

7 Facts about US Household Debt

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September 2016

Abstract

Private households in the US took on large amounts of debt over the last three decades. Understanding the driving forces is crucial in order to design monetary and fiscal policies which are aimed at reducing the risk of future financial crises. This paper provides an in-depth descriptive analysis of borrowing patterns of the US household sector based on the Survey of Consumer Finances (SCF). 7 stylized facts are presented and can be used as a benchmark against which theoretical models of household borrowing decisions can be compared. The paper also assesses to what extent four common explanations of increasing household leverage are consistent with the data: 1) increasing income inequality, 2) rising house prices and real estate markets in general, 3) shifts in credit supply conditions and 4) negative income shocks requiring debt to maintain living standards. The paper concludes that real estate related borrowing explains a large part of the increase in household liabilities over the sample period of 1989-2007. Shifts in credit supply conditions and borrowing due to negative income shocks also carry some explanatory power while the data does not support the notion that increasing income inequality was the key factor in explaining rising debt levels, especially not in the 2001-2007 period.

The author thankfully acknowledges and benefited from financial support via the INET grant '[Rising Inequality as a Structural Cause of the Financial and Economic Crisis](#)'.

Introduction

Since the financial crisis of 2007/2008 there is a growing body of literature which documents that private sector indebtedness in general and household debt in particular is an informative predictor of financial crises (Bezemer & Zhang, 2014; Schularick & Taylor, 2012) and the severity of the recessions which follow (Mian & Sufi, 2009). So while there is an empirically and theoretically established link between household debt accumulation and financial instability the factors driving that accumulation are less clear and more open to debate. This paper presents a descriptive analysis of the US household sector's borrowing patterns and provides a collection of stylized facts against which predictions from theoretical models can be assessed. In addition the paper analyses to what extent four common explanations of US household debt accumulation are consistent with the data. The first is called the expenditure cascades hypothesis and is the reformulation by Frank et al. (2014) of an old idea: households care about their social status and their position in society relative to others. In particular if people compare themselves to richer peers then rapidly growing top incomes will trigger a debt financed cascade of expenditures in an effort by lower income households to preserve their relative position. The phenomenon is more widely known as 'keeping up with the Joneses'. Thus the expenditure cascade hypothesis considers rising income inequality as the main driver of household indebtedness. The second explanation will be labelled the 'housing hypothesis' because it rests on the simple idea that house price increases are requiring first time buyers to take on larger mortgages if they are not willing to postpone their purchase. In addition homeowners will take on additional debt in order to cash in on capital gains and speculators will buy debt-financed property to enjoy future capital gains. The third explanation focuses on the role of the financial sector and the willingness to lend by financial institutions. The obvious reason for putting emphasis on the supply side of credit markets is that loans in general and mortgages in particular need to be approved by the borrower's bank and thus credit supply conditions can be a binding constraint independent of the debtor's motivations to take on debt. If the financial sector becomes more willing to accept customers with low credit ratings and accepts higher loan to value ratios household sector indebtedness will rise. The fourth explanation is labelled the income stagnation hypothesis and states that the main reason for the rise in household indebtedness is that in the face of stagnant or even falling real incomes, households rely on debt in order to prevent living standards from falling. Similar to the expenditure cascades hypothesis an increase in income inequality will be observed given that the upper end of the income distribution maintains positive real income growth rates. The difference between the two hypotheses is that the income substitution hypothesis predicts that it is those households with low income growth which borrow heavily and there is no borrowing cascade down from the top of the

income distribution. The four hypotheses and the corresponding explanations of rising household debt are summarised in Table 1.

Table 1: Hypothesis assessed in the paper

label	main cause of rising household debt
expenditure cascades hypothesis	increasing top incomes and the resulting inequality in incomes
housing hypothesis	rising house prices requiring first time buyers take out larger mortgages and making debt financed purchases attractive in the light of future price increases
credit supply hypothesis	increasing willingness to lend by financial institutions eases formerly binding credit constraints
income stagnation hypothesis	stagnant or falling real incomes require borrowing in order to maintain living standards

The paper uses micro data on households' balance sheets and incomes from the Survey of Consumer Finances (SCF). The most important feature and the SCF's biggest advantage over other surveys is that its sample design incorporates tax information and thus allows to address the problem of underreporting and lower participation rates among affluent households. Since the expenditure cascades hypotheses crucially relies on increasing income inequality as the driving factor of rising household indebtedness obtaining qualitatively reliable information about the upper end of the distribution is crucial. In addition the SCF's detailed questionnaire about the household's finances provides a detailed picture of the household balance sheet which reduces measurement error due to misreporting and forgetting information in less detailed surveys.

The contribution of the paper to the existing literature is threefold: First it provides a detailed description of the borrowing patterns of the US household sector which does not exist in this explicit form. This descriptive analysis is particularly useful because it is based on high quality micro data which allows to take the distribution of income, assets and liabilities into account which is not possible with aggregate data. Second, the descriptive analysis is used assess to what extent four common explanations are consistent with the existing data. It is needless to say that unconditional analysis cannot be interpreted in a causal way but it still allows to identify inconsistencies between the theory and the data and thus informs further more formal analysis. Third, the presented stylized facts can be used as reference points against which theoretical models of household borrowing can be tested and assessed.

The findings can be summarised as follows. First, US households increased their liabilities substantially. Between 1989 and 2007 total outstanding liabilities of the household sector rose from \$4.4 trillion to \$12.7 trillion in real terms. This increase was the result of two effects: households taking on more debt and more households taking on debt. Second, the data presented strongly points to the dominant role of the housing market as a driving factor of household debt accumulation. More than 80% of outstanding household liabilities are mortgages and most of them were taken out in order to purchase or improve property and not to spend otherwise. Third, the nexus between intra group income inequality and household indebtedness is shaky. The data supports such a relationship for black households but not for white households and especially not in the pre-crisis period between 2001 and 2007. Fourth, the credit supply hypothesis seems to have some explanatory power especially for the group of white college-educated households. Fifth, the notion that borrowing was concentrated among households which suffered income declines relative to the past and used debt in order to maintain living standards is not confirmed by the data.

The next section briefly introduces the specific characteristics of the Survey of Consumer Finances. Then 7 stylized facts about US household borrowing behaviour are presented. These are: 1) Debt to income ratios tripled between 1989 and 2007, 2) Mortgages account for more than 80% of outstanding debt, 3) Most household debt was used to purchase homes, 4) Expenditure cascades cannot explain the pre-crisis rise in household debt, 5) Increasing real estate wealth drove the pre-crisis rise in household debt levels 6) Growing willingness to lend by the financial sector allowed households to leverage up and 7) Borrowing as a reaction to income losses does not explain the surge of household debt prior to 2007. Throughout the remaining paper monetary values are expressed in 2013 prices if not stated otherwise.

The Survey of Consumer Finances

The paper uses data from the Survey of Consumer Finances between 1989 and 2013. The SCF is a triannual survey undertaken by the Federal Reserve Board (FRB) in cooperation with the Statistics of Income Division (SOI) of the Internal Revenue Service. In each wave between 3,143 (1989) and 6,482 (2010) households are interviewed. The SCF focuses on household income, assets and liabilities and represents the most detailed source of information about household balance sheets and especially high income household balance sheets. This latter benefit of the SCF stems from the dual-frame sample design consisting of an area-probability sample and a list sample.

About two thirds of the completed cases stem from the area probability sample which is built in three stages. In the first stage metropolitan areas and rural counties are stratified by a variety of characteristics and primary sampling units (PSUs) are selected proportional to their population. At the second stage subareas are selected within PSUs again based on stratification. At the third stage random samples are drawn within these subgroups. This design ensures that each household in the sample has the same probability of being selected. Thus the area-probability sample covers broadly distributed household characteristics, while at the same time limiting the cost of data collection due to the stratified design.

Nevertheless there are two important shortcomings. First, due to the highly skewed distribution of household characteristics like income and wealth an enormous sample size would be needed to gain sufficient observations of wealthy households to obtain an adequate picture of the distribution of these characteristics. The cost of obtaining such a sample would be substantial. For example the relatively large Consumer Expenditure Survey (CEX) is based on less than 14,000 observations representing 124 million households in 2012. This corresponds to a sample of only 0.11‰ of the target population. Even a large survey like the CEX is not sufficient to adequately represent the highly skewed income distribution because not enough observations from the top end of the distribution would be part of the sample. This fact becomes obvious if one compares the average pre-tax income in the 10th decile calculated from CEX data with data published by the IRS. According to the IRS, average income in the top decile in 2011 was \$2.1 million¹ compared to \$229,771² in 2014 according to CEX data. So despite the timing gap and different income concepts the difference is striking. One reason for this discrepancy is the problem of non-observation, demonstrated by simulation exercises in Kennickell (2005) and Eckerstorfer et al. (2015).

Second, there is evidence that the likelihood of participation in (wealth) surveys is negatively correlated with household wealth itself (A. B. Kennickell & McManus, 1993; A. B. Kennickell, 2008; Singer, 2006) known as systematic non-response. One can think of several reasons why rich households are less willing to participate, ranging from greater concerns about data protection to higher valuation of the time needed to complete the interview. However if non-response is systematically related to household characteristics like wealth or income, any estimates based on samples which do not address this problem will be biased.

