FINANCIAL SERVICES REVIEW

Financial Services Review 29 (2021) 121–145

Focusing on both sides of the balance sheet: the potential benefit of liability management

Zhikun Liu[a,*], David M. Blanchett[b]

[a]*Empower Retirement, 8515 E. Orchard Road, 4T2, Greenwood Village, CO 80111, United States*
[b]*Morningstar Investment Management LLC, 22 W. Washington Street, Chicago, IL 60602, United States*

Abstract

Debt has become a significant issue among U.S. households with average household interest payments on liabilities exceeding expected returns on investment assets by more than 50%. In this study, we explore the role of U.S. household debt and analyze the impact of different economic, demographic, and behavioral factors on household borrowing decisions, with a particular focus on "good" and "bad" debts, which depend on type and interest rate. We estimate significant potential benefits with improved liability management and find that households with lower asset, income, and education levels are likely to benefit most from assistance with debt optimization.

JEL classification: D12; G4; D15

Keywords: Debt management; Retirement financial planning; Behavioral finance; Financial decision making

1. Introduction

Debt is an increasingly significant part of the U.S. household balance sheet. After the 2007–2009 economic recession, debt levels of American households have increased significantly (Bricker et al., 2017). The total U.S. household indebtedness was approximately $14.27 trillion as of June 30, 2020, according to the Federal Reserve Bank of New York. This is higher than the previous peak of $12.68 trillion in the third quarter of 2008 (adjusted to 2019 dollars) and has increased by 27.9% since the second quarter of 2013 (Federal Reserve Bank of New York, 2020). Additional information on this effect is shown in Fig. 1.

* Corresponding author: Tel.: +1-303-737-6207; fax: +1-303-737-6544.
Email address: zhikun.liu@empower-retirement.com (Z. Liu)

1057-0810/21/$ – see front matter

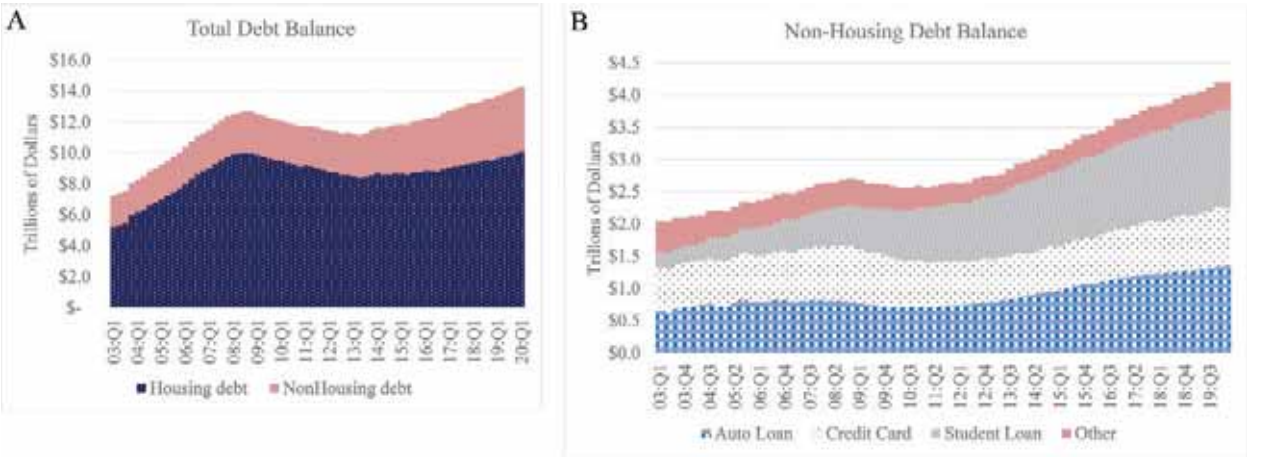


Fig. 1. Growth trends in U.S. consumer credit owned. *Source:* Federal Reserve Board NY 2020 Consumer Credit Panel/Equifax.

Financial firms and advisors tend to spend significantly more time focusing on the assets side of the household balance sheet compared with the liability side. This focus is consistent with the traditional skill set of financial advisors—building portfolios—and reflects how they are typically compensated (e.g., as a percentage of assets under management). However, in this study, we demonstrate that this predominant attention paid to the assets does not necessarily reflect the economic importance within the context of the household's entire balance sheet (i.e., when liabilities are taken into consideration). For example, data from the 2016 Survey of Consumer Finances (SCF) suggest that among "low-to-affluent" U.S. households, the total interest payments on debts exceed the expected gains from their financial assets.[1] Therefore, spending time on "debt optimization" is likely to result in better outcomes than focusing on assets alone.

In this article, we explore the composition of household balance sheets in the United States to understand the potential benefits associated with making more intelligent debt decisions. Consistent with past research, we find that certain types of "bad" debts, such as credit cards, are relatively common on household balance sheets today despite their high interest rates (averaging approximately 15%).[2] It is not clear to what extent interest rates could be lower had the household done more due diligence on its debt decisions, or the extent to which these debts can be refinanced, but it is likely that some, and possibly many, households' situations can be improved (i.e., the household could reduce the interest rate on outstanding debt). This analysis suggests more work should be done to understand the potential benefits of improving household credit decisions.

The objective of this study is to demonstrate the urgency, importance, and potential impact of household liability management by answering the following questions: What is the current financial situation and retirement outlook of low-to-affluent U.S. households? What factors are associated with household debts and leverage ratios? What is the difference between "good" and "bad" debts?[3] Will the attributes related to households carrying different types of debts be similar? What kinds of families are more likely to have higher average debt interest rates and how much could they save by accessing liability optimization?

2. Literature review

Using data from multiple waves of the SCF, Emmons and Noeth (2013) report that the household leverage ratio, defined by the sum of total debts divided by total assets, is higher among younger families. Also using SCF data, Barba and Pivetti (2009) demonstrate that the rising household indebtedness is associated with a decrease in the household savings rate. This phenomenon is partially explained by lagging real wage growth and the tendency for U.S. households to sustain their relative consumption level. Based on data from *Consumer Finance Monthly*, Jiang and Dunn (2013) show that younger consumers have higher levels of credit card debt and are repaying that debt at lower rates than previous generations.[4]

Using the Health and Retirement Study (HRS), Gustman, Steinmeier, and Tabatabai (2011) find that relative debt levels have been increasing for households that are near retirement since the 2007–2009 recession and that much of the growth in debt appears to be related to mortgage and housing expenses. The Quarterly Report on Household Debt and Credit for the second quarter of 2020 supports this finding, reporting $9.78 trillion of mortgage balances for U.S. households (Federal Reserve Bank of New York, 2020). Using the HRS, Lee, Lown, and Sharpe (2007) study the dissaving behavior of older Americans and point out that financial debt carried into later life may result in reduced access to essential health care, restrictions on activities, and delayed retirement.

Among the different categories of household liabilities, high-interest debts such as consumer revolving credit debts can have significant negative impacts on household balance sheets and cash flows. Based on information from the Federal Reserve Bank of New York (2019), credit card balances stood at $870 billion as of the last quarter of 2018, with a seasonally adjusted annual growth rate of 3%. Auto loan originations reached the highest amount in the 19-year recorded history of the New York Fed in 2018, amounting to $584 billion. Unlike certain good debts, which tend to have lower relative interest rates and are typically used to purchase assets that are expected to generate long-term income or grow in value (e.g., mortgages), bad debts such as credit cards, payday loans, and some auto loans typically have higher interest rates and are generally associated with purchases (and assets) that do not generate positive long-term returns (Hanson, 2006). In other words, the cost of the good debts can often be outweighed by their potential long-term benefits, while the bad debts' high interest costs typically have little-to-zero long-term returns. Bad debts are not only expensive, but they may also negatively influence the borrowers' credit scores, hinder their financial and retirement goals, and even cause stress and health issues. Davies, Montgomerie, and Wallin (2015) report a positive relationship between individuals who are deeply in debt and those who report mental health problems such as depression and physical illness. Behavioral studies also indicate that consumers may be more likely to accumulate a larger revolving credit card balance if they frequently pay behind schedule or miss payments (Kim & DeVaney, 2001; Wärneryd, 1999). Therefore, helping consumers stay away from "bad" debt and coaching them to develop good borrowing and accumulation habits are essential approaches for advisors and financial planning firms to support their clients' liability management.

This effect, in which households spend more on their debt than they earn on their savings, is likely to continue in the future given the growth in debt among American households, as noted in Fig. 2 Therefore, it is essential for financial planning firms and advisors to start putting a greater emphasis on their clients' debt structures and help them better manage their liabilities in order to help ensure that they can achieve a successful retirement.

Zinman (2015) notes that research on the household debt has significantly lagged its sister literature on the asset side of the balance sheet. While one may assume that households make rational decisions regarding debt, Stango and Zinman (2016) find that cross-consumer dispersion in credit card borrowing costs remains substantial even after controlling for debt levels, credit risk, and product characteristics.

