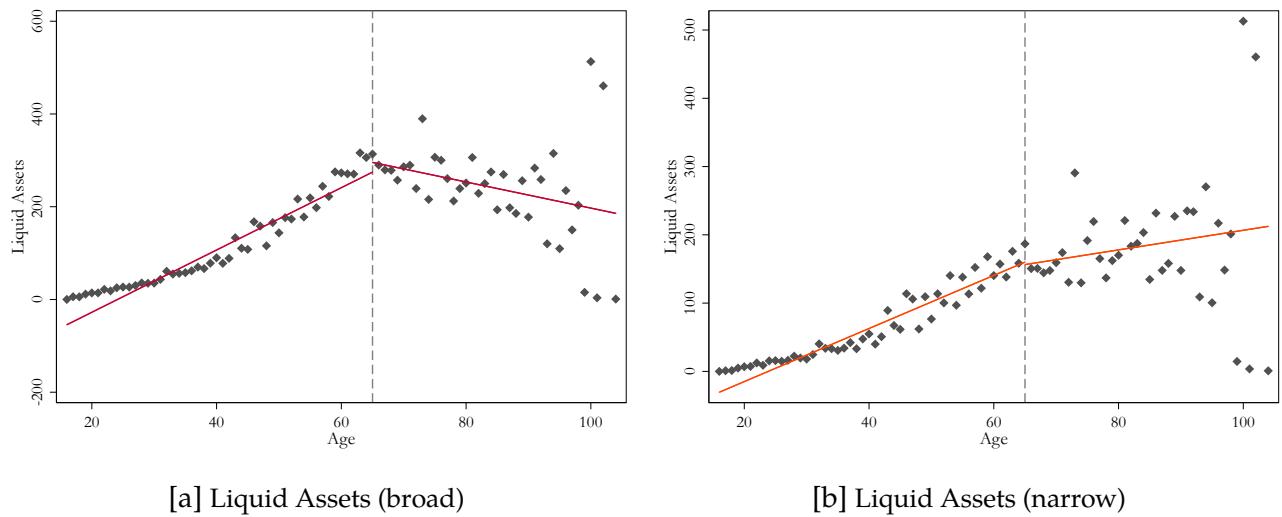
Household networth have an inverted V-shape over the lifecycle as is seen in Figures 11. However, this observation changes for more liquid assets. Households accumulate assets over their lifetimes until retirement and then starts decumulating. Figure 12 plots liquid assets based on two definitions. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets. Figure 13 plots checking/saving account balance over the lifecycle as the most liquid asset type. As the assets become more liquid, the decline after retirement begins to reverse. These plots suggest that old households keep their wealth in liquid forms, they consume and possibly liquidate their illiquid assets at retirement.

Figure 11 Net wealth over the lifecycle



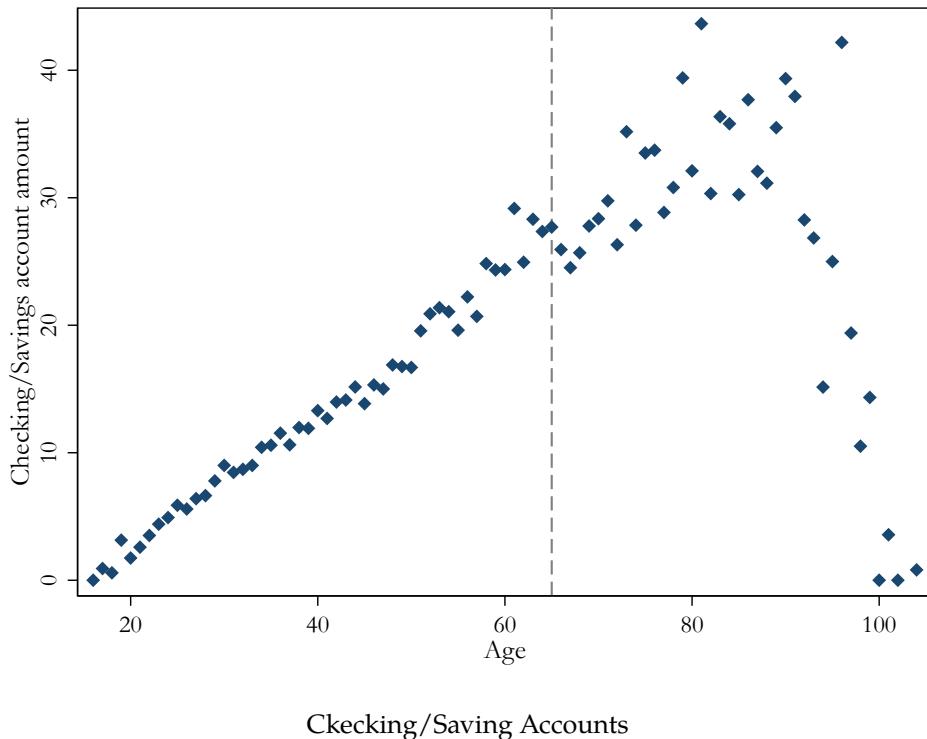
Notes: The figure plots total household net wealth with and without home equity averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars.

Figure 12 Liquid assets over the lifecycle



Notes: The figure plots total household liquid assets averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999–2015. The amounts are plotted in thousands 2010 dollars. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets.

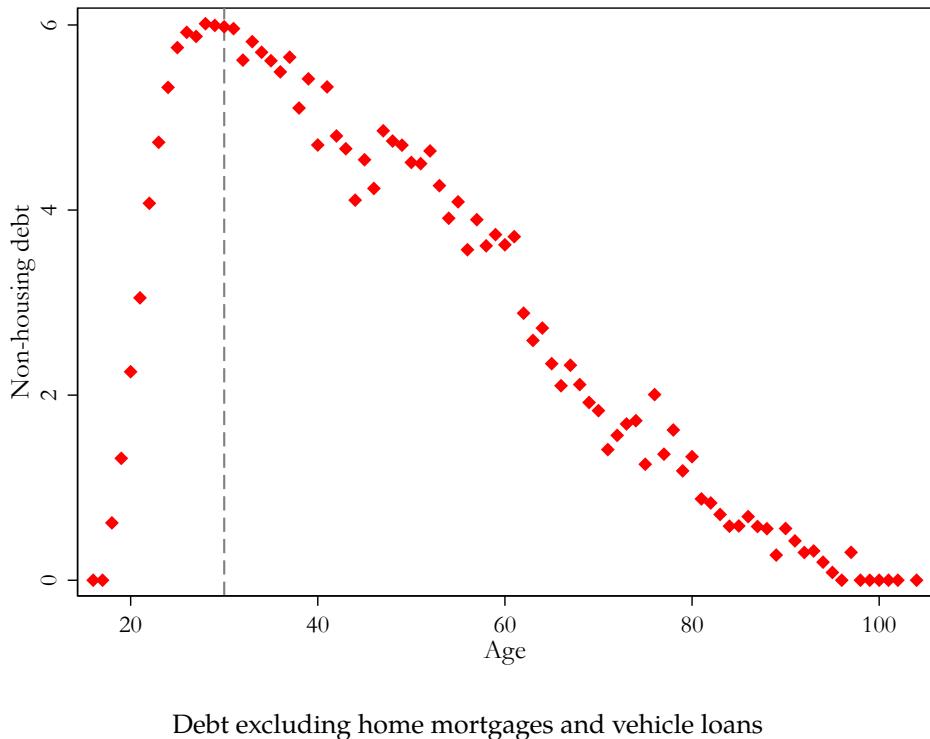
Figure 13 Ckecking and Savings Accounts over the lifecycle



Notes: The figure plots household checking and savings account balance averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars.

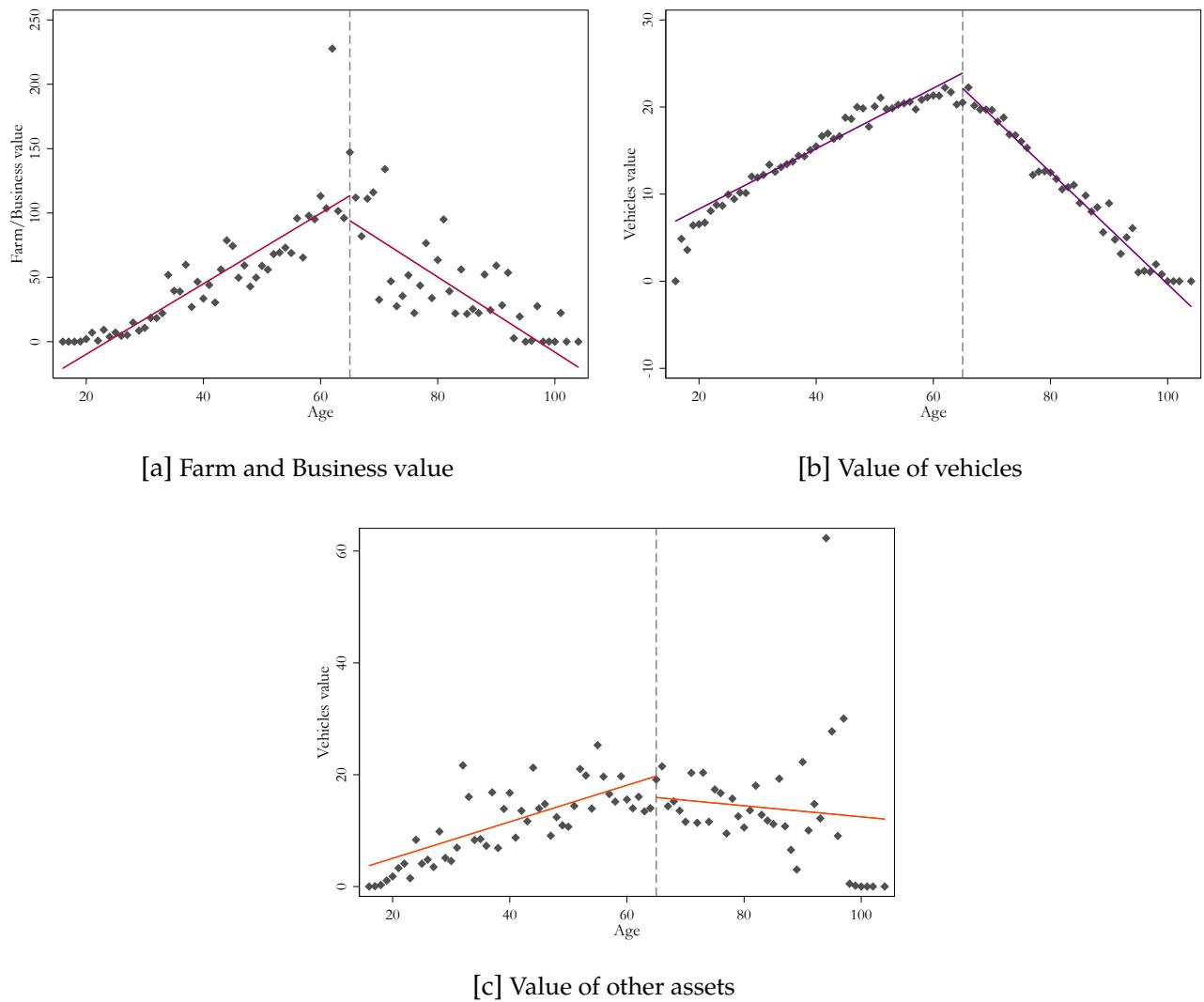
Figure 14 plots debt over the lifecycle. The figure clearly shows that debt is front loaded in household lifetime. Figures 15 - 17 plots disaggregated assets over the lifetime. The inverted V-shaped figure is seen in most asset types. Similar to above observations for liquid assets, the inverted shape does not hold for stocks or other assets that include bonds which are more liquid than farms and businesses, housing or vehicles.

Figure 14 Debt over the lifecycle



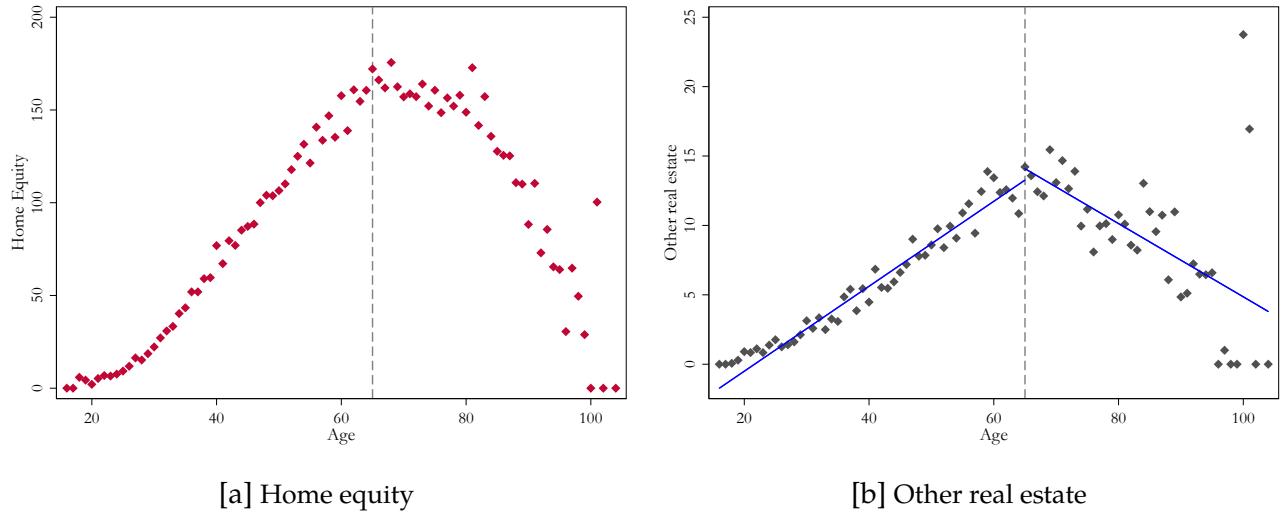
Notes: The figure plots household all household debt other than mortgage and vehicle loans averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars.

Figure 15 Farm/Business value, vehicle value and value of other assets over the lifecycle



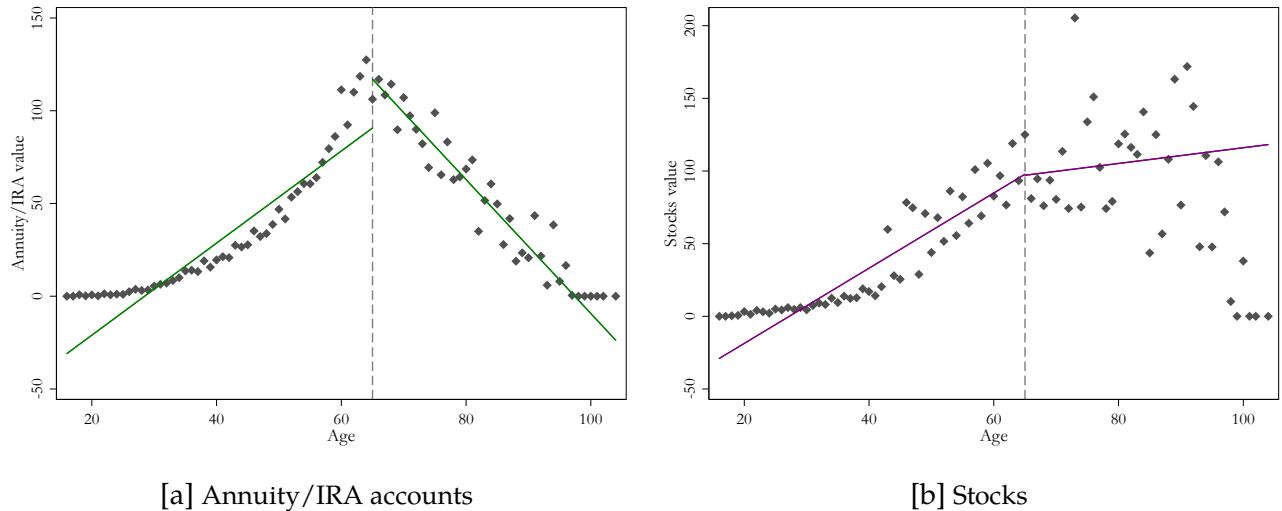
Notes: The figure plots value of farm and business, value of vehicles and value to other assets owned by the household averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars.

Figure 16 Home equity and other real estate value over the lifecycle



Notes: The figure plots value of home net of debt and other real estate owned by the household averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars.

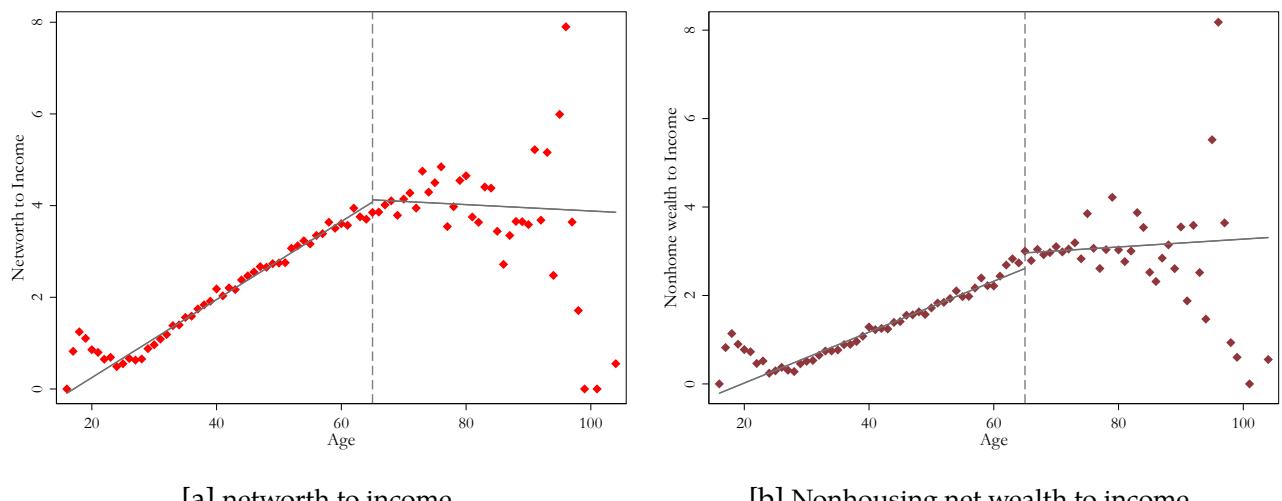
Figure 17 Annuity/IRA and stocks over the lifecycle



Notes: The figure plots value of annuity/IRA accounts and value of stocks owned by the household averaged over households against age of the head of the household. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars.

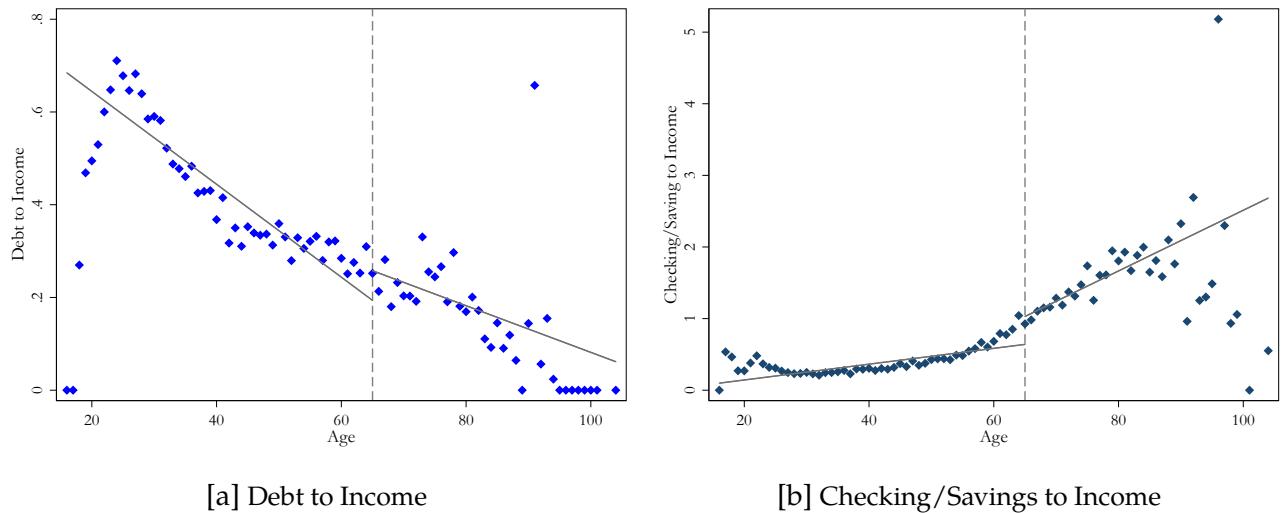
Figures 18 - 20 show how wealth grows relative to income during lifetime. Assets relative to income grows over life until retirement. This is not surprising since wealth is a stock variable while income is flow variable. Even a constant savings rate will increase wealth to income ratio. At retirement the ratio is mostly constant except for relatively liquid assets. This again shows old households' tendency to keep wealth in liquid forms. On the other hand, debt to income ratio decline throughout life except for very young households until the age of 30. Households accumulate debt very rapidly early in life then start paying off around 30s.

Figure 18 Wealth to Income Ratio over the lifecycle in PSID



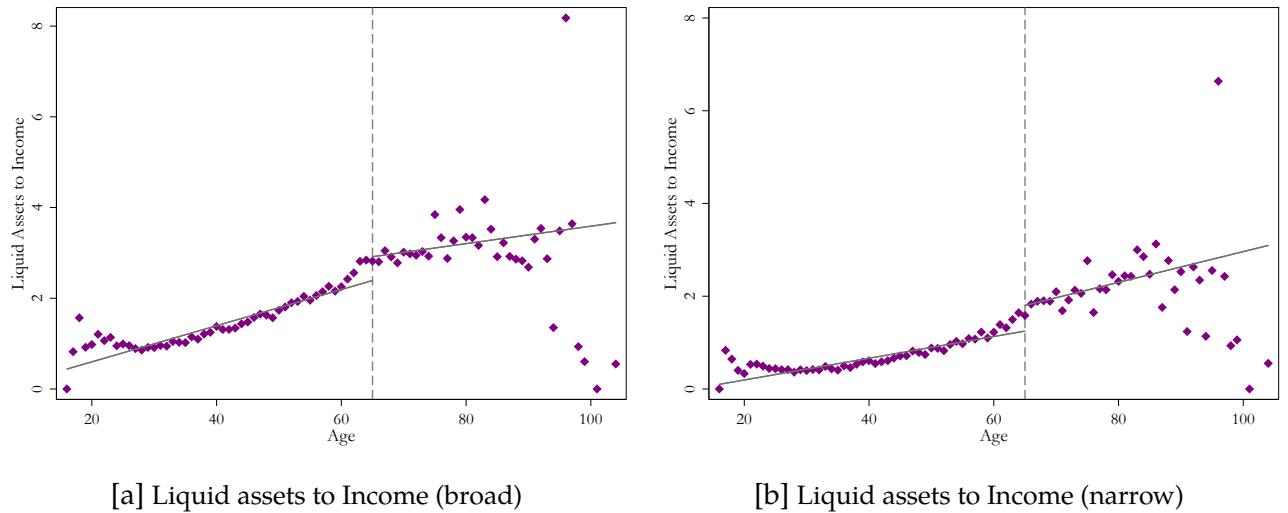
Notes: The figure plots networth to income ratio and nonhousing wealth to income ratio against age of the head of the household for households in 1999-2015 waves of PSID. Income is total income after taxes plus credits.

Figure 19 Debt to Income Ratio and Checking/Savings to Income Ratio over the lifecycle in PSID



Notes: The figure plots debt to income ratio and checking/savings to income ratio against age of the head of the household for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans. Income is total income after taxes plus credits.

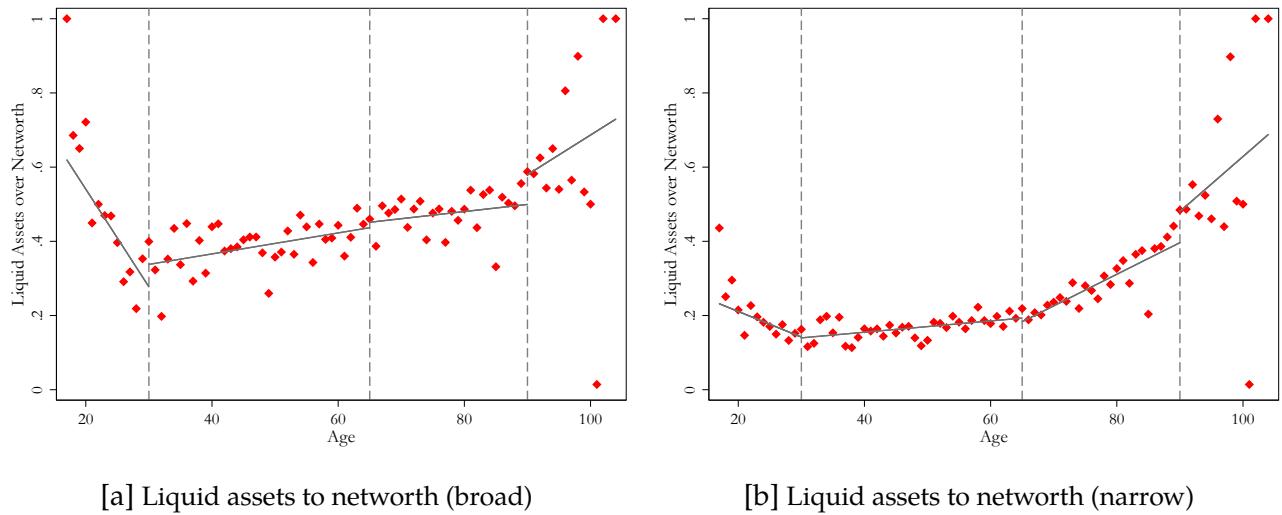
Figure 20 Liquid assets to Income in PSID



Notes: The figure plots the ratio of liquid assets to income against age of the head of the household for households in 1999-2015 waves of PSID. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets. Income is total income after taxes plus credits.