¹ IRS data based on “1979 Income Concept” from SOI Bulletin article - Individual Income Tax Rates and Tax Shares, Table 7.

² Summary Table 1110 (<http://www.bls.gov/cex/2014/combined/decile.pdf>).

In order to address the issues of non-observation and systematic non-response, the SCF relies on the second component of the dual-frame sample: the list sample. The purpose of the list component is to over-sample wealthy households. In order to be able to identify such households prior to data collection an external data source is needed. Due to a cooperation with the IRS under extremely strict privacy conditions, the list sample is built by using a sample of income tax records. Based on that information the assets of tax units are estimated by capitalizing asset related income streams³. Then observations are selected in a two stage process. First, only observations in PSUs which were already selected for the area-probability sample are considered in order to keep the costs of the survey in check. Second, households are stratified based on percentiles of the estimated asset holdings (SCF documents refer to it as a *wealth index*). Then samples are drawn from each strata and strata corresponding to higher estimated net wealth are sampled at higher rates. The details about the sample design of the list sample are not publicly available in order to ensure anonymity of all participants.

Due to non-observation and non-response problems, surveys which do not pay as much attention to their sample design as the SCF does and in particular surveys which do not apply oversampling techniques suffer from serious shortcomings and are in general not able to provide an adequate picture of the income or wealth distribution. Kennickell (2008) demonstrates the contribution of the list sample for the SCF: While net worth at the 90th percentile only increases by 5.5% due to the additional information from the list sample, at the 99th percentile the increase is 74%. Vermeulen (2014) and Eckerstorfer et al. (2015) demonstrate the impact of such a shortcoming for other countries and surveys. The latter paper estimates that aggregate net wealth is underestimated by about one quarter due to non-observation and non-response problems in the case of Austria in the Household Finance and Consumption Survey. Since the current paper is interested in rising income inequality as a potential explanation of increased household borrowing, taking non-observation and non-response problems serious is very important.

7 Facts about US Household Debt

Fact #1:

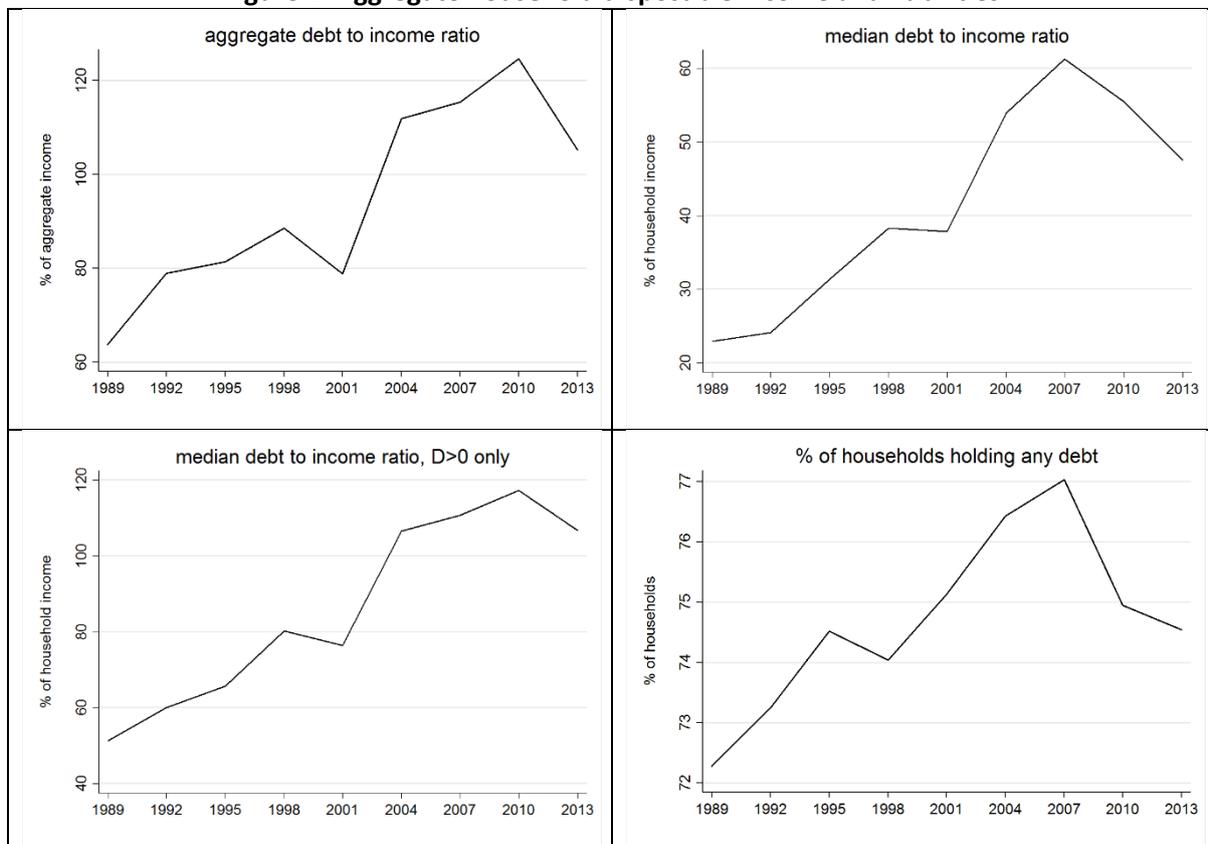
Debt to income ratios triple between 1989 and 2007

US households took on large amounts of debt in the years leading up to the financial crisis of 2007/2008. Household disposable income as well as debt peaked in 2007 at \$11 trillion and \$12.6 trillion respectively (see Figure 10 in the Appendix for absolute amounts). The upper right panel of

³ Kennickell (2000) provides a detailed discussion of the details and the two different models used.

Figure 1 displays the ratio of aggregate outstanding household liabilities to aggregate disposable household income. The total amount of US households' liabilities expressed as a percentage of total disposable income rose from around 60% in 1989 to 111% in 2007 and more than 120% in 2010. The peak in 2010 was the result of disposable incomes falling faster than liabilities in the severe recession which followed the financial crisis. These numbers are widely known and several economists stressed the importance of household debt and private sector debt in general as an informative indicator for financial crises (Bezemer & Zhang, 2014; Schularick & Taylor, 2012). The aggregate ratio however does not contain any information which households owe these liabilities and which households are receiving most of these income streams.

Figure 1: Aggregate household disposable income and liabilities



The aggregate debt to income ratio is computed as aggregate liabilities over aggregate income. The median debt to income ratios are the median of the individual household debt to income ratios. Source: author's calculations based on SCF.

The upper right panel of Figure 1 displays the median debt to income ratio which is computed as the median of individual debt to income ratios. The striking difference compared to the aggregate ratio is that the median ratio is substantially lower and is only 23% in 1989. In contrast to the low level the increase over the sample period is substantial. In fact the median ratio almost triples from between

1989 (23%) and its peak in 2007 (61%). The first important reason why median debt to income ratios are so low is that a large proportion of US households does not hold any debt, which pulls the median closer to 0. The lower right hand panel of Figure 1 shows that the proportion of US households which have some form of liability grew steadily between 1989 and 2007. This increase in the proportion of debtors also pushed up median debt to income ratios as more people took on debt. The second reason why median debt to income ratios are much lower compared to the aggregate is that a large proportion of indebted households have quite low debt to income ratios and at the same time this group contains disproportionately low income households which means their contribution to aggregate income as well as debt measures is below average. The flip side of that statement is that the low median debt to income ratio compared to the aggregate ratio indicates that there are a few heavily indebted households (relative to income as well as in absolute terms) which dominate aggregate outcomes.

The lower left panel of Figure 1 displays the median debt to income ratio if only indebted households are taken into account (i.e. zero debt to income ratios are excluded). Logically excluding non-debtors leads to higher median ratios. Nevertheless they are still substantially lower compared to the aggregate ratio. This indicates that even if one excludes non-debtors, a large part of household liabilities is held by a few highly indebted households (again relative to income as well as in absolute terms). However excluding non-debtors also excludes the information about the increasing share of debtors. If aggregate debt levels rise only because more and more people take on debt but they do it proportional to the existing distribution (meaning that most people take on the median debt to income ratio) then the median debt to income ratio excluding non-borrowers would hardly move. For that reason the median ratio displayed in the upper right panel of Figure 1 is the preferred measure used throughout the remaining paper. The advantage of that ratio is that it takes into account two effects: more people taking on debt (the proportion of debtors in the total population is rising) and people taking on more debt (the degree of indebtedness increases).