While the share of U.S. households with debt has been relatively constant, ranging from 72.3% in 1989 to 77.1% in 2016 (Bricker et al., 2017), the mean value of debt for American families has increased significantly, from $66,900 in 1989 (in 2016 dollars) to $123,400 in 2016. This magnitude of debt increase has been observed across age levels. Within the 2016 SCF survey wave, the percentage of households carrying debt peaked around middle age (approximately 45 years old), with the most common debt categories being mortgages, credit card debts, auto loans, and student loans, as noted in Fig. 3.

Not surprisingly, interest rates differ significantly across different types of loans. In Fig. 4 we provide context regarding the distribution of interest rates for households by loan type, again using 2016 SCF data.

Fig. 4 shows that unsecured personal loans (such as credit card loans and other consumer loans) typically have the highest interest rates. These loans are also typically categorized as bad debts because they are not used to purchase assets that improve the long-term financial condition of the household and rather are used to purchase items that are more consumption-based in nature.

Fig. 5 jointly illustrates the prevalence of different loan types and the median interest rates among the households in which the head-of-household is 45 years old. While median interest rates are relatively static across ages, age 45 is selected as the representative age because it is the approximate peak age for indebtedness, as previously noted in Fig. 3.

Our study explores the urgency and importance of liability management for American households. The article consists of the following sections: First, this study utilizes SCF data to develop a general picture of U.S. households' financial situations in terms of their balance sheet characteristics. Second, we review the liability side of households' balance sheets to investigate the prevalence of different types of consumer debts and the interest rates associated with them. Third, we analyze a number of economic and demographic factors that are associated with household debts. After exploring the attributes that potentially relate to the households carrying bad debts, we then identify the characteristics of households that have higher average debt interest rates. Finally, we demonstrate the impact of liability management in terms of investment alpha-equivalent ("excess investment return"-equivalent) analysis and the potential dollar amount that can be saved through interest rate reduction relative to financial asset considerations.

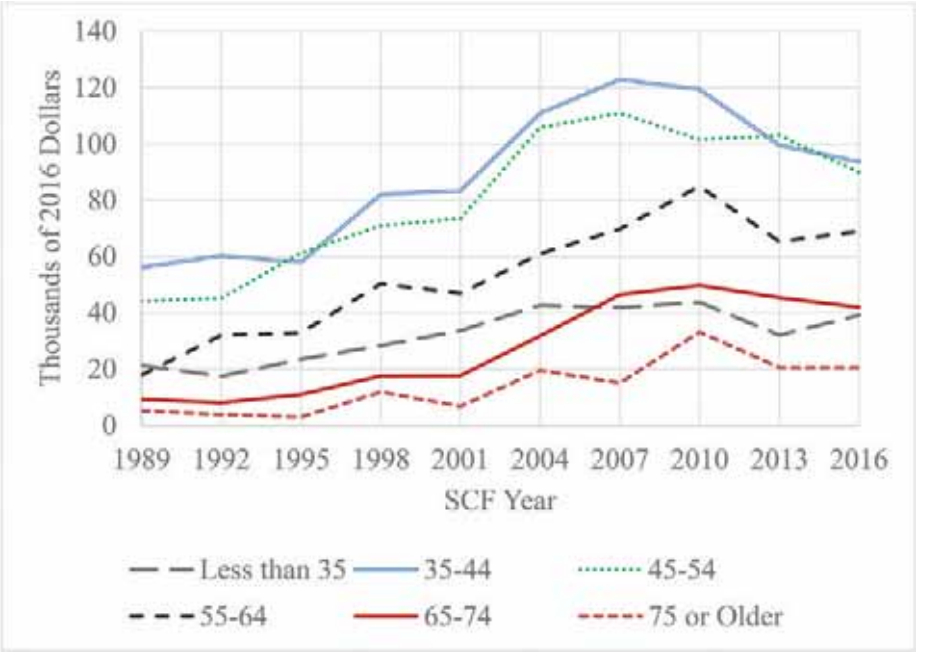


Fig. 2. Mean value of debt for U.S. families with debt holdings. *Source:* Federal Reserve Board Survey of Consumer Finances (SCF) Bulletin 2017. *Notes:* All respondents in the 2016 SCF data are included in this graph. The age of the household is represented by the age of the household head.

3. Theory

The household consumption decision involves a trade-off between consuming more today (borrowing) and consuming more in the future (saving). The borrowing and saving behavior of households is largely driven by their intertemporal consumption choices, affected by their time-discounting preference, investment interest rates, and other factors.

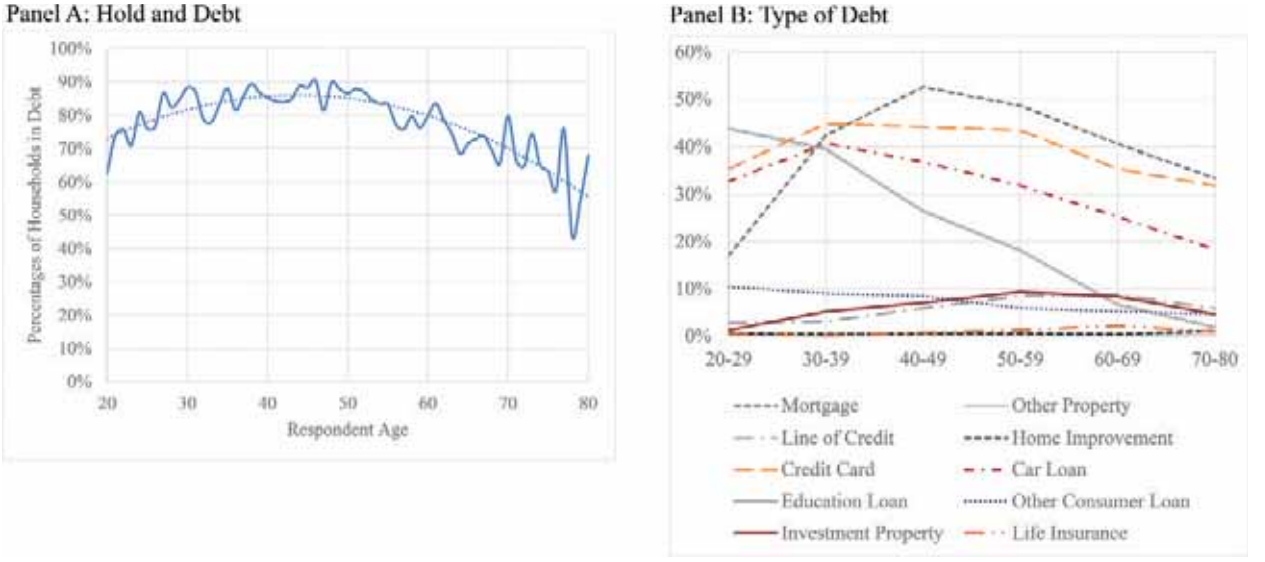


Fig. 3. Probability of a household having debt. *Source:* Federal Reserve Board Survey of Consumer Finances 2016 survey wave. *Notes:* Weights applied. Other consumer loans include loans for household appliances, furniture, hobby or recreational equipment, medical bills, friends or relatives, etc. This category does not include credit cards, margin loans, or loans against life insurance or pensions.

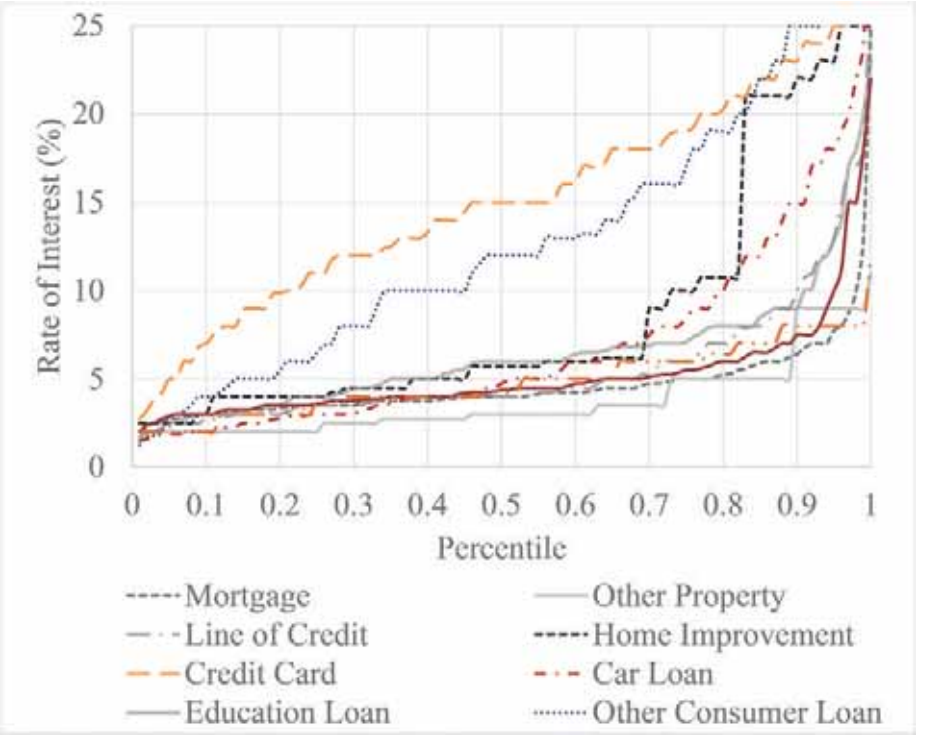


Fig. 4. Distribution of household loan interest rates. *Source:* Federal Reserve Board Survey of Consumer Finances 2016 survey wave. *Notes:* Weights applied. This figure shows the percentile distribution of interest rates across different types of loans. Other consumer loans include loans for household appliances, furniture, hobby or recreational equipment, medical bills, friends or relatives, etc. This category does not include credit cards, margin loans, or loans against life insurance or pensions.