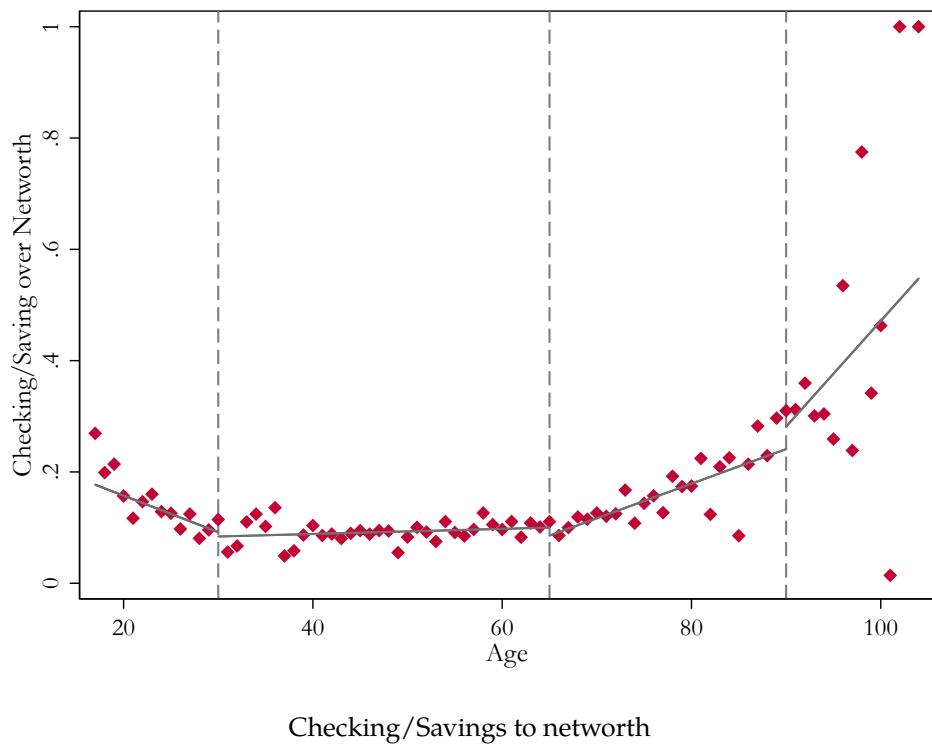
Figures 21 and 22 plots the share of liquid assets to networth over the lifecycle. The ratio is high in 20s, early in working life. Then it decline and is almost constant for middle aged. These are the ages while households invest in housing, real estate and businesses. The ratio is increasing after retirement which is consistent with the finding in previous graphs such that old households decumulate or deliquidate illiquid assets and keep liquid assets.

Figure 21 Liquidity share in wealth over the lifecycle in PSID



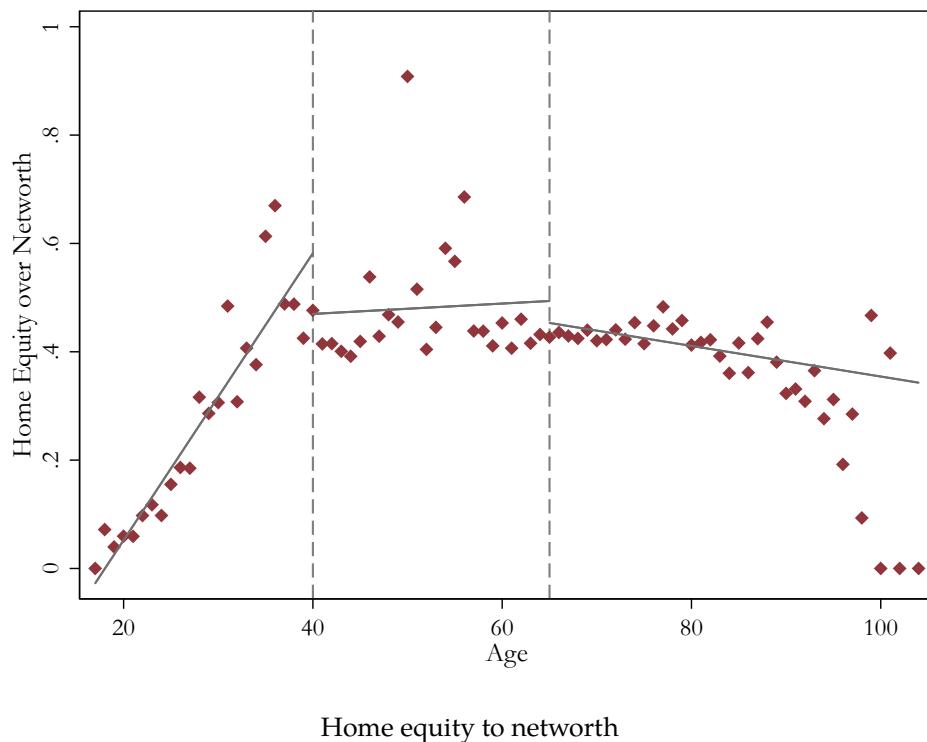
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Figure 22 Checking/Savings share in wealth over the lifecycle in PSID



Notes: The figure plots Checking/Savings account share in net wealth against age of the head of the household for households in PSID. Income is total income after taxes plus credits.

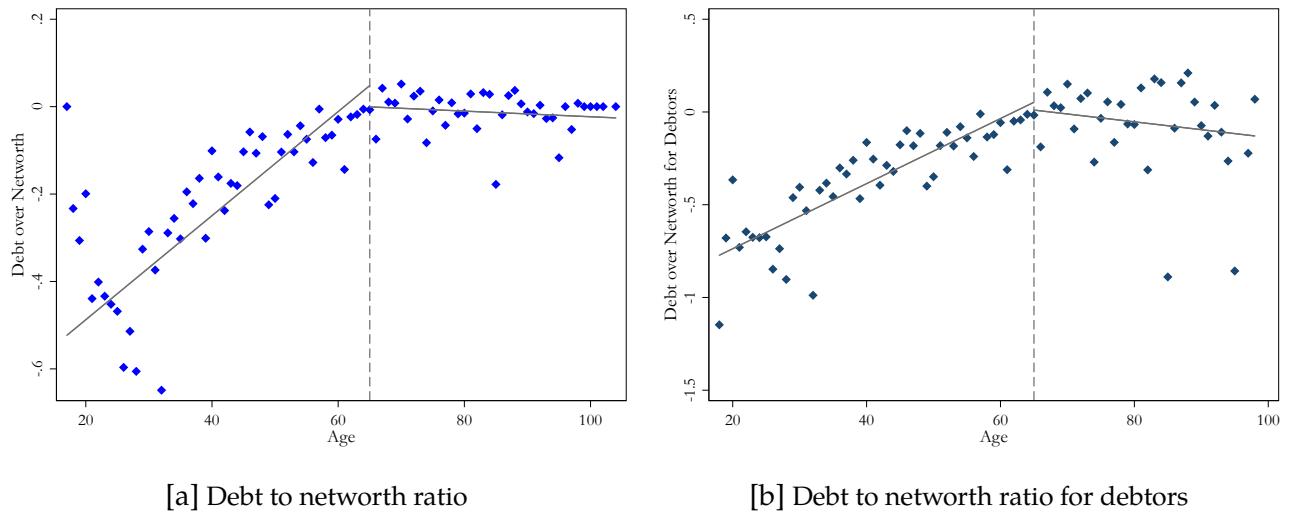
Figure 23 Home equity share in wealth over the lifecycle in PSID



Notes: The figure plots home equity share in net wealth against age of the head of the household for households in PSID.

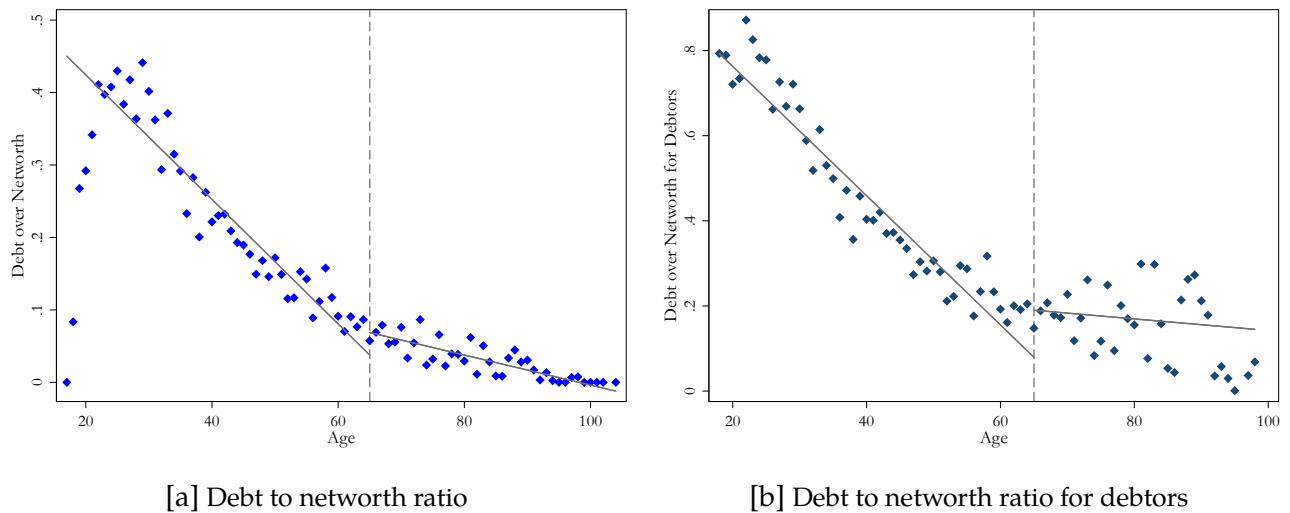
Home equity share increase sharply early in working life up until 40s as is shown in Figure 23. It is not surprising since most households' biggest invest is their houses. Figures 24 and Figure 25 plots debt share in networth for all households and also for households with positive networth. The reversal of figures for positive networth households is because of the statistical averaging of negative and positive values. Negative ratio for negative networth households are higher than positive values and dominates in simple averages. As households pay their debt over time, the negative average increase towards zero.

Figure 24 Debt share in networth over the lifecycle in PSID



Notes: The figure plots debt to networth ratio against age of the head of the household for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans.

Figure 25 Debt share in networth for positive networth households over the lifecycle in PSID

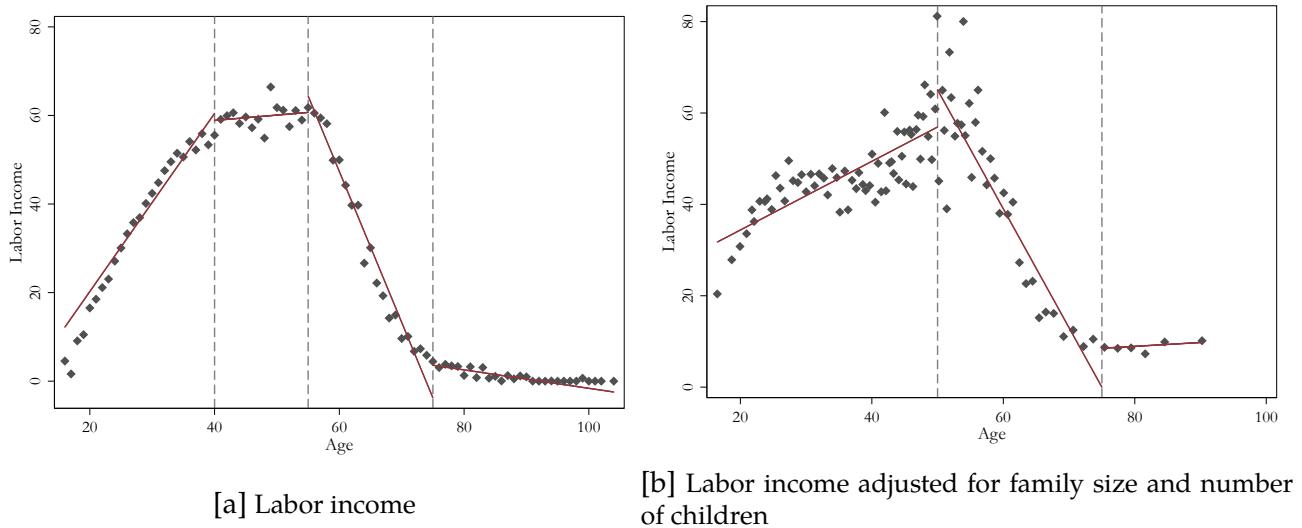


Notes: The figure plots debt to networth ratio against age of the head of the household for positive networth values for households in 1999-2015 waves of PSID. Debt excludes residential mortgages and vehicle loans.

3.3 INCOME OVER THE LIFECYCLE

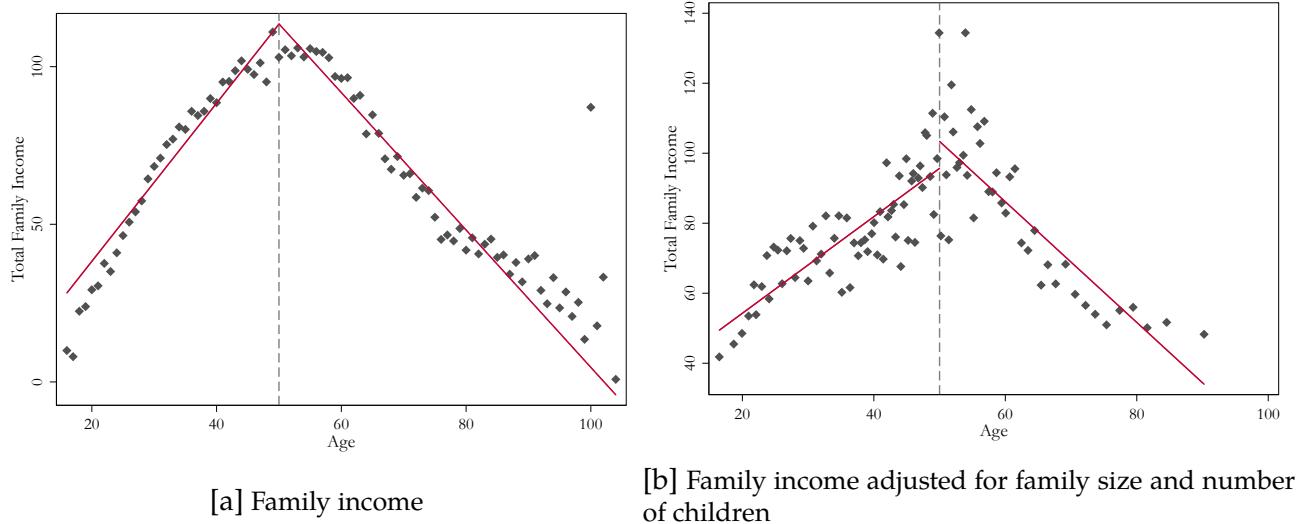
Income has an hump shape over the lifecycle. Figures 26 - 28 plot the household labor, total family and disposable incomes respectively. Panel b in the figures are adjusted for the family size and the number of children. After the adjustment, the plots look more like inverted V shapes. In all the figures, the income peaks around the age of 50-55, then starts to decline. The reason for why income declines before retirement age 65 can be a composition effect. Some households might be retiring early, or working part time due to illnesses or disability arising later in working life. The curve flattens only after 75 which points to late retirement for some households.

Figure 26 Household labor income over the lifecycle



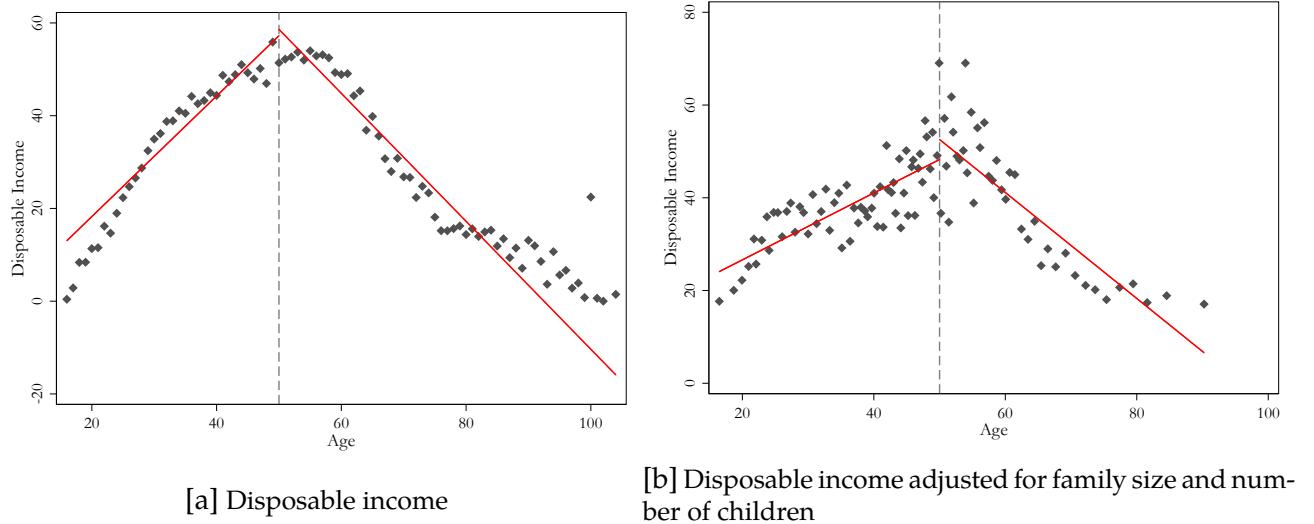
Notes: The figure plots total household labor income averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

Figure 27 Total family income over the lifecycle



Notes: The figure plots total family income including labor and capital income averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

Figure 28 Disposable income over the lifecycle

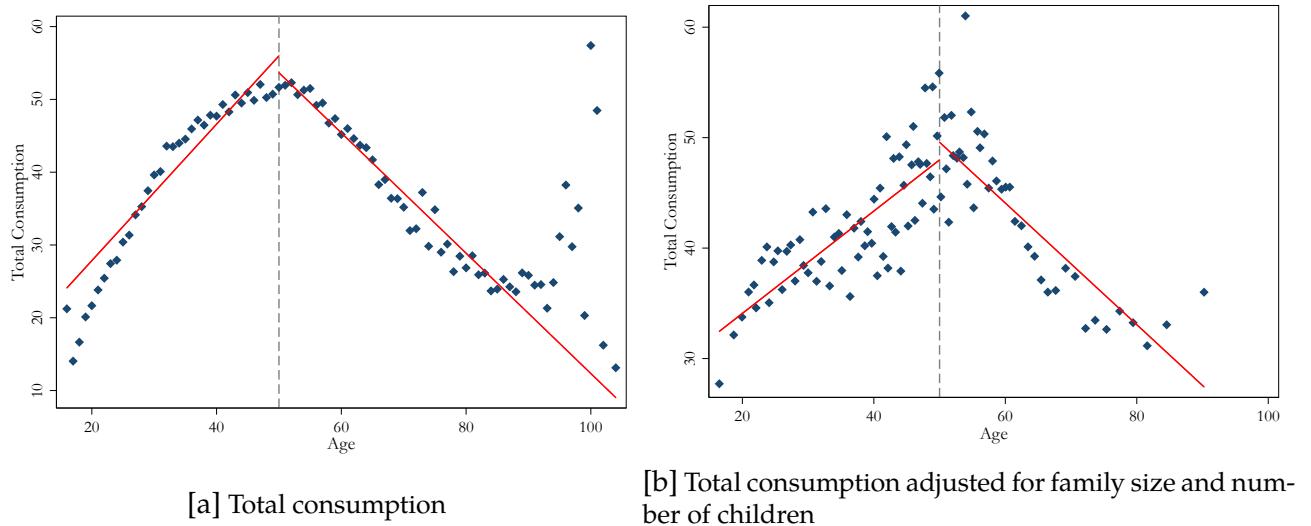


Notes: The figure plots household income net of taxes paid and averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

3.4 CONSUMPTION OVER THE LIFECYCLE

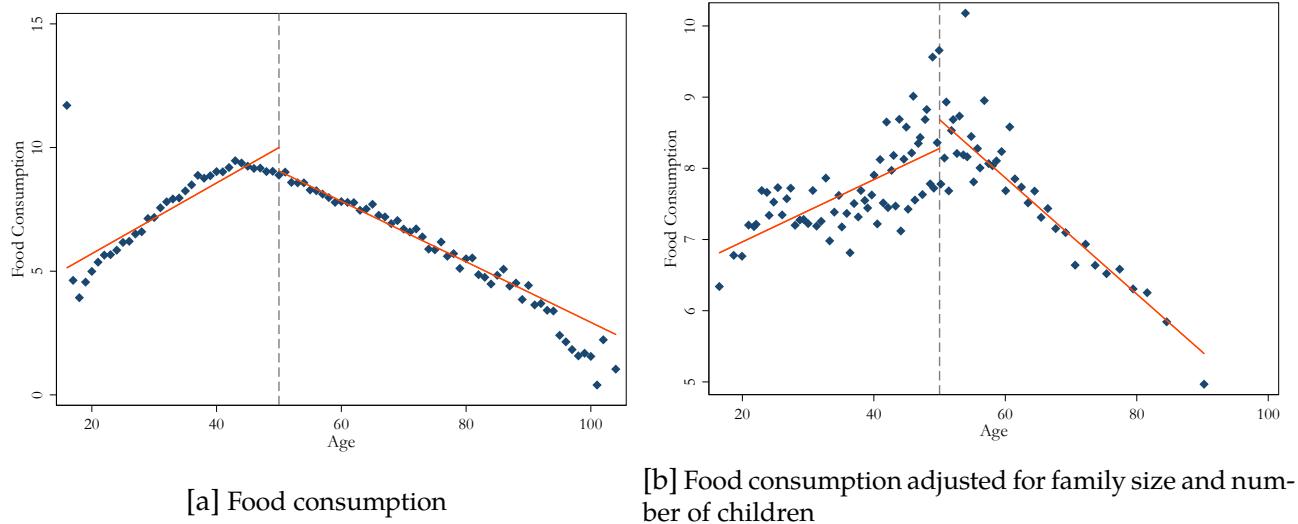
The shape of consumption path throughout life is very similar to income except for healthcare expenditures. This suggests that households are not perfectly smoothing their consumption in their lifetime. For healthcare expenditures, households spend more on healthcare as they age even after retirement. This observation is true even after adjusting for family size and composition. At the retirement age 65, there is a level drop in the trend for health expenditures indicating the effect of Medicare eligibility at his age.

Figure 29 Total consumption over the lifecycle



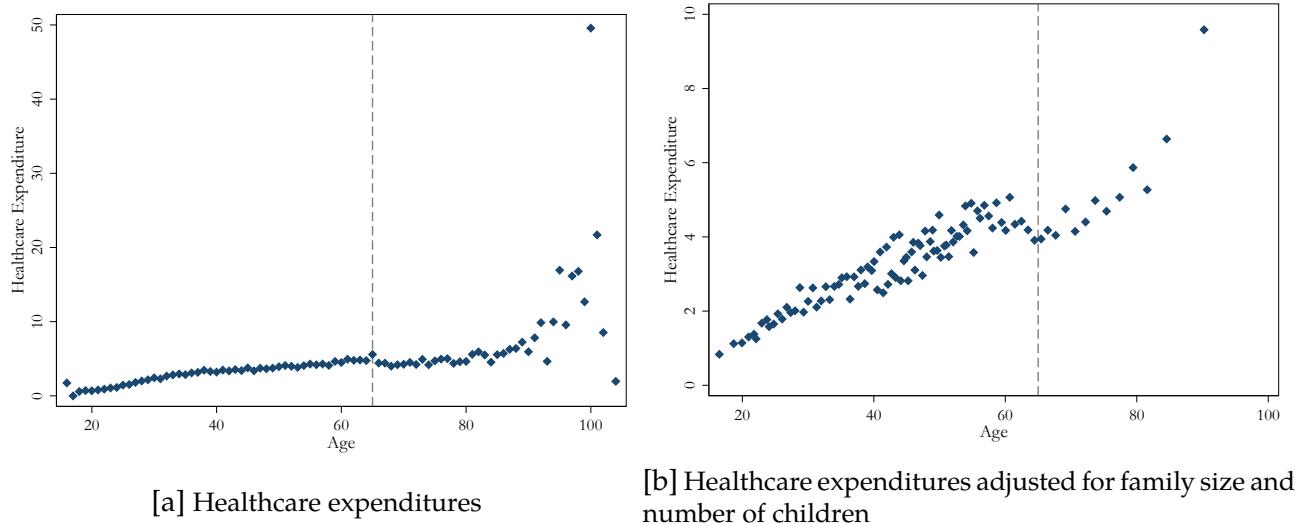
Notes: The figure plots total household consumption averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

Figure 30 Food Consumption over the lifecycle



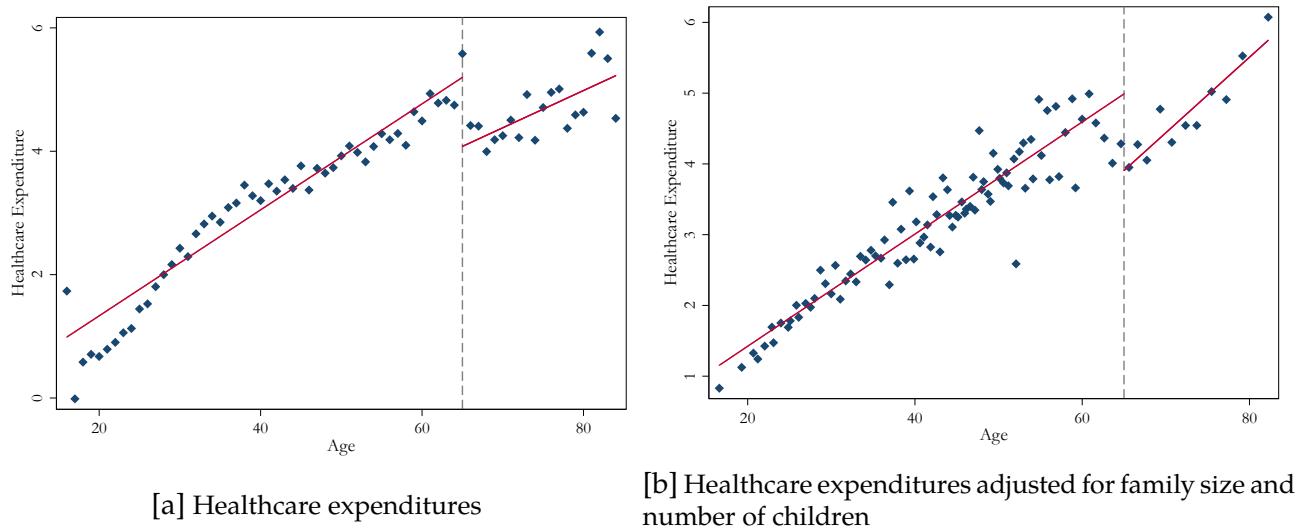
Notes: The figure plots household food consumption averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

Figure 31 Healthcare Expenditures over the lifecycle



Notes: The figure plots household healthcare expenditure averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

Figure 32 Healthcare Expenditures for 85 years old and younger

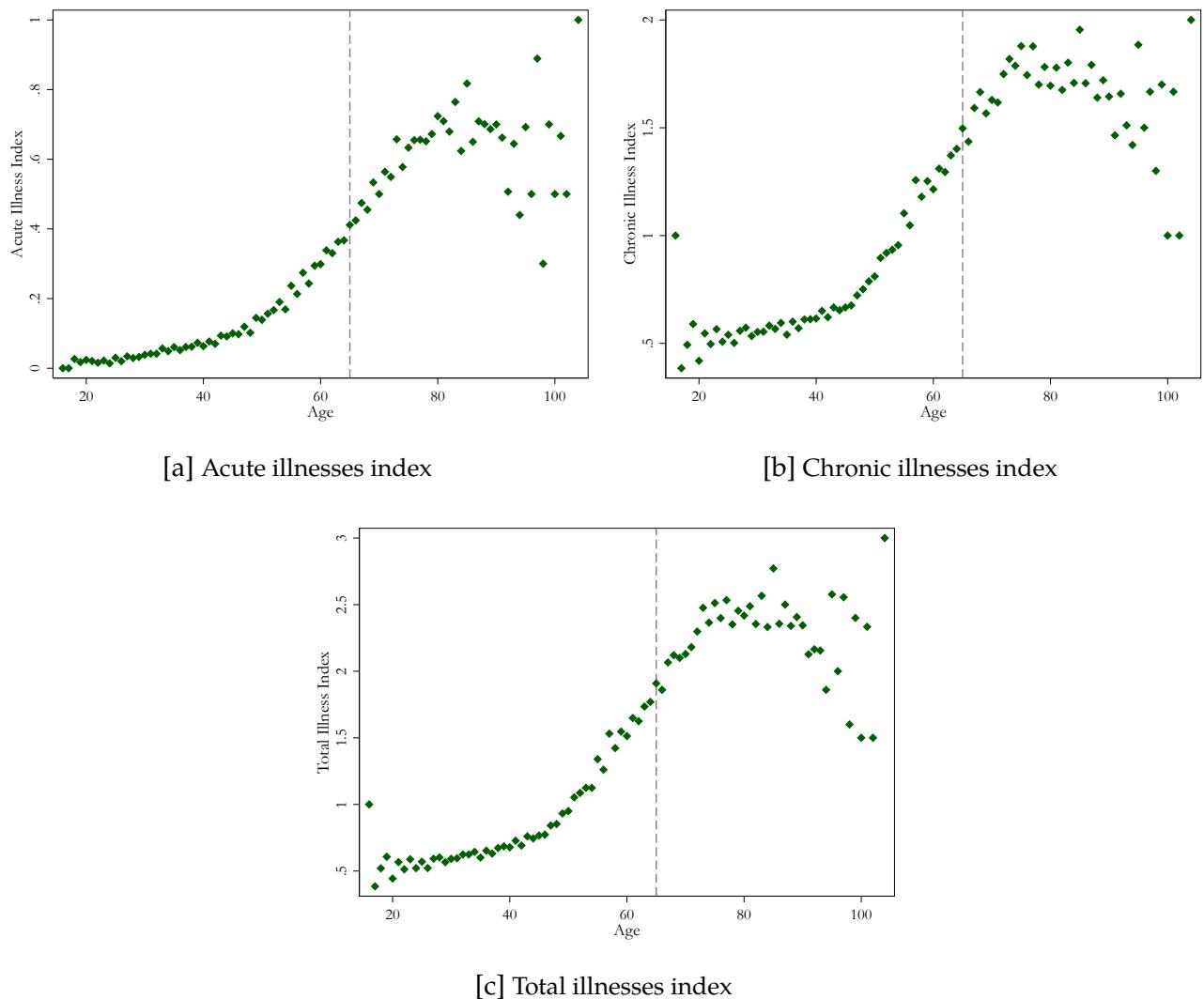


Notes: The figure plots household healthcare expenditure for 85 years old and younger that is averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015. The amounts are plotted in thousands 2010 dollars. Family size and the number of children are partialled out in the adjusted figure.

