Financial Literacy to Prevent Poor Borrowing Choices

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Abstract

Working Americans face the new reality of having to fund and manage their retirement while facing rising levels of indebtedness. A basic level of financial knowledge is essential to make good long-term financial decisions. Using the 2015 National Financial Capacity Study, we investigate the impact of financial literacy on the decision to access retirement plan loans before retirement or use one or more high-cost lenders. Our results show that being financially literate reduces the likelihood of using high-cost lenders and using retirement-plan loans. Furthermore, we find evidence of a negative relation between financial literacy and myopic spending. © 2021 Academy of Financial Services. All rights reserved.

1. Introduction

The use of defined contribution (DC) plans for retirement savings accumulation has increased significantly over the last 30 years. Today, DC plans cover 90 million Americans, with retirement assets totaling $6.7 trillion. Acknowledging the long-run solvency issues facing the social security system in the United States, it is important and logical to assume that DC plans along with other tax-advantaged retirement accounts such as Individual Retirement Accounts (IRAs) will be the main source of retirement wealth for Americans in the future. The widespread adoption of plans such as a 401(k), leaves a growing number of

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American workers with the responsibility of individually funding and managing this critical source of retirement income. Munnell and Webb (2015) found that individuals ten years or less from retirement had a combined average of only $111,000 in their DC plans.

A possible explanation for such a modest average retirement savings balance, as outlined by Munnell and Webb (2015), is the American retirement savings system's liquidity. In the United States—more than any other developed country—plan participants may access their retirement savings at any point during their life cycle (Beshears, Choi, Hurwitz, Laibson, & Madrian, 2015). Specifically, retirement plan participants may take a plan loan or hardship withdrawal against their retirement assets while working.[1]

Total U.S. Non-housing consumer debt reached $4 trillion at the end of 2016 (New York Fed, 2017). The higher the level of debt on household balance sheets, the more likely households will be negatively impacted by economic shocks, such as a drop in income or change in home prices. To meet shortfalls while experiencing liquidity constraints, some American households have turned towards high-cost lenders such as payday and title loan providers. The Pew Charitable Trust reported that 12 million Americans spent $9 billion in payday loan fees and another $3 billion on auto title loans on an annual basis.

The potential liquidity provided by retirement accounts and high-cost lenders is a double-edged sword that offers short-term financial reprieve in the presence of an income shock, and the possibility of a loss of utility during present and future periods such as retirement (Argento et al., 2015). Using data from the National Financial Capacity Study (NFCS) 2015 State-by-State Tracking dataset, in this paper we study the use of two alternatives to conventional borrowing: retirement plan withdrawals ("leakage") and accessing high-cost lenders. Further, we investigate the impact of financial literacy on either accessing retirement savings before retirement or using high-cost lenders. We also study how financial literacy relates to optimal liquidity.

While prior research associated with financial literacy have focused on retirement readiness from a wealth perspective, we offer an insight into household liquidity and debt management. Thus, we make a notable contribution to the current literature on financial literacy. We created a measure of financial literacy and statistically linked the lack of financial knowledge to increased leakages via retirement plan loans, in addition to the inappropriate use of nonconventional borrowing. To our knowledge, this is the first study to explore this important topic.

The remainder of the paper is organized as follows. We provide a review of the current literature in Section 2. In Section 3, we present the data and a description of how we derived our final sample. In Section 4, we highlight the univariate analysis of our final sample. We then present our empirical results in Section 5. In Section 6, we discuss our main findings and discuss our conclusions and policy implications.