To better analyze the liability management of U.S. households, we structure our theoretical framework according to the life-cycle hypothesis (Jappelli & Pagano 1989; Modigliani 1986), which holds that a household chooses a consumption path to maximize its lifetime utility

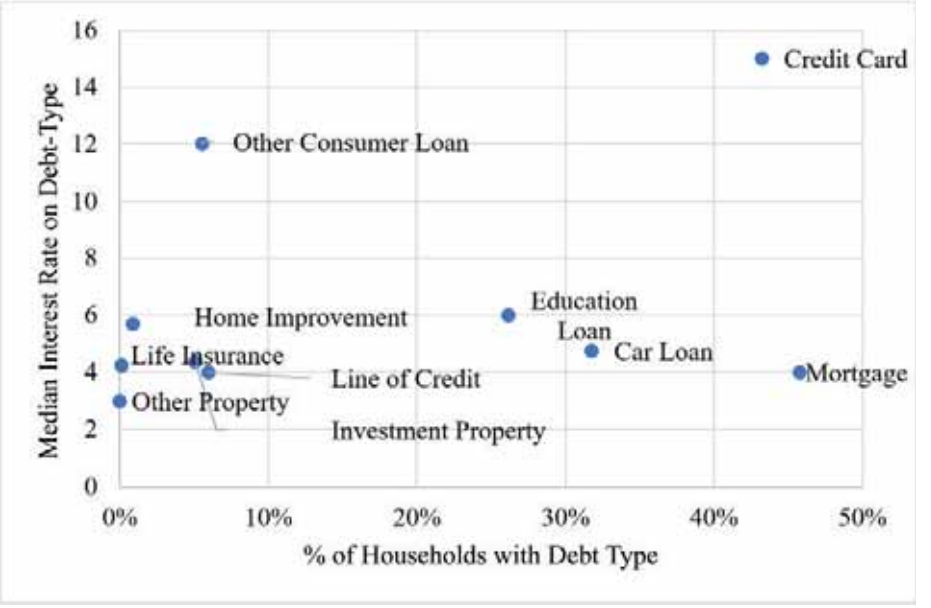


Fig. 5. Loan prevalence and median interest rates. *Source:* Federal Reserve Board Survey of Consumer Finances (SCF) 2016 survey wave. *Notes:* Weights applied. This graph uses a subsample of 45-year-old respondents to illustrate the prevalence and median interest rates of different types of household debts in the SCF data.

subject to an intertemporal budget constraint. We start with a simple two-period life-cycle model to understand the dynamic intertemporal choice issue. Then we generalize this model to multiple periods to capture the households' liability decisions for different life stages.

In the two-period model, a household maximizes its utility described as following:

$$U(c_1, c_2) = u(c_1) + \delta \ u(c_2) \tag{1}$$

where c_1 and c_2 are consumptions in periods 1 and 2, respectively.[5] δ is the discount factor that depicts the household's time preference. The assumption of $0 < \delta < 1$ illustrates the tendency that present consumption is always more preferable than future consumption. δ is more close to 0 when the household is more future-discounting. If δ is close to 1, the household has no preference between present and future consumptions.

The two-period budget constraint that the household faces can be represented by the following inequalities:

$$c_1 + s \leq y_1 \tag{2}$$

$$c_2 \leq (1 + r) \ s + y_2 \tag{3}$$

where y_1 and y_2 are the income of the household for period 1 and period 2, respectively. The borrowing/saving factor is symbolized by s. If $s > 0$, then the household saves in period 1. If $s < 0$, then this household borrows in period 1; thereby, forfeiting investment opportunities and reducing the consumption in period 2. r represents the prevailing interest rate in the financial markets. If $s > 0$, then r stands for the investment return from savings. If $s < 0$, then r can represent the interest charged for the debt the household borrows during period 1.

Substituting out the borrowing/saving factor s, we obtain the "lifetime budget constraint." This constraint represents the fact that the discounted present value of all periods' consumption must be less than or equal to the discounted present value of lifetime income:

$$c_1 + \frac{C_2}{1 + r} \leq y_1 \ + \ \frac{y_2}{1 + r} \tag{4}$$

Now the household's intertemporal consumption choice model can be rewritten as:

$$\underset{\{c_1, \ c_2\}}{Max} \ U(c_1, c_2) = u(c_1) + \delta \ u(c_2) \tag{5}$$

$$s.t. \ c_1 + \frac{C_2}{1 + r} \leq \ y_1 \ + \ \frac{y_2}{1 + r}$$

Using the Lagrangian technique, the solution to this problem is:

$$FOC(c_1): \ u'(c_1) = \lambda \tag{6}$$

$$FOC(c_2):\ \beta u'(c_2) = \frac{\lambda}{1+r} \tag{7}$$

$$FOC(\lambda):\ c_1 + \frac{C_2}{1+r} \leq y_1 + \frac{y_2}{1+r} \tag{8}$$

Putting the first order conditions together, we arrive at the Euler equation:

$$\frac{u'(c_1)}{\delta u'(c_2)} = (1+r) \tag{9}$$

This equation describes the intertemporal optimal consumption choice between the current and future period: The marginal rate of substitution (appropriately discounted by δ) is equal to the gross interest rate, which represents the relative price between consumption in period 1 and consumption in period 2. In terms of saving ($s > 0$), if r is high, the price of consumption in period 1 is high because the household is forgoing a high interest rate of investment return. In the case of borrowing debt ($s < 0$), the interpretation still applies: If r is high, the price of consumption in period 1 is high because the household is paying a high borrowing cost due to the high interest rate. The Euler equation implies that the household maximizes utility by smoothing the consumption path over the life cycle, which explains the borrowing behavior of the household.

The two-period intertemporal consumption model can be generalized for multiple-period analysis. Assume a household's finite lifetime can be categorized into T different periods. In each period t, the household has income y_t, saves or borrows s_t, and consumes c_t. Then the household's intertemporal consumption choice model is as follows:

$$\underset{\{c_1,\ c_2,\ \ldots,\ c_t\}}{Max} \quad E\left[\sum_{t=1}^{T} \delta^{-t+1} u(c_t)\right] \tag{10}$$

$$s.t.\ \ \Sigma_{t=1}^{T}(1+r)^{-t+1} c_t \leq \Sigma_{t=1}^{T}(1+r)^{-t+1} y_t \tag{11}$$

where δ is still the discounting factor measuring the households' preference for present versus future, and r is the rate of return on the investment (or interest rate of borrowing on the debt).

Similarly, one can derive the solution to this problem and arrive at the generalized Euler equation:

$$E_t\left[\frac{u'(c_t)}{\delta u'(c_{t+1})}\right] = (1+r) \tag{12}$$

Notice that the Eq. (12) can be rearranged into:

$$E_t\left[\frac{u'(c_t)}{u'(c_{t+1})}\right] = (1+r)\ \delta \tag{13}$$

Then we can interpret the Euler Eq. (13) as the marginal rate of substitution between the period (t) and the next period ($t+1$), is equal to the product of the gross interest rate and the time discounting factor. In other words, the households smooth their lifetime consumption paths based on two factors, the interest rate (borrowing or investing) and their time discounting preference.

There have been some variations to the life-cycle model since its development. For example, the presence of liquidity and borrowing constraints has been brought up to modify the model for better suitability to empirical analysis. In our analysis, we assumed that U.S. households are able to leverage from various lending sources to achieve their consumption smoothing and combine the liquidity and dollar amount borrowing constraints into the interest rate constraint (the household's tolerance of high interest rates).[7] We also consider households' liquid assets in our analysis to investigate their debt problems. To capture the discounting preference of American families, we use the household's financial planning horizon as a proxy in the empirical analysis.