3.5 HEALTH OVER THE LIFECYCLE

Health is an important part of household well-being. It is important to assess its lifecycle dynamics and its relation to income and wealth. I construct two indices that count the number of acute and chronic illnesses for head and spouse of the household. Figure 33 plots acute index, chronic index and their sum over the lifecycle. As expected, the illnesses increase as the households ages. There is decline after around age 80 which is due to the survival bias. The relatively healthier households live longer past age 80.

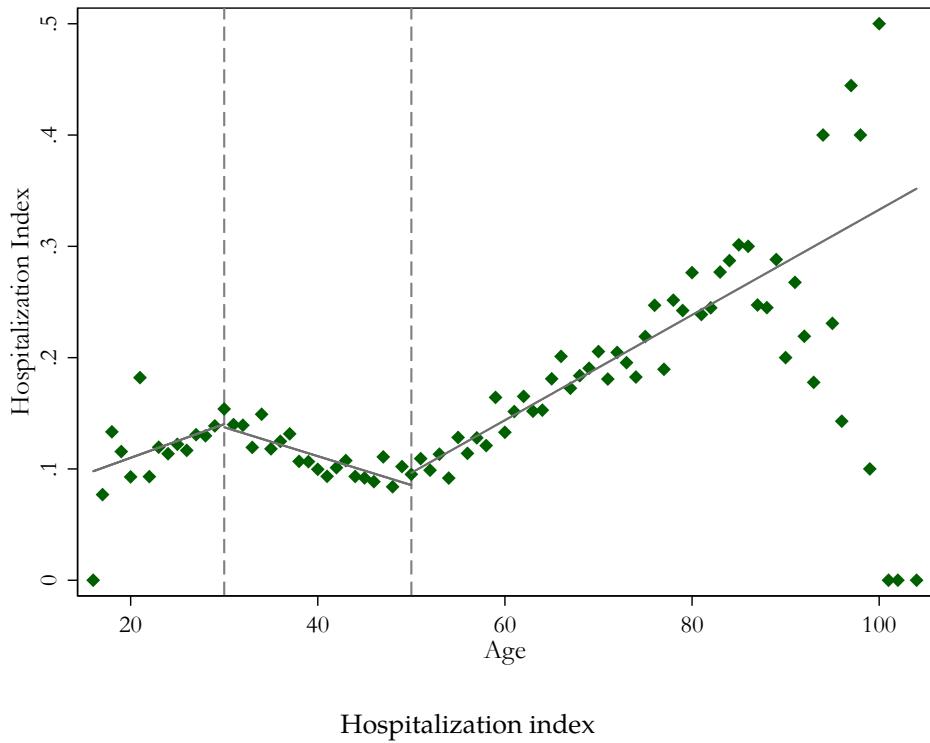
Figure 33 Family health status over the lifecycle



Notes: The figure plots households acute index, chronic index and total index changes that is averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015.

Figure 34 plots the hospitalization index that is constructed whether household head or spouse is hospitalized during the year. Hospitalizations increase with age in general. However, there is a small local peak around age 30. This peak is possibly due to the hospital stay of young women that give birth.

Figure 34 Hospitalization over the lifecycle



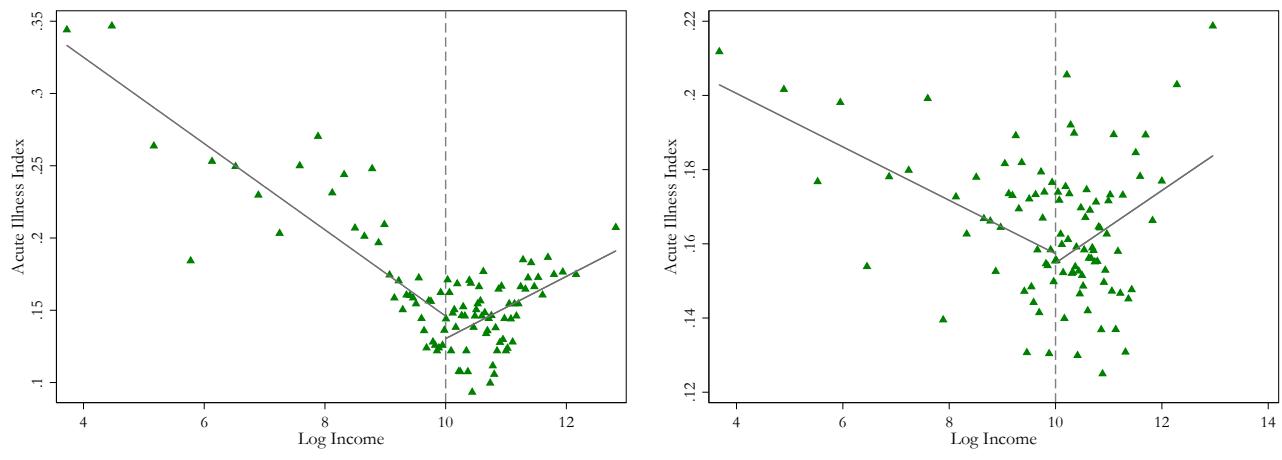
Notes: The figure plots households hospitalization index changes that is averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015.

3.6 HEALTH-INCOME GRADIENT

The correlation between health status and income is shown in Figure 35 - 37. The figures plot acute index, chronic index and hospitalization index against disposable income. The panel a in all figures plot unadjusted index. The age profile of indices reveal high age effects in the number of illnesses in the family. Therefore, the panel b in the figures plot the residual indices adjusted for age effects. Acute index does not show a high income correlation. On the other hand, chronic index is highly negatively correlated with income. This relation is true even after the age effects are taken out.¹ Hospitalization is also negatively correlated with income though not as high as chronic index.

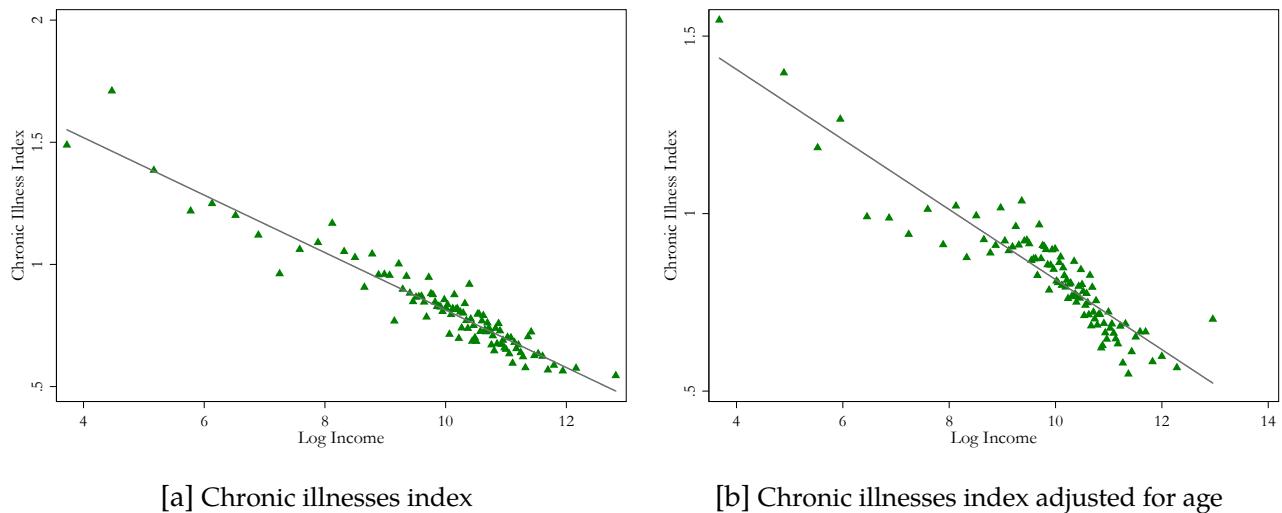
¹The plotted indices are residuals of a linear regression on age of the household. The results are similar if a quadratic polynomial in age is used.

Figure 35 Acute illnesses status by income



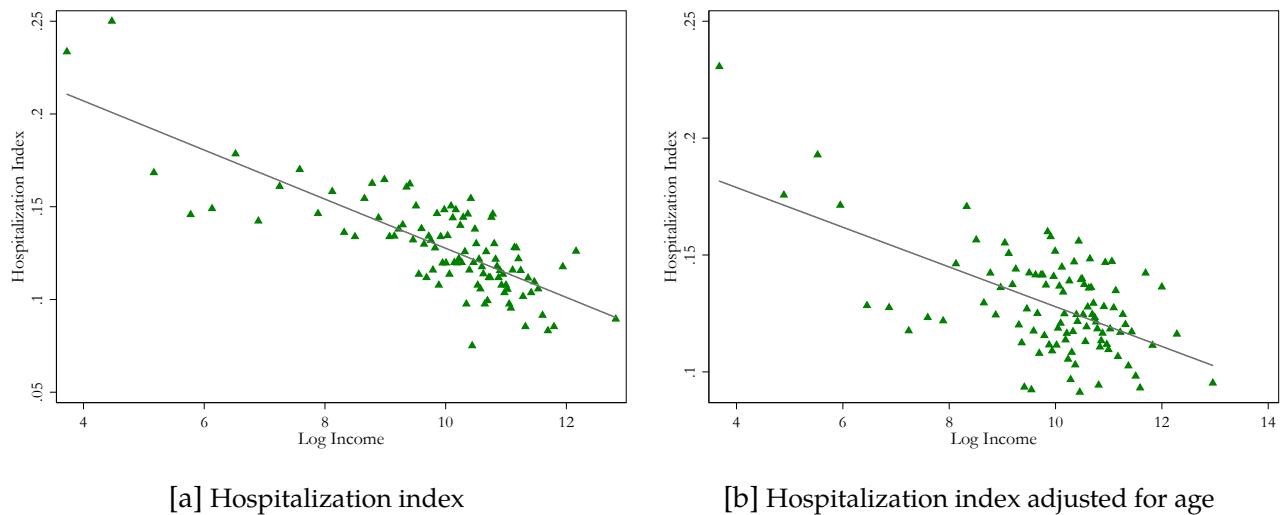
Notes: The figure plots households acute index changes adjusted and unadjusted for age effects that is averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015.

Figure 36 Chronic illnesses status by income



Notes: The figure plots households chronic index changes adjusted and unadjusted for age effects that is averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015.

Figure 37 Hospitalization status by income



Notes: The figure plots households hospitalization index changes adjusted and unadjusted for age effects that is averaged over households by the age of the head. The data is a pooled sample of PSID for waves 1999-2015.

These negative correlations do not give information about the causal relation. It is possible that low income leads to lower nutrition, worse self care which results in worsening of health status. On the other hand, the low health workers are possibly less productive and therefore earn lower incomes.

4 WELFARE OVER THE BUSINESS CYCLE

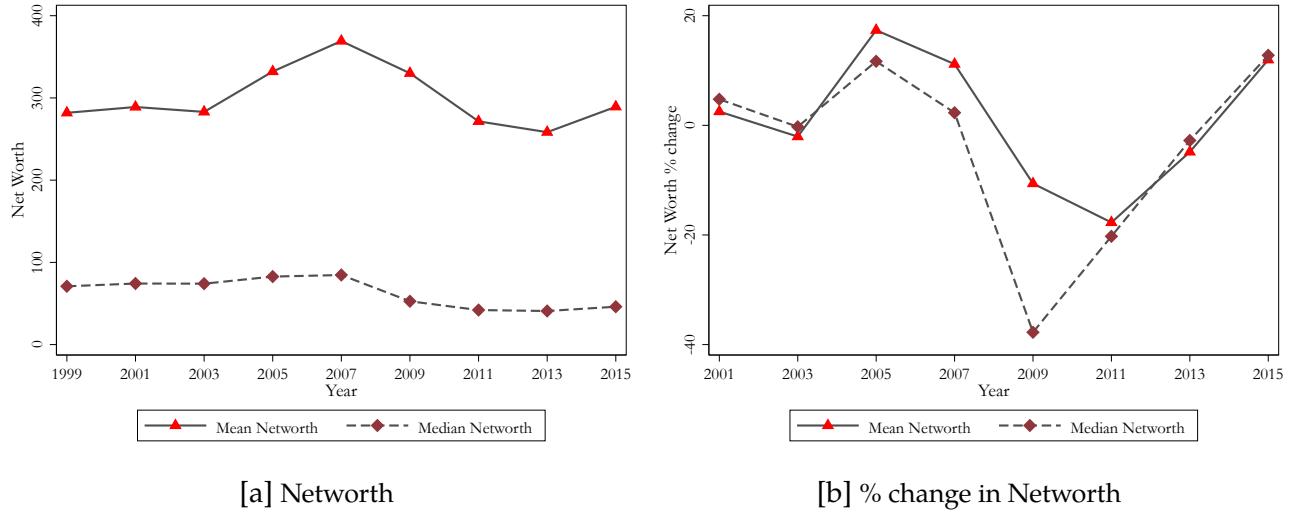
This section presents the dynamics in household wealth, income and consumption over 1999-2015 time period. This period involves one of the most severe economic downturn in US history. The Great Recession from 2007 to 2009 has tremendous effect on household wellbeing.

4.1 WEALTH, INCOME AND CONSUMPTION OVER THE BUSINESS CYCLE

Figure 38 and Figure 39 plots mean and percentiles of household networth and their percent changes from previous period(2 years) for 1999-2015 time period. The figures clearly show the

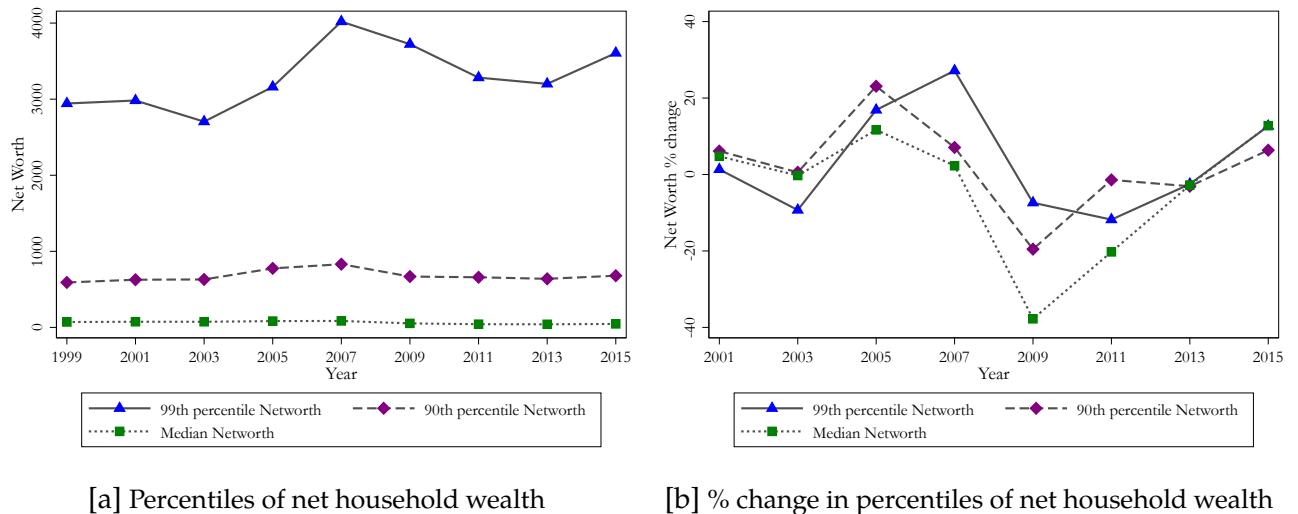
drop in networth from 2007 to 2009 and the drop is present across the distribution of networth. Similar results are observed for wealth excluding home equity.

Figure 38 Networth over time



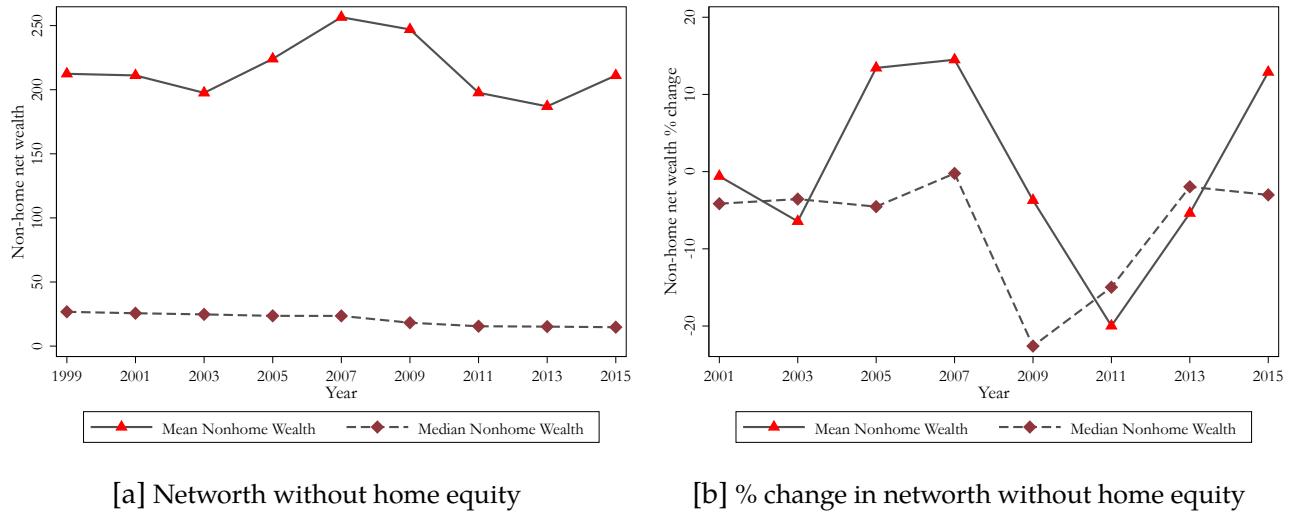
Notes: The figure plots mean and median net household wealth over years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

Figure 39 Percentiles of Networth over time



Notes: The figure plots median, 90th and 99th percentiles of net household wealth over years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

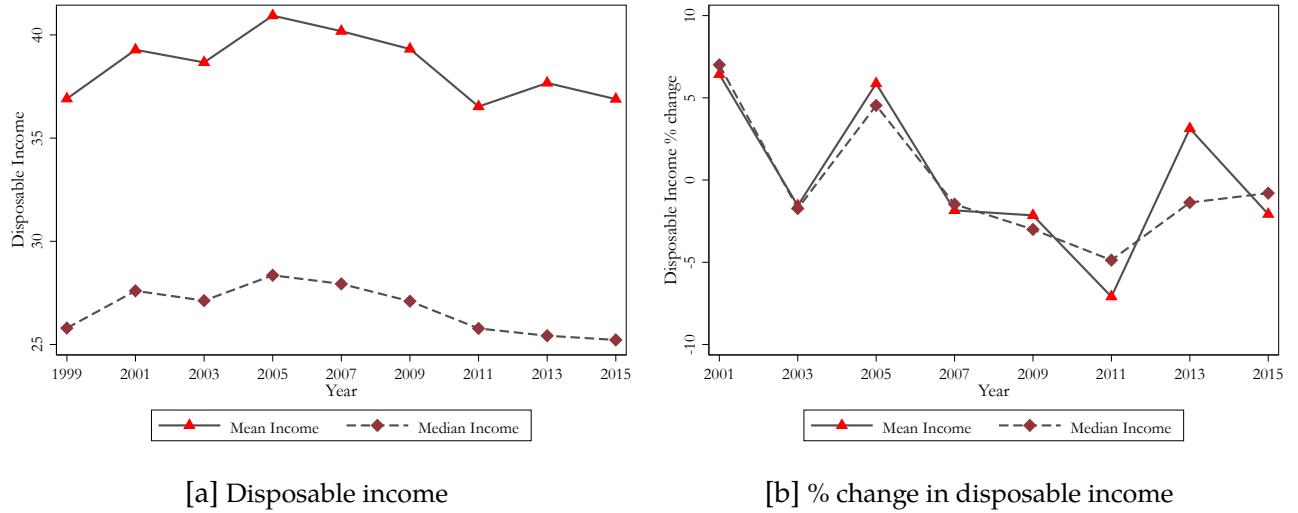
Figure 40 Nonhousing wealth over time



Notes: The figure plots mean and median net household wealth excluding home equity over years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

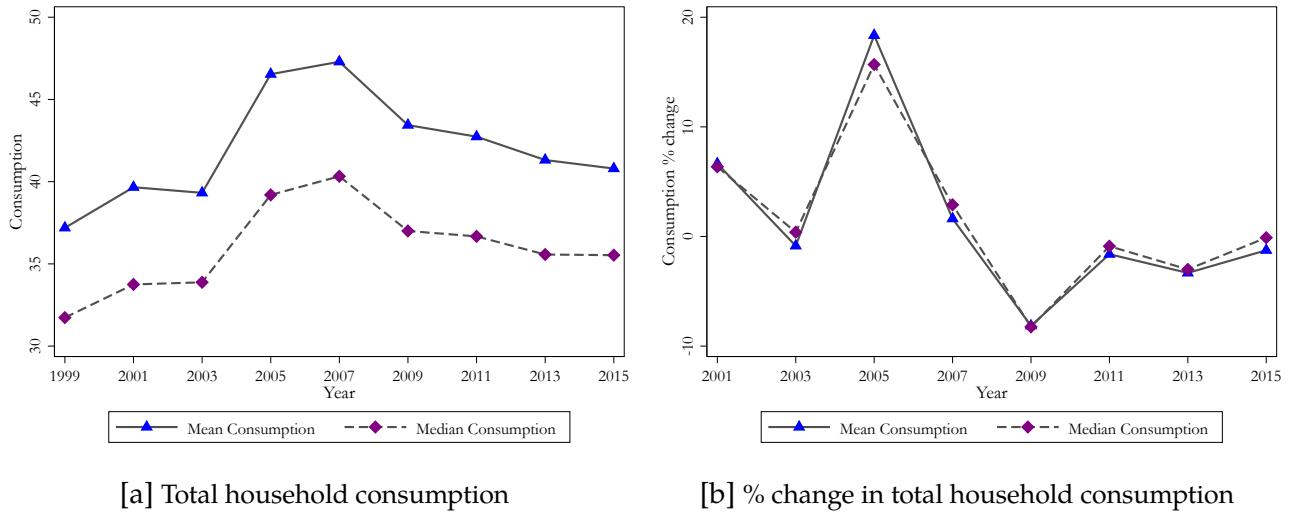
Figures 41 and 42 show the drop in disposable income and consumption during the recession and the recovery afterwards.