2. Literature review

The life-cycle hypothesis states that households attempt to maintain a constant present value of marginal utility of consumption over time to maximize expected lifetime utility

(Modigliani & Brumberg, 1954). This consumption smoothing can be achieved by transferring money from periods where the marginal utility of consumption is low, to periods where it is higher (i.e., borrowing when earnings are low—high marginal utility of consumption, saving when earnings are high—low marginal utility of consumption, and dissaving in retirement). Households may need to withdraw funds from their retirement account(s) due to income shocks or special financial needs such as expenses associated with housing, college funding, a medical crisis, or meeting household needs after a job loss or change in occupation (Argento, Bryant, & Sabelhaus, 2015; Butrica, Zedlewski, & Issa, 2010; Brady, 2011; Copeland, 2009). An extensive review of the current literature on financial literacy and its impact on savings, investments, and debt management reveals that many individuals in the United States and worldwide are unfortunately financially illiterate (Lusardi & Mitchell, 2014).

Individuals need sufficient financial knowledge to make informed decisions in the present to maximize their chances for positive future outcomes; including the ability to recognize when they have made financial mistakes. Current research provides ample evidence that financial mistakes are frequently made by individuals who exhibit low financial sophistication levels. Bernheim (1998) demonstrated that financial literacy had a positive impact on retirement wealth accumulation. Lusardi and Mitchell (2007) indicated that individuals with low financial sophistication levels are less likely to think about retirement. According to van Rooij, Lusardi, and Alessie (2007), individuals with low financial literacy levels are less likely to participate in the stock market. Hastings and Tejeda-Ashton (2008) found that individuals with low financial sophistication levels are more likely to invest in mutual funds with high fees.

It appears that American consumers, on average, are not using credit optimally. Lusardi and Tufano (2015) indicated that individuals with low financial knowledge levels are more likely to struggle with debt management, incurring higher fees, and using high-cost lenders. Credit card debt revolvers often hold credit card debt while simultaneously holding low-interest liquid assets and retirement assets. This is a clear example of mental accounting and suboptimal credit use, a behavioral combination that conflicts with utility maximization (Bertaut & Haliassos, 2006). Disney and Gathergood (2012) used United Kingdom household data to show that consumer credit customers underestimate borrowing costs. The authors also revealed that individuals who borrow on consumer credit tend to exhibit lower financial literacy. Campbell (2006) highlighted a lower likelihood of refinancing mortgages during low-interest-rate periods among less educated and lower-income individuals. Gerardi, Goette, and Meier (2013) provided evidence of a positive relation between low financial literacy and subprime mortgage adoption, as well as mortgage default.

Agarwal, Skiba, and Tobacman (2009) examined a group of payday loan and credit card users. The authors found that even in the presence of a more cost-effective liquidity option (a credit card), 66% of their sample still took out a payday loan. Tang and Lu (2014) used the NFCS as well as hypothetical debt scenarios to compare loan costs in funding consumption. They found that households were able to save up to 130% by switching from high-cost lenders such as payday loan companies to 401(k) plan loans. Tang and Lu (2014) concluded that consumers view 401(k) plan loans as a last resort when their liquidity is constrained. Since loans from retirement plans carry lower interest rates than traditional sources of

consumer loans, plan loans may be a more optimal choice (Tang & Lu, 2014; Utkus & Young, 2011). Also, using the NFCS, Lusardi and Scheresberg (2013) examined high-cost borrowing methods and concluded that more financially literate individuals are less likely to have engaged in high-cost borrowing. The authors of that paper argue that (lack of) financial literacy plays an important role in explaining why individuals have used high-cost lenders such as payday loans. Tang and Lu (2014) showed the impact of optimal use of 401(k) plan loans on household balance sheets, but failed to consider the role of financial literacy in explaining why respondents were not utilizing 401(k) plans in periods of high marginal utility (high need) and low liquidity. Lusardi and Scheresberg (2013) made a powerful argument showing a negative relation between financial literacy and high-cost borrowing, but did not consider a comparison with low-cost borrowing. We contribute to the literature by investigating financial literacy and optimal borrowing choices.