The household consumption decision model provides guidance on what to expect in the regression analysis results presented in this article. For instance, we expect to observe that interest rates significantly affect household leverages across various debt types. Households with relatively longer financial planning horizons are less likely to carry debt (or they have lower debt amount, debt-to-income ratio, and debt-to-asset ratio) compared with the households whose financial planning horizons are short. Liquid asset holdings should significantly reduce the household debt level. Detailed discussion on the regression results will be presented in the following sections.

4. Data and methodology

This article uses data from the SCF to analyze the characteristics of U.S. household finances. The SCF, conducted by the Federal Reserve Board, is a nationally representative cross-sectional survey of U.S. households. This triennial survey collects a variety of information on income, balance sheet, and demographic characteristics from a selection of more than 6,000 American families in each survey wave. Using the 2016 survey wave, we study the characteristics of the balance sheets of American households, explore the factors that are associated with high debt-to-asset ratios for certain households, and investigate the benefit of liability management for these households.[8]

For our analysis, we focus on "low-to-affluent" American families, which we define as households with less than $1 million in financial assets. Households with very high net worth often have their own unique leveraging and investment strategies, and optimizing these strategies is beyond the scope of this article.

The comprehensive perspective of the average household balance sheet (see Appendix A) indicates that the average return on financial (i.e., investment) assets is approximately 62% of the debt interest charges for the average U.S. household. In other words, the average U.S.

family is spending more on interest servicing household debt than they are earning from investing their financial assets. This is despite a significant focus on managing the asset side of the household balance sheet that is common within the financial advising profession.

The focus of this article is to explore how low-to-affluent American families can potentially benefit from debt restructuring and liability management with assistance from their financial planners and advisors. Because of the nature of the SCF data, which oversamples high-income households (Aizcorbe, 2003; Nielsen 2015), we apply sample weights to all the empirical analyses. In addition to focusing only on households with less than $1 million in financial assets, we also restricted the opportunity set to households whose head is between 20 and 85 years old and that had an annual family income of at least $1,000. After applying these restrictions, our analysis sample is reduced to 4,481 households (see Appendix B for descriptive statistics of the analysis sample). Because each household in the 2016 SCF data has five implicates, the total number of observations in our analysis sample is 22,415.[9] To cope with the dual-frame complex sample design and the multiple-imputation process of the SCF data, this study use the "SCFcombo" Stata macro designed by Nielsen (2015) to conduct our regression analyses.[10]

5. Results and discussion

The regression analyses used in this article follow these steps: First, we use probit and ordinary least squares (OLS) regressions to study what factors are associated with household debt. We look at the economic, demographic, and behavioral factors that could potentially impact the likelihood of carrying household debt, the total debt amount, the debt-to-financial-asset ratio, and the debt-to-income ratio. Second, we isolate what are frequently considered bad debts (represented by credit card debts) and compare them with debts that are typically viewed as good debts (represented by mortgages) to see whether the factors associated with different debt categories are similar. Then, we utilize different interest rate measures to check the attributes that relate to high interest rates. Finally, we perform alpha-equivalent analyses and calculated the potential savings to demonstrate the impact of liability management and interest rate reduction from a financial asset perspective. Detailed descriptions and summary statistics of the variables used in the regression analyses are presented in Appendix B.

Table 1 presents the results of the probit and OLS regressions to better understand what factors are associated with household debts. The dependent variables in these regressions include "whether the household carries debt," "total debt amount," "debt to financial asset ratio," and "debt to income ratio." The marginal effect results of the probit regression in Table 1 provide a general picture of what factors are associated with low-to-affluent American families' debt holdings. The OLS regression demonstrates the impact on household debt amounts from each of these factors. In some cases, relatively wealthier families that are in good financial conditions still carry larger amount of debt due to their high income or sizeable financial asset accumulations. While some financially challenged families might not be carrying a sizable sum of debt in terms of dollar amounts, these debts are typically detrimental to their financial well-being compared with their income and asset levels. To consider these cases, we analyze the debt-to-financial-asset ratio and the debt-to-

income ratio in comparison with the analyses on the likelihood of having debts and the total debt amount. The intertemporal model discussed in the Theory Section above suggests that time discounting preference should affect households' consumption smoothing behaviors significantly. Therefore, we expect to see from the results in Table 1 that households with longer financial planning horizons are less likely to carry debt, have lower debt-to-asset ratio as well as lower debt-to-income ratio. In addition, we expect to see a significant negative relationship between the households' liquid asset levels and the likelihood of carrying debts, total debt amount as well as debt-to-income ratio.

Based on the results in Table 1, married families and households with children are more likely to carry debts. Families that own houses are much more likely to borrow, and the more real assets a family owns, the more likely this family is to carry debts. Liquid assets and age are negatively related to the likelihood of having debts. This is most likely because households are less likely to borrow if they have enough liquid assets to cover their needs, which supports the advocacy of emergency savings through liquid accounts for the general public. Older families are less likely to have debts because they generally have had a longer time to accumulate wealth and pay off their various household debts.

It appears to be counterintuitive that education and income level, as well as reporting having savings, are positively related to carrying household debts. However, if we consider the OLS results together with the marginal effects of the probit regression, the impact of these factors on household debts becomes clear. For instance, although high-income families are more likely to leverage and have larger debt sizes, their debt-to-income ratios are lower and negatively related to their income level. Households that have savings demonstrate much lower debt-to-financial-asset ratios, despite the higher likelihood to borrow, with other variables such as liquid asset levels controlled.

The combined results could indicate that these families may be more financially literate and leverage lower-interest debts to increase their investments in financial assets and savings. When it comes to education level, more educated households are more likely to carry debts, have higher debt balances, and have a higher debt-to-income ratio, keeping all other factors, such as income and assets, the same. This is a strong indication of the impact of student loans on these families. Ceteris paribus, educated families are more likely to carry student loans compared with the less educated ones, because of the prevalence of student loans used to finance education today.

A family's financial planning horizon is also a strong behavioral indicator of household debts. Households with longer financial planning horizons are much less likely to have debts. Total debt amount, as well as debt-to-financial-assets ratio and debt-to-income ratio, are all negatively associated with a longer financial planning horizon. This finding supports the myopic planning hypothesis, which predicts that having a myopic financial planning horizon fuels households' borrowing and may lead families deeper into debt. It also suggests that promoting long-term financial planning horizons serves as a good approach to help families with their liability management.

"Not all debt is created equal," as the saying goes. While good debts are typically defined as those with lower interest rates that help households finance activities and purchases that provide long-term benefits (e.g., mortgages), bad debts are usually associated with higher interest rates and are used to purchase depreciating assets that do not generate long-term

Table 1 Probit and ordinary least squares (OLS) regressions on factors associated with household debts

Variables	Probit (ME)[a] Have debt	OLS Total debt amount ($)	OLS Debt-to-financial-asset ratio[b]	OLS Debt-to-income ratio[c]
Married	0.115** (0.039)	−819.6 (3,577.505)	−119.2 (186.344)	−0.223* (0.102)
Number of kids	0.0787*** (0.019)	5,433.1*** (762.826)	151.1 (142.587)	0.0172 (0.025)
Education level	0.0593*** (0.007)	2,830.9*** (658.963)	−62.01 (33.751)	0.102*** (0.020)
Real assets (per $10K)	0.0109*** (0.002)	4,314.9*** (207.030)	6.767 (8.760)	0.0416*** (0.003)
Liquid assets (per $10K)	−0.0794*** (0.010)	−4,076.7*** (0.051)	7.407 (0.001)	−0.0459*** (0.000)
Have houses	0.583*** (0.057)	6,711.6** (2,509.261)	123.3 (253.975)	0.750*** (0.069)
Have savings	0.298*** (0.035)	3,114.6 (1,963.956)	−853.9*** (149.459)	0.109 (0.089)
Race Black	0.126* (0.052)	8,291.1*** (1,863.746)	216.5 (300.610)	0.116 (0.067)
Race Hispanic	−0.0300 (0.052)	−525.3 (4,670.203)	−177.6 (300.430)	0.116 (0.088)
Race other	−0.0178 (0.062)	4,989.8 (2,683.881)	−511.6** (184.211)	0.443 (0.226)
Income (per $10K)	0.0578*** (0.011)	3,410.2** (1,128.458)	−35.24 (18.272)	−0.0950** (0.029)
Age	−0.0161*** (0.001)	−1,237.7*** (52.300)	−12.94*** (3.904)	−0.0238*** (0.002)
Financial planning horizon (omitted baseline category “next few months”)				
Next year	−0.150** (0.052)	−3,839.2 (2,043.248)	−930.4** (286.531)	0.136 (0.160)
Next few years	−0.0195 (0.043)	−5439.2* (2,269.333)	−734.6* (293.134)	−0.123* (0.057)
Next 5 to 10 years	−0.202*** (0.050)	−11,861.2*** (2,530.713)	−969.5*** (262.833)	−0.193** (0.070)
Longer than 10 years	−0.245*** (0.060)	−6,553.9* (3,156.322)	−630.7* (306.992)	−0.276** (0.090)
N	4,481	4,481	4,481	4,481

Notes: [a] This column reports the average marginal effect of the probit regression. The 2016 Survey of Consumer Finances (SCF) sample weights were applied to the regressions. [b] The analysis sample in this regression includes the households whose debt to financial asset ratio equals to zero. For the reduced-size analysis sample which only includes the households who carry debt, please see the reduced sample regression results in Appendix C. [c] The analysis sample in this regression includes the households whose debt to income ratio equals to zero. Alternative regression with the reduced sample where only households with debts are included is discussed in Appendix C. Standard errors in parentheses.