Figure 41 Disposable Income over time



Notes: The figure plots mean and median net household income net of taxes for years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

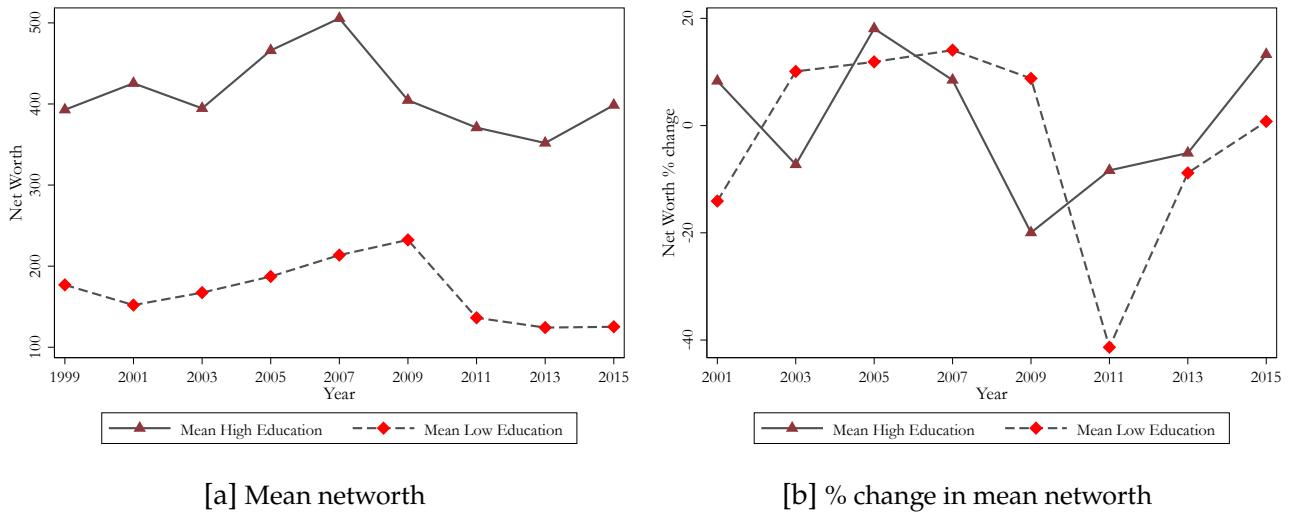
Figure 42 Consumption over time



Notes: The figure plots mean and median of total household consumption for years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

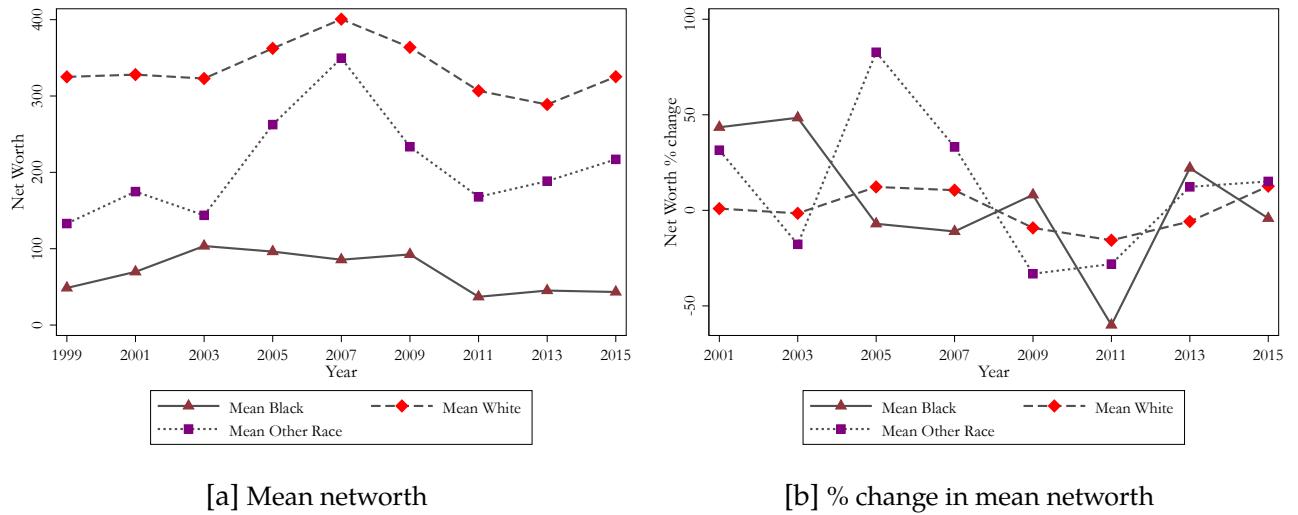
Figures 43 and 44 and 45 show the change in networth by education, sex and race of the head of the household. Although the fall during the recession is prevalent for all demographic groups, it is more severely felt by low educated, non-white and female households.

Figure 43 Networth by education over time



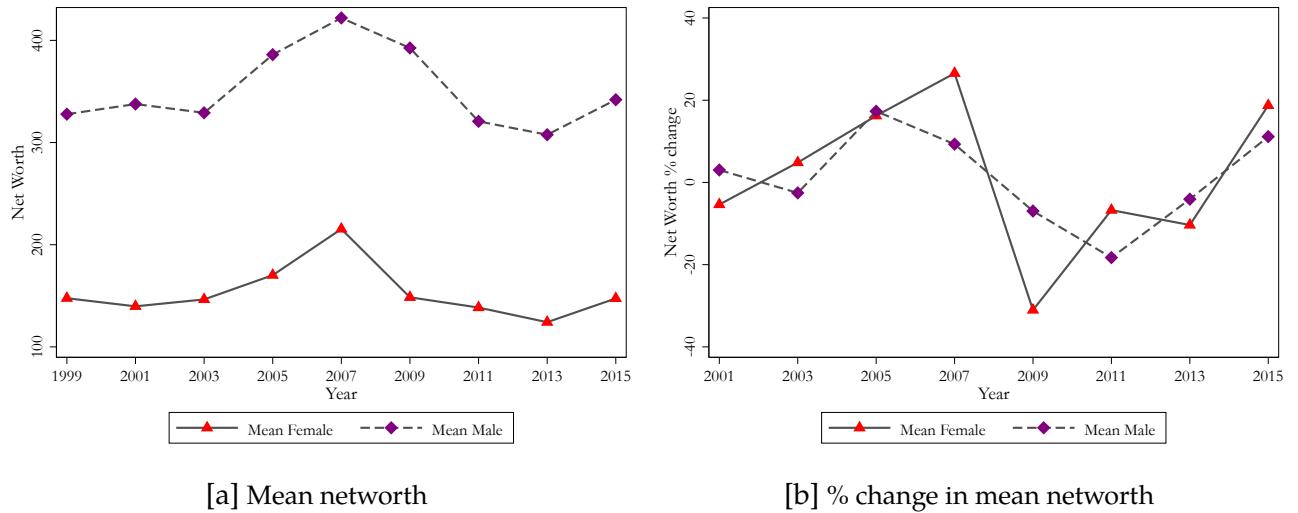
Notes: The figure plots mean networth for high and low educated households for years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

Figure 44 Networth by race over time



Notes: The figure plots mean networth for race categories for years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

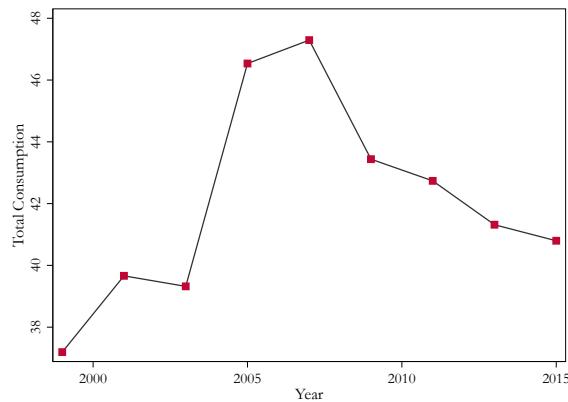
Figure 45 Networth by sex over time



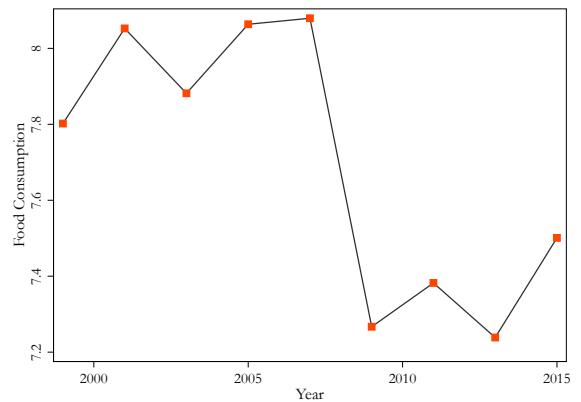
Notes: The figure plots mean networth for female and male headed households for years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

Figure 46 plots average consumption for 1999-2015. Consumption falls during the recession. This is particularly interesting for household out-of-pocket healthcare expenditures which had an increasing trend over many years. However, the effect of the recession seem to be short-lived.

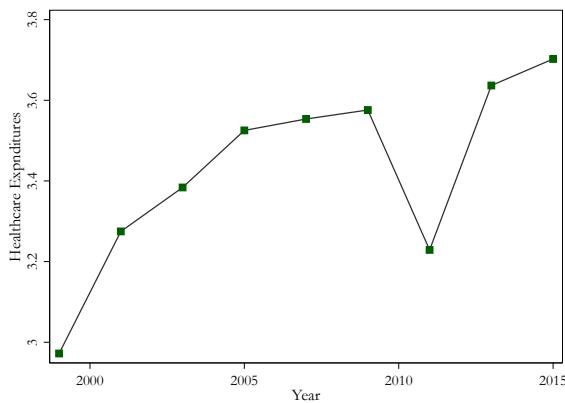
Figure 46 Consumption over the business cycle



[a] Total consumption



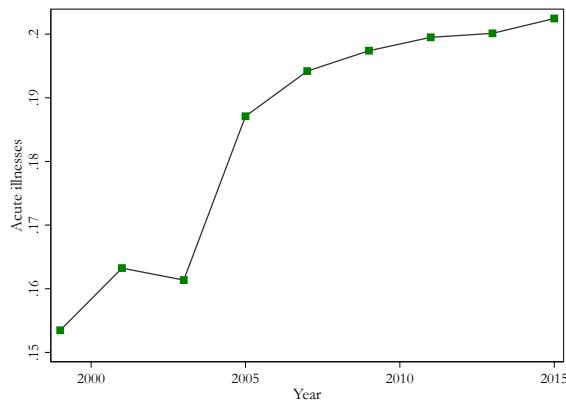
[b] Food consumption



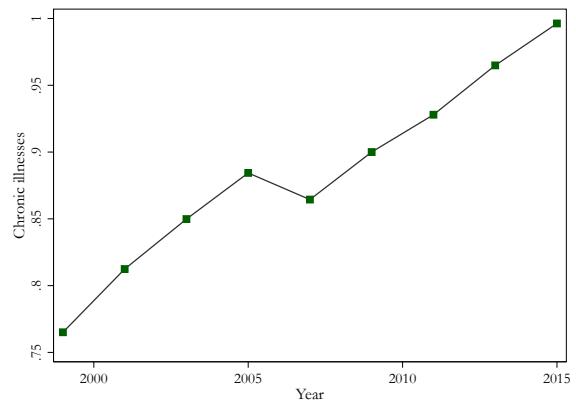
[c] Healthcare expenditures

Notes: The figure plots total, food and healthcare expenditures for years 1999-2015. The data is taken from 1999-2015 waves of PSID. The amounts are plotted in thousands 2010 dollars.

Figure 47 Health status over the business cycle



[a] Acute illnesses index

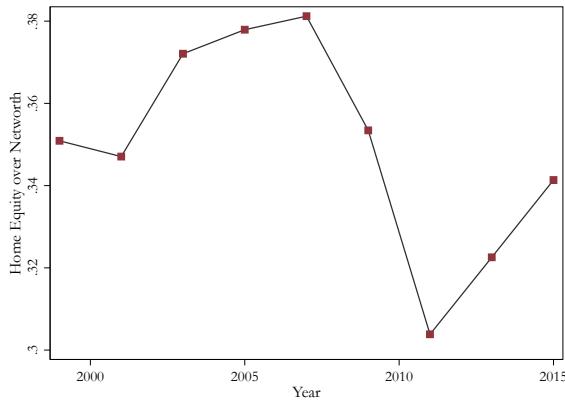


[b] Chronic illnesses index

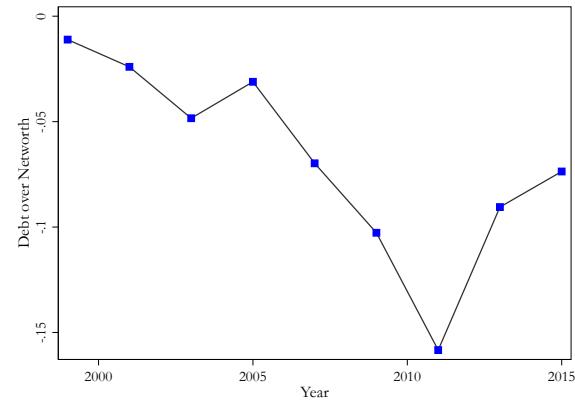
Notes: The figure plots household health indices for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

Figures 48 to 53 show the change in household portfolios over 1999-2015. The recession adversely affected all the measures of household wealth and this effect is more severe for the most vulnerable households, namely for female, non-white and low educated.

Figure 48 Portfolio over the business cycle



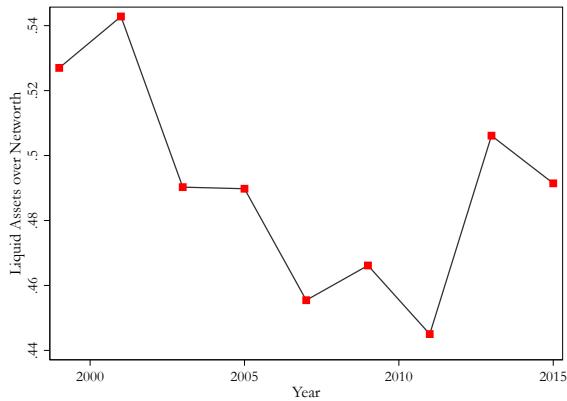
[a] Home equity to networth



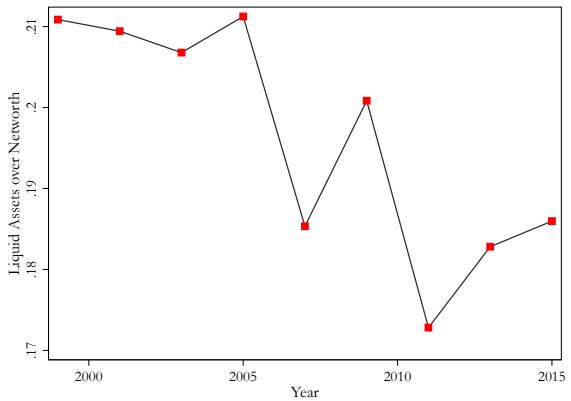
[b] Debt to networth

Notes: The figure plots ratios of home equity and debt to household net wealth for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

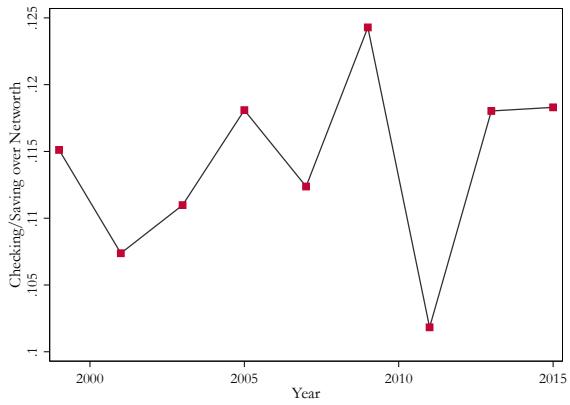
Figure 49 Liquidity over the business cycle



[a] Liquid assets to networth (broad)



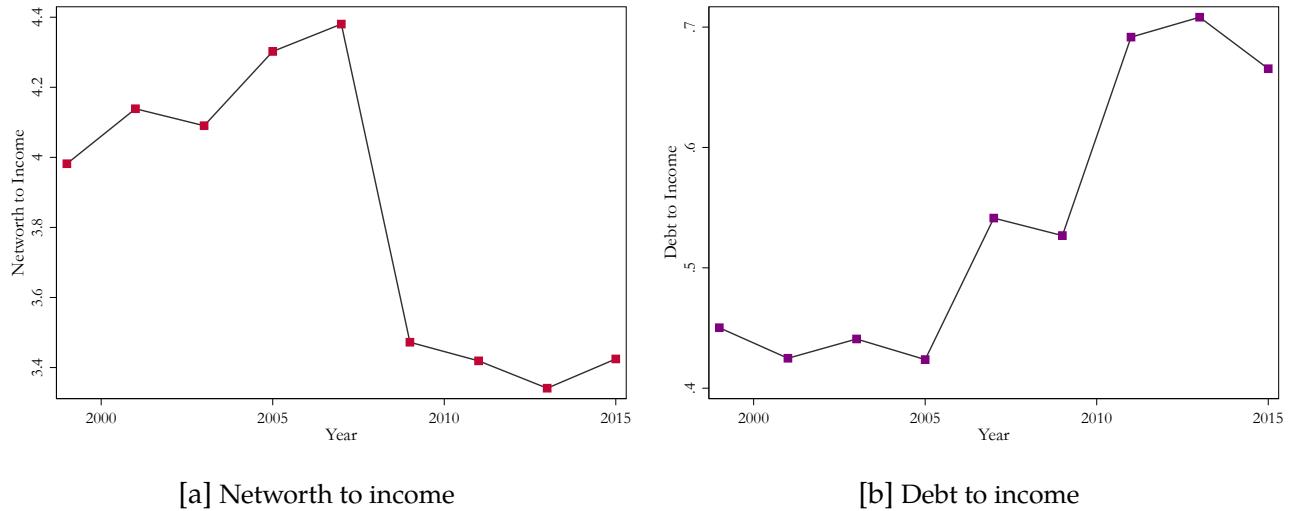
[b] Liquid assets to networth (narrow)



[c] Checking/Saving to networth

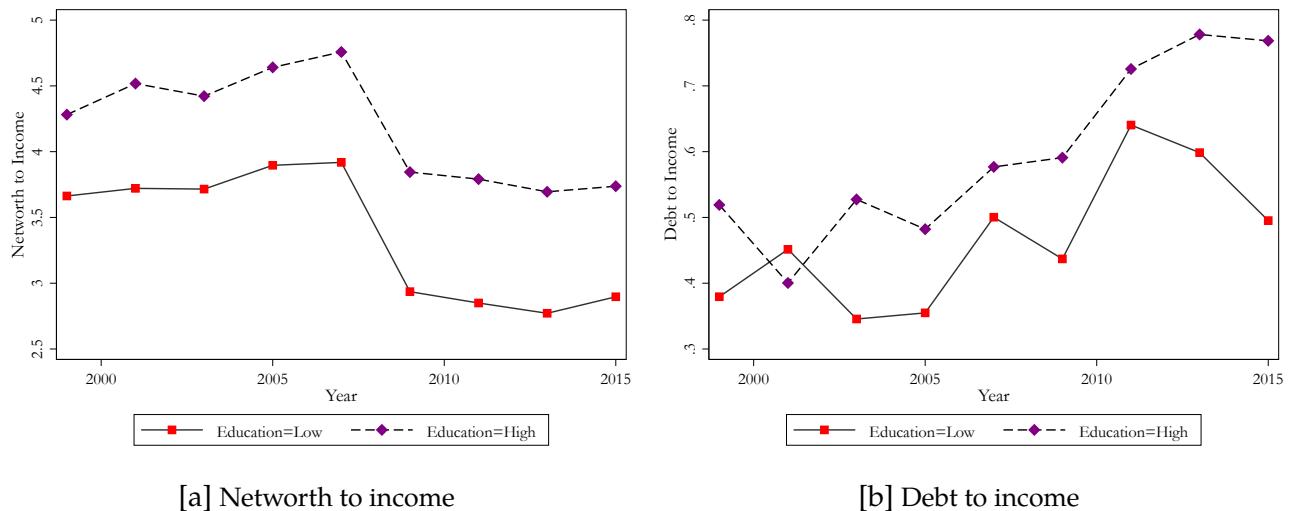
Notes: The figure plots ratios of liquid assets, and checking/saving to net wealth for years 1999-2015. The data is taken from 1999-2015 waves of PSID. Broad definition of liquid assets for PSID data is the sum of checking/savings account, stocks, value of vehicles, other assets and annuity/IRA. Narrow definition of liquid assets is the sum of checking/savings account, stocks, and other assets.

Figure 50 Wealth to income over the business cycle



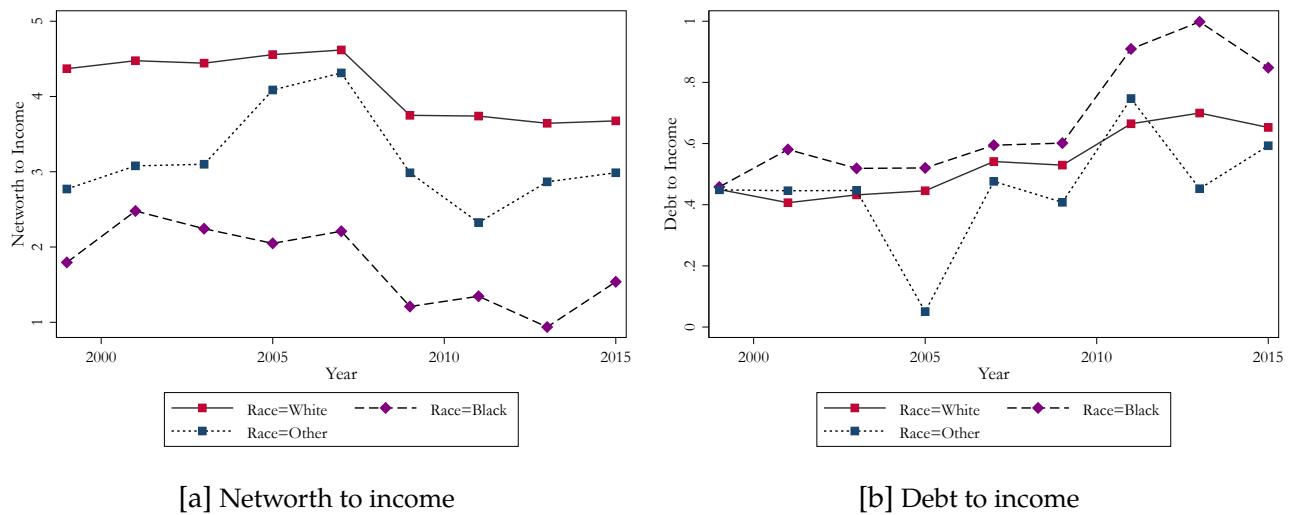
Notes: The figure plots networth to income and debt to income ratios for years 1999-2015. The data is taken from 1999-2015 waves of PSID. Income is total income after taxes plus credits.

Figure 51 Wealth to income by education over the business cycle



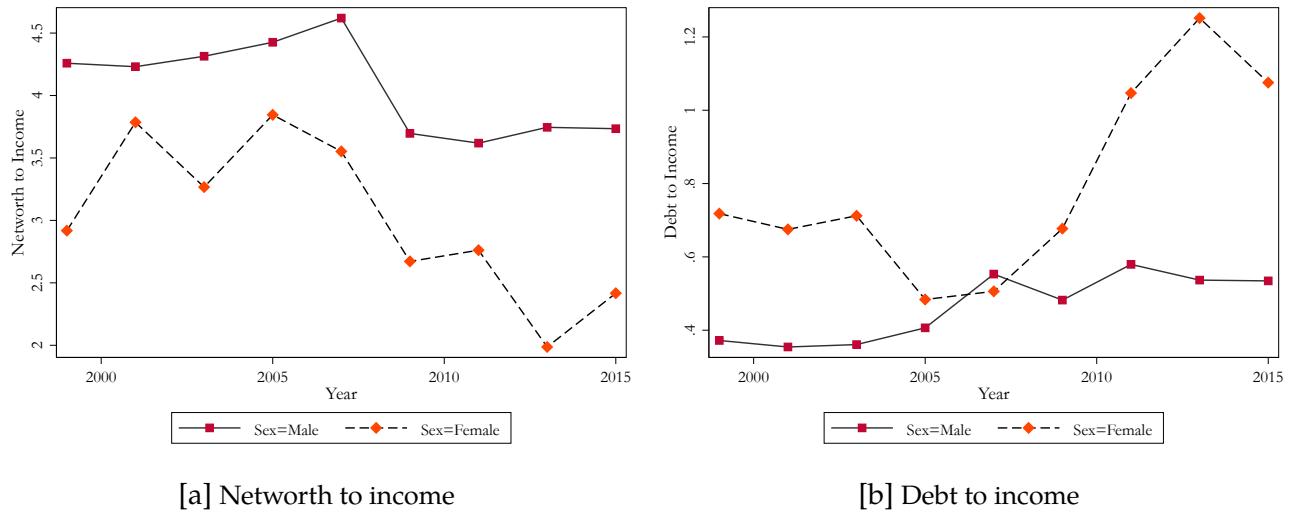
Notes: The figure plots networth to income and debt to income ratios by education of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID. Income is total income after taxes plus credits.

Figure 52 Wealth to income by race over the business cycle



Notes: The figure plots networth to income and debt to income ratios by race of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID. Income is total income after taxes plus credits.

Figure 53 Wealth to income by sex over the business cycle



Notes: The figure plots networth to income and debt to income ratios by sex of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID. Income is total income after taxes plus credits.

4.2 POVERTY OVER THE BUSINESS CYCLE

In this section, I calculate poverty rate in PSID sample. I use weighted average poverty thresholds provided by the U.S. Census Bureau to calculate poverty rates. The thresholds vary by the number of persons in the family. I use disposable income to determine income poverty rates. Alternatively, before tax income is also used to calculate poverty rates in some measurements. The poverty thresholds are calculated to measure the fraction of households below an income threshold. I use the thresholds to calculate *Income Poverty* rate in the PSID sample. Additionally, I construct the fraction of households that have savings below the poverty threshold and call it *Asset Poverty* rate. This latter rate measures whether households have enough assets worth of a year's income. The poverty thresholds by the Census Bureau is provided in Table 8 in the Appendix. Table 1 gives the poverty rates for the pooled sample between 1999-2015. Poverty rates for each year is provided in the Appendix Tables 9- 17.