However a closer look at the median ratio including only debtors, reveals that there was a change in the debt accumulation dynamic after 2001. Between 2001 and 2007 the median ratio (including only debtors) and the aggregate ratio converge and display almost the same values. This means that the concentration of liabilities in the hands of a relatively small number of heavily indebted households is easing up. The distribution of debt holdings flattened out: Table 1 presents how the relative weight of the 5% most heavily indebted households changed between 1992 and 2004. The measure of indebtedness used is the debt to income ratio. The first result from Table 1 is that debt is concentrated in the hands of a few heavily indebted households because only 5% owe almost 20% of all outstanding liabilities. This proportion however fell from 19% to 17% in a shift which represents the fact that the

concentration of debt eased up. The other side of the coin is that the share of total debt of those households which have debt to income ratios around the median and lie above the 25th percentile and below the 75th percentile of debt to income ratios, increased from 26% in 1992 to 32% in 2004.

Table 2: Concentration of debt with highly indebted households

percentiles of debt to income ratio distribution	year	share of total liabilities
96-100 (Top 5%)	1992	19.1%
96-100 (Top 5%)	2004	17.3%
26-75 (Middle 50%)	1992	25.8%
26-75 (Middle 50%)	2004	32.1%

Percentiles correspond to the distribution of debt to income ratios not to the distribution of income. Source: author's calculation based on SCF waves 1992 and 2004.

Several important conclusions can be drawn from the data presented in this section. First, US private households leveraged up considerably. This result holds regardless of the metric used. Second, the increased debt holdings were the sum of two effects: more people taking on debt and people taking on more debt. Third, debt holdings in the household sector are highly concentrated in the hands of a few highly indebted households. The 5% of most indebted households (based on debt to income ratios) accounted for almost 20% of all outstanding liabilities in 1992 and 17% in 2004. Fourth, the distribution of debt shifted from 2001 onwards. The weight of the most heavily indebted households declined as the share of debtors in the population increased and the middle of the distribution took on more debt. Overall it seems that household debt accumulation did not only accelerate after 2001 but that the process also changed in a qualitative way with a broader part of the population taking on debt. This draws any explanation of the US household debt accumulation documented over the sample period to the immediate pre crisis period 2001-2007 which seems to be of special importance.

Fact #2:

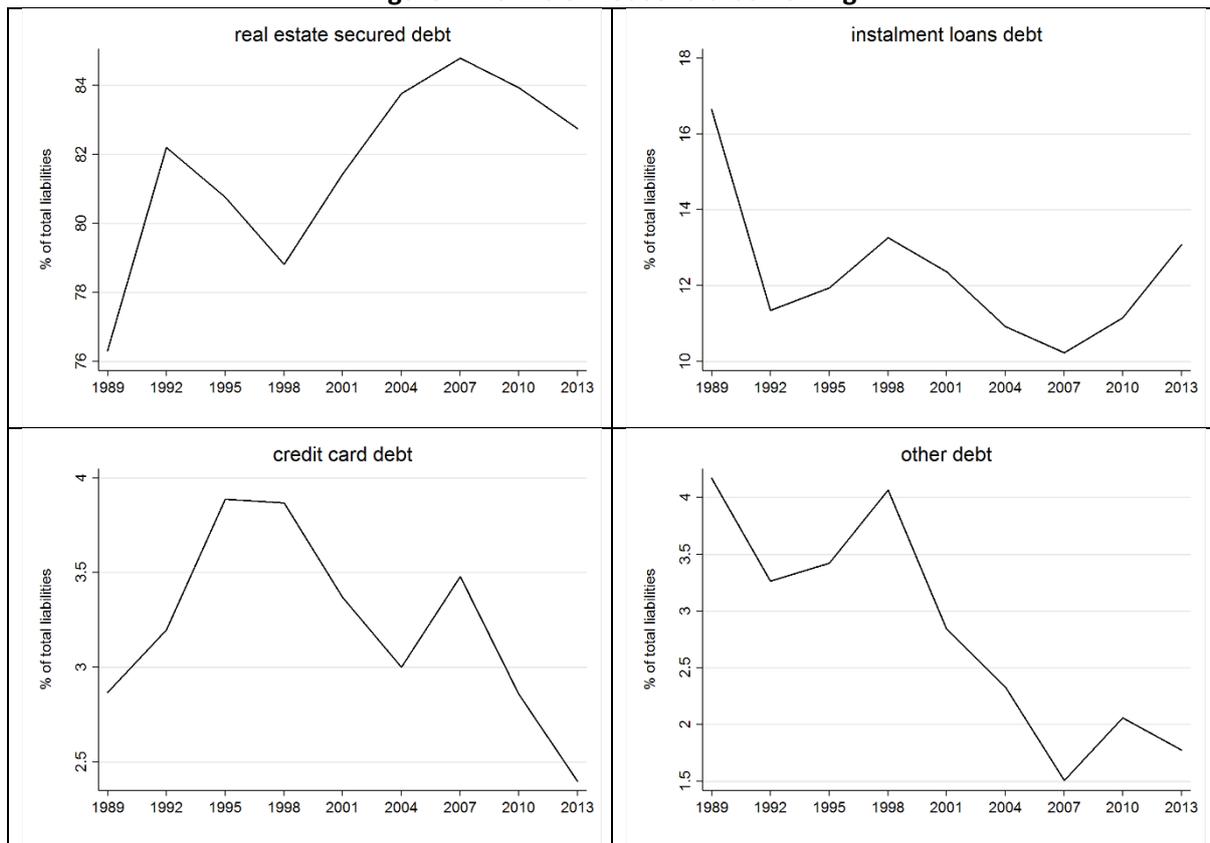
Mortgages account for more than 80% of outstanding debt

The first step in shedding some light on the mechanisms which drove up US households' liabilities, is to split up the total amount of household debt by type. This reveals that the vast majority of household debt is mortgage debt and other real estate secured debt. This comes as no surprise since for most households the owner occupied residence is the main asset which is purchased by taking out a mortgage. Nevertheless it is important to point that out because it seems that some theoretical analyses of household borrowing do not take this empirical fact serious (Kapeller & Schütz, 2014;

Kumhof & Ranciere, 2010; Ryo & Kim, 2014). Figure 2 displays the main forms of household borrowing in detail. The upper left hand panel displays the share of real estate secured debt in total outstanding debt. Real estate secured debt includes mortgages and home equity lines of credit. Real estate related forms of borrowing comprise not only more than 80% of total borrowing over the period 1989 to 2013 but its share increased by more than 5 percentage points between 1998 and 2007. This means that over this sub-period mortgages exhibited above average growth compared to other forms of borrowing.

The upper right panel of Figure 2 displays the share of instalment loans, most of which are car and consumer loans. These became less important between 1998 and 2007 and only accounted for roughly 10% of total borrowing in 2007. Since instalment loans are heavily used to finance consumption expenditures the below average growth casts some doubts on the expenditure cascades hypothesis as an explanation for rising household indebtedness as it predicts debt-financed consumption spending as the main reason for household borrowing.

Figure 2: Forms of household borrowing



All variables are expressed relative to total outstanding liabilities (see Figure 10 in the Appendix). Source: author's calculations based on SCF waves 1989-2013.

The lower left panel contains the ratio of credit card debt to total outstanding household liabilities. Credit card debt plays a minor role for aggregate borrowing and its share in total household liabilities fell from about 4% in 1995 and 1998 to 3% in 2004 and 2.5% in 2013. The share of other forms of borrowing is presented in the lower right panel of Figure 2. Other forms of borrowing include loans against pension accounts and any other liabilities not part of the previous categories. They account for less than 4% of total liabilities and their share fell to a low of 1.5% in 2007, indicating that these forms of borrowing grew slower than total borrowing and in particular slower than mortgages.

Figure 2 demonstrates that real estate secured borrowing is the elephant in the room. Not only in terms of the actual size of this debt category relative to total outstanding household liabilities but also because of its increasing importance in the years leading up to the financial crisis.

Fact #3:

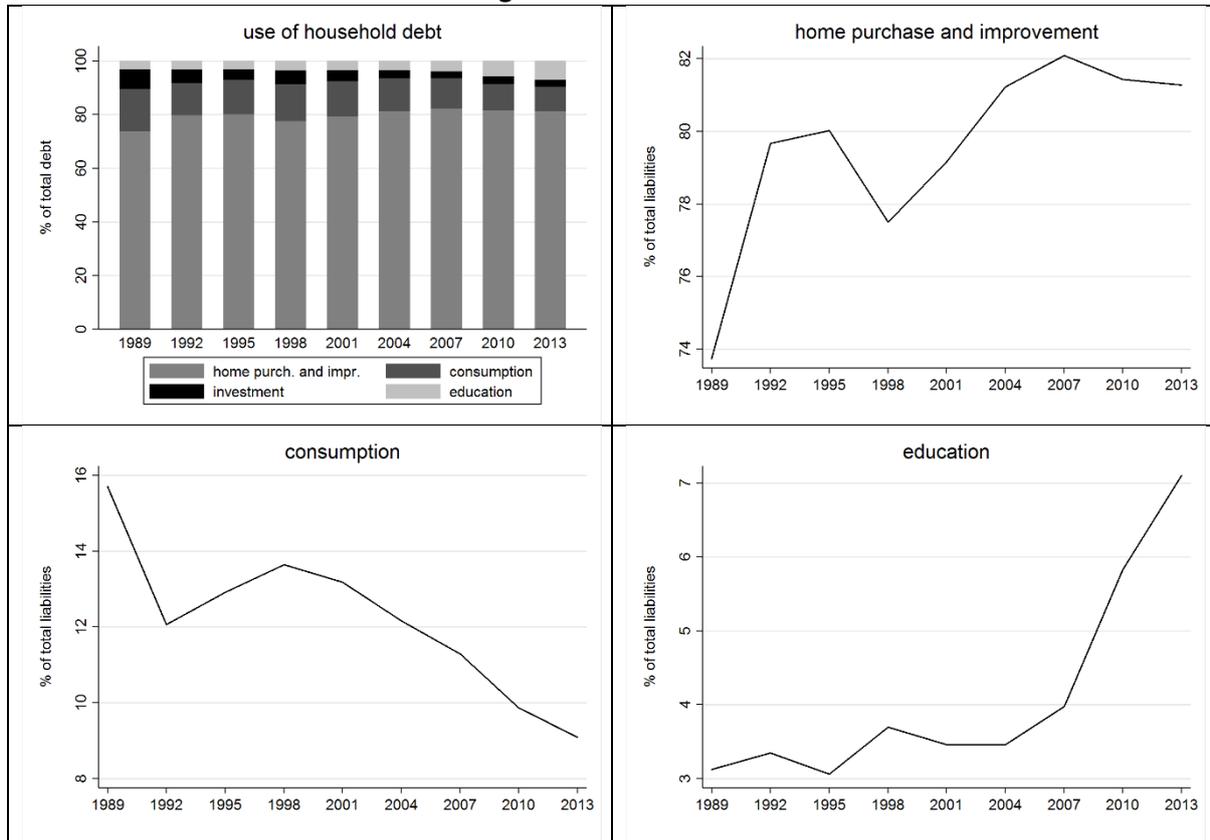
Most household debt was used to purchase homes

Splitting up household debt by types of liabilities provides some information about how the borrowed money was used. However there is not a clean 1:1 relationship between the type and the use of credit. Figure 3 splits up US household debt based on how the money was used. The main result which immediately emerges is that households mainly borrow in order to purchase homes or to improve the current residence. The upper left panel of Figure 3 displays how outstanding liabilities were used and distinguishes between home purchases and home improvements; consumption expenditures; investment purposes; and education expenses. It is important to note that purchases of second homes for investment purposes (buy-to-let) are not included in the home purchase and improvement category but in the investment category.

The upper right part of Figure 3 demonstrates that home purchases and improvements were the motivation behind 78% of total liabilities in 1998 and 82% in 2007. In comparison, real estate secured debt accounted for about 79% of total liabilities in 1998 and for 85% in 2007. This indicates that only a small (but increasing) proportion of real estate secured debt was used for other purposes than home purchase or improvement. The lower left panel of Figure 3 might be surprising for some economists because it is in stark contrast with the idea that US households borrowed heavily prior to the 2007 crisis in order to finance consumption. On aggregate between 1998 and 2007 borrowing for consumption purposes declined from almost 14% of total liabilities to about 11%. Of course in absolute terms and also relative to disposable household incomes debt-financed consumption did grow over this period, but it grew slower than borrowing for home purchases and home

improvements. The lower right panel of Figure 3 reveals a recent development in the United States: the rapid increase in student debt. After 2004 student debt rapidly increased relative to other liabilities. This reflects the overall deleveraging of the household sector, however student debt was not part of this deleveraging process.

Figure 3: Use of credit



All variables are expressed relative to total outstanding liabilities (see Figure 10 in the Appendix). Source: author's calculations based on SCF waves 1989-2013.

Altogether the result from the previous section carries over: real estate markets are the main driver of US household borrowing. In particular prior to the financial crisis in 2007, real estate related borrowing was only marginally used for consumption purposes and potentially as a substitute for more expensive forms of borrowing such as unsecured loans and credit cards. These findings are consistent with the housing hypothesis but cast doubt on the expenditure cascades hypothesis as a valid explanation of US household borrowing in the last three decades.

Fact #4:

Expenditure cascades cannot explain the pre-crisis rise in household debt

The question of how and whether the concentration of income at the top of the distribution which occurred over the last 40 years is related to increased household borrowing is a hotly debated issue. The debate is centred around the idea that if people spend and consume not only in order to fulfil their needs but also in order to signal social status, then strongly growing top incomes should trigger debt-financed expenditures further down in the income distribution in particular by households which do not enjoy fast growing incomes. This argument relies on the assumption that households are upward looking, in the sense that it is those people richer than oneself who set the spending and living standards which one aspires.

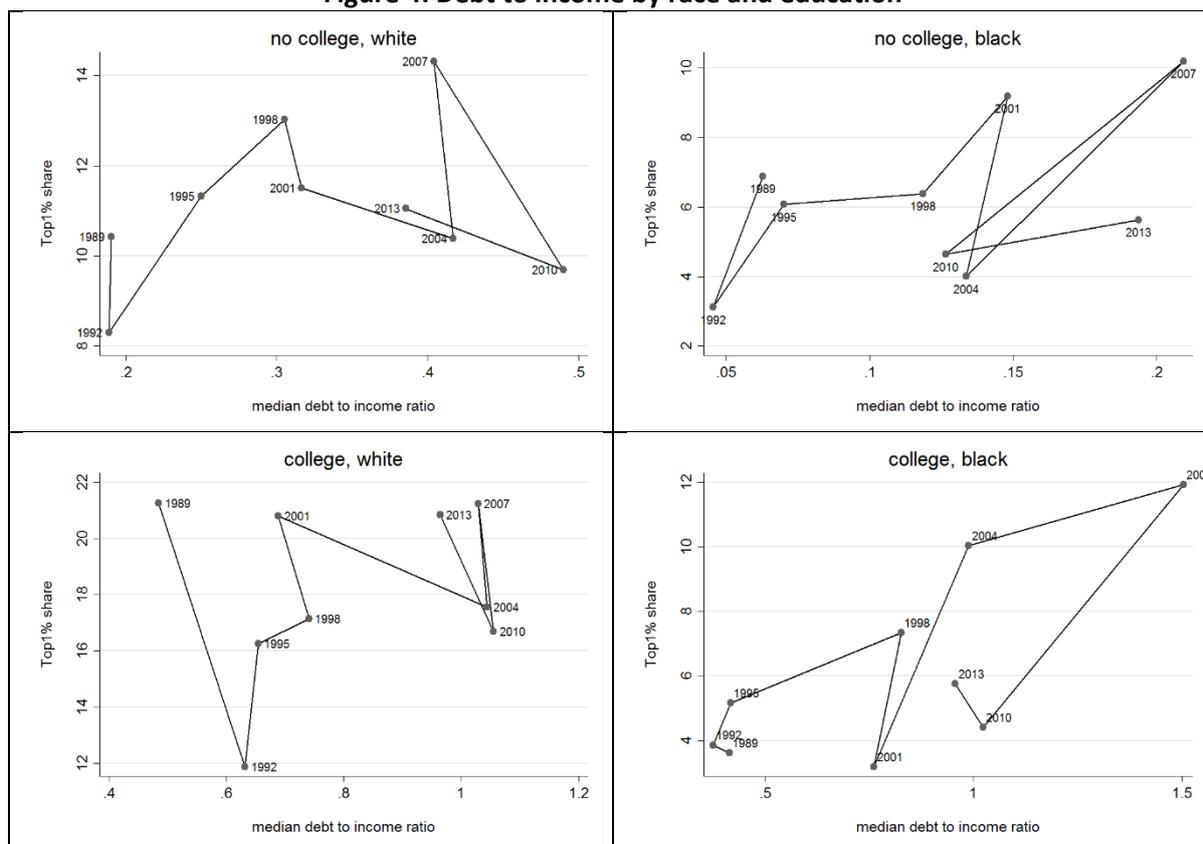
Figure 4 compares four groups of US households which account for more than 80% of the total outstanding household sector liabilities: white and black households and distinguishes further based on whether the household head has a college degree or not. For each group (e.g. for households which identify themselves as black and the household head has a college degree) the richest 1% within that group are identified and their income share with respect to total income of the group are computed. Debt to income ratios for each group are calculated as the median debt to income ratio among those households below the 99th percentile of the group income distribution⁴. Results are combined in Figure 4.

The upper left panel contains the trajectory of top income shares and debt to income ratios over time for white households without a college degree. Within this group the income share of the top 1% grew from 8.3% in 1992 to 14.3% in 2007⁵. Over the same period (1992-2007) median debt to income ratios doubled from 0.19 to 0.4 (in absolute terms \$1.6 trillion in 1992 and \$ 3.7 trillion in 2007, see Figure 11 in the Appendix). The biggest increase in debt to income ratios occurred between 2001 and 2004, a period during which the income share of the top 1% fell from 11.5% to 10.4%. When top income shares jumped 3.9 percentage points between 2004 and 2007 median ratios barely moved. Thus only with a focus on the overall development between 1992 and 2007 one can identify a positive link between top income shares and median income ratios (as well as the absolute amounts of outstanding debt). However for the immediate pre-crisis period (2001-2007) such a link does not exist in the data.

⁴ Group income distribution refers to the income distribution within a group (e.g. households which identify as black and with a college educated head) in contrast to the aggregate income distribution which refers to the distribution of income within the entire population.