*$p < .05$, **$p < .01$, ***$p < .001$.

benefits. The costs associated with good debts are often outweighed by the benefits. Bad debts, on the contrary, carry high interest rates with little or no long-term returns (Hanson, 2006). These types of debts can potentially negatively impact the borrower's credit scores, retirement goals, and financial health, as well as family relationships. In some circumstances, bad debts can create a vicious borrowing cycle for some families and cause stress and mental as well as physical health problems (Davies, Montgomerie, & Wallin 2015). The negative health effects of debt (i.e., the "high price of debt") is a phenomenon noted both in the United States (Sweet et al., 2013) and internationally (Clayton, Liñares-Zegarra, & Wilson, 2015).

This article explores the different factors that are potentially related to households carrying bad debts. We first investigate these potential factors by separating debt categories. (In Table 2, we chose credit card revolving balances as a representation of bad debt and mortgages as an example of good debt.) Then, we utilize different interest rate measures to check the relationships between these factors and high interest rates (Table 3).

Although liquid assets and interest rates are both predicted to be associated with household leveraging, we expect these factors to play different roles when it comes to "good debts" versus "bad debt." In particular, we want to test whether interest rate has more significant negative relationships with mortgages due to the large size and long durations of the debt, and whether liquid assets level is more significantly and negatively related to credit card debts due to the "liquidity needs compromise." In addition, we expect to observe negative significant relationships between household financial planning horizons and the amount of both types of debts. The regression results in Table 2 indicate that although some household attributes are related to both good and bad debts, certain factors are particularly noteworthy when it comes to explaining what kinds of households are more likely to carry bad debts. Having more children is positively associated with both credit card loans and mortgages. However, other factors such as interest rate, real assets, liquid assets, and income have different relationships with credit card debt compared with mortgages. For instance, mortgages are more sensitive to interest rate changes, but credit card loans are more sensitive to liquid assets and income. The reason behind this difference could be interpreted as "liquidity needs" compromise. Credit card loans are often used to cover short-term liquidity needs. Their insensitivity toward interest rates could be largely caused by a lack of liquid assets to cover certain short-term needs (such as holiday shopping, etc.). Therefore, credit card debts are negatively related to liquid asset levels. On the contrary, mortgages are negatively associated with interest rates because of their relatively larger debt size (hence larger interest payments) and longer investment horizon.

One interpretation of the income effect on credit card loans could be that, keeping everything else (including liquid assets) equal, households with higher incomes have the ability and resources to borrow—and pay back—more credit card loans. Age is another factor that is only negatively related to mortgages. This finding indicates that older households are more likely to have had a longer time to pay off their mortgages and hence reduce the size of this type of good debt. Because houses are a major component of most households' real assets, it is not surprising that the real asset level is positively related to family mortgage loans. The financial planning horizon factor is negatively associated with both credit card loans and mortgages in

Table 2 Ordinary least squares (OLS) on different debt categories

Variables	"Bad" debts (credit and store cards balance)	"Good" debts (mortgages)
Interest rate	−28.40 (18.556)	−1,673.5* (677.040)
Married	265.1 (364.032)	−4,993.6 (4,070.197)
Number of kids	275.3* (122.659)	5,148.3*** (1,183.437)
Education level	76.84 (54.142)	1,626.4* (771.444)
Real assets	0.00197 (0.001)	0.393*** (0.020)
Liquid assets	−0.0328*** (0.003)	−0.0817 (0.067)
Have houses	519.9 (388.969)	Omitted
Have savings	−419.8 (262.935)	−823.7 (3,076.358)
Race black	−528.6 (345.616)	7695.6 (4,149.247)
Race Hispanic	−685.3* (314.295)	6,027.6 (9,231.032)
Race other	−247.4 (311.224)	4,493.5 (5,760.525)
Income	0.0201** (0.007)	0.144 (0.090)
Age	13.30 (6.916)	−1,009.6*** (106.106)
Financial planning horizon (omitted baseline category "next few months")		
Next year	−685.5 (386.068)	1,138.5 (4,312.770)
Next few years	−861.4** (322.013)	−6,064.8 (4,592.322)
Next 5 to 10 years	−1,109.0*** (329.694)	−9,363.6** (3,520.808)
Longer than 10 years	−1,368.6** (483.781)	−12,236.5** (4,396.354)
N	2,808	1,661

Notes: Not all of the respondents in our analysis sample reported the interest of different kinds of loans. Therefore, the number of observations was reduced in the regressions above. The 2016 Survey of Consumer Finances (SCF) sample weights were applied to the regressions. Standard errors in parentheses.

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 2. This is consistent with the previous regression results, indicating that families with longer financial planning horizons are less likely to carry both kinds of debts.

A major focus of household liability management is to help the targeted families to reduce the interest rates of their debts. The following analysis seeks to explore what kind of factors are associated with higher household interest rates. We expect to see negative relationships between the weighted average interest rate and certain household characteristics such as real and liquid asset levels, household head education level, homeownership, savings, as well as being married and having a longer financial planning horizon. In Table 3, we use different measures to capture the households' average interest rates as well as the percentile ranking of the average interest rates. The weighted average interest rate takes into account the dollar amount weighted average interest rates across all loan types. For example, for each household, the dollar amount of different loans is multiplied by their interest rates to calculate the overall liability cost per year. Then this liability cost is divided by the total loan amount to acquire the weighted average interest rate for this household. The simple average interest rate measure takes the arithmetic average of the interest rates across all loan types. This measurement, together with the weighted average interest rate percentile and simple average interest rate percentile measures, serves as a robustness check for the weighted average interest measurement. Based on the OLS regression results from Table 3, households with less education, lower levels of assets, fewer savings, and older age are

Table 3 Ordinary least squares (OLS) on average interest rate measures

Variables	Weighted[a] average interest rate	Weighted average interest rate percentile	Simple[b] average interest rate	Simple average interest rate percentile
Married	−1.187** (0.378)	0.00524 (0.009)	−0.789* (0.350)	0.00903 (0.009)
Number of kids	0.0337 (0.102)	0.0108*** (0.003)	0.164 (0.102)	0.0110*** (0.003)
Education level	−0.319*** (0.054)	−0.00613*** (0.002)	−0.277*** (0.051)	−0.00680*** (0.001)
Real assets (per $10K)	−0.0381*** (0.007)	−0.00128*** (0.000)	−0.0431*** (0.008)	−0.00142*** (0.000)
Liquid assets (per $10K)	−0.141*** (0.000)	−0.00348** (0.000)	−0.166*** (0.000)	−0.00388*** (0.000)
Have houses	−0.888** (0.342)	−0.00484 (0.010)	−0.368 (0.402)	−0.00774 (0.009)
Have savings	−0.826* (0.364)	−0.0164** (0.006)	−0.851* (0.354)	−0.0174** (0.005)
Race Black	−0.506 (0.384)	0.0307** (0.009)	0.0127 (0.336)	0.0284*** (0.008)
Race Hispanic	0.749 (0.413)	0.0452*** (0.011)	1.332** (0.509)	0.0358*** (0.010)
Race other	0.0260 (0.420)	0.0126 (0.011)	0.627 (0.473)	0.0166 (0.011)
Income (per $10K)	−0.0255 (0.040)	−0.00109 (0.001)	−0.0302 (0.041)	−0.00166 (0.001)
Age	0.0462*** (0.010)	0.000589* (0.000)	0.0297*** (0.009)	0.000559* (0.000)
Financial planning horizon (omitted baseline category "next few months")				
Next year	−1.343*** (0.406)	−0.00407 (0.011)	−0.396 (0.416)	−0.0109 (0.010)
Next few years	−0.505 (0.507)	−0.0188* (0.009)	−0.335 (0.447)	−0.0128 (0.008)
Next 5 to 10 years	−1.359*** (0.346)	−0.0185 (0.011)	−1.188*** (0.253)	−0.0194* (0.009)
Longer than 10 years	−0.692 (0.436)	−0.0111 (0.012)	−0.477 (0.356)	−0.00924 (0.011)
N	3,398	3,398	3,398	3,398

Notes: Interest information for some loans was not reported in the 2016 Survey of Consumer Finances (SCF) data, therefore the total number of households was reduced from 4,481 to 3,398. The 2016 SCF sample weights were applied.