3. Data

We use the 2015 NFCS State by State Tracking Dataset. The NFCS was commissioned and funded by the Investor Education Foundation of the Financial Industry Regulatory Authority (FINRA, 2009). The research objectives of the NFCS were to benchmark key indicators of financial capacity and evaluate how these indicators vary with underlying demographic, behavioral, attitudinal, and financial literacy characteristics. Consistent with surveys on financial capability that have been done in other countries (Atkinson, McKay, Kempson, & Collard, 2007), the NFCS looks at multiple indicators of both financial knowledge and capacity, including how individuals manage their resources, how they make financial decisions, the skill sets they use in making decisions and the search-and-information elaboration that goes into making these decisions.

The 2015 State by State Tracking Dataset pools 2009, 2012, and 2015 NFCS State-by-State surveys. For this paper, we only use the 2012 and 2015 pooled cross-sections. The new State-by-State Tracking Dataset provides some benefits not derived in a single-period cross-section. The observations are random and independent of each other at different points in time. Consequently, serial correlation of residuals should not be an issue in the regression analysis. Combining both waves of data results in a sample size of 53,703 respondents.

To ensure a sufficient number of respondents for the analysis, African Americans, Hispanics, Asian Americans, and adults with less than a high school education are oversampled.

3.1. Sample

To ensure the internal validity of our results, we restricted our sample to respondents who reported having a retirement plan through their current or previous employer, and were able to choose the asset allocation of their retirement accounts. We also included respondents who reported having non-employer sponsored plans such as IRAs. To identify respondents who are in the accumulation stage of their life cycle, we further restricted our attention to

respondents who have a full-time job or are self-employed between the ages of 25-54. This resulted in a final sample of 10,560 respondents.

3.2. Measuring financial literacy

Our primary predictor variable is financial literacy. Respondents who participated in the 2012 and 2015 NFCS were asked five financial literacy questions. For the purposes of the study, we use the three most likely to be related to our research. The questions as stated in the survey include:

1. Suppose you had $100 in a savings account and the interest rate was 2% per year. After five years, how much do you think you would have in the account if you left the money to grow?
2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account?
3. Buying a single company's stock usually provides a safer return than a stock mutual fund.

The first two questions were initially introduced in the 2004 Health and Retirement Study by Lusardi and Mitchell (2011). Subsequently, van Rooij, Lusardi, and Alessie (2011) presented the question on bond pricing for a study carried out by the Dutch Central Bank Household Survey.

In prior studies, researchers have used the answers to some or all of these questions as proxies for financial sophistication (Huston et al., 2012) by producing indices or other linear combinations (Allgood & Walstad, 2013). Lusardi and Scheresberg (2013) use these same questions to construct their proxy for financial literacy.

3.3. Other key variables

3.3.1. Retirement plan loan

To capture defined-contribution leakage, this study uses two questions provided in the 2012 and 2015 NFCS. The first question used asks, "in the last 12 months, have you (or your spouse/partner) taken a loan from your retirement account(s)?" If respondents answered 'yes' to the question, they were assigned '1' and if no, '0'. Within the sample examined, 16% of respondents indicated taking a loan from their retirement account in the last 12 months.[2]

3.3.2. High-cost and inappropriate borrowing

The survey includes a set of questions related to high-cost borrowing behavior. Respondents were asked a series of questions about using any high-cost borrowing options in the past five years. The high-cost borrowing options included auto title loans, payday loans, advance tax refunds, rent-to-own consumer purchasing, and pawn shops. We focus on three areas known for excessive fees and high interests: payday loans, title loans, and

pawnshops. If a respondent answered yes, they were assigned a '1', if not a '0'. We then create a high-cost-of-borrowing variable that captures whether a respondent had used any of these types of loan options. We also create dummy variables to proxy for other forms of sub-optimal borrowing, such as cash advances on credit cards, maxing out credit cards, and over-drafts on bank accounts.