⁵ Within group top income shares provide a normalized measure of within group inequality. However they do not provide any information about between group differences. Table 1 in the Appendix contains the average income for the top 1% for each group which can be used as an indicator for between group inequalities.

Figure 4: Debt to income by race and education



Top income shares are computed separately for each group. Debt to income ratios are computed as the median debt to income ratio among those households below the 99th percentile of the group income distribution. Households with no income are excluded.

The upper right panel of Figure 4 contains the results for the group of households which identify as black and whose head had no college degree. Median debt to income ratios (as well as absolute amounts outstanding, see Figure 11 in the Appendix) rose continuously between 1992 and 2007. The important exception was the year 2004 in which median debt to income ratios dropped slightly in the face of sharply falling top income shares. One can think that deleveraging in the face of easing income polarization takes longer than taking on debt as a reaction to rising income inequality which would explain this asymmetric reaction of borrowing to increases and reductions of inequality. In absolute terms the liabilities for this group rose from \$147 billion in 1992 to \$502 billion in 2007. Between 2004 and 2007 alone debt increased by \$148 billion. Based on these results one can argue that there is a pattern of rising income inequality coinciding with increased household borrowing.

Borrowing habits for the group of white-college educated households are strikingly different. Between 1992 and 2001 top income shares increased from 11.9% to 20.8% while the median debt to income ratio barely moved from 0.63 to 0.69. This compares with a jump from 0.69 (2001) to 1.04 (2004)

despite the fact that the top income share fell 5.2 percentage points over this period. Also in absolute numbers the biggest increase in outstanding liabilities occurred in that period (from \$3.7 trillion in 2001 to \$5.1 trillion in 2004). Similar to the group of white non-college educated households there is a positive longer term relationship between top income shares and household borrowing (measured by median debt to income ratios as well as absolute amounts) but for the period of 2001-2007 such a relationship is clearly not present in the data. Put differently the expenditure cascade hypothesis does not apply to white college educated households in the pre-crisis period.

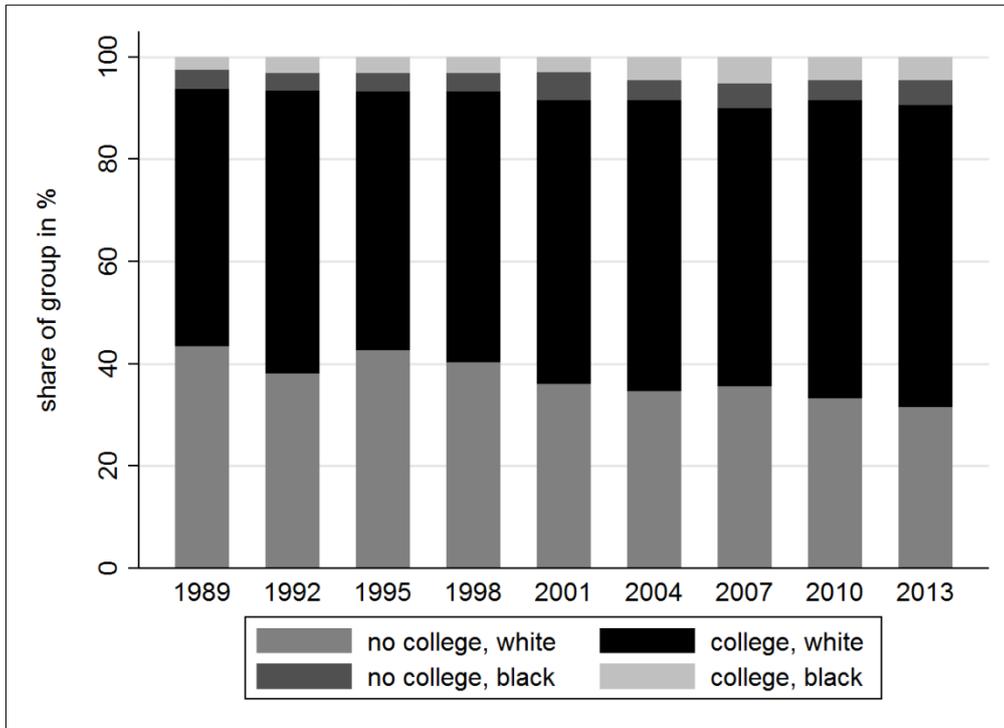
The fourth panel of Figure 4 contains the results for black-college-educated households. Similar to the group of non-college educated households over the 1992-2007 period there is a clear pattern of rising top income shares and rising median debt to income ratios. A similar pattern arises from the absolute amounts borrowed. Between 1998 and 2001 top income shares fall and so does the median debt to income ratio. Even though the reduction seems small given the size of the drop of top income shares, the direct relationship still holds and the asymmetry between periods of increasing and decreasing income polarization might be explained by the fact that it takes households longer to deleverage than to leverage up. In absolute terms the outstanding liabilities of this group increased from \$133 billion in 1992 to \$549 in 2007 (see Figure 11 in the Appendix) while the income share of the top 1% grew from 3.9% to 11.9%. The pronounced jumps in debt ratios which coincide with dramatic increases in income inequality lends support to the expenditure cascades hypothesis for this group.

From the data presented in Figure 4 an important conclusion follows: The expenditure cascades hypothesis is not a convincing explanation for the pre crisis increase in household debt holdings. This conclusion holds even though the data for black households (college and non-college educated) is consistent with the expenditure cascades hypothesis. However the limited size of these two groups does not allow to generalize this conclusion to the wider population. The relative size of each group in terms of outstanding debt is presented in Figure 5 below.

However this is not to say that the hypothesis of expenditure cascades should be entirely ignored. A key feature of financial crises is that a collapse of one market segment can have big implications if a panic develops and (institutional) investors seek to repair their balance sheets by selling of other assets. Such fire sales cause problems to spread quickly across the financial sector. The IMF's former chief economist emphasizes that subprime mortgage defaults of about \$250 billion in 2007 were the trigger for the financial crisis. This is important because even if the total liabilities of black households amounted to only \$1.05 trillion out of \$12.7 trillion and thus to 8.3% of the total in 2007, the absolute amounts are large enough to have significant macroeconomic effects. This latter point is especially

important if subprime borrowing was concentrated among black households which there is some evidence in the literature.

Figure 5: Debt by race and education, relative sizes



The Figure presents the amount of total outstanding liabilities within each group as % of the total outstanding liabilities of all four groups taken together.

So while the expenditure cascades hypothesis might be highly relevant at the margin, it is not a valid explanation for the increase in aggregate debt levels. Other explanations should be taken into account not only in order to find an explanation for the pronounced increases in borrowing by white households for which the cascades hypothesis is not consistent with the data; but also because Figure 4 is based on unconditional information. This means that even if there is a direct relationship between debt and inequality this might just be a coincidence because the actually relevant factor is omitted⁶. Two alternative explanations are especially important. The first factor which is missing from Figure 4 is the housing market and the second one is easing credit supply conditions. The next two sections will address these two issues.

⁶ Which is the motivation for applying regression analysis in order to take several factors into account simultaneously (Wildauer, 2016).

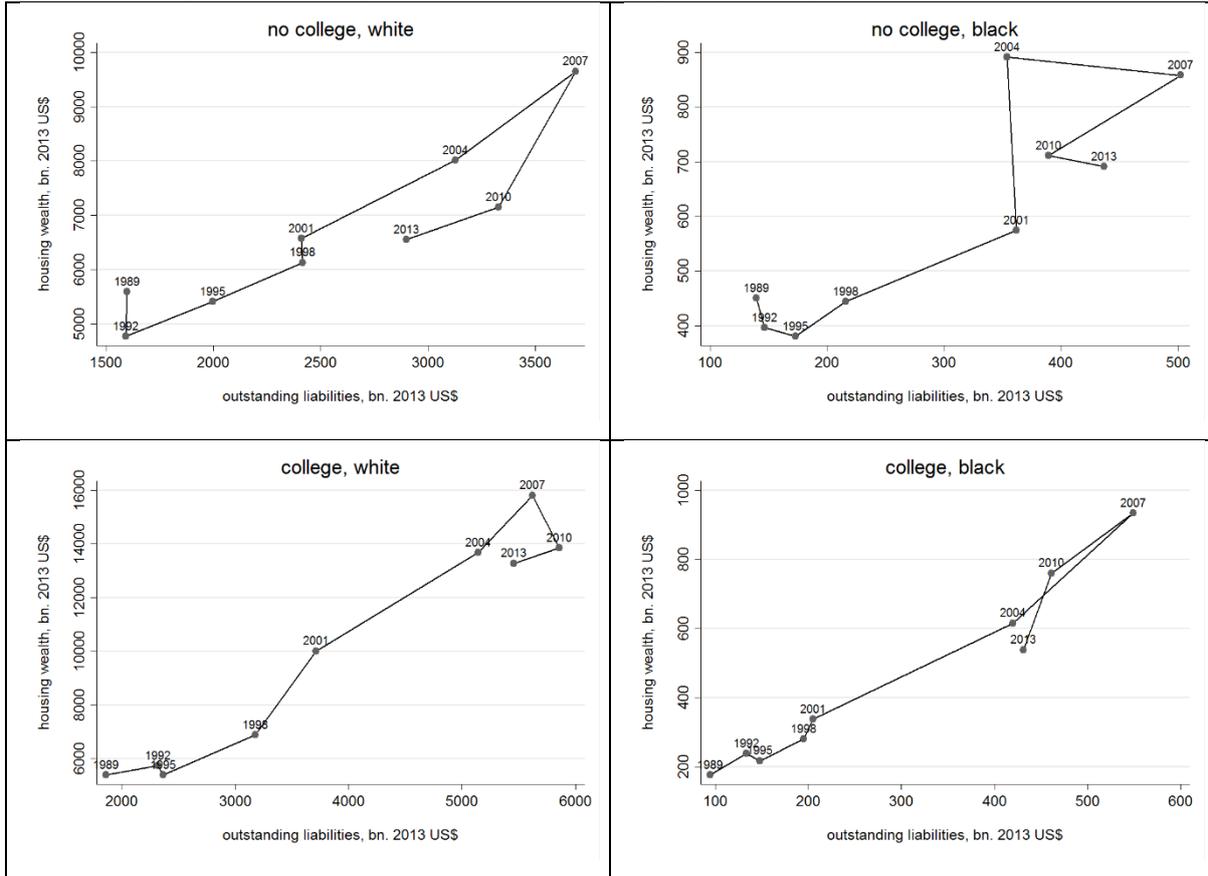
Fact #5:

Increasing real estate wealth drove the pre-crisis rise in household debt levels. Fact #2 and fact #3 provided some evidence that household borrowing is closely tied to real estate markets. In an environment of rising house prices first time buyers will have to take out larger mortgages if they do not want to postpone their purchase. Also homeowners will experience capital gains which might lead them to take out additional debt in order to 'extract' some of their home equity and positive home equity eases borrowing constraints. In addition rising property prices will trigger debt-financed property purchases if further price increases and thus potentially substantial capital gains are expected. Figure 6 displays the co-movement of housing wealth and total outstanding liabilities for each of the four groups. The measure of housing wealth used in Figure 6 includes the value of primary residences and any other residential real estate held by each group.

For the group of white college educated households there is a clear direct relationship between the two for most of the sample period. The 2001-2004 period is of special interest because it was this period during which a substantial increase in median debt to income ratios occurred despite falling top income shares. The increase of housing wealth by \$1.4 trillion coincides with an increase in outstanding liabilities of \$717 billion. Between 2004 and 2007 the corresponding amounts are a \$1.6 trillion increase in housing wealth and an increase in debt of \$560 billion. These numbers strongly point to the real estate market as the driving force of debt accumulation for white non-college educated households, especially in the 2001-2007 period.

For black non-college educated households the direct relationship between housing wealth and outstanding liabilities is not as clear as for the previous group but still strong. The periods 2001-2004 and 2004-2007 are surprising in the sense that first the value of the groups' housing wealth rose considerably and only afterwards outstanding liabilities increased. The fact that data is only available at 3 year intervals might be a problem here. In the recession of 2001 households might have deleveraged and re-leveraged in the years which followed which were the years of actual increasing house prices. Similar the relatively low value of housing wealth in 2007 most likely reflects the fact that house prices in the US began to fall already in 2006 but deleveraging would not have begun or would not have begun on a large enough scale to affect the aggregate outstanding liabilities. Nevertheless also for this group the strong connection between real estate wealth and household debt is clearly visible in the data.

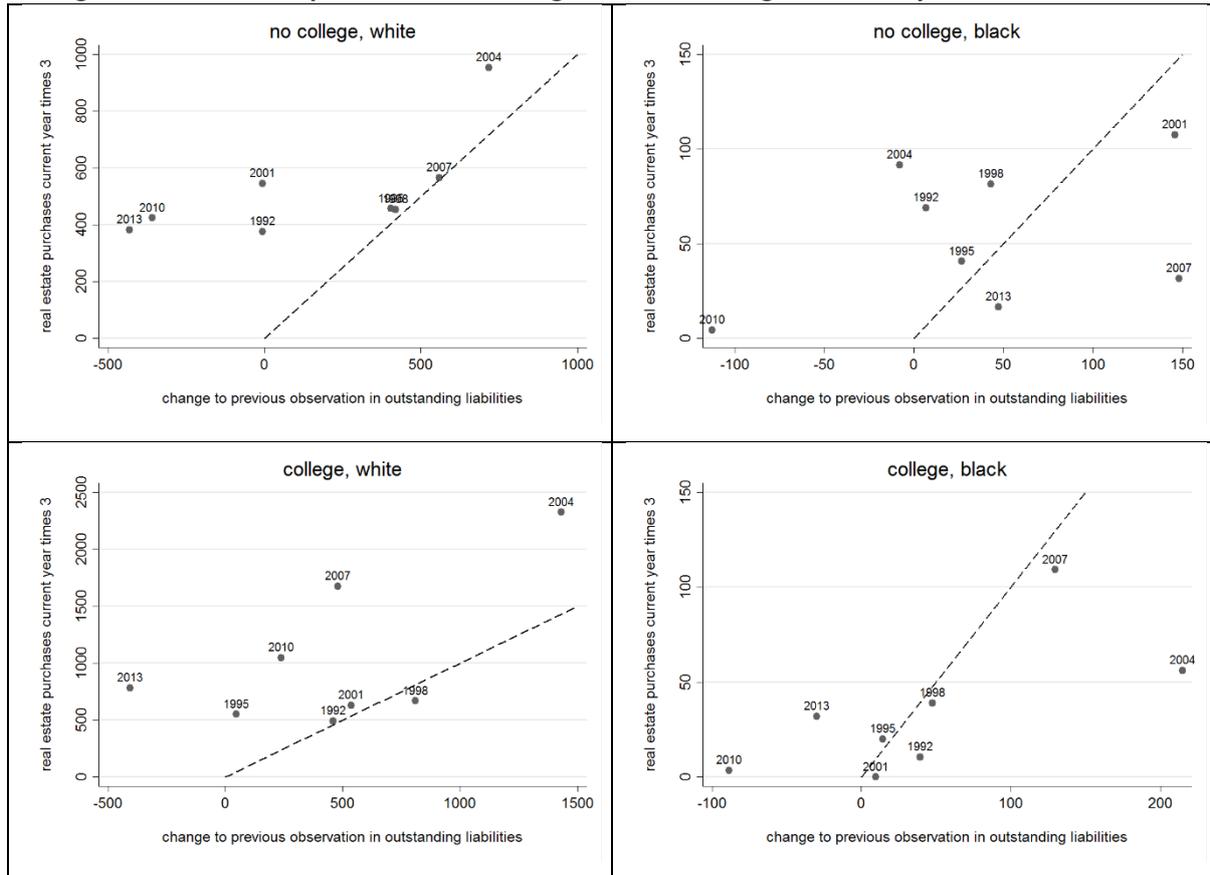
Figure 6: Housing wealth and outstanding liabilities by race and education



Liabilities are computed as total outstanding liabilities for the bottom 99% of each group. Housing wealth is computed as the value of all residential real estate held by the bottom 99% of each group. All monetary variables are expressed in constant 2013 Dollar values.

The group of white college-educated households which is presented in the lower left panel of Figure 6 displays a clear pattern of liabilities rising with real estate wealth. Also for this group the period 2001-2004 proved to be difficult to align with the expenditure cascades hypothesis due to strongly rising debt levels despite falling top income shares. Figure 6 reveals that between 2004 and 2001 the outstanding liabilities of white college-educated households increased by \$1.4 trillion while the value of residential real estate held by this group rose by \$3.7 trillion. It is hard to believe that the period with the largest increase in real estate wealth coincides with the largest increase in outstanding liabilities. The lower right panel presents results for the group of black college-educated households and basically the same picture emerges. Also for this group the biggest increase of outstanding debt which occurred between 2001 and 2007 coincides with a spectacular expansion of housing wealth.

Figure 7: Real estate purchases and changes in outstanding liabilities by race and education



Changes in liabilities are computed as the change relative to the previous observation and thus are three year changes. Real estate purchases correspond to purchases in the year of the survey and are multiplied by 3. All monetary variables are expressed in constant 2013 Dollar values. The dotted line represents all points where real estate purchases equal the change in liabilities.

The fact that increases in debt coincide with increases of housing wealth does not reveal anything about the exact mechanism of borrowing. In particular it remains unclear whether liabilities increased in order to purchase homes or whether homeowners extracted equity as a result of the capital gains they experience. Figure 7 sheds some light on the role and size of real estate purchases. It plots the change in outstanding debt against the value of residential real estate purchases which occurred in the year of the survey. Because data is only available in three year intervals and because the changes in debt reflect 3 year changes the value of real estate purchases was multiplied by three. In addition each panel contains a 45 degree line which marks all points where the value of purchases equals the change in liabilities. So if the value of purchases measured in e.g. 2004 is equal to the value of purchases in 2003 and 2002 and if households only relied on debt to finance these purchases then the 2004 data point would lie on the dashed line. The dashed line is not supposed to indicate a realistic scenario of household behaviour but provides orientation. Due to the fact that most households will not rely entirely on debt when purchasing residential real estate one expects the data points to lie

above the dashed line. Accordingly if the value of annual purchases in the year of the survey (e.g. 2004) are much higher than in the previous two years (e.g. 2003 and 2002), then taking three times the value from the current survey year (e.g. 2004) will overstate the value of purchases for that three year period and the data points will lie below the dashed line. Similarly if the purchase values of the current year underestimate the purchases in the previous years then the data point is expected to lie above the line.