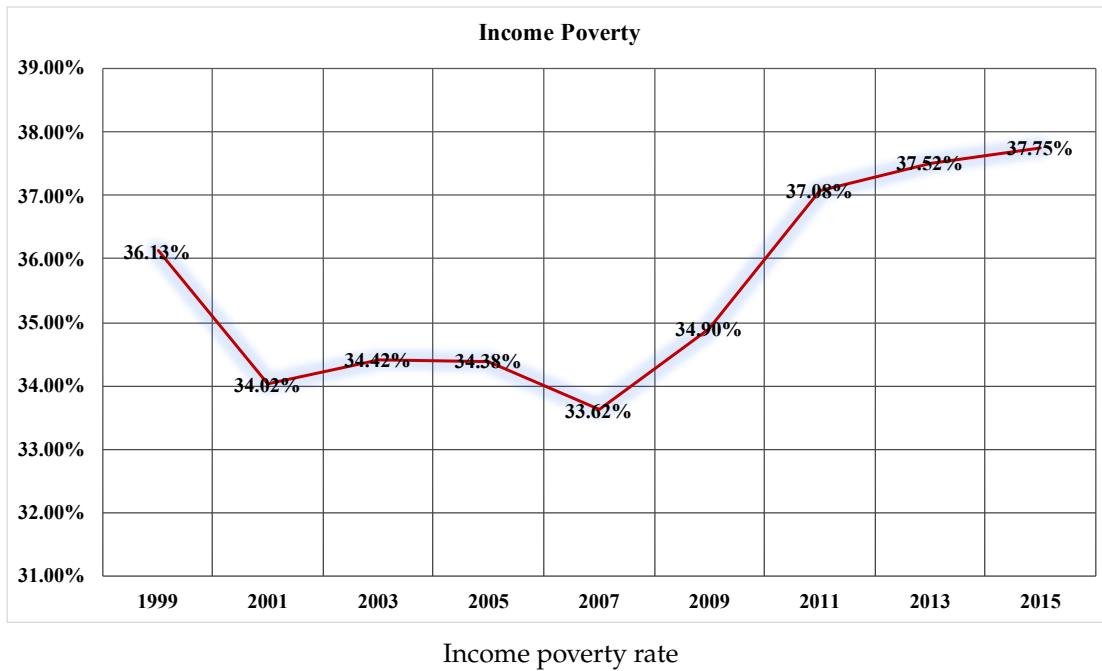
Table 1 Poverty Rates for 1999-2015 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income	Above Poverty Line	41.53	22.90	64.43
Poverty	Below Poverty Line	11.48	24.10	35.57
	Total	53.01	46.99	100.00
	Observations	53774		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

According to the Table 8, 35.57 % households have incomes below the threshold. 46.99 % households do not have enough assets worth of a year's income. This number reflects the fact that many households hold zero or very low levels of wealth in U.S. Most of the wealth is concentrated among few rich households. These poverty definitions are not mutually exclusive. Some households may be below income poverty line but may have enough assets and vice versa. Only 11.48 % of households that experience income poverty have assets above asset poverty level. 24.1 % of households experience income poverty as well as asset poverty.

Figure 54 Income poverty rate for 1999-2015 PSID sample

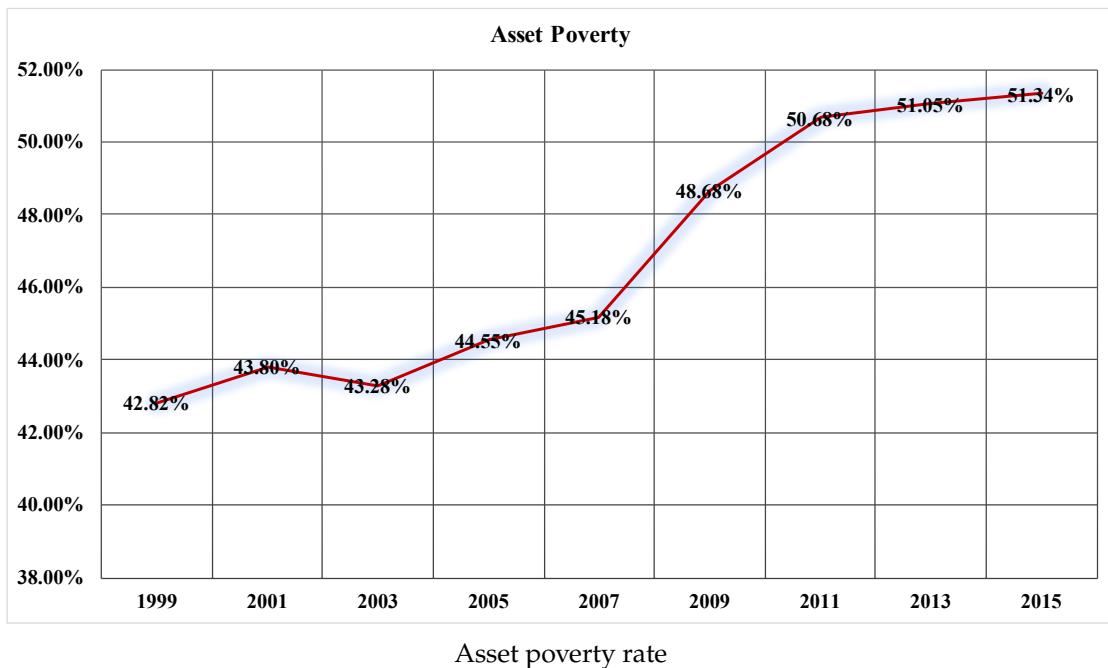


Notes: The figure plots poverty rate calculated based on disposable income for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

Figures 54 and 55 show the change in poverty rates over time. Both figures show the impact of Great Recession on US households. Poverty rates dramatically increases around 2009. Income poverty rate rises by 3.5 percentage points from 2007 to 2011. Asset poverty rises by around 5.5 percentage points during the same period. Figure 56 plots income and

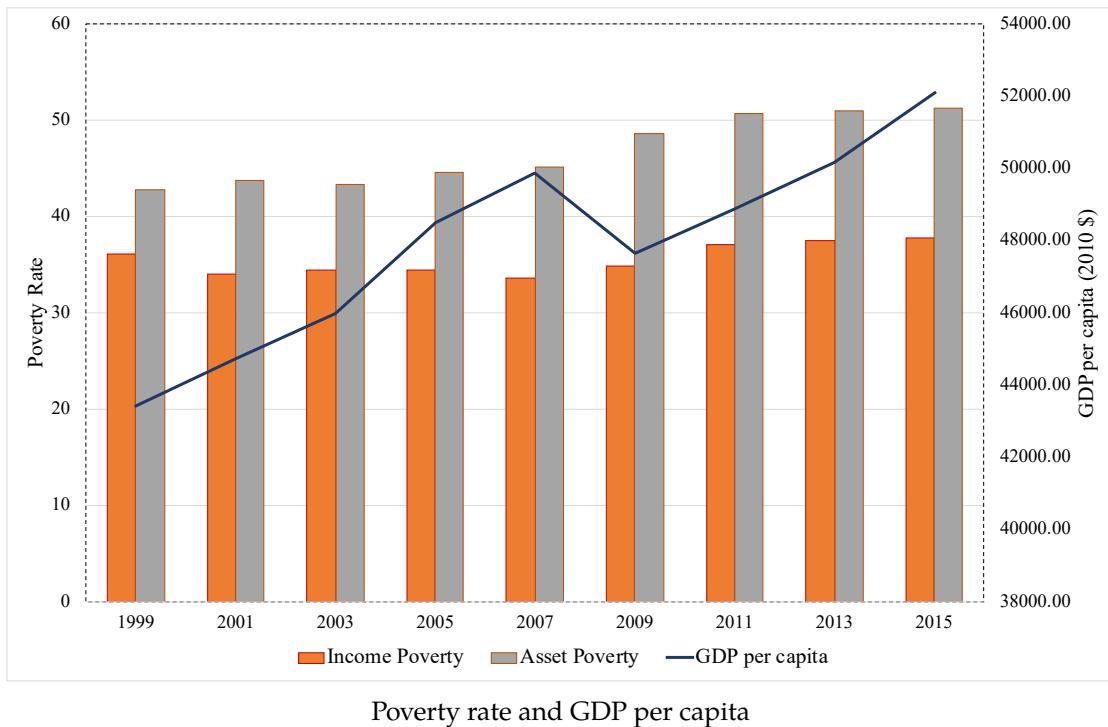
asset poverty rates together with GDP per capita for the same time period. The decline in GDP per capita corresponds to the increase in poverty rates showing the adverse effect of recession on poor households. However, the overall increase in per capita GDP during this period is not accompanied by a decline in poverty rates. Although the income poverty rate had a declining trend before the Great Recession, it actually continues to rise even after GDP per capita recovers. Asset poverty shows an increasing trend during all these periods. This results suggests that the poor households are not benefiting from the booms in the economy. The business cycles have asymmetric effects on the poor households, and the benefit of a growing economy goes to richer households which further increases the prevalent inequality.

Figure 55 Asset poverty rate for 1999-2015 PSID sample



Notes: The figure plots poverty rate calculated based on household networth for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

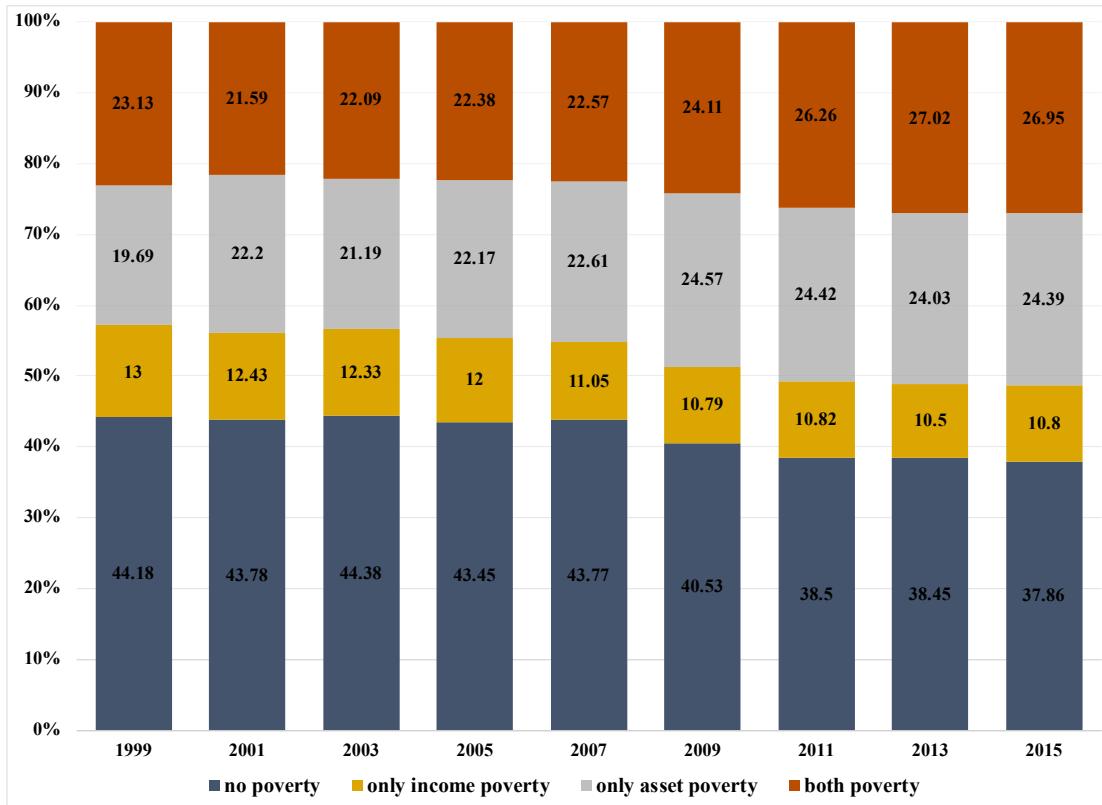
Figure 56 Poverty rates and GDP per capita for 1999-2015



Notes: The figure plots poverty rates calculated based on household networth for years 1999-2015 and U.S. GDP per capita in 2010 dollars. The household data is taken from 1999-2015 waves of PSID. GDP per capita is from the World Bank.

Figure 57 shows the disaggregated poverty rates over time. The figure shows the declining share of households with no poverty and increasing share of households with both types of poverty. These trends together with an increasing GDP are worrisome and are further pointing to an increase in economic inequality in the society.

Figure 57 Income and Asset Poverty rates for 1999-2015 PSID sample

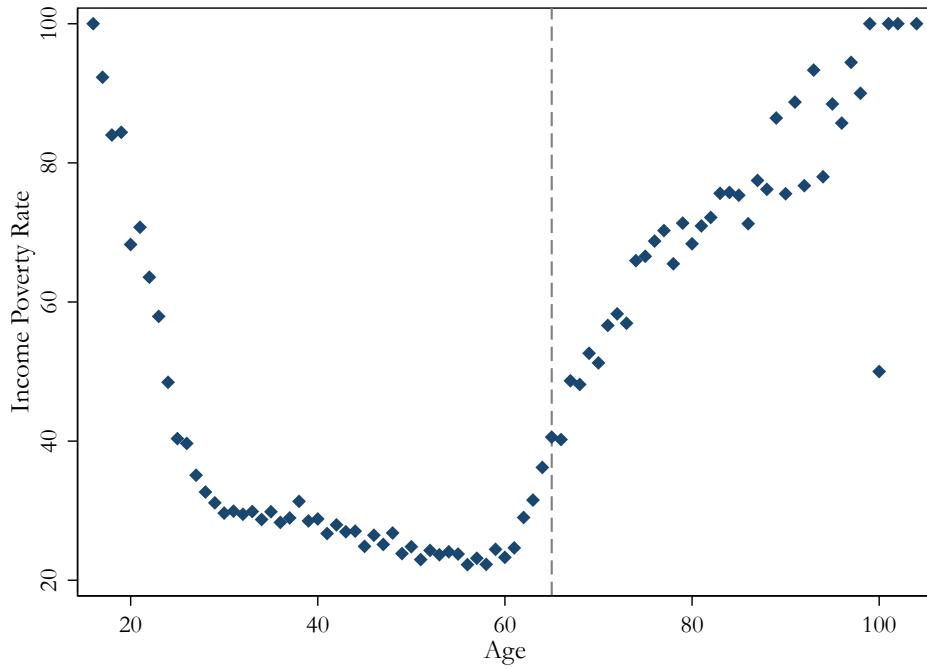


[a] Income and Asset poverty rates

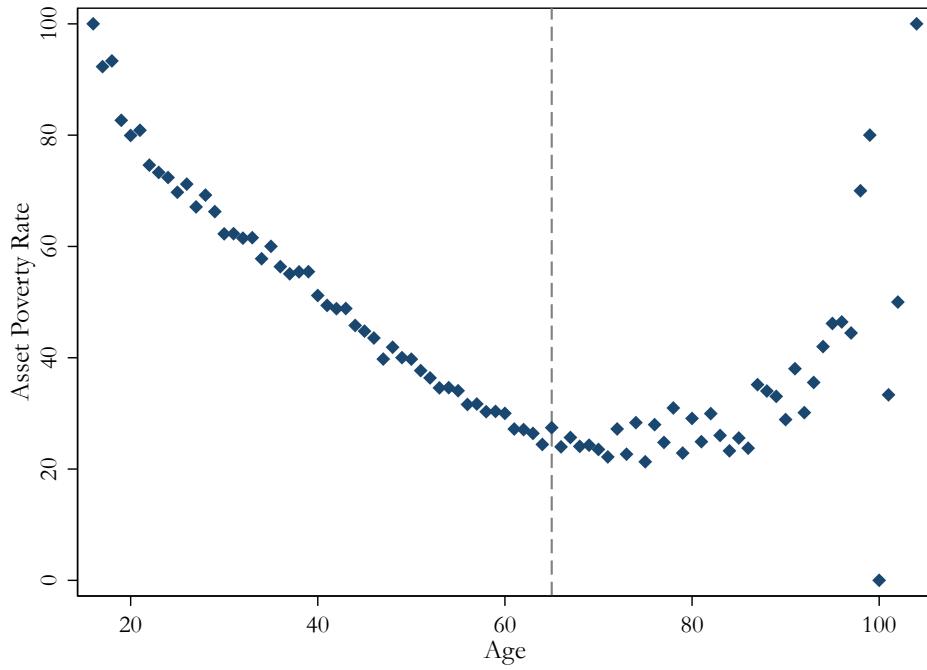
Notes: The figure plots income and asset poverty rates for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

Figure 58 shows the poverty rates over the lifecycle. Both income and asset poverty declines as the young households enter to the labor force and increases after retirement and as the old households decumulate wealth. Figure 59, Figure 60 and Figure 61 plots poverty rates separately by education, race and sex of the head of the household. The poverty rates are dramatically higher for low educated defined as less than high school education, for black and for females. However, the adverse effect of the Recession can be seen for both low and high educated households. The most dramatically affected group by the recession is other non-white race households. The declining trend of both asset and income poverty among this group sharply reverses between 2007 to 2009.

Figure 58 Income and Asset Poverty rates over the lifecycle



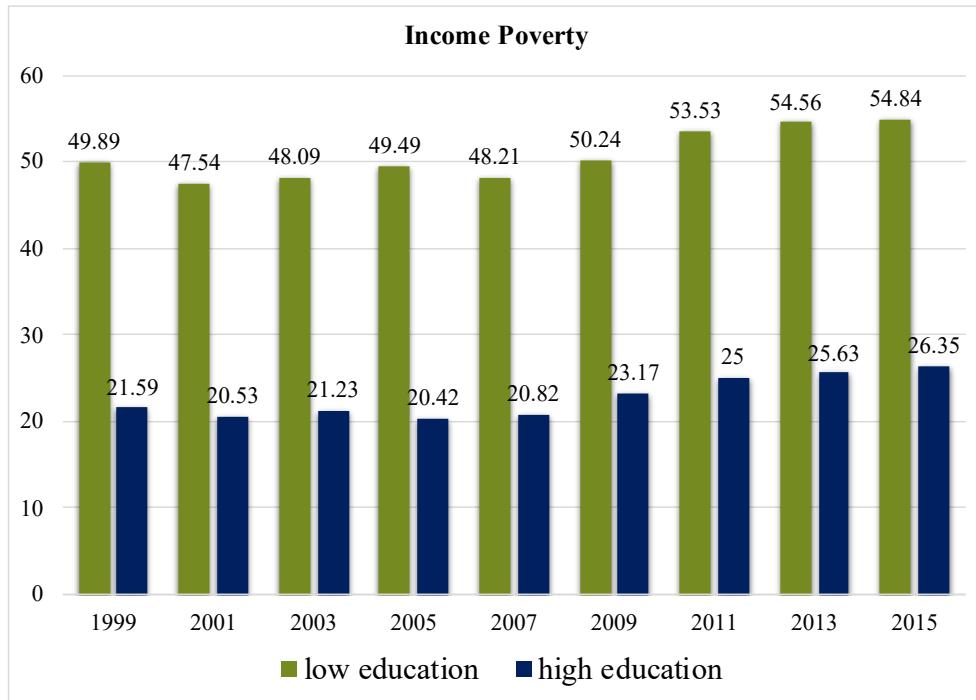
[a] Income poverty rate by age



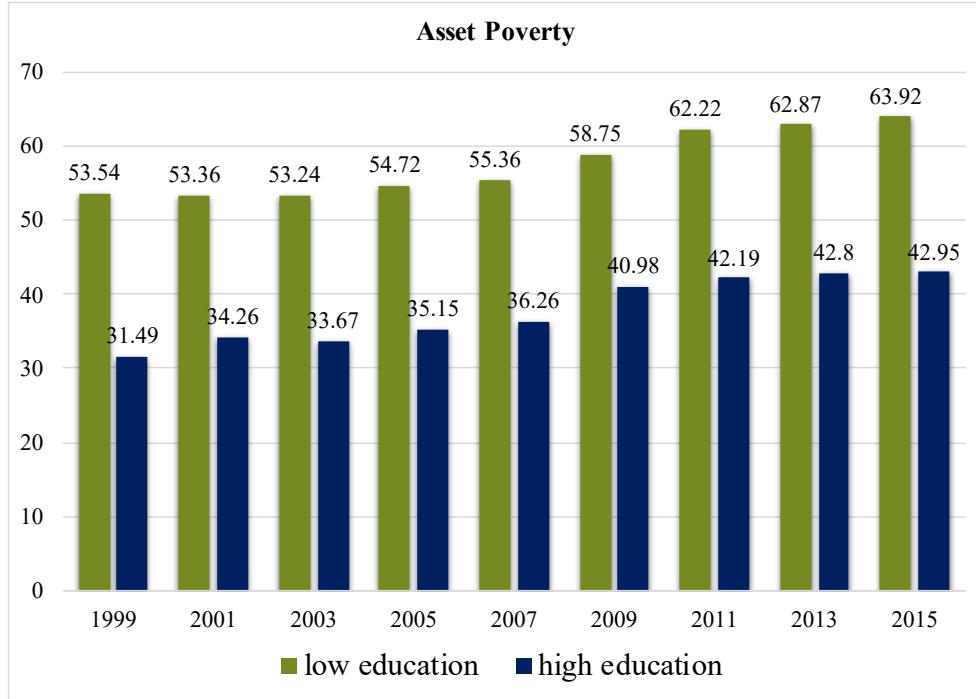
[b] Asset poverty rate by age

Notes: The figure plots income and asset poverty rates by age of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

Figure 59 Income and Asset Poverty rates by education



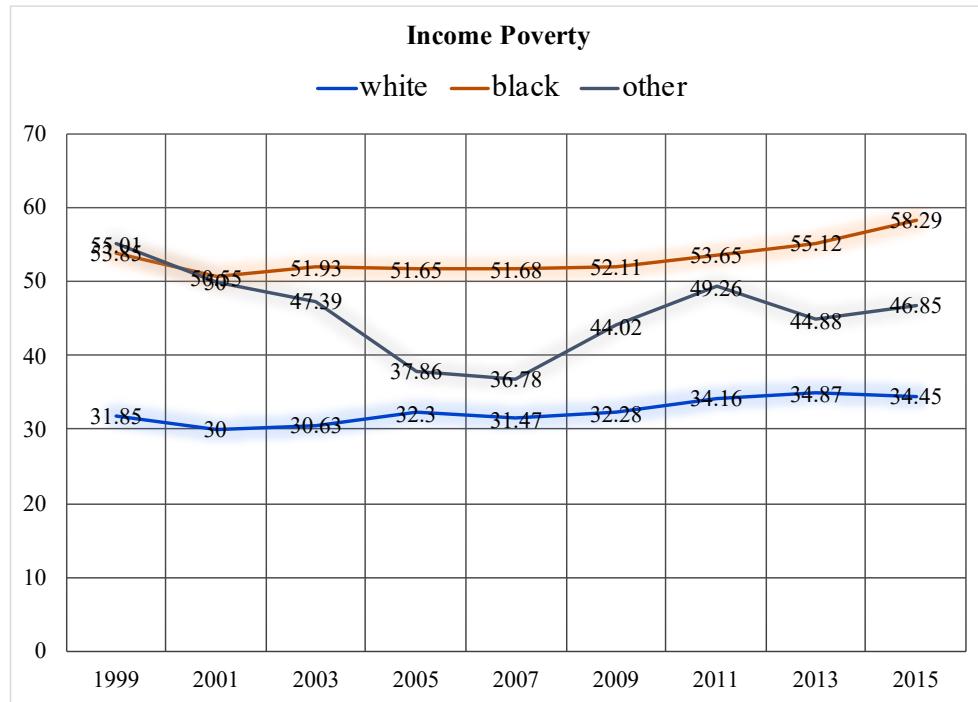
[a] Income poverty rate by education



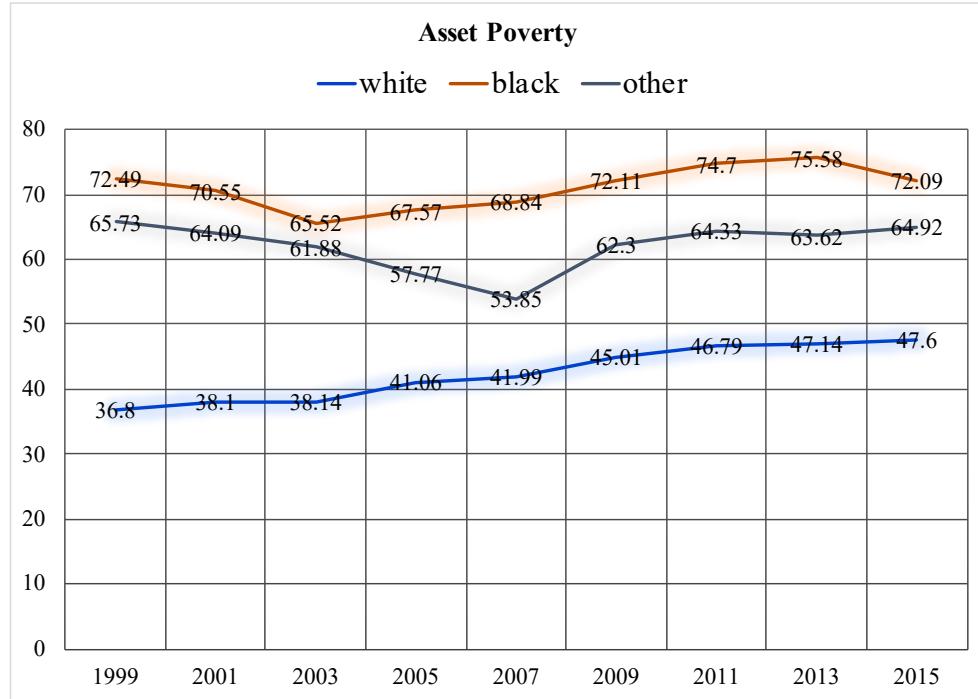
[b] Asset poverty rate by education

Notes: The figure plots income and asset poverty rates by education of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

Figure 60 Income and Asset Poverty rates by race



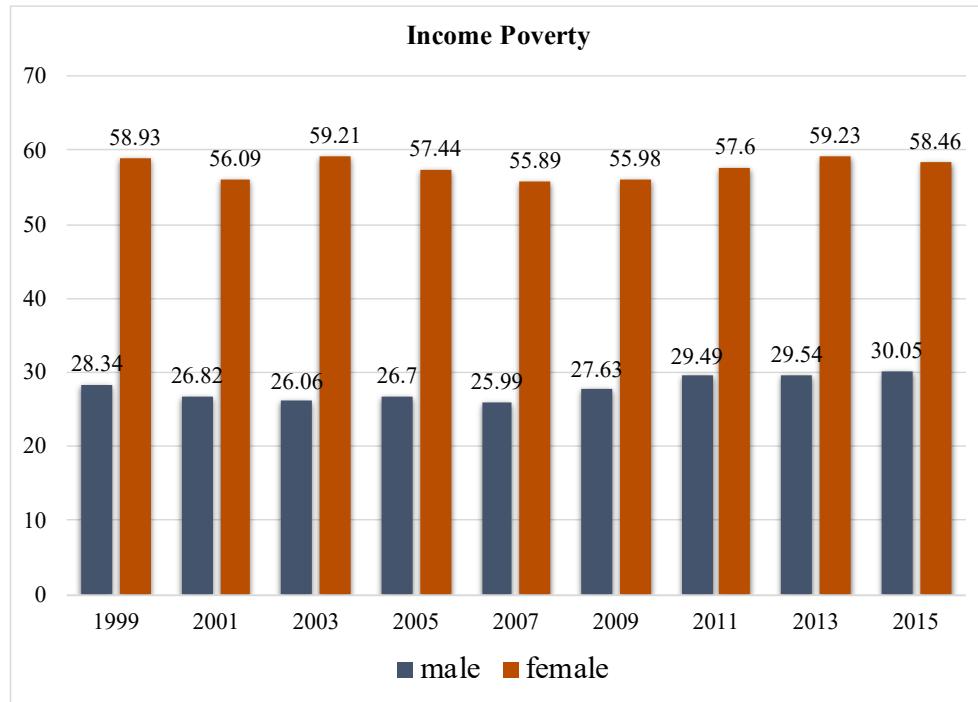
[a] Income poverty rate by race



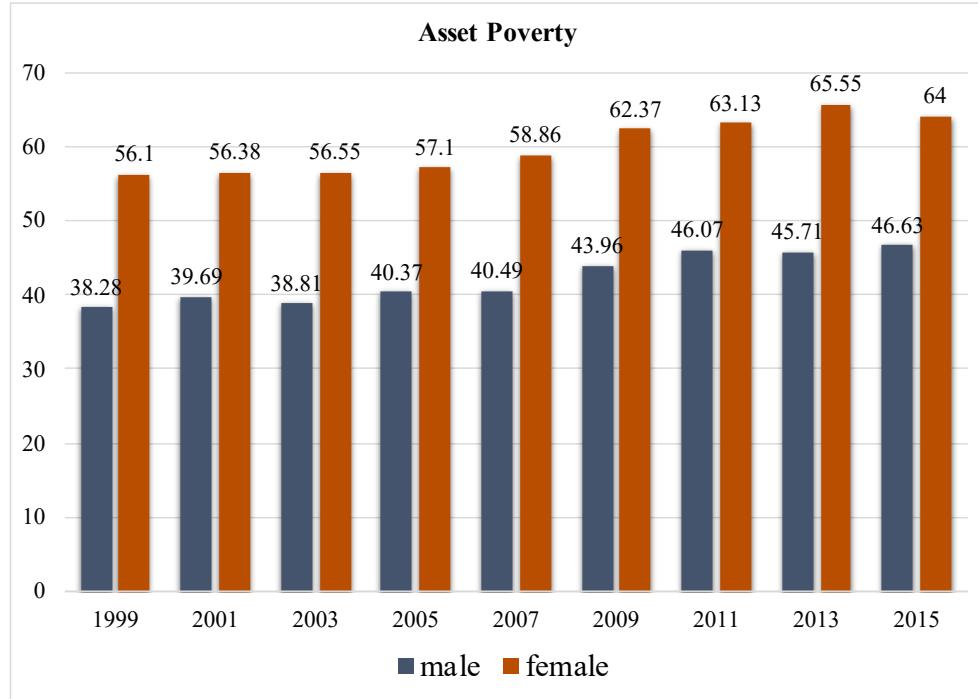
[b] Asset poverty rate by race

Notes: The figure plots income and asset poverty rates by race of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

Figure 61 Income and Asset Poverty rates by sex



[a] Income poverty rate by sex



[b] Asset poverty rate by sex

Notes: The figure plots income and asset poverty rates by sex of the head of the household for years 1999-2015. The data is taken from 1999-2015 waves of PSID.