3.3.3. Other control variables

The empirical literature shows that both household and market factors affect life-cycle behavior. If households forecast an increase in income, they may dissave to meet consumption needs; if households anticipate a drop in income, they may save more and consume below optimal consumption–more so if borrowing constraints persist. Additionally, households with children may dissave to meet current consumption needs relative to households without children. Homeownership is another factor that affects households' life-cycle behavior. The nature of homeownership is to act as a forced savings mechanism, which reduces a family's consumption over the mortgage term. Health condition is another household characteristic that affects life-cycle behavior. If an individual has poor health with no health insurance, he/she may save more in anticipation of a health shock; contrastingly, households with members in good health can consume at higher levels.[3] We also control for the effects of overspending on saving behavior by identifying those households that indicated spending more than their income within the previous 12 months.

4. Descriptive results

Table 1 provides the frequency distribution of the full sample and by household groups. We can observe that most individuals with retirement plan loans incur high-cost borrowing (HCB), and only 22% are financially literate. HCB also varies with age; among those in the early stage of their careers (age 25–34), the probability of using HCB is 44%. Furthermore, as age increases, the use of HCB decreases. We also see that HCB varies with income. The highest percentage of HCB users are earning between $50,000 and $74,999.

Table 2 shows the frequency distribution of respondents' financial capacity and improper borrowing in the full sample and by household groups. We observe that individuals who do not have a retirement plan loan demonstrate greater financial capacity in other areas of their financial lives. For instance, the majority of them have a positive cash flow and an emergency fund. It is important to note that 68% of HCB are homeowners compared with the 45% who are not catgorized as HCB. This is a potential indication that owning property could lead to financial constraints, especially if the homeowner is not prepared for a sudden drop in income. We observe that individuals with retirement plan loans engage in other forms of borrowing, with 34% maxing out their credit cards, and 34% having a cash advance loan. In contrast, the proportion of individuals who do not have a retirement plan loan and engage in HCB, is small. Results also show that 27% of HCB maxed out their credit cards, 32% have cash advances, and 48% reported having a recent bank overdraft. Among those who did not engage in HCB, 4% maxed out their credit cards, 6% had cash advances, and 14% recently experienced a bank overdraft.

Table 1 Frequency distributions for the weighted full sample and by household groups

Variable	Full N = 10,560	Retirement plan loan N = 1,523	No retirement plan loan N = 9,037	High-cost borrowing N = 2,336	No high-cost borrowing N = 8,224
Loan decision					
Plan loan (low cost)	16%	—	—	35%	9%
High-cost borrowing	24%	55%	19%	—	—
Financial literacy					
(All correct)	22%	12%	24%	10%	26%
(Total correct)	3.37	2.73	3.50	2.72	3.59
Gender					
Male	63%	64%	63%	66%	62%
Female	37%	36%	37%	34%	38%
Race					
Whites	63%	57%	56%	35%	53%
Non-Whites	37%	43%	44%	65%	47%
Age					
25–34	30%	41%	28%	44%	25%
35–44	33%	32%	33%	33%	33%
45–54	37%	27%	39%	23%	42%
Married	66%	71%	65%	64%	66%
Income					
Less than 15k	1%	2%	1%	2%	1%
15k–24,999	2%	3%	2%	4%	2%
25,000–34,999	6%	7%	6%	10%	5%
35,000–49,999	12%	11%	12%	15%	11%
50,000–74,999	24%	24%	24%	28%	23%
75,000–99,999	20%	22%	20%	20%	21%
100,000–149,999	23%	21%	23%	15%	25%
150,000+	12%	11%	12%	7%	14%
No. of children					
Zero	41%	28%	44%	29%	45%
One	23%	28%	22%	26%	22%
Two	24%	28%	23%	28%	23%
Three	8%	10%	8%	11%	7%
Four+	4%	7%	3%	5%	3%

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Table 1   (Continued)

Variable	Full N = 10,560	Retirement plan loan N = 1,523	No retirement plan loan N = 9,037	High-cost borrowing N = 2,336	No high-cost borrowing N = 8,224
Employment status					
Self	9%	11%	9%	10%	9%
Full	91%	89%	91%	90%	91%
Financial risk tolerance					
Lowest risk	7%	6%	7%	7%	7%
Risk class 2	14%	11%	15%	11%	15%
Risk class 3	25%	18%	27%	19%	27%
Risk class 4	35%	28%	37%	31%	37%
Highest risk	18%	38%	14%	32%	13%