The pattern which emerges from Figure 7 is that large increases in household debt coincide with high volumes of real estate purchases. An important exception for that relationship are the post crisis years of 2010 and 2013 which are characterised by relatively low purchase volumes and declining debt volumes. For both groups of white households the data points for the crucial years of 2004 and 2007 are in the upper right corner of the diagram which indicates that the largest increases in household liabilities were associated with very high volumes of purchases. Measurement problems due to the three year intervals are an issue but the general pattern can be observed. Together with the evidence from Figure 6 it becomes clear that in order to explain the aggregate increase in household liabilities, rising house prices and real estate purchases emerge as the most important factor, especially for the pre-crisis period of 2001-2007.

Fact #6:

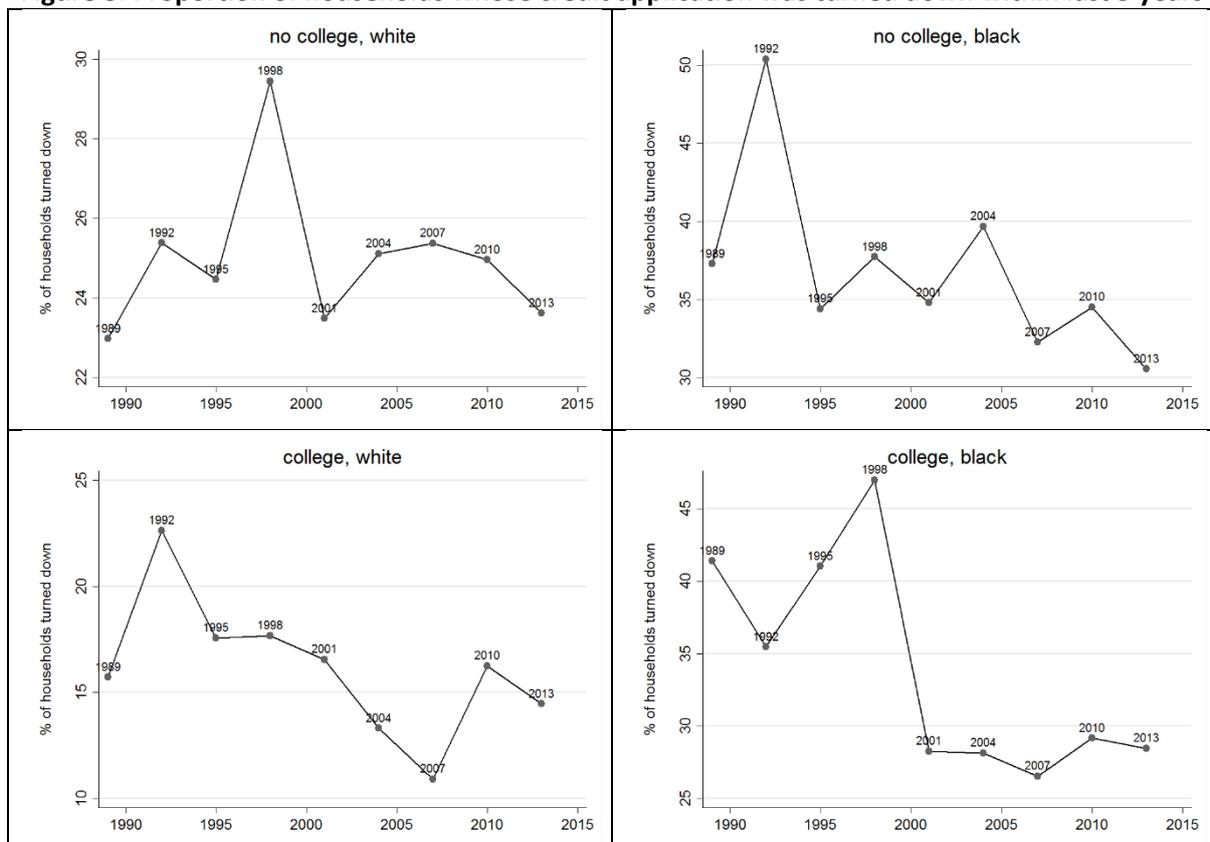
Growing willingness to lend by the financial sector allowed
households to leverage up

Changing attitudes in the financial industry and in particular an increasing willingness to lend can be an important factor in explaining the expansion of household debt up until 2007. Some authors argue that the emerging practice of securitization and re-securitization of mortgages allowed financial institutions to quickly offload risks from their balance sheets and become much more willing to lend to low quality debtors. Since the SCF is a household survey it does not contain information about banking practices but it does contain information on whether a household was rejected when it applied for credit in the past. If one assumes that lower ratios of turned down households reflect an increasing willingness of the financial sector to accept lower quality borrowers, then this ratio can be used as a proxy for shifts in credit supply conditions ('willingness to lend'). In theory the ratio could also fall if the quality of applicants improves across the board. Nevertheless it is not clear why the overall quality of applicants should improve in a given year because even in an economic boom period in which households' disposable income grows strongly, new applicants with low credit scores will try

to borrow, encouraged by the general positive economic circumstances. For these reasons the ratio of turned down borrowers is interpreted as an indicator of credit supply conditions, assuming that general shifts in the quality of applicants do not drive the ratios.

Figure 8 presents the number of rejected credit applicants relative to the total number of debtors for each group over the sample period. The fact that the number of rejected households are presented relative to households holding any form of debt takes into account that as more people take on debt also the number of turned down households would increase even if credit standards remain unchanged. So using the (increasing) number of actual debtors as the scaling factor takes this effect into account. Figure 8 shows that for many groups the relative number of households whose credit applications were rejected fell over time. For the group of white college-educated households the ratio declines from 1992 to 2007. For the other groups the patterns are less clear but at least for the group of black college-educated households there is a falling tendency as well. So overall it is highly plausible that shifts in the willingness to lend by the financial sector were an important factor which allowed households to leverage up over the sample period.

Figure 8: Proportion of households whose credit application was turned down within last 5 years



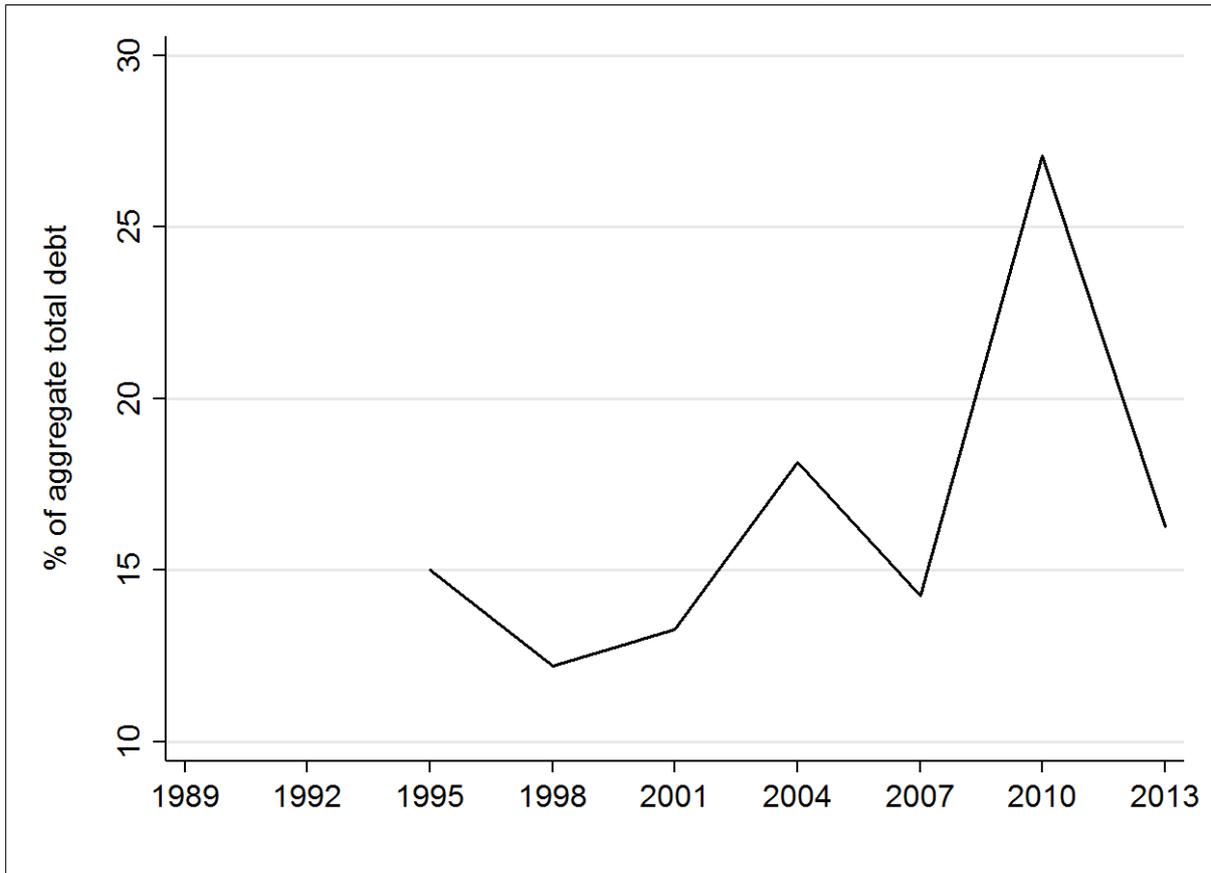
The proportion of turned down households is computed as the share of those households within each group who were turned down when applying for credit over the last 5 years relative to those households holding any debt.