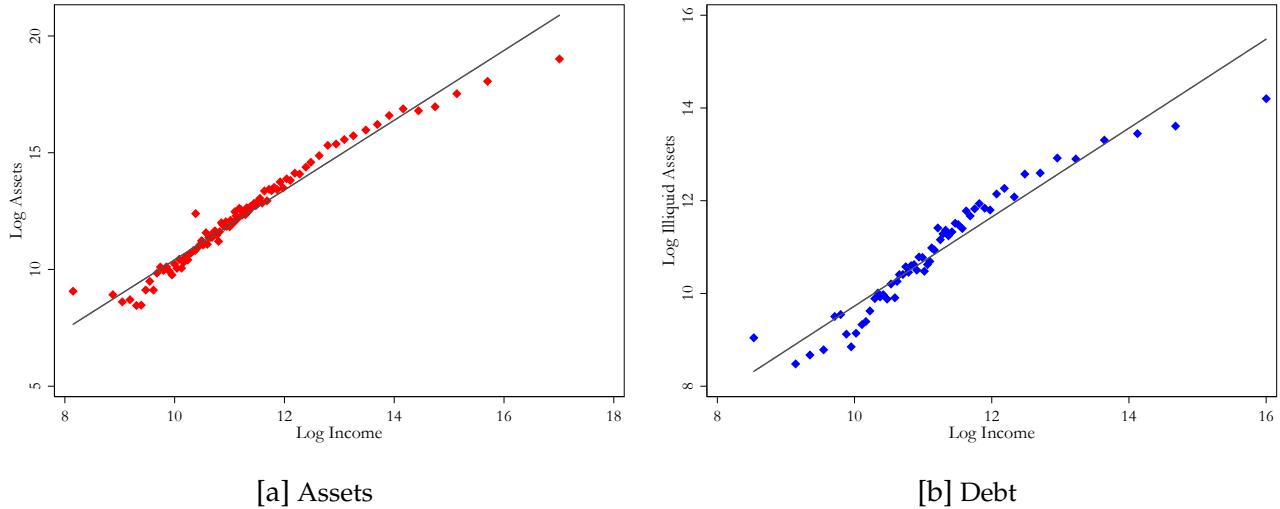
5 PORTFOLIO ALLOCATION IN SCF

5.1 WEALTH-INCOME GRADIENT IN SCF

Survey of Consumer Finances survey is main source for wealth and portfolio statistics in the literature. SCF is a better source to assess the dynamics in portfolio allocation because it has detailed asset information. Moreover, SCF oversamples high income households drawn from tax records. This makes possible to include portfolio allocation of upper tail of income distribution. PSID lacks in this dimension, and indeed include lower income households disproportionately with added SEO and Latino samples. In this study I did not include these subsamples. However, the PSID sample is still on average poorer than SCF sample and provide more information on the lower tail of the income distribution. Therefore, a combined study using both of these datasets provide a more accurate picture of portfolio allocation across the income distribution including lower and upper tails. This section shows the SCF sample results and compares it with the PSID sample. In the middle income range, the two samples provide similar information about the income and portfolio allocation of US households. However, there are some differences in liquid asset share and debt share in some subsamples between PSID and SCF data.

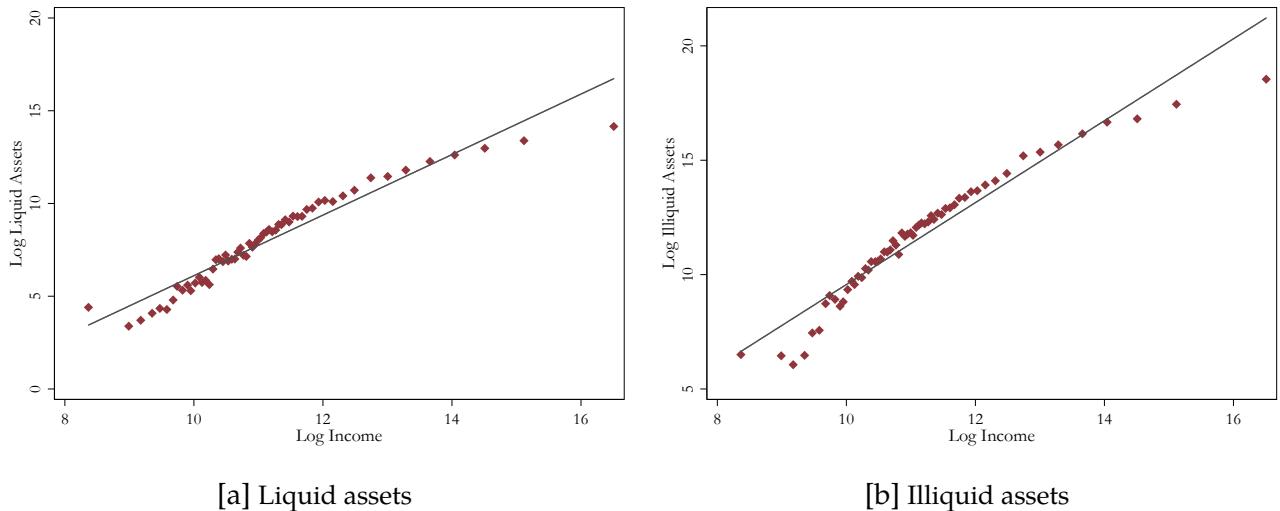
Figures 62 and 63 show the positive association between household income and assets, as well as debt. Debt in SCF is defined broader than the one in PSID sample which is the sum of all kinds of debt and includes residential and nonresidential real estate, loans as well as credit card debt.

Figure 62 Assets and Debt against income in SCF 2010



Notes: The figure plots total assets and total debt against income for households in 2010 wave of Survey of Consumer Finances. Debt includes residential and nonresidential real estate, loans as well as credit card debt. Income is total income before taxes.

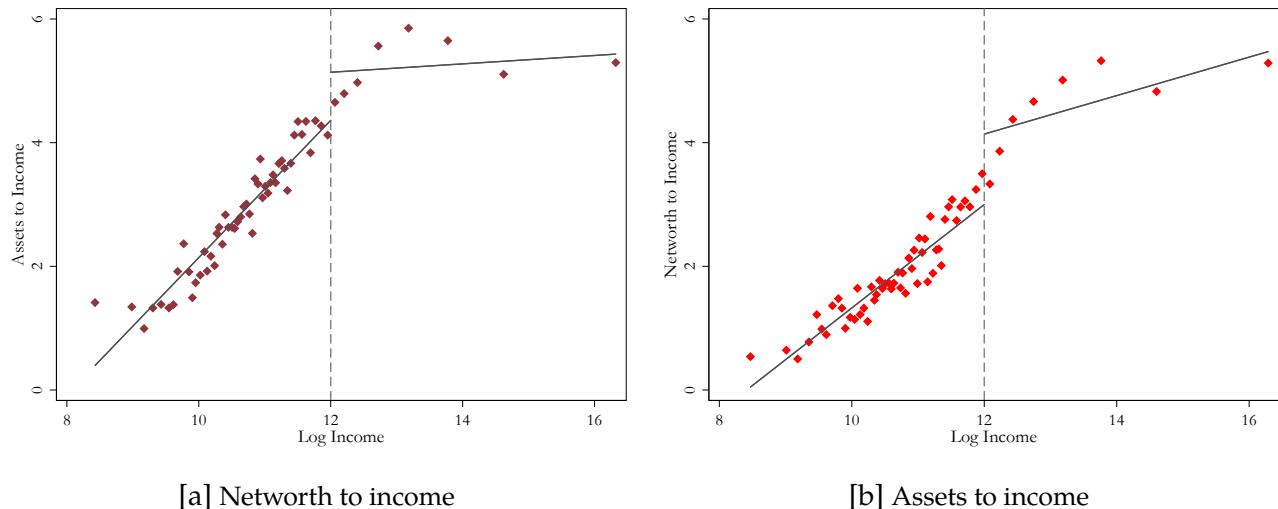
Figure 63 Liquid and Illiquid Assets against income in SCF 2010



Notes: The figure plots liquid and illiquid assets against income for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages. All other assets are considered as illiquid. Income is total income before taxes.

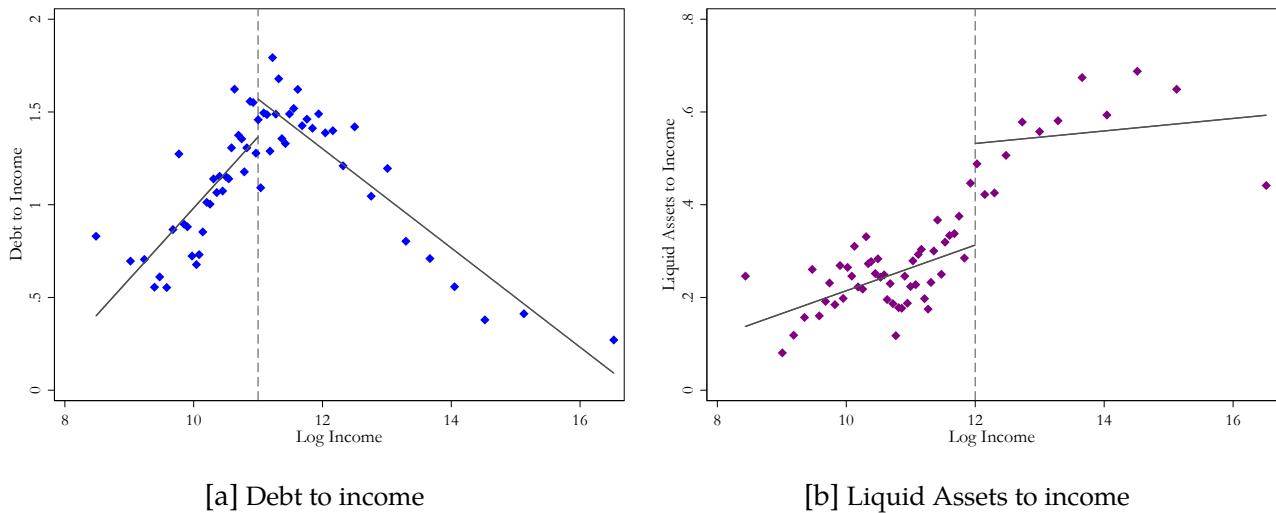
Wealth to income ratio is positively correlated with income for most of the households in the middle income range. This finding is similar to the PSID sample. However, two datasets differ in terms of information by very low and very high income earners. PSID sample includes very low income earners (below log income 8) which constant of declining assets to income ratio as is seen in Figures 3 - 5. On the other hand, SCF gives information on very high income earners which is missing in PSID sample. On the higher end of the income distribution (above log income 13), the positive association of wealth to income are not as strong especially for liquid assets. Debt to income ratio follows an inverted-V shape in both PSID and SCF samples where it peaks around log income 8 or 9 (around 3000\$ - 8000\$ annual income). It is important to note that PSID income measure is disposable income after tax plus credits, on the other hand SCF income measure is income before tax. However, log 8-9 income are very small income levels such that the tax paid must be very small.

Figure 64 Wealth to Income ratio against income in SCF 2010



Notes: The figure plots the ratio of networth to income and all assets to income against income in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

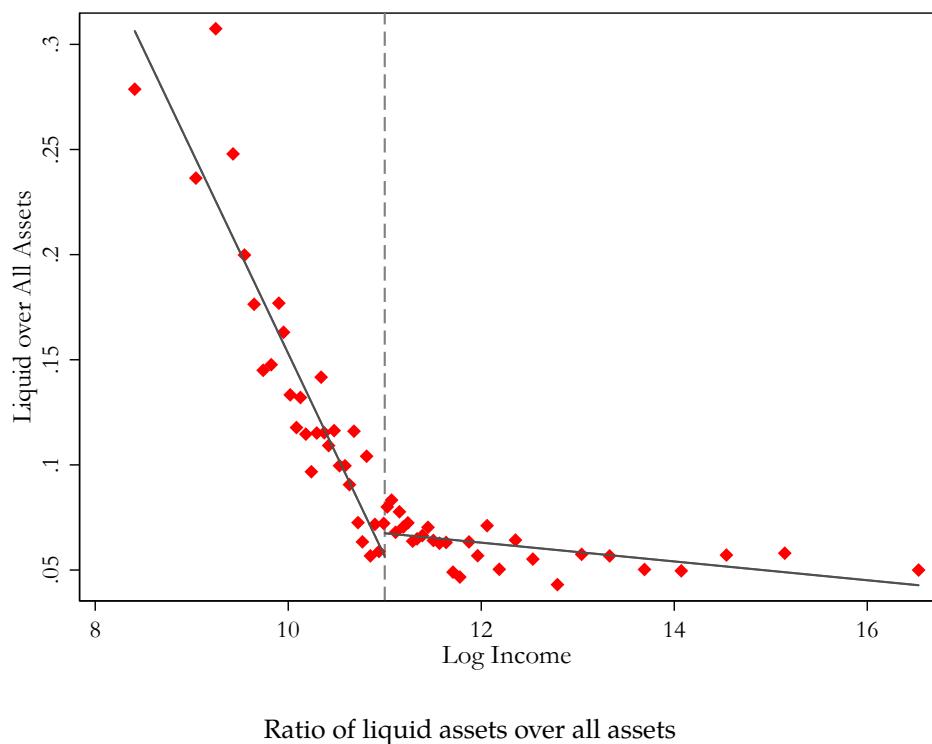
Figure 65 Debt and Liquid assets to Income ratio against income in SCF 2010



Notes: The figure plots the ratio of debt to income and liquid assets to income against income in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

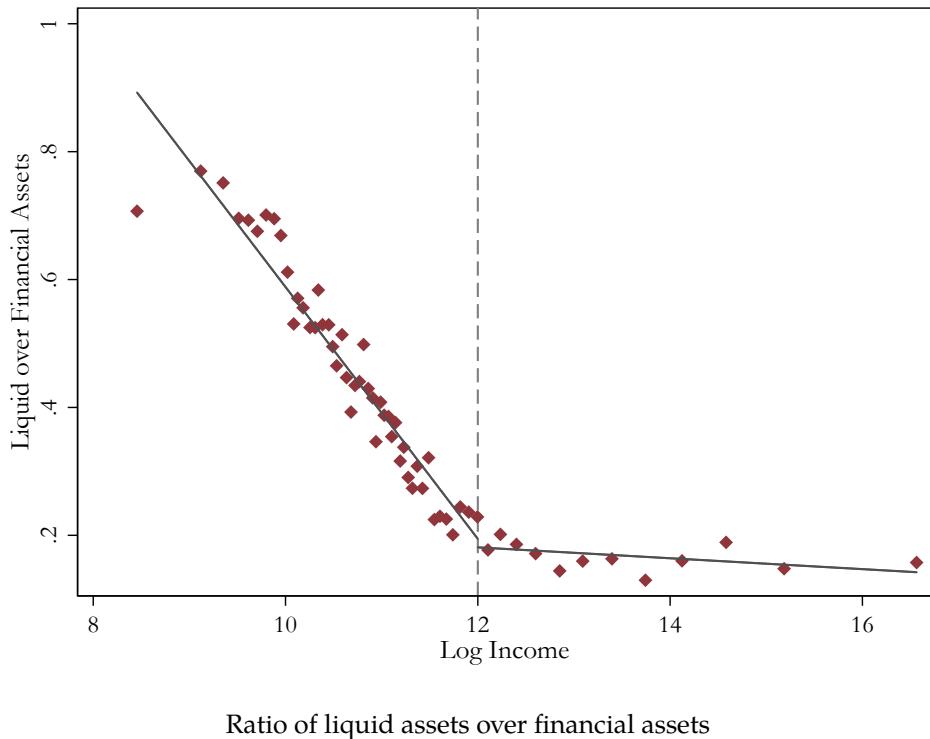
SCF and PSID draw very different pictures in terms of liquid asset share in wealth against income. Figure 66 show that liquid assets to income ratio is sharply declining as the income rises for low income earners in SCF sample. Above around log income 11 (around 22026\$ annual income), the correlation is nearly constant. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages. Therefore I will use the most liquid asset definition in PSID, checking/savings account share, to compare with SCF. Figure 6 show a V shape for liquidity share in PSID sample. Comparing middle income class which is the biggest class in both samples, the correlation between liquidity ratio and income do not agree. In SCF sample, share share declines with income, but in PSID sample the share increase. This is an interesting finding and it points to important difference in SCF and PSID samples in portfolio allocation. Figure 68 represents that this divergence between the two datasets is driven by non-homeowners in SCF sample.

Figure 66 Liquidity share in wealth against income in SCF 2010



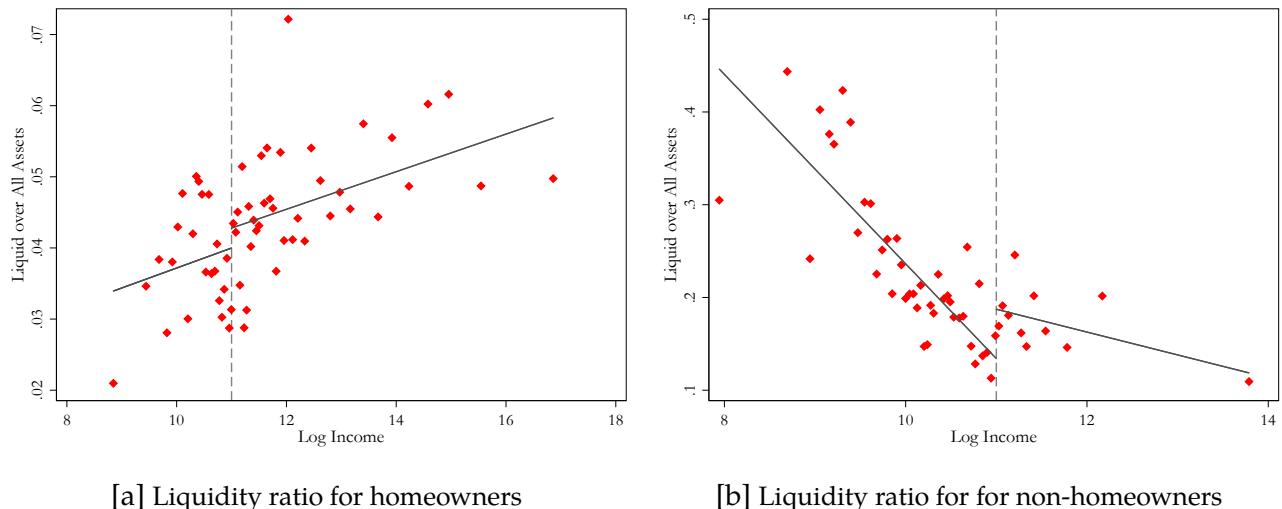
Notes: The figure plots the ratio of liquid assets to all assets against income for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages. Income is total income before taxes.

Figure 67 Liquidity in Financial Assets against income in SCF 2010



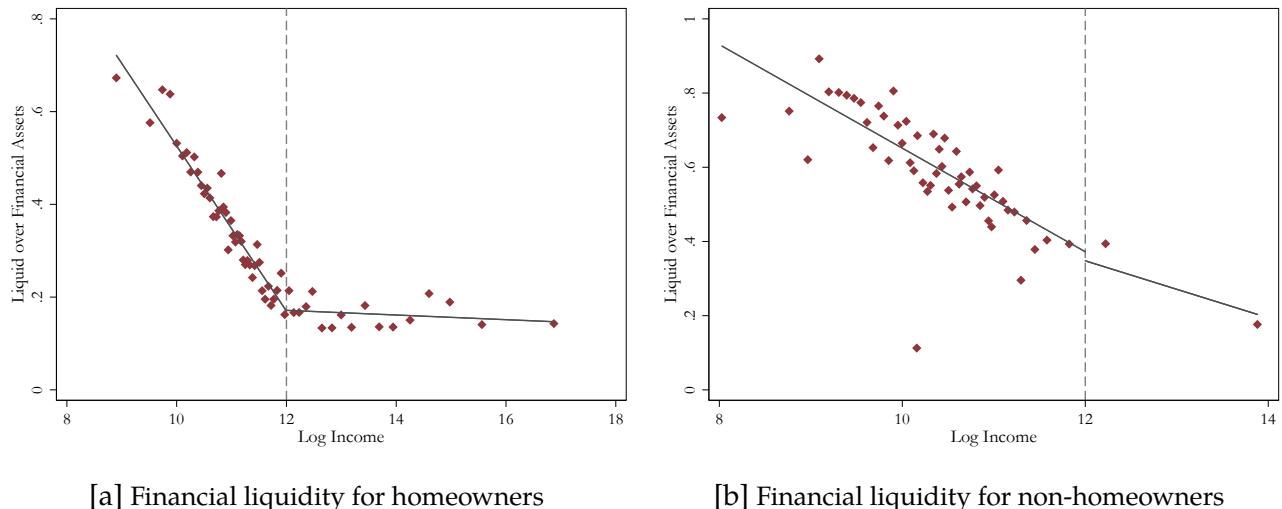
Notes: The figure plots the ratio of liquid assets to financial assets against income for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages. Income is total income before taxes.

Figure 68 Liquidity ratio by homeownership in SCF 2010



Notes: The figure plots the ratio of liquid assets to all assets against income by homeownership status for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Figure 69 Liquidity in Financial Assets by homeownership in SCF 2010

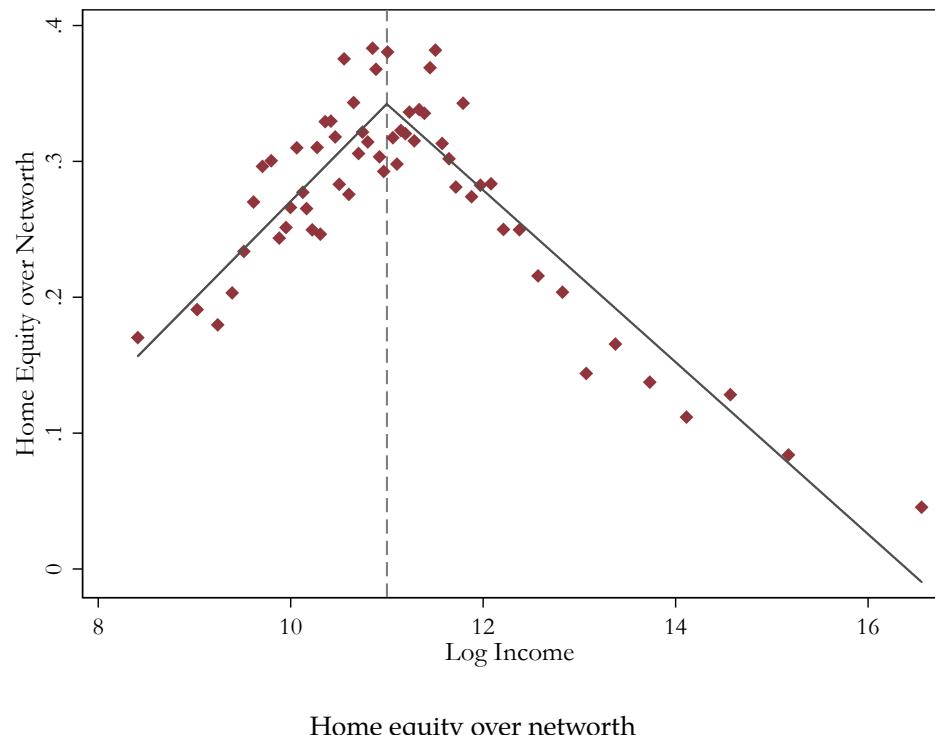


Notes: The figure plots the ratio of liquid assets to financial assets against income by homeownership status for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Home equity share in networth increase for low income earners who are possibly young households buying houses, then decline after around log income 11, as seen in Figures 70 and 71. This finding agrees with PSID sample as well.