Table 2   Shows the weighted frequency distributions of respondents' financial capacity and improper borrowing in the full sample and by household groups

Variable	Full $N = 10,560$	Retirement plan loan $N = 1,523$	No retirement plan loan $N = 9,037$	High-cost borrowing $N = 2,336$	No high-cost borrowing $N = 8,224$
Financial capacity					
Cash surplus	49%	35%	51%	36%	53%
Emergency fund	57%	52%	58%	51%	59%
Drop in income	22%	50%	16%	42%	15%
Home owner	75%	79%	74%	68%	45%
Health insurance	95%	95%	95%	91%	96%
Improper borrowing					
Maxed credit card	9%	34%	5%	27%	4%
Cash advance	12%	34%	8%	32%	6%
Bank overdraft	22%	55%	16%	48%	14%

Table 3 shows correct answers to the financial literacy questions by the full sample and household groups. Panel B highlights the distribution by loan type. We note that 84% of the total sample answered the interest question correctly, 68% answered the inflation question right, and 62% correctly answered the diversification question. Most individuals characterized as HCB with a plan loan correctly responded to the interest rate question. However, only 44% of individuals with a plan loan correctly answered the inflation and the diversification question. Similarly, only 45% of the HCB group correctly answered the inflation and the diversification question. We note that among individuals who do not engage in HCB nor have a plan loan, 88% answered the interest rate question correctly, 75% answered the inflation question correctly, and 67% answered the risk diversification question right.

Table 3   Shows correct answers to the financial literacy questions by the full sample and household groups. Panel B highlights the distribution by loan type

Panel A					
	Full	Plan loan	No plan loan	High-cost borrowing	No high-cost borrowing
Interest rate question	84%	70%	87%	72%	88%
Inflation question	68%	44%	73%	45%	75%
Risk diversification question	62%	44%	65%	45%	67%
N	10,560	1,523	9,037	2,336	8,224

Panel B					
	Full	Both high-cost and plan loan	High-cost only	Plan loan only	Neither
Interest rate question	84%	59%	78%	84%	89%
Inflation question	68%	25%	56%	67%	76%
Risk diversification question	62%	32%	53%	58%	68%
N	10,560	790	9,037	733	7,491

Table 4 Binary logistic regression on the likelihood of taking a retirement plan loan

Variable	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
Intercept	0.26	***	0.27	***	0.19	***	0.09	***	0.09	***
Financial literacy (all correct)	0.37	***	0.39	***	0.42	***	0.46	***	0.56	***
Socio-demographic										
Male			1.25	***	1.07		1.15	**	1.15	**
White			0.78	***	0.83	**	0.83	**	0.83	**
35–44			0.74	***	0.81	**	0.80	**	0.81	**
45–54			0.64	***	0.73	***	0.71	***	0.72	***
Married			1.15	*	1.20	**	1.10		1.10	
25,000–34,999			0.76		0.86		0.93		0.94	
35,000–49,999			0.74	*	0.85	*	0.96		0.98	
50,000–74,999			0.73	*	0.81	*	0.96		0.98	
75,000–99,999			0.82		0.87		1.18		1.21	
100,000–149,999			0.75		0.79		1.20		1.22	
150,000+			0.72	*	0.70	*	1.20		1.21	
One			2.00	***	1.84	***	1.62	***	1.61	***
Two			1.87	***	1.72	***	1.48	***	1.47	***
Three			1.83	***	1.67	***	1.38	**	1.38	**
Four+			2.43	***	2.16	***	1.72	***	1.72	***
Home							1.10		1.09	
Full							1.07		1.06	
Financial risk										
Risk class 2					0.99		1.06		1.05	
Risk class 3					1.01		1.17		1.18	
Risk class 4					1.11		1.27	*	1.27	*
Highest risk					3.22	***	3.15	***	3.10	***
Financial capacity										
Drop in income							3.58	***	4.31	***
Emergency fund							0.65	***	0.63	***
Cash surplus							0.66	***	0.66	***
Health insurance							1.37	**	1.36	**
Fin lit*drop in income									0.56	***
Year 15	0.94		0.91		0.83	**	0.89	*	0.89	*
R^2	0.05		0.09		0.13		0.21		0.21	