Fact #7:

Borrowing as a reaction to income losses does not explain
the surge of household debt prior to 2007

Figure 9 displays the share of total debt owed by those households which report that their income is lower compared to 'normal' periods in the past. The amount owed by those households increases between 1998 and 2004 to about 18% of total outstanding liabilities. Between 2004 and 2007 it falls back to about 15% and peaks in 2010 at more than 25% of total liabilities. The sharp increase between 2007 and 2010 most likely is due to the fact that after the financial crisis a deleveraging process started with absolute amounts of outstanding household debt falling from \$12.7 trillion (2007) to \$12.3 trillion (2010) and \$11.2 trillion (2013). It would be those households which did not experience income shocks which are in the position to deleverage and thus the share of outstanding debt held by those who face income losses increases. Figure 8 provides mixed evidence. Between 1998 and 2004 total household debt held by households hit by negative income shocks increased from \$0.8 trillion to \$2 trillion (total debt: \$6.9 trillion and \$10.9 trillion respectively) while in 2007 it was down to \$1.8 trillion (total debt: \$12.7 trillion). So out of the \$5.8 trillion increase in household debt between 1998 and 2007, \$1 trillion can be accounted to households which were facing negative income shocks. While this is a significant part of the total increase, it is not enough to explain the increase in aggregate liabilities. It follows that the hypothesis that the accumulation of household debt prior to the financial crisis was driven by stagnant income growth and debt accumulation took place in order to sustain living standards in the face of low income growth and rising cost of living is not convincing as an overall explanation of the US experience prior to 2007. This does not mean that such mechanisms did not exist or were not important for some communities but they cannot be seen as the primary explanation of US household borrowing.

Figure 9: Outstanding liabilities of households hit by negative income shocks



Source: Author's calculations based on SCF waves 1989-2013.

Summary and Conclusion

The paper uses survey data from the SCF to provide a detailed descriptive analysis of borrowing patterns in the US household sector. Seven stylized facts are presented and can be used to assess the realism and relevance of theoretical models of household sector debt accumulation processes. In addition the paper assesses to what extent four common explanations of the sharp increase in household indebtedness prior to 2007: First, the expenditure cascades hypothesis which states that rising income inequality triggered debt-financed expenditures to cascade down from the top of the income distribution as households try to keep up with the richer Joneses they look up to. The second explanation of rising household debt is labelled the housing hypothesis. There the argument is that rising house prices led (first time) homebuyers to take out larger mortgages, and encouraged equity extraction due to capital gains and debt-financed property purchases in expectation of future price increases. Thus overall a booming housing market is seen as the key factor explaining household indebtedness. The third explanation labelled the credit supply hypothesis emphasizes the role of financial institutions and changes in their behaviour. The idea is that it was the increasing willingness

to lend and to take on risk in the financial sector which lifted previously binding credit constraints and thus resulted in the household sector leveraging up. The fourth explanation is called income stagnation hypothesis and focusses on the fact that for large proportions of the US income distribution real incomes did not grow over the last decades. As a reaction to stagnant incomes households borrowed in order to maintain their living standards.

The findings can be summarised as follows. First, US households increased their liabilities substantially. Between 1989 and 2007 total outstanding liabilities of the household sector rose from \$4.4 trillion to \$12.7 trillion in real terms. This increase was the result of two effects: households taking on more debt and more households taking on debt. The first effect is reflected by the increase of the median debt to income ratio (including only indebted households) from 51% in 1989 to 111% in 2007. The second effect is reflected in the rise of the proportion of households with any form of liability from 72.3% in 1989 to 77% in 2007. Second, the data presented strongly points to the dominant role of the housing market as a driving factor of household debt accumulation. More than 80% of outstanding household liabilities are mortgages and most of them were taken out in order to purchase or improve property and not to spend otherwise. Especially in the 2001-2007 period household debt and housing wealth expanded in parallel. This is interpreted as the mixture of households being forced to buy into a higher priced market, taking on debt to extract equity and debt financed purchases in order to speculate on future capital gains. The paper does not attempt to distinguish between these channels but concludes that the housing hypotheses has most explanatory power of the assessed explanations. Third, the nexus between intra group income inequality and household indebtedness is shaky. The data supports such a relationship for black households but not for white households and especially not in the pre-crisis period between 2001 and 2007. This is interpreted as the data not supporting the expenditure cascades hypothesis as an explanation of increasing household indebtedness. Fourth, the credit supply hypothesis seems to have some explanatory power especially for the group of white college-educated households. For this group the share of households which were rejected when applying for credit over the past 5 years dropped from the peak of 22.6% in 1992 to 10.9% in 2007. Fifth, the notion that borrowing was concentrated among households which suffered income declines relative to the past and used debt in order to maintain living standards is not confirmed by the data. There is some evidence that this kind of borrowing became more important prior to the crisis but by no means this hypothesis can serve as the main explanation for the increase in household liabilities up to 2007 because liabilities by households with lower than normal incomes accounted only for 13.3% of all outstanding liabilities in 2004 and 10.9% in 2007.

The paper concludes that the housing hypothesis carries most explanatory power. What follows from that conclusion is that housing markets are crucial and policy makers need to pay close attention to

them when monitoring the financial fragility of the household balance sheet. It is important to stress that none of the four hypotheses are mutually exclusive. For example if credit supply conditions eased for specific groups which are clustered in certain areas then easing credit conditions will allow house prices to grow. So the paper is not always able to make a clean distinction between the individual explanations. However this was never the aim of this descriptive analysis. The aim is to make a very strong point: housing is the key factor in household debt dynamics. So any attempt to explain or model the leverage of the (US) household sector without taking the housing market into account is missing the point.

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Appendix

Table 3: Average Top1% incomes by group

	1989	1992	1995	1998	2001	2004	2007	2010	2013
no-col w	\$633	\$427	\$644	\$762	\$735	\$672	\$887	\$546	\$675
no-col b	\$185	\$145	\$167	\$220	\$391	\$163	\$358	\$183	\$195
col w	\$3,075	\$1,330	\$1,868	\$2,243	\$3,588	\$2,737	\$3,865	\$2,511	\$3,237
col b	\$519	\$419	\$397	\$582	\$557	\$1,974	\$996	\$414	\$473

Average incomes in thousands of 2013 US Dollars. Author's own calculation based on SCF waves 1989-2013.

Figure 10: Aggregate disposable income and debt

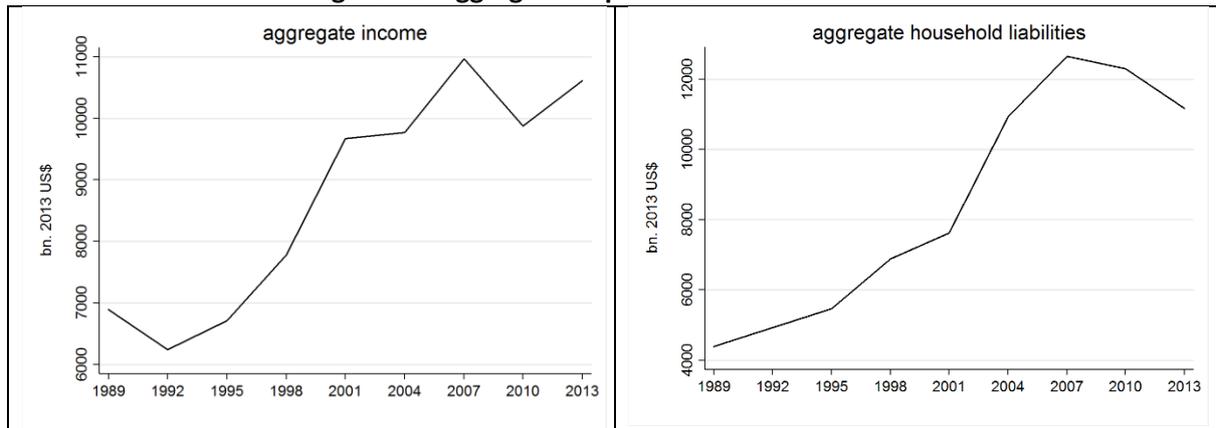


Figure 11: Debt by race and education