[a] "Weighted" means this interest rate measure takes the dollar amount weighted average of the interest rates across all loan types into account. That is, for each household, the dollar amounts of different loans are multiplied by their interest rates to calculate the overall liability cost per year. Then this liability cost is divided by the total loan amount to acquire the weighted average interest rate for each household.

[b] ™Simple" means this interest measure is based on the simple arithmetic average of the interest rates across all loan types. This measurement serves as a robust check for the weighted average interest measure. Standard errors in parentheses.

*$p < .05$; **$p < .01$; ***$p < .001$.

subject to higher interest rates. Therefore, families with these attributes are more likely to need help with liability management and could potentially benefit significantly from interest rate reductions.

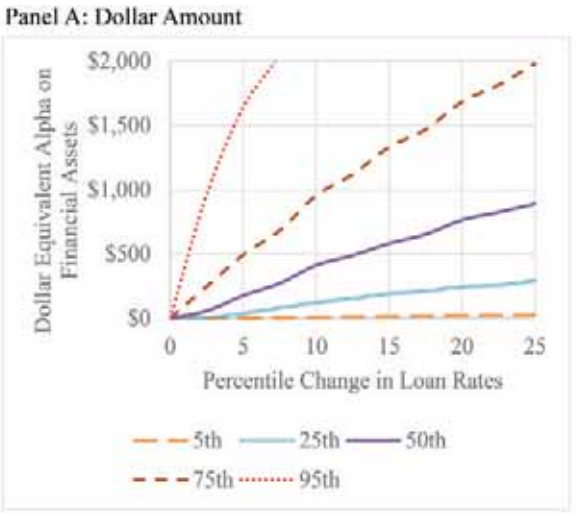
Finally, we perform the alpha-equivalent analysis to determine the potential savings a household would experience if it were able to reduce the interest rates on their existing liabilities. For the analysis we assume the household's interest rates are reduced based on the distribution of household loan interest rates as noted in Fig. 3 We assume each liability would be reduced by some percentile amount, based on the distribution for that respective liability.

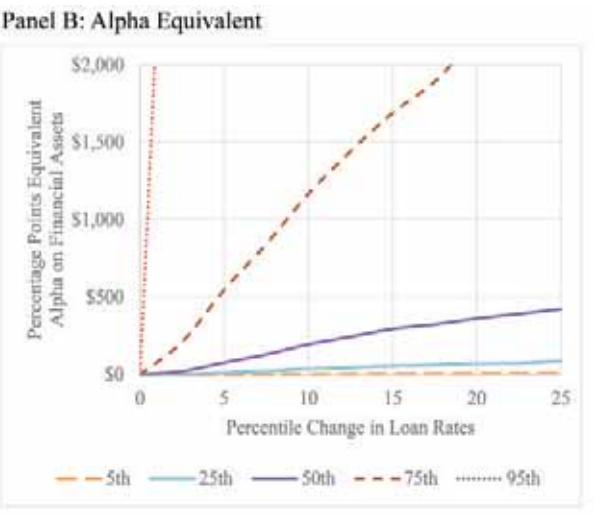
For example, let us assume a household had financial assets (i.e., a portfolio) worth $100,000 and a single liability, which was $15,000 in credit card debt at an interest rate of 15%. A 15% interest rate on credit card debt would be in the 47th percentile of interest rates according to Fig. 4 If the household were able to reduce the interest rate by ten percentile points, to the 37th percentile, the interest rate would decline to approximately 13%. This results in an interest savings of 2% (15% to 13% = 2%) that would translate into $300 of total savings on the $15,000 total credit card debt ($15,000*2% = $300). If we divide the estimated $300 in annual interest savings by the total financial assets, we can estimate the "alpha-equivalent" benefit associated with liability optimization, which would be 30 bps (basis points) in this case ($300/$100,000 = 30 bps).

We conduct this analysis for all households, where the rate on each loan is assumed to be reduced by some percentile level, based on the distribution of loan rates in Fig. 3 For the analysis the lowest possible rate is the 1st percentile. Information about the distribution of potential dollar savings and alpha-equivalent benefit are included in Fig. 6 in Panels A and B, respectively.

The potential savings associated with improving loan rates can be significant, especially for households that have higher interest percentiles. If a household's weighted average debt interest rate is currently in the 95th percentile, a five-percentile drop could generate 113.5% equivalent alpha, or $1,641 in annual savings. If these households achieve a 10-percentile reduction in loan rates, the total savings would be $2,614, which is equivalent to 237.5% of investment alpha. Even the median household stands to benefit from even modest improvements. For example, the median households would on average save $410 if they were able to reduce their weighted average loan rates by 10 percentile points, which is equivalent to a 195 bps of investment alpha. This suggests that, for many households, making efforts to reduce the interest rates on their liabilities is more likely to result in wealth gains than attempting to construct portfolios that might outperform the market.

Notice that when calculating the potential savings on interest rate reductions, we use the weighted average interest rate in the discussion. Lowering the household average interest rate may be achieved in two different ways. First, households can make more efforts on interest rate shopping and negotiate lower interest rate on their loans, if possible. Second, even if directly lowering interest rates is not feasible, the weighted average interest rate can still be reduced through debt restructuring. Households can substitute a higher interest loan with lower interest borrowings to achieve the reductions of overall weighted average interest rates. (For example, consider a household with a large revolving balance on credit card loans who cannot reduce the total amount of household debt. This household could still potentially





Percentage Points Equivalent Alpha											
	Change in Interest Rate Percentile										
Current Interest Rate Percentile	Δ0	Δ2.5	Δ5	Δ7.5	Δ10	Δ12.5	Δ15	Δ17.5	Δ20	Δ22.5	Δ25
5th	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.10%	0.10%	0.10%	0.10%
25th	0.00%	0.00%	0.10%	0.20%	0.40%	0.50%	0.60%	0.60%	0.70%	0.80%	0.80%
50th	0.00%	0.20%	0.80%	1.30%	1.90%	2.40%	2.90%	3.20%	3.60%	3.90%	4.20%
75th	0.00%	2.10%	5.50%	8.40%	11.70%	14.40%	16.90%	18.90%	21.70%	22.80%	24.70%
95th	0.00%	57.20%	113.50%	159.60%	237.50%	254.40%	302.80%	336.50%	382.20%	410.60%	455.40%
Dollar Equivalent Alpha											
	Change in Interest Rate Percentile										
Current Interest Rate Percentile	Δ0	Δ2.5	Δ5	Δ7.5	Δ10	Δ12.5	Δ15	Δ17.5	Δ20	Δ22.5	Δ25
5th	$0	$0	$0	$4	$7	$12	$14	$17	$20	$21	$23
25th	$0	$2	$36	$79	$120	$153	$189	$209	$243	$255	$290
50th	$0	$56	$175	$270	$410	$488	$580	$652	$763	$824	$889
75th	$0	$245	$492	$681	$953	$1,120	$1,328	$1,468	$1,683	$1,814	$1,980
95th	$0	$960	$1,641	$2,053	$2,614	$2,952	$3,409	$3,785	$4,278	$4,443	$4,840

Fig. 6. Benefit of reducing interest rates on debt. *Source:* Federal Reserve Board Survey of Consumer Finances (SCF) 2016 survey wave. *Notes:* The subsample is restricted to households that carry loans, reported complete data on all loan types, and have more than $1 in financial assets. The number of observations is 3,371. The 2016 SCF sample weights were applied.

pay off this high interest rate credit card loan with low-interest secured-personal loans or some other type of loan. By doing so, the average interest rate of this household could be reduced, potentially significantly.)

The analyses above reveal the significant potential benefits of liability management and point out the characteristics that are associated with different households' debt problems. Financial planning practitioners and financial institutions can benefit from this research not only by recognizing the potential benefits of liability management for low-to-affluent American families, but also by identifying the attributes associated with those

households that most need debt assistance. This study can also encourage consumers to seek for an integrated approach to making decisions about their marginal income and benefit significantly from analyzing both sides of their balance sheet extensively and regularly.[11]

6. Conclusion and implications

Debt is a significant and growing component of U.S. household balance sheets. With total interest rate payments on loans exceeding the expected returns on household financial assets for the average household, the impact of liability optimization should draw more focus from financial advisors, financial firms, and consumers. In this study, we first reviewed American families' current financial outlook by looking at their debt situations. Using the SCF data, we then analyzed the different economic, demographic, and behavioral factors that are associated with household borrowing and leverage ratios. Next, we separated the good and bad debts and investigated whether the attributes related to different debt categories are similar. After checking the characteristics demonstrated by the households that carry high-interest debts, we performed alpha-equivalent analyses to calculate the potential benefits of liability management.