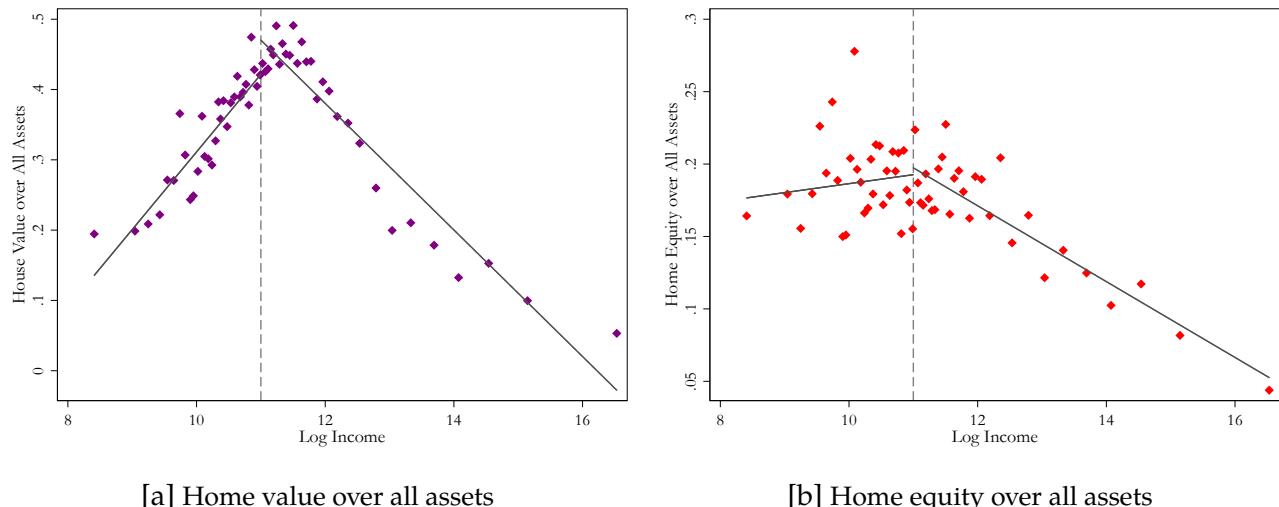
The correlation between debt share in wealth and income is very similar to the observations in PSID sample for positive networth households as seen in Figure 73. For low income households, debt is high compared to their income and networth and they borrow even more with more income upto around log income 10. Then, as households have higher incomes, they have less debt compared to their net wealth.

Figure 70 Home equity over networth against income in SCF 2010



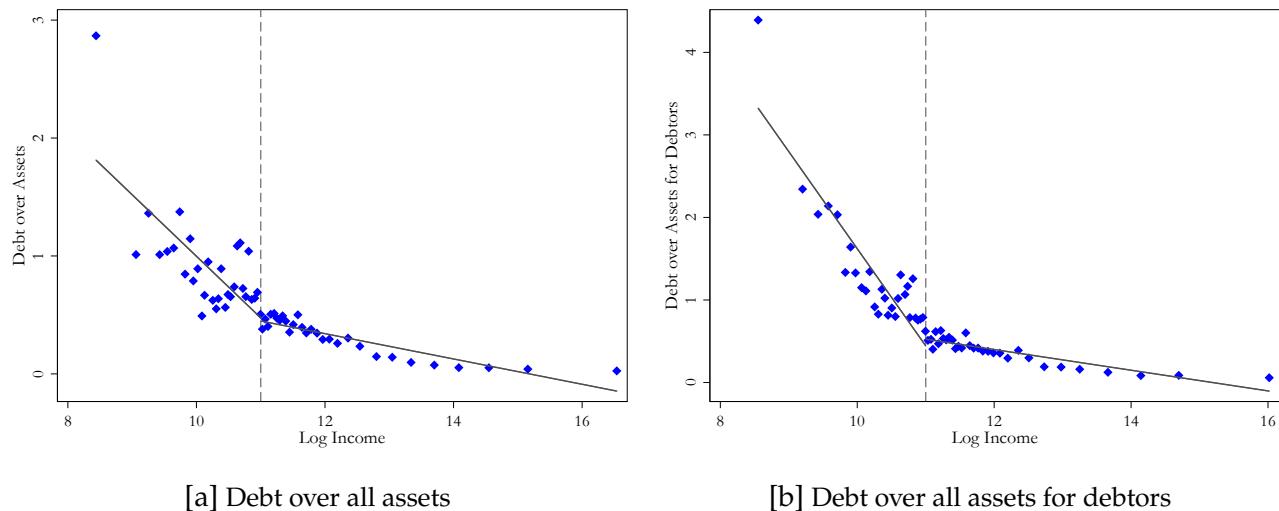
Notes: The figure home equity share in net wealth against income for households in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Figure 71 Housing share in wealth against income in SCF 2010



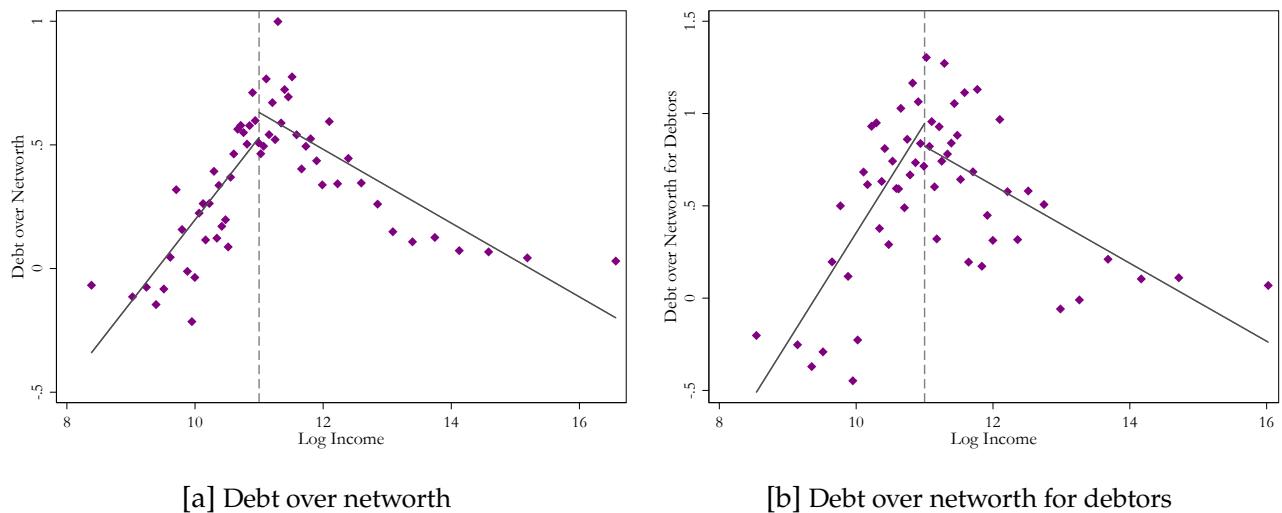
Notes: The figure housing home value over all assets, and home equity over all assets against income for households in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Figure 72 Debt share in wealth against income in SCF 2010



Notes: The figure debt over all assets against income for all households and for only debtors for households in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Figure 73 Debt share in networth against income in SCF 2010



Notes: The figure debt over networth against income for all households and for only debtors for households in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Table 2 gives OLS results of regressing liquid assets and debt share in household wealth on various household characteristics. The particular focus is the income-portfolio relationship when other demographic factors are controlled. The results indicate a highly negative correlation between income and liquid asset share with even after controlling for age. Illiquid assets usually necessitate high fixed costs and high transaction costs which can reduce their eligibility and practicality for low income households. Another interesting observation is that non-white other than Hispanic and Black households have a significantly high share of liquid assets in wealth compared white households keeping income constant. This can be cultural as these groups are possibly experiencing higher income fluctuations and may want to keep easily accessible savings to cushion against rainy days.

Table 2 Determinants of household portfolio allocation

	<i>Liquid/Assets</i>	<i>Liquid/Financial Assets</i>	<i>Debt/Assets</i>	<i>Debt/Networth</i>
	(1)	(2)	(3)	(4)
Log income	-0.0166*** (0.00401)	-0.129*** (0.00684)	-0.268*** (0.0610)	0.0535* (0.0313)
Age	0.000328 (0.000218)	-0.00232*** (0.000358)	-0.0184*** (0.00218)	-0.0140*** (0.00188)
Education	0.00575*** (0.00130)	-0.0168*** (0.00235)	0.0575*** (0.0162)	-0.0380*** (0.0105)
Female	0.00304 (0.0111)	0.00335 (0.0177)	0.158 (0.123)	-0.0174 (0.0769)
Married	-0.0302*** (0.00877)	-0.00461 (0.0163)	0.0771 (0.104)	-0.0586 (0.0766)
Non-homeowner	0.185*** (0.00800)	0.104*** (0.0140)	0.614*** (0.0784)	-0.973*** (0.0717)
Black	-0.000604 (0.00971)	0.0285 (0.0182)	0.0371 (0.117)	-0.0543 (0.0817)
Hispanic	0.0119 (0.0109)	0.151*** (0.0196)	-0.279*** (0.106)	0.157 (0.0981)
Other non-white	0.0367** (0.0151)	0.0515** (0.0251)	-0.190 (0.136)	0.172 (0.135)
Constant	0.145*** (0.0411)	2.125*** (0.0736)	3.476*** (0.597)	1.412*** (0.349)
Observations	31212	30190	31068	30172
Adjusted <i>R</i> ²	0.195	0.210	0.0617	0.0539

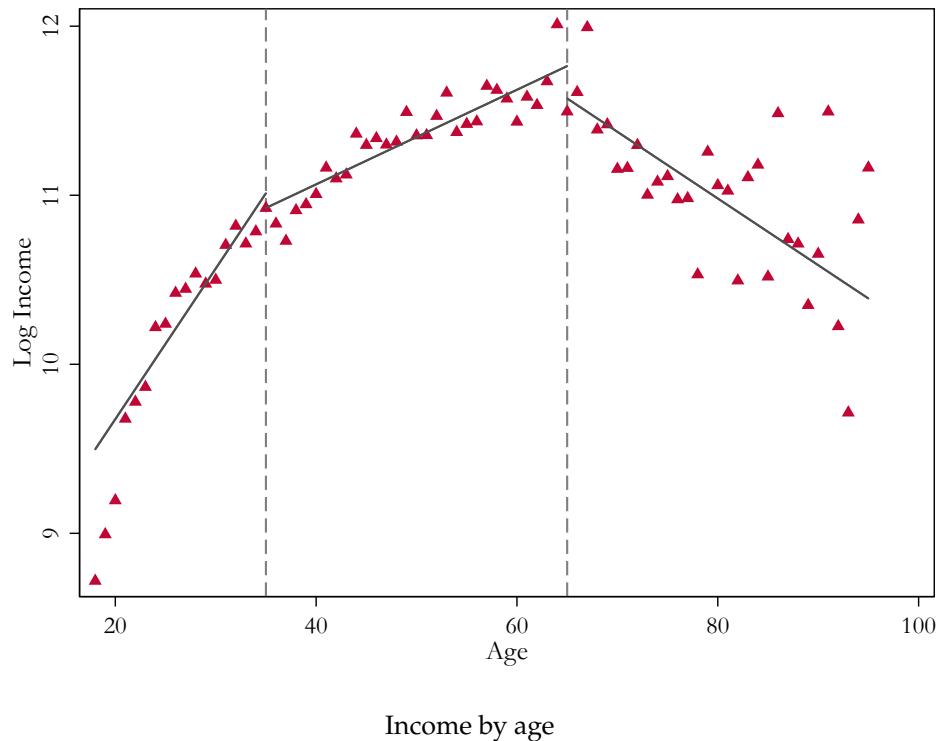
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents OLS estimates of ratio of liquid assets and debt in household portfolio on household demographics. The data is taken from 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages. Debt includes residential and nonresidential real estate, loans as well as credit card debt. Income is total income before taxes. Robust standard errors are in parenthesis.

5.2 AGE PROFILE IN SCF

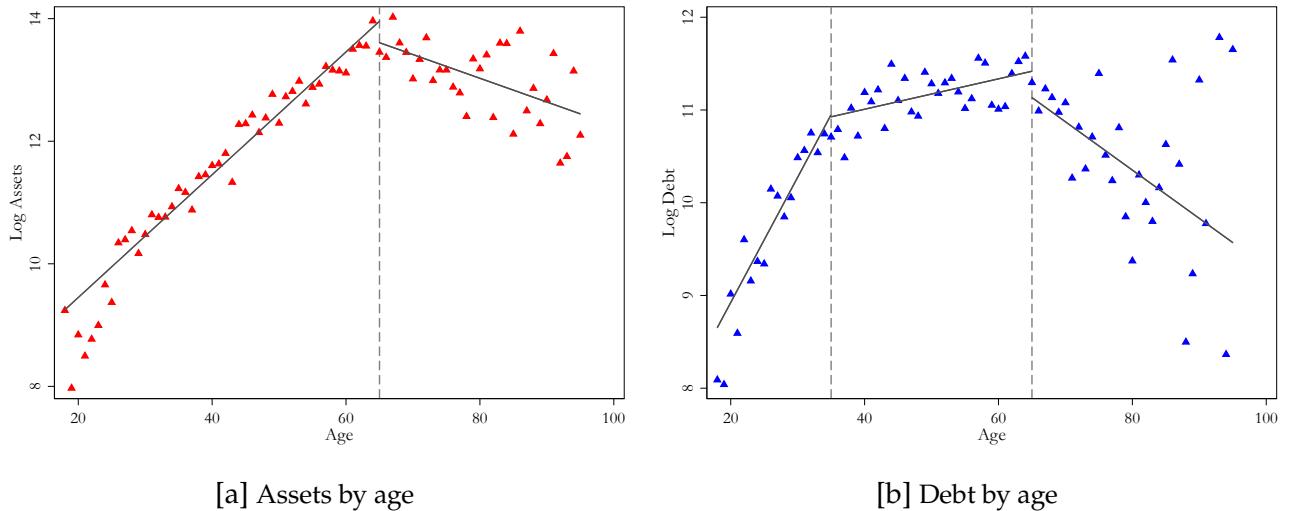
Figure 74 shows that income has a hump-shape over the lifecycle which is a common finding in income studies. Figure 75 and 76 shows that assets and debt follow a similar shape over lifetime. Households accumulate wealth until retirement, then they start decumulating after the age of 65. However, this is not the case for liquid assets as old households prefer keeping wealth in liquid forms.

Figure 74 Income over the lifecycle in SCF 2010



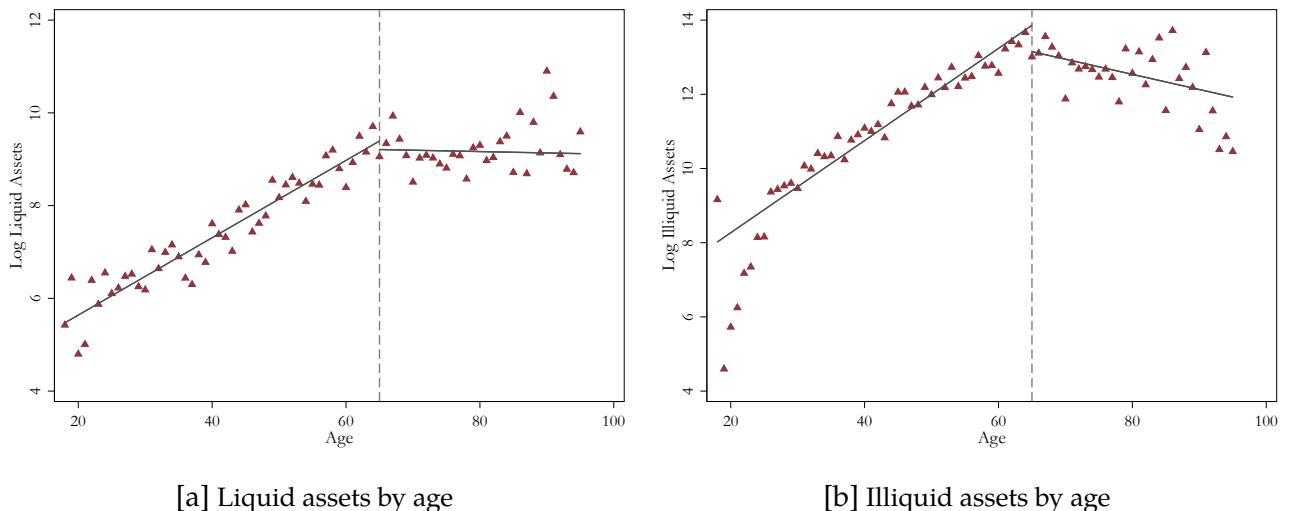
Notes: The figure plots total household income over the lifecycle for households in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Figure 75 Assets and Debt over the lifecycle in SCF 2010



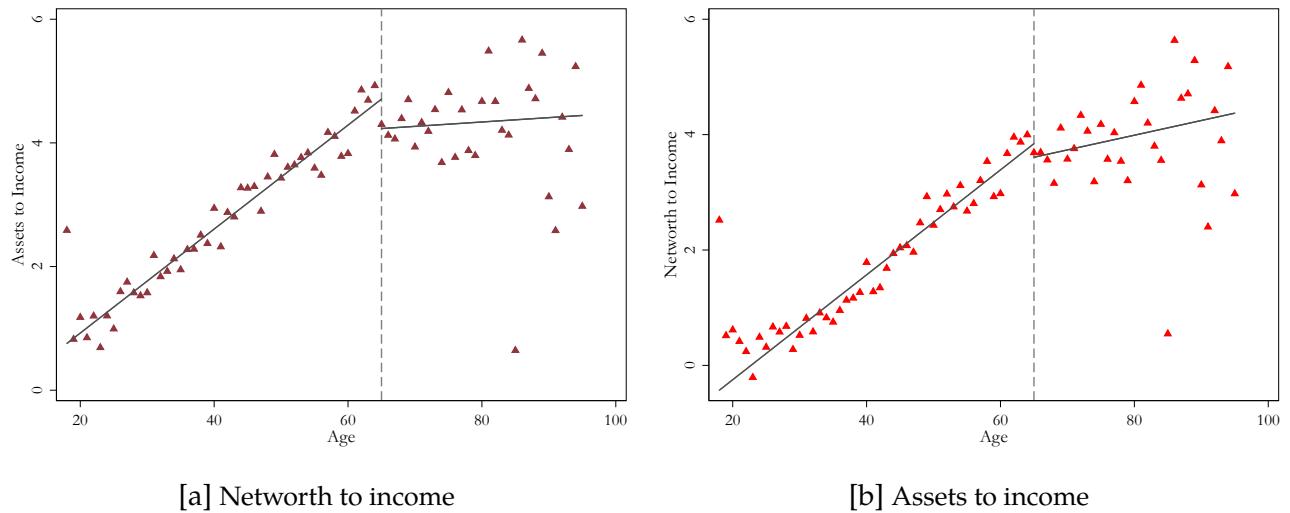
Notes: The figure plots total assets and total debt over the lifecycle for households in 2010 wave of Survey of Consumer Finances. Debt includes residential and nonresidential real estate, loans as well as credit card debt.

Figure 76 Liquid and Illiquid Assets over the lifecycle in SCF 2010



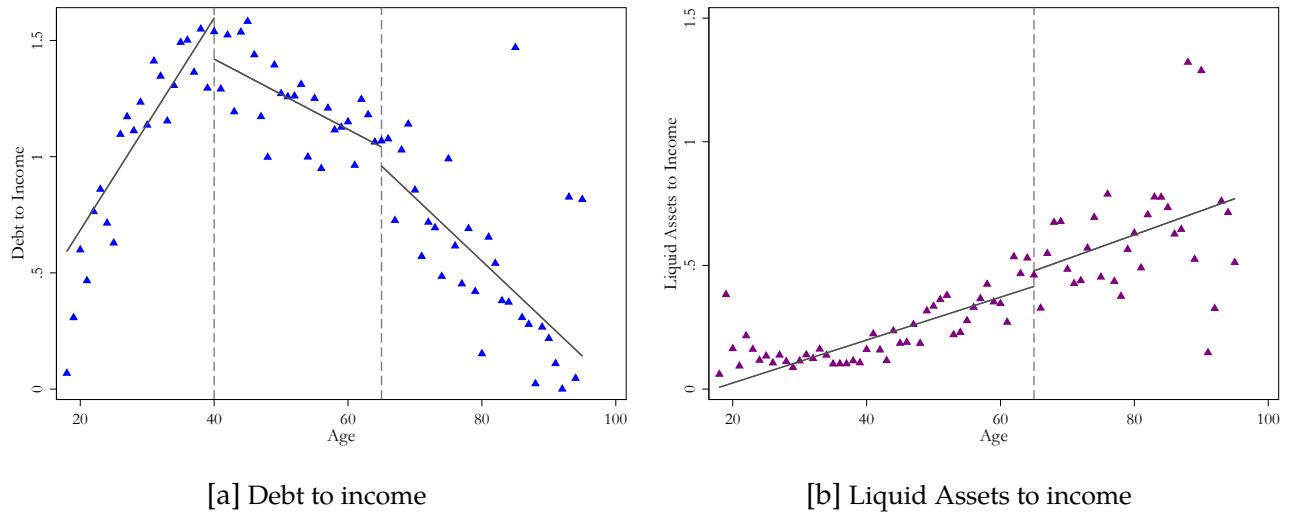
Notes: The figure plots liquid and illiquid assets over the lifecycle for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Figure 77 Wealth to Income Ratio over the lifecycle in SCF 2010



Notes: The figure plots the ratio of networth to income and all assets to income over the lifecycle in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Figure 78 Debt to Income and Liquid assets to Income ratio over the lifecycle in SCF 2010

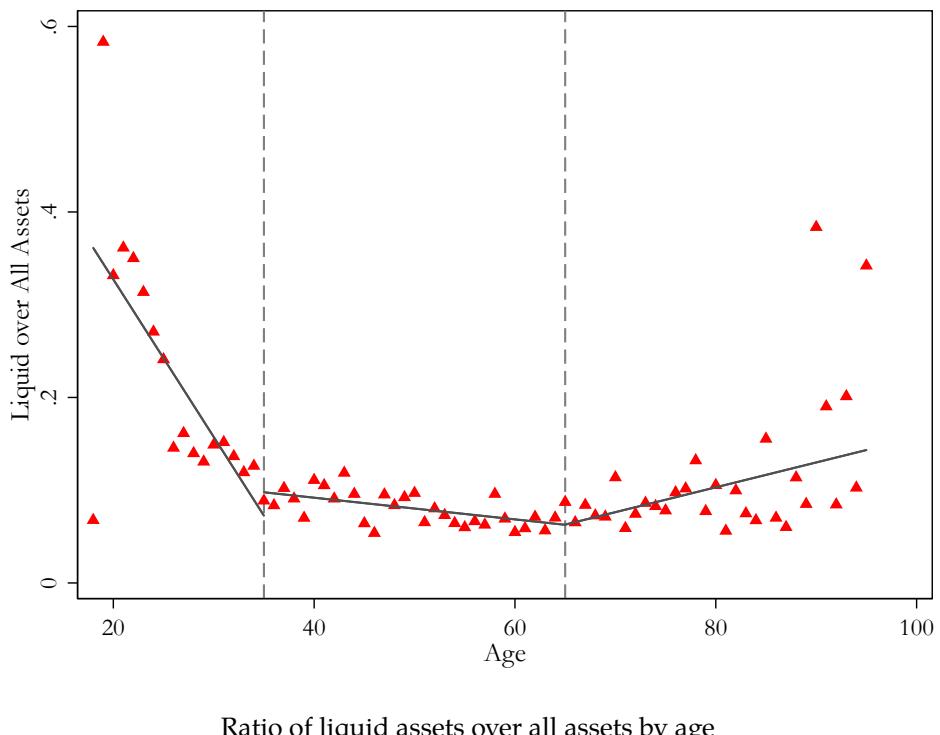


Notes: The figure plots the ratio of debt to income and liquid assets to income over the lifecycle in 2010 wave of Survey of Consumer Finances. Income is total income before taxes.

Figures 77 and 78 show that wealth to income ratio increase until retirement and then stays stable which is a similar finding to PSID sample. Debt to income ratio increase initially in life as the households accumulate debt sharply in young ages, then falls during the middle and old ages. Liquid assets to income ratio continues to rise in retirement ages as seen in Figure 78 panel b.

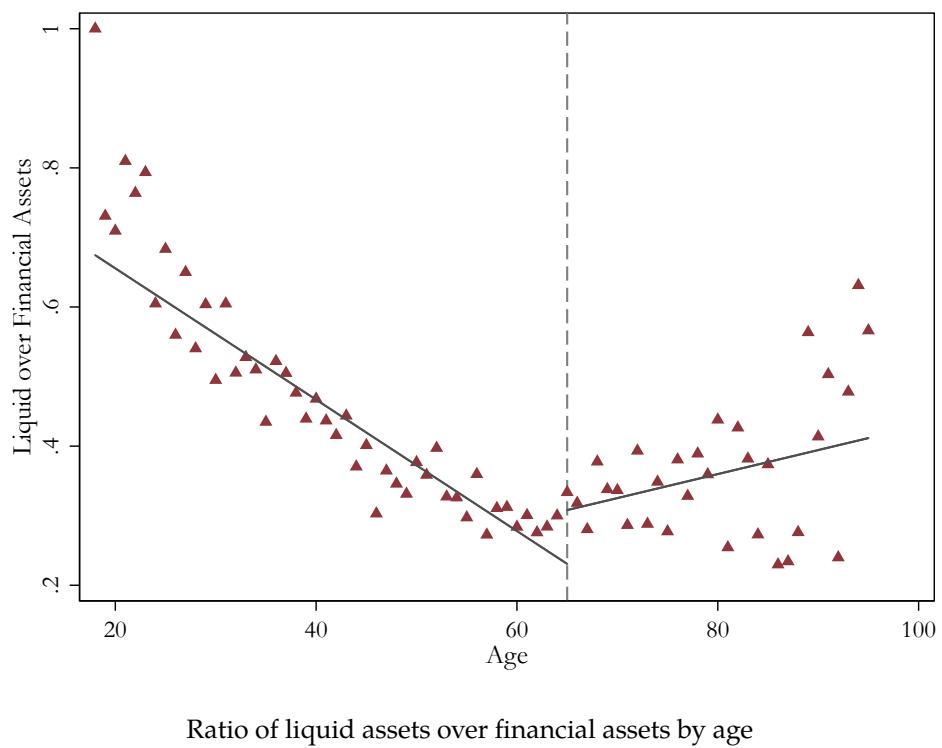
Liquidity share in wealth shows very similar patterns for SCF and PSID samples. Initially, young households have high share of liquid assets, then the share is stable over lifetime until retirement. During retirement, household increase liquid assets share in their assets.