Our study indicates that households with lower assets, income, and education levels need assistance the most and could significantly benefit from debt management. Households' time discounting preferences also play an important role in their borrowing decisions. Families with longer financial planning horizons are less likely to carry loans. Among the borrowers, a shorter financial planning horizon is usually an indicator of a higher debt amount as well as higher debt-to-asset and debt-to-income ratios. Families with myopic planning horizons are also more likely to carry a higher amount of bad debts, such as credit card balances.

This study can also inspire advisors and financial services firms to consider alternative approaches to helping consumers improve their financial well-being. For example, advisors could help their clients design a road map for debt restructuring and interest rate reduction along with building portfolio investment strategies. By reviewing both sides of the household balance sheet extensively and periodically, advisors can integrate both investment and liability management strategies to better improve their clients' economic outlooks. These strategies would be particularly effective for households with lower income, education, and asset levels.

Large retirement firms could explore the possibility of building a bridge between their retirement plan participants and lending institutions to help their participants gain access to loans with competitive rates. Participants could utilize these lower "group rate" loans to restructure and reduce the interest payments on their existing debts. Financial planners could also implement different behavior coaching strategies (such as behavioral nudging devices) to help their clients increase their financial planning horizons and avoid the consequences of myopic planning.

The integration of investment and liability management strategies prompts financial advisors to help their clients to answer the question, "Where should my next dollar go?" By designing a universal comparison mechanism between investing and paying off debt, financial advisors can help their customers to better manage their marginal income. An integrated model or strategy can be designed to not only educate the consumers on the importance of liability management, but also guide their decision-making process after taking each consumer's unique financial situation into account. Future studies may find it favorable to build such an integrated methodology to help answer the age-old invest or pay off debt conundrum faced by many households.

Notes

1 Defined as households with a net worth not exceeding $1 million, have more than $1,000 annual income and have at least $1 in financial assets. High net worth households, defined as those with net worth over $1 million, often have their own unique leveraging and investment strategies, and optimizing these special strategies is beyond the scope of this paper. Our definition of "low-to-affluent" households includes those in the middle-to-low income range because these households are most likely to need debt management assistance. Detailed descriptions of the analysis sample can be found in the data and methodology section of this article.

2 This is the lower end of average credit card and retail store installment card interest rates. Source: 2016 SCF data weighted average credit card interest rate for low-to-affluent households.

3 The definition of "good" and "bad" debts is discussed in both the literature review section and the results section.

4 The *Consumer Finance Monthly* study is conducted by the Consumer Finance Research Group at Ohio State University.

5 The utility function satisfies monotonicity (more is preferred to less) and concavity (diminishing marginal utility) properties and assumes c_t's are normal goods for every period t. The concavity property implies the preference of smoothing consumption across time because of the love of diversity.

6 The budget constraint depicted by Inequality (14) is derived from the following constraints while substituting out the borrowing factor s_t ($\forall$t from 1 to T):

$$C_t + S_t \leq y_t \tag{11.1}$$

$$C_{t+1} \leq (1 + r)\, s_t + y_{t+1} \tag{11.2}$$

7 Given the prevalence of "payday lending" and other short-term loans in the United States (Caskey, 2001; Stegman, 2007), we assume that American households have access to sufficient amount of lending sources despite the fact that some of the loans may have unreasonably high interest rates. While we do not recommend consumers access these short-term loans, we use their potential access abilities of these loans to

simplify the model and transform the borrowing constraints to interest rate constraints. Another reason why we do not restrict the borrowing/saving factor s in the intertemporal consumption model is that this factor is canceled out when combining the two-period budget constraints together using substitutional method and Lagrangian technique to solve this intertemporal optimization problem.

8 The most current wave available at the time of the analysis.

9 The Survey of Consumer Finances uses "multiple imputation technique" to account for missing data. Because each missing value in the SCF is imputed five times, each SCF family has five separate observations (called "implicates") in the final data.

10 The SCF data are derived from a dual-frame sample design, with one frame including households chosen via an area probability sample and the second frame including households selected from a list provided by the Internal Revenue Service. The second selection frame has introduced the problem of oversampling wealthy families (Nielsen, 2015).

11 Liability optimization includes debt restructuring, loan reduction, interest rate optimization, behavior coaching, etc. There are numerous complexities associated with liability optimization at the individual household level. The objective of this article is not focused on the detailed liability optimization approaches, rather to better understand which types of households have higher debts, in particular bad debts, and the potential benefits associated with reducing the interest on those debts.

Appendix A

Sample balance sheet for the weighted mean value of the 2016 Survey of Consumer Finances households

Assets							
Category	Sub-category	Sub-category detail	Amount	Sum total	Percent of population	Interest rate (estimated[a])	Total annual earnings
Financial assets				$73,122.13	98.29%		
	Transaction accounts (liquid)			$13,590.40	97.75%	0.20%	$27.18
	CDs			$1,485.40	4.84%	0.96%	$14.26
	Pooled investment funds			$4,569.21	5.66%	5.61%	$256.52
	Savings bonds			$351.91	7.33%	2.62%	$9.22
	Directly held stocks			$2,791.27	9.20%	7.53%	$210.13
	Directly held bonds			$273.57	0.38%	3.70%	$10.12
	Cash value of whole life insurance			$2,746.16	17.23%	2.20%	$60.42
	Other managed assets:			$3,725.21	3.35%	4.10%	$152.73
		Annuities	$2,861.44				
		Trusts	$863.77				
	Quasi-liquid retirement accounts			$42,112.74	48.04%	4.00%	$1,684.51
	Other misc. financial assets			$1,476.26	8.29%	4.00%	$59.05
Nonfinancial assets				$159,244.50	89.76%		
	Vehicles (RVs, planes, boats, etc.)			$17,982.83	84.47%		
	Primary residence			$118,573.20	59.54%		
	Residential property excluding primary residence			$11,071.96	9.12%		
	Net equity in nonresidential real estate			$2,780.49	4.22%		
	Businesses			$7,812.36	9.23%		
	Other misc. nonfinancial assets			$1,023.67	4.92%		
Total assets				$232,366.60	99.32%		
Net worth				$156,181.85			
Total investment assets				$73,122.12			$2,484.13
Total financial assets less total debt				$(3,062.63)			
Mortgages (including home equity loans, HELOCs)							
	Debt secured by primary residence:			$53,249.90	40.67%		
		Mortgages and home equity loans secured by primary residence	$51,818.03		39.27%	4.51%	$2,336.99
		Home equity lines of credit secured by primary residence	$1,431.87		3.59%	5.81%	$83.19
	Debt secured by other residential property			$3,875.32	3.87%	5.45%	$211.20
	Other lines of credit (not secured by residential real estate)			$143.90	1.80%	6.00%	$8.63
Credit card balances after last payment				$2,581.29	47.79%	15.09%	$389.52
Installment loans				$15,794.03	53.50%	16.27%	
	Education loans		$8,390.03		24.69%	5.92%	$496.69
	Vehicle loans		$5,764.13		35.36%	6.63%	$382.39
	Other installment loans		$1,639.87		12.51%	6.00%	$98.39

(continued on next page)

Appendix A (Continued)

Assets							
Category	Sub-category	Sub-category detail	Amount	Sum total	Percent of population	Interest rate (estimated[a])	Total annual earnings
Other debt (e.g., loans against pensions or life insurance, margin loans)				$540.31	5.35%	6.00%	$32.42
Total debt				$76,184.75	79.24%		$4,039.43
Total asset return less total interest charges			$(1,547.19)				
Financial asset to debt ratio							0.960

Notes: Sample weights applied. Number of households: 4,481; Net worth < $1million; Income > $1,000; Age: 20–85.

[a] Interest rate estimation sources:

CDs: FRED, Federal Reserve Bank of St. Louis. Averaged since 2008.

Pooled investment fund: Assumes 50% stocks and 50% bonds. Uses the average for mutual fund return.

Savings bonds: US Department of the Treasury, 10-Year High Quality Market (HQM) Corporate Bond Spot Rate [HQMCB10YR].

Directly held stocks: S&P 500 Return Calculator, with Dividend Reinvestment. (2019). Retrieved March 22, 2019.

Directly held bonds: US Department of the Treasury, 10-Year High Quality Market (HQM) Corporate Bond Spot Rate [HQMCB10YR]. Retrieved March 22, 2019, from FRED, Federal Reserve Bank of St. Louis.