Figure 79 Liquidity ratio over the lifecycle in SCF 2010



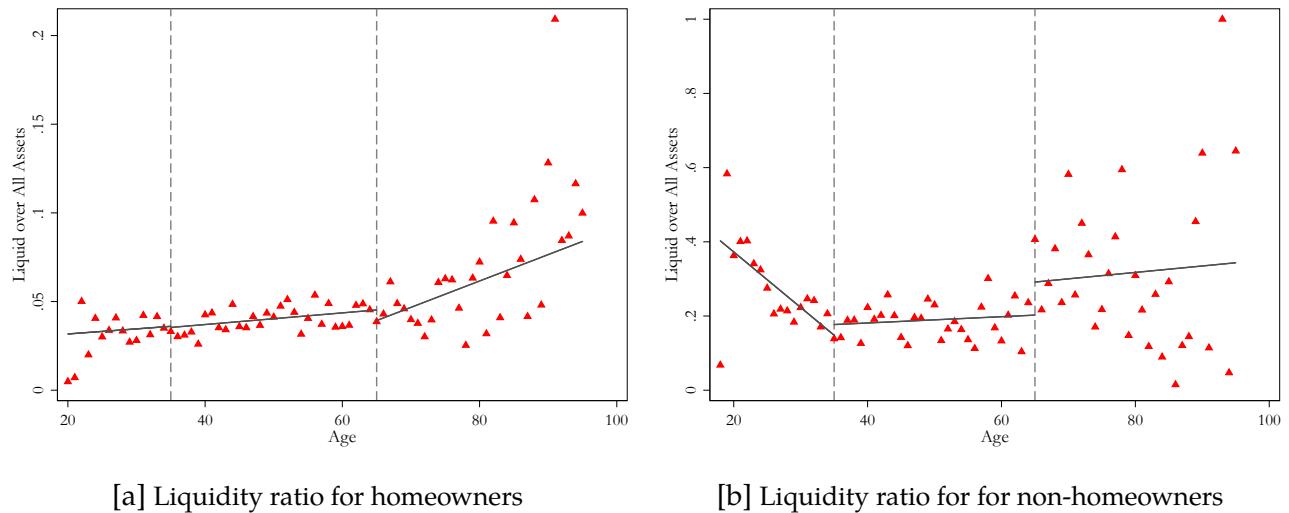
Notes: The figure plots the ratio of liquid assets to all assets over the lifecycle for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Figure 80 Liquidity in Financial Assets over the lifecycle in SCF 2010



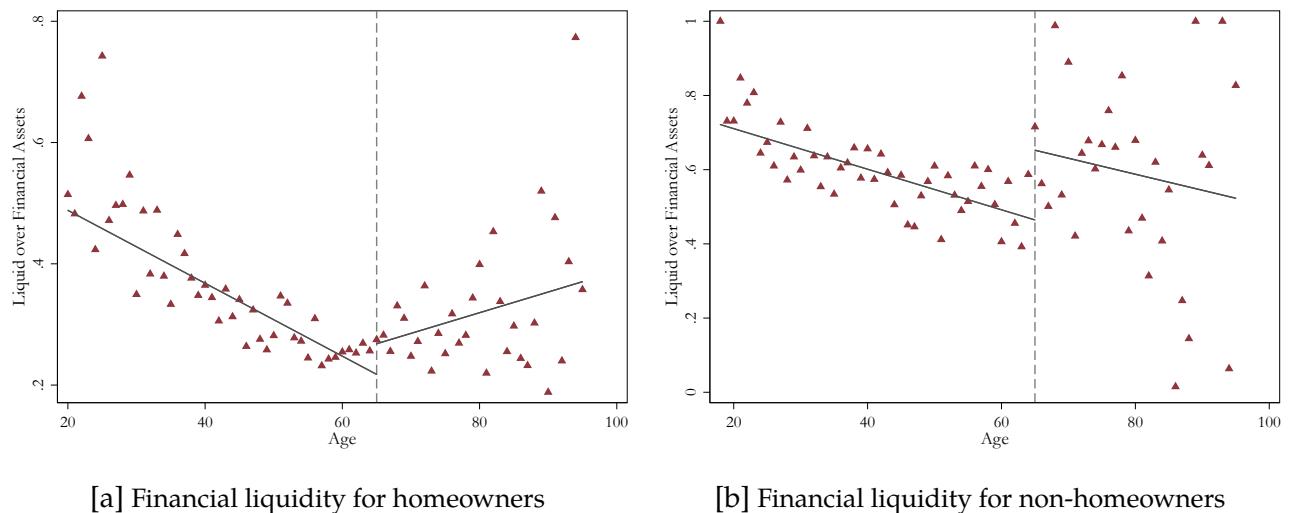
Notes: The figure plots the ratio of liquid assets to financial assets over the lifecycle for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Figure 81 Liquidity ratio over the lifecycle by homeownership in SCF 2010



Notes: The figure plots the ratio of liquid assets to all assets over the lifecycle by homeownership status for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Figure 82 Liquidity in Financial Assets over the lifecycle by homeownership in SCF 2010

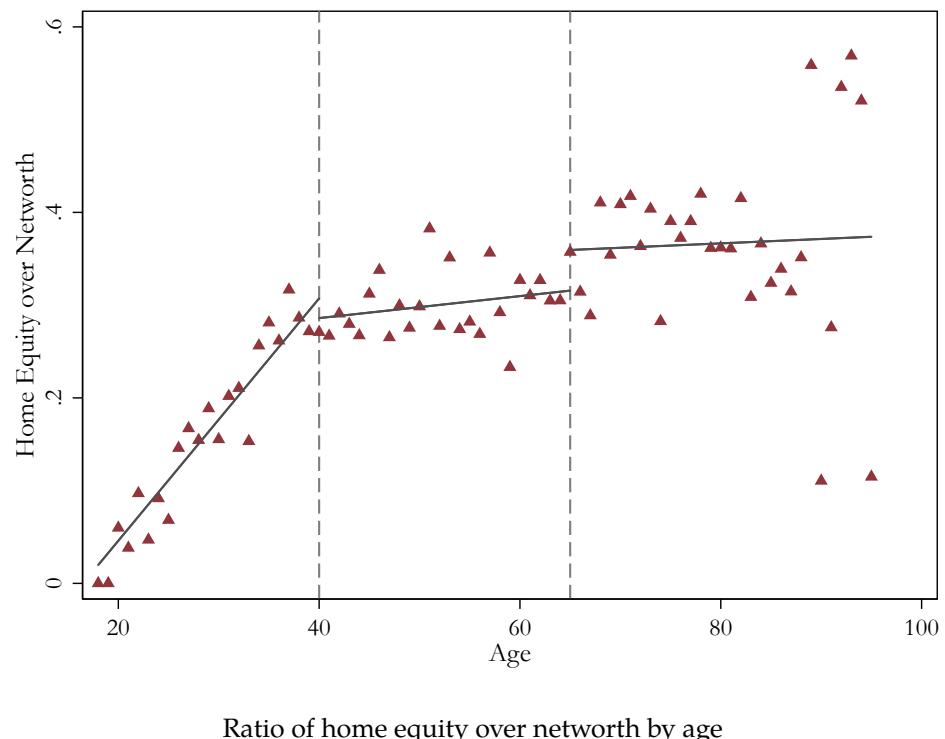


Notes: The figure plots the ratio of liquid assets to financial assets over the lifecycle by homeownership status for households in 2010 wave of Survey of Consumer Finances. Liquid assets are defined as the sum of the checking account, savings account, money market accounts (money market deposit accounts and money market mutual funds) and call accounts at brokerages.

Home equity share in wealth over the lifecycle is also similar to PSID sample. Young households buy houses and increase their home equity compared to all assets until the age of 40, then the share is almost stable during the lifetime as seen in Figures 83 and 84.

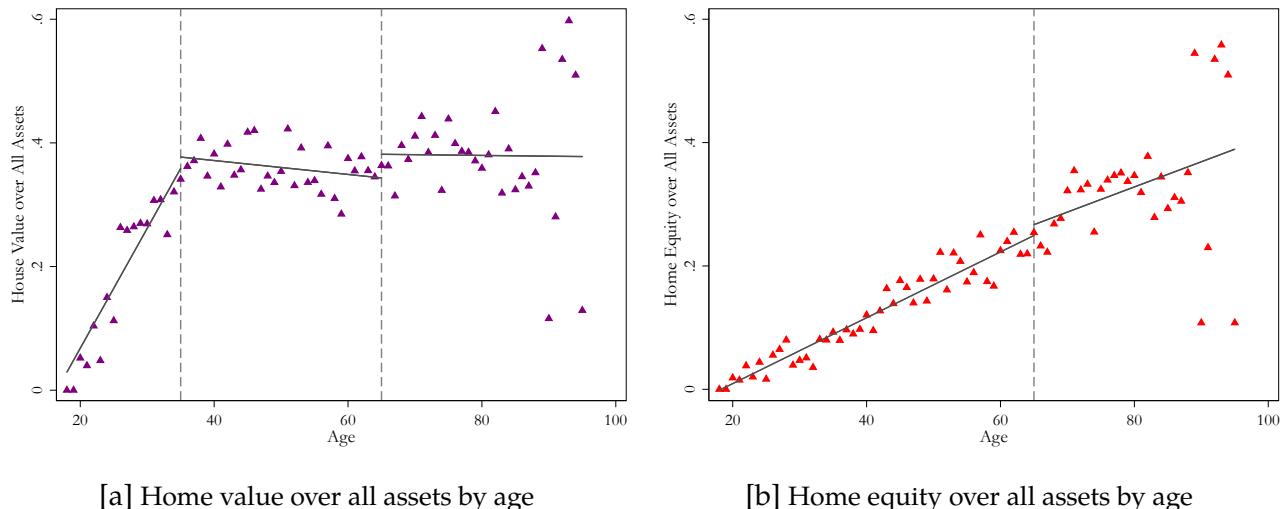
Debt share in networth is similar to PSID sample when all households are considered as in Figure 86 panel a. However, when only debtors are considered, the positive correlation in early ages disappears.

Figure 83 Home equity over networth over the lifecycle in SCF 2010



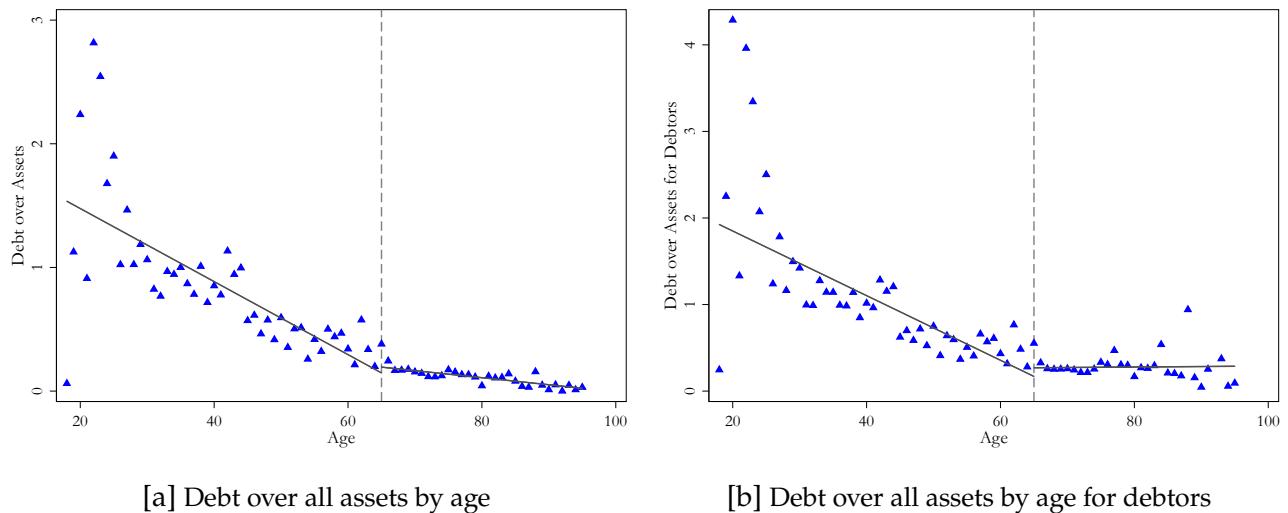
Notes: The figure home equity share in net wealth over the lifecycle for households in 2010 wave of Survey of Consumer Finances.

Figure 84 Hosuing share in wealth over the lifecycle in SCF 2010



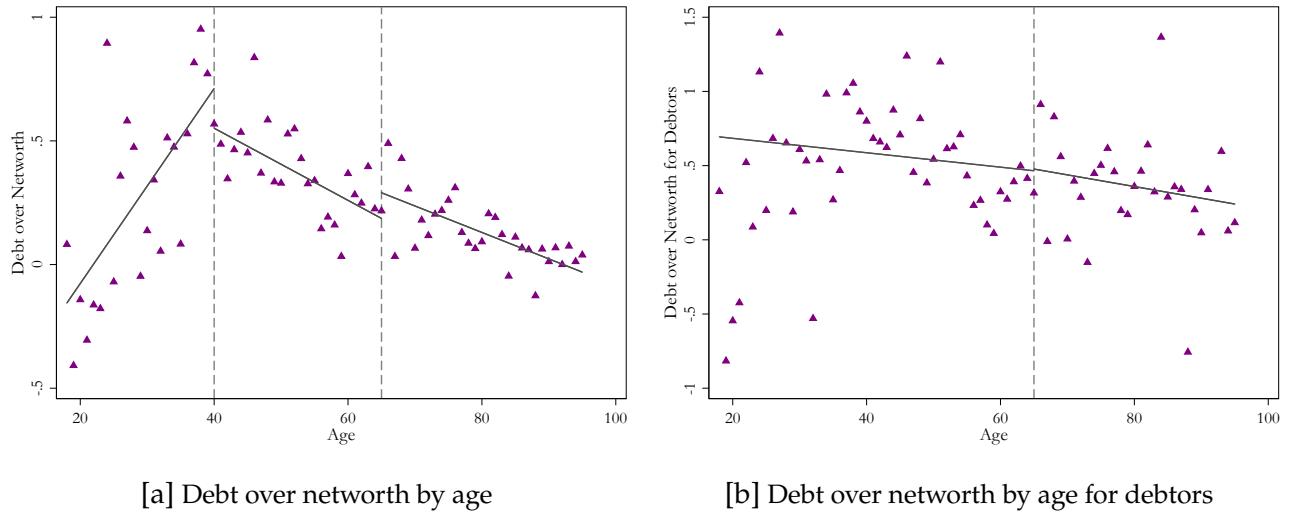
Notes: The figure housing home value over all assets, and home equity over all assets over the lifecycle for households in 2010 wave of Survey of Consumer Finances.

Figure 85 Debt share in wealth over the lifecycle in SCF 2010



Notes: The figure debt over all assets over the lifecycle for all households and for only debtors for households in 2010 wave of Survey of Consumer Finances.

Figure 86 Debt share in networth over the lifecycle in SCF 2010



Notes: The figure debt over networth over the lifecycle for all households and for only debtors for households in 2010 wave of Survey of Consumer Finances.

6 CONCLUSION

This paper explores features of household portfolio allocation as well as the income-wealth gradient of household wealth over the lifecycle and over the business cycle. This question is addressed using two main household surveys in the United States: Panel Study of Income Dynamics and Survey of Consumer Finances. The paper provides several stylized facts on household portfolios and welfare using PSID and SCF samples.

The empirical findings show that asset accumulation have an inverted-V shape over the lifecycle. This observation is not true when considering most liquid assets. The liquid to networth ratio has a U shape throughout the lifecycle with a large flat region in mid-ages. The share increase after retirement. On the other hand, home equity share in wealth declines after retirement. These findings imply that older households prefer holding their assets in liquid forms.

Other important findings is that debt is front loaded in the lifecycle. There is a strong positive correlation with income and asset holdings for middle income households. Debt to income ratio, liquid assets to income ratio, debt share in networth, liquidity share in networth reverse correlation above approximately 22,000 \$ annual household income.

Income follows a hump-shape over the lifecycle. Consumption follows the pattern of income even after controlling for family size and composition which points to the lack of perfect consumption smoothing. However, healthcare expenditure is different in the sense that it is steadily increasing over the lifecycle. Health is correlated with income even after controlling for age effects.

I use poverty thresholds provided by the U.S. Census Bureau to calculate *Income Poverty* rate and *Asset Poverty* rate in the PSID sample. For 1999-2015 time period, 35.57 % households have incomes below the poverty threshold and 46.99 % households have assets lower than the poverty line. 24.1 % of households experience both income poverty and asset poverty. Looking at the effect of Great Recession, poverty rates increase from 2007 to 2011. On the other hand, networth, liquid assets, consumption among other measures drops from 2007 to 2009 which is felt across the distribution of wealth. The most affected demographic groups are non-white households, female headed households and low educated households.

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8 APPENDICES

A ADDITIONAL TABLES

Table 3 Wealth to Income and Debt to Income ratios in PSID and SCF

		PSID			
		PSID 1999-2015	PSID 2009	PSID 2011	SCF 2010
Networth to income	Mean	3.82	3.47	3.42	4.17
	Median	1.76	1.47	1.38	1.75
	Observations	44,784	5,215	5,234	30,457
Debt to income	Mean	0.55	0.53	0.69	1.28
	Median	0.03	0.04	0.05	0.44
	Observations	49,558	5,740	5,737	31,922

Notes: This table presents wealth to income and debt to income ratios in PSID and SCF samples. Income in PSID is disposable income, income after tax. Income in SCF is income before tax. Debt in SCF includes all debt. Debt in PSID only includes debt other than mortgage and vehicle loans. Therefore debt to income ratios are not comparable. All samples are trimmed such that the ratios are between -30 and 30.

Table 4 Networth across time

	Mean	Median	90th	99th
Networth:				
1999	281891.5	70898.16	590666	2942943
2001	288956.8	74268.2	626816.1	2982125
2003	283007.6	74069.34	630377.3	2704561
2005	332118.6	82717.51	775872.5	3160885
2007	369188.2	84613.63	830722.5	4019486
2009	329979.7	52664.91	668439.2	3722396
2011	271504.3	42000	659000	3283000
2013	258325.7	40839.08	638704.3	3200644
2015	289213.7	46054.68	679306.5	3606081
Total	300532.5	61121.24	680889.9	3301000
Nonhome net wealth:				
1999	26754.03	418700.5	2694130	281891.5
2001	25642.47	444469.6	2443950	288956.8
2003	24730.19	412169.8	2428780	283007.6
2005	23608.51	488621	2722195	332118.6
2007	23553.36	553815	3417861	369188.2
2009	18230.16	445626.1	3314851	329979.7
2011	15500	450000	2781000	271504.3
2013	15195.94	432134.5	2863485	258325.7
2015	14737.5	474363.2	3186984	289213.7
Total	20472.69	458398.8	2864601	300532.5

Notes: This table presents the distribution of networth including and excluding home equity for years 1999-2015. The table shows mean, median, 90th and 99th percentiles of networth of US households in the PSID sample for each year. The amounts are deflated to 2010 dollars.

Table 5 Networth by education and by sex of the household

	Education		Sex	
	High	Low	Male	Female
Mean Networth:				
1999	392838	176917.9	327767.3	147609.2
2001	425515.3	152003.6	337671.1	139670.8
2003	394623.3	167365.1	329069.2	146425.3
2005	465999	187258.9	386028	170170.6
2007	505585.7	213601.6	421922.6	215351.1
2009	404637.4	232379.8	392543	148495.7
2011	370833.6	136310.3	320735.8	138490.4
2013	351852.7	124270.4	307645.4	124148.6
2015	398565.5	125230.3	341904.5	147407.1
Total	410368	169294.8	352098	152696.2
Median Networth:				
1999	120794.4	42902.75	90896.8	25215.67
2001	123843.7	44320.32	92882.74	26592.2
2003	120014.1	45278.06	95768.86	22911.79
2005	134493.4	48025.13	108518.3	24243.45
2007	135822	44889.3	113575.3	20713.98
2009	89125.23	25319.67	76262.84	13166.23
2011	72000	20450	61000	10500
2013	67811.88	19006.79	63632.99	8167.816
2015	77371.86	19849.57	67838.54	10776.79
Total	101007.2	34080.46	84688.25	16145.68

Notes: This table presents mean and median networth by education and sex of the household head for PSID sample in years 1999-2015. The amounts are deflated to 2010 dollars.

Table 6 Networth over time and by race

Years	Mean			Median			90th percentile			99th percentile		
	White	Black	Other	White	Black	Other	White	Black	Other	White	Black	Other
1999	325077.1	48590.01	132949.5	94976.79	10567.84	18727.82	676876.8	150265.3	276904.2	3108818	473546.3	2086814
2001	328007.7	69708.67	174799.8	98137.87	15195.54	24946.01	715456.7	1646184	351396.9	3165758	823724.9	2229946
2003	322885.6	103473.4	143696.5	96130.12	14547.17	31761.32	719018.1	150922	357295.4	3012476	1200141	1914526
2005	362375.6	96192.69	262546.6	100437.2	12698.95	53393.32	842171.4	176630.9	622248.6	3521074	1290675	2992912
2007	400571.1	85571.18	349573.9	99513.63	11087.12	78961.91	889132.7	220660.7	772312.3	4030519	1283401	4256371
2009	363710.9	92523.48	233552.3	68869.49	5671.605	19242.95	728193.6	137637.7	522597.9	3842513	1764274	3479935
2011	306802.6	36992.32	167869.3	54750	5000	16000	758000	116000	395000	3505000	517160	2420000
2013	288826.2	45165.02	188500.1	53874.35	5950.159	22793.91	729405	121567.5	413139.6	3457076	559495.4	3288021
2015	325254.8	43284.4	217022.5	58949.99	6447.655	18744.25	776942.4	128953.1	46886.6	3967150	543445.2	3636478
Total	336110.2	68146.07	199403.3	79214.05	8485.013	26546.1	761330.8	147147.1	443967.1	3571330	722685.8	2917544

Notes: This table presents mean and median networth by race of the household head for PSID sample in years 1999-2015. The amounts are deflated to 2010 dollars.

Table 7 Income and Consumption across time

	Mean	Median	90th	99th
Disposable Income				
1999	36907	25794.16	77204.95	212180.8
2001	39279.28	27600.69	80913.9	240376.2
2003	38666.79	27122.92	80785.11	209544.4
2005	40935.43	28353.04	83942.96	230714
2007	40179.89	27935.84	85060.08	231495.6
2009	39316.36	27096.61	82249.16	227027.9
2011	36527.2	25776.2	78799.02	197951.9
2013	37671.03	25423.66	81054.68	197910.3
2015	36888.72	25221.02	80737.13	202109
Total	38476.8	26608.75	81209.61	215452
Total Consumption:				
1999	37191.74	31732.11	65595.05	126598.2
2001	39661.42	33749.29	70423.2	139042.3
2003	39320.89	33880.13	70680.89	125770.8
2005	746535.41	39193.6	82321.96	168386
2007	47291.71	40324.92	84863.05	168356.7
2009	43438.73	37000.41	77431.22	148205.8
2011	42736.41	36672	75936	148430
2013	41315.85	35570.2	74785.34	137206.2
2015	40797.06	35530.79	73223.23	135284.4
Total	42126.09	35878.47	75483.85	145975.7

Notes: This table presents the distribution of disposable income and total consumption for years 1999-2015. The table shows mean, median, 90th and 99th percentiles of disposable income and total consumption of US households in the PSID sample for each year. The amounts are deflated to 2010 dollars.

Table 8 Poverty Thresholds

Years	Family Size						
	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons
1999	8,316	10,634	13,003	16,660	19,680	22,228	25,257
2001	8,794	11,239	13,738	17,603	20,819	23,528	26,753
2003	9,183	11,756	14,348	18,392	721,744	24,576	28,001
2005	9,646	12,335	15,066	19,307	22,830	25,787	29,233
2007	10,294	13,167	16,079	20,614	24,382	27,560	31,205
2009	10,991	14,051	17,163	22,025	26,049	29,456	33,529
2011	11,139	14,218	17,374	22,314	26,439	29,897	34,009
2013	11,720	14,937	18,284	23,492	27,827	31,471	35,743
2015	12,071	15,379	18,850	24,230	28,695	32,473	36,927
							40,968
							49,021

Notes: This table presents poverty thresholds for years 1999-2015. Each threshold refers to the threshold for the previous year to be compatible with the PSID timing. The amounts are deflated to 2010 dollars. Source: U.S. Census Bureau.

Table 9 Poverty Rates for 1999 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	44.18	19.69	63.87
	Below Poverty Line	13.00	23.13	36.13
	Total	57.18	42.82	100.00
Observations		5278		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 1999. The data is taken from 1999 wave of PSID.

Table 10 Poverty Rates for 2001 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	43.78	22.20	65.98
	Below Poverty Line	12.43	21.59	34.02
	Total	56.20	43.80	100.00
Observations		5544		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2001. The data is taken from 2001 wave of PSID.

Table 11 Poverty Rates for 2003 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	44.38	21.19	65.58
	Below Poverty Line	12.33	22.09	34.42
	Total	56.72	43.28	100.00
Observations		5813		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2003. The data is taken from 2003 wave of PSID.

Table 12 Poverty Rates for 2005 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	43.45	22.17	65.62
	Below Poverty Line	12.00	22.38	34.38
	Total	55.45	44.55	100.00
Observations		5890		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2005. The data is taken from 2005 wave of PSID.

Table 13 Poverty Rates for 2007 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	43.77	22.61	66.38
	Below Poverty Line	11.05	22.57	33.62
	Total	54.82	45.18	100.00
Observations		6056		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2007. The data is taken from 2007 wave of PSID.

Table 14 Poverty Rates for 2009 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	40.53	24.57	65.10
	Below Poverty Line	10.79	24.11	34.90
	Total	51.32	48.68	100.00
Observations		6292		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2009. The data is taken from 2009 wave of PSID.

Table 15 Poverty Rates for 2011 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	38.50	24.42	62.92
	Below Poverty Line	10.82	26.26	37.08
	Total	49.32	50.68	100.00
Observations		6356		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2011. The data is taken from 2011 wave of PSID.

Table 16 Poverty Rates for 2013 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	38.45	24.03	62.48
	Below Poverty Line	10.50	27.02	37.52
	Total	48.95	51.05	100.00
Observations		6351		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2013. The data is taken from 2013 wave of PSID.

Table 17 Poverty Rates for 2015 PSID sample

		Asset Poverty		
		Above Poverty Line	Below Poverty Line	Total
Income Poverty	Above Poverty Line	37.86	24.39	62.25
	Below Poverty Line	10.80	26.95	37.75
	Total	48.66	51.34	100.00
Observations		6194		

Notes: This table presents percent of household below or above poverty lines for disposable income and household networth for year 2015. The data is taken from 2015 wave of PSID.