Appendix B

Descriptive statistics of the analysis sample

Variable	Definition/explanations	Mean	SD	Min.	Max.
Have debt	(yes = 1, no = 0)	0.7924	0.4056	0	1
Debt amount	Dollar amount of total debt	$76,185	$117,866	$0	$2,630,000
Married	(yes = 1, no = 0)	0.5433	0.4981	0	1
Number of children in household	Total number of children in the household	0.7989	1.1334	0	7
Education level	Highest level of education completed according to the SCF standard categories[a]	9.2774	2.7128	0	14
Real assets	Total value of real assets[b]	$150,409	$185,257	$0	$2,282,900
Liquid assets	All types of transaction accounts[c]	$13,590	$32,926	$0	$572,000
Leverage ratio	Total debt/total asset	12.8096	462.9600	0	25,750
Own houses	(yes = 1, no = 0)	0.5954	0.4908	0	1
Have savings	Have more than $0 in savings? (yes = 1, no = 0)	0.5043	0.5000	0	1
Race black	(yes = 1, no = 0)	0.1637	0.3700	0	1
Race Hispanic	(yes = 1, no = 0)	0.1140	0.3178	0	1
Race other	(yes = 1, no = 0)	0.1073	0.3095	0	1
Income	Household income in previous calendar year	$62,321	$59,020	$1,013	$2,531,591
Age	Age of the household head	49.6815	16.5849	20	85
Financial planning horizon categorical variables[d]					
Next year	(yes = 1, no = 0)	0.1551	0.3620	0	1
Next few years	(yes = 1, no = 0)	0.2817	0.4498	0	1
Next 5 to 10 years	(yes = 1, no = 0)	0.2186	0.4133	0	1
Longer than 10 years	(yes = 1, no = 0)	0.1059	0.3077	0	1

Notes: Sample size is 4,481 households. Sample weights applied.

[a] 2016 Survey of Consumer Finances (SCF) codebook education level standard categories:

1. 1st, 2nd, 3rd, or 4th grade.
2. 5th or 6th grade.
3. 7th and 8th grade.
4. 9th grade.
5. 10th grade.
6. 11th grade.
7. 12th grade, no diploma.
8. High school graduate - high school diploma or equivalent.
9. Some college but no degree.
10. Associate degree in college - occupation/vocation program.
11. Associate degree in college - academic program.
12. Bachelor's degree (e.g., BA, AB, BS).
13. Master's degree (e.g., MA, MS, MENG, MED, MSW, MBA).
14. Professional school degree (e.g., MD, DDS, DVM, LLB, JD) and Doctorate degree (e.g., PHD, EDD).

[b] Real assets, according to the SCF Bulletin category definition, include: Houses, vehicles, residential properties excluding primary residence (e.g., vacation homes), and net equity in non-residential real estate.

[c] Liquid assets, according to the SCF Bulletin category definition, include: Money market accounts, checking accounts, savings accounts, call accounts, and prepaid cards.

[d] Original Survey Question from SCF codebook: "In planning or budgeting your (family's) saving and spending, which of the time periods listed on this page is most important to you (and your family living here)?"

Appendix C

Ordinary least squares (OLS) regressions on factors associated with debt ratios (reduced sample)

Variables	OLS Debt-to-financial-asset ratio[a]	OLS Debt-to-income ratio[b]	OLS Debt-to-financial-asset ratio[c]
Married	−215.9 (244.237)	−0.357* (0.144)	21.86 (24.820)
Number of kids	168.7 (166.241)	−0.0148 (0.029)	6.673 (6.939)
Education level	−117.3** (44.613)	0.105*** (0.027)	1.151 (4.360)
Real assets (per $10K)	8.508 (9.951)	0.0435*** (0.004)	0.342 (0.526)
Liquid assets (per $10K)	13.88 (9.462)	−0.0343** (0.013)	−3.307** (1.085)
Have houses	−109.2 (323.537)	0.770*** (0.084)	60.14*** (16.643)
Have savings	−1142.8*** (198.107)	0.0345 (0.109)	−69.84*** (19.396)
Race Black	314.1 (373.679)	0.113 (0.077)	65.24 (54.015)
Race Hispanic	−168.1 (385.584)	0.108 (0.099)	19.05 (25.444)
Race other	−662.5** (237.327)	0.576* (0.275)	−1.861 (10.477)
Income (per $10K)	−43.01 (22.350)	−0.120** (0.040)	−4.335 (2.696)
Age	−13.59** (4.997)	−0.0239*** (0.002)	−0.517 (0.292)
Financial planning horizon (omitted baseline category "next few months")			
Next year	−1184.4** (379.501)	0.234 (0.198)	−48.46** (16.202)
Next few years	−917.7* (371.363)	−0.150* (0.071)	−4.372 (29.915)
Next 5 to 10 years	−1196.6*** (339.037)	−0.150 (0.086)	−52.28** (16.884)
Longer than 10 years	−752.0 (389.874)	−0.241* (0.120)	−54.19** (16.834)
N	3,561	3,561	3,495

Notes: [a] The analysis sample in this regression has been reduced and does not include the households whose total debt amount equals to zero. [b] The analysis sample in this regression only include the households whose total debt amount is greater than zero. [c] The analysis sample in this regression only include the households whose total debt amount is greater than zero. The analysis sample is further reduced by eliminating the households whose total financial assets is less than $10.

References

Aizcorbe, A. M., Kennickell, A. B., & Moore, K. B. (2003). Recent changes in US family finances: Evidence from the 1998 and 2001 Survey of Consumer Finances. *Federal Reserve Bulletin*, *89*, 1.

Barba, A., & Pivetti, M. (2009). Rising household debt: Its causes and macroeconomic implications—a long-period analysis. *Cambridge Journal of Economics*, *33*, 113-137.

Bricker, J., Dettling, L. J., Henriques, A., Hsu, J. W., Jacobs, L., Moore, K. B., ... Windle, R. A. (2017). Changes in US family finances from 2013 to 2016: Evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin*, *103*, 1.

Caskey, J. (2001). Payday lending. *Journal of Financial Counseling and Planning*, *12*. (available at https://ssrn.com/abstract=2443130)

Clayton, M., Liñares-Zegarra, J., & Wilson, J. O. (2015). Does debt affect health? Cross country evidence on the debt-health nexus. *Social science & Medicine*, *130*, 51-58.

Davies, W., Montgomerie, J., & Wallin, S. (2015). *Financial Melancholia: Mental Health and Indebtedness.* London: Political Economy Research Centre.

Emmons, W. R., & Noeth, B. J. (2013). Economic vulnerability and financial fragility. *Federal Reserve Bank of St. Louis Review*, *95*, 361-388.

Federal Reserve Bank of New York Center for Microeconomic Data. (2020). *Quarterly Report on Household Debt and Credit, 2020:Q2*. (available at https://www.newyorkfed.org/microeconomics/hhdc.html).

Gustman, A. L., Steinmeier, T. L., & Tabatabai, N. (2011). *How Did the Recession of 2007-2009 Affect the Wealth and Retirement of the Near Retirement Age Population in the Health and Retirement Study*? (No. w17547). National Bureau of Economic Research.

Hanson, J. (2006). *Good Debt, Bad Debt: Knowing the Difference Can Save Your Financial Life.* New York, NY: Portfolio Penguin.

Jappelli, T., & Pagano, M. (1989). Consumption and capital market imperfections: An international comparison. *The American Economic Review*, 79, 1088-1105.

Jiang, S. S., & Dunn, L. F. (2013). New evidence on credit card borrowing and repayment patterns. *Economic Inquiry*, *51*, 394-407.

Kim, H., & DeVaney, S. A. (2001). The determinants of outstanding balances among credit card revolvers. *Financial Counseling and Planning*, *12*, 67-77.

Lee, Y. G., Lown, J. M., & Sharpe, D. L. (2007). Predictors of holding consumer and mortgage debt among older Americans. *Journal of Family and Economic Issues*, *28*, 305-320.

Modigliani, F. (1986). Life cycle, individual thrift, and the wealth of nations. *Science*, *234*, 704-712.

Nielsen, R. B. (2015). SCF complex sample specification for Stata. *Technical Note. Department of Financial Planning Housing and Consumer Economics. University of Georgia*, *Athens, GA*.

Stango, V., & Zinman, J. (2016). Borrowing high versus borrowing higher: Price dispersion and shopping behavior in the US credit card market. *Review of Financial Studies*, *29*, 979-1006.

Stegman, M. A. (2007). Payday lending. *Journal of Economic Perspectives*, *21*, 169-190.

Sweet, E., Nandi, A., Adam, E. K., & McDade, T. W. (2013). The high price of debt: Household financial debt and its impact on mental and physical health. *Social Science & Medicine*, *91*, 94-100.

Wärneryd, K. E. (1999). *The Psychology of Saving. A Study on Economic Psychology.* Cheltenham: Edward Elgar Publishing.

Zinman, J. (2015). Household debt: Facts, puzzles, theories, and policies. *Economics*, *7*, 251-276.