Note: Binary logistics regression. Reference variables not included in regression: age 25–34, income lower than $25,000, no financially dependent children, self-employed, lowest risk tolerance. ***$p < .01$, **$p < .05$, *$p < .1$.

5. Empirical results

5.1. Financial literacy and retirement plan loans

Table 4 provides the logistic regression results, displaying the likelihood of respondents stating that they used a retirement-plan loan in the past 12 months. The first column of our table shows that those who are financially literate are 63% less likely to have a plan loan. In column 2, we add a set of demographic characteristics, such as a household's estimated annual income and the number of children who financially depend on this income, gender, ethnicity, and age. We observe that financial literacy reduces the likelihood of taking out a plan loan by 61%. We also find that the use of plan loans varies strongly with gender, as males are 25% more likely to have a plan loan compared with females. Moreover, being white decreases the likelihood of having a plan loan by 22% relative to nonwhites. We also observe a strong relationship between age and the likelihood of having a plan loan. As individuals get older, the odds of taking a retirement plan loan decreases. With regards to children, the presence of dependents within a household increases the odds of taking a retirement loan. In column 3, we add a set of variables that measure the level of risk tolerance. We find that respondents with the highest risk tolerance level are 222% more likely to have a plan loan than those in the lowest risk tolerance class.

Within the fourth column, we complete our model by taking into account financial capacity. Therefore, we include variables that would provide some protection against an income or wealth shock. These variables include having an emergency fund, positive cash flow, and health insurance. Our results suggest that individuals who have an emergency fund are 35% less likely to take a loan plan. Likewise, individuals with a positive cash flow are 34% less likely to borrow from their retirement account. Conversely, individuals who experience an income drop are 258% more likely to have a loan plan than those that have not reported one. Respondents who have health insurance are 37% more likely to have a loan plan than those who do not have health insurance. This could be attributed to the presence of a high deductible health insurance plan. Unfortunately, we are unable to compare different forms of health insurance due to data limitations. The negative relation between financial sophistication and the likelihood of having a plan loan is significant. We find that financial sophistication reduces the likelihood of having a plan loan by 44%. In column 5, we add interaction terms to see if financial literacy can offset the effects of a drop in income. We find that being financially literate and reporting a decline in income reduces the likelihood of having a plan loan by 44%, compared with those who are not financially literate.

5.2. Financial literacy and HCB

Table 5 provides logistic regression results on the likelihood of respondents stating that they engaged in HCB. The first column accounts for HCB in general. We see that financial literacy reduces the likelihood of engaging in HCB by 58%. We observe that as income increase, the odds of accessing a high-cost loan decrease. Similar results are found as the number of financially dependent children within a household increases. Those who own their

Table 5   Binary logistic regression on the likelihood of high-cost borrowing

Variable	Using high-cost borrowing		Using auto title loans		Using a pawn shop		Using payday loan	
	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
Intercept	0.92		0.12	***	0.35	***	0.37	***
Financial literacy (all correct)	0.42	***	0.34	***	0.37	***	0.30	***
Socio-demographic								
Male	1.29	***	1.40	***	1.47	***	1.35	***
White	0.76	***	0.91		0.81	**	0.63	***
35–44	0.74	***	0.61	***	0.71	***	0.70	***
45–54	0.58	***	0.49	***	0.52	***	0.50	***
Married	0.99		1.18	**	0.88		1.00	
25,000–34,999	0.86		0.84		0.70	*	0.97	
35,000–49,999	0.66	**	0.72	*	0.53	***	0.89	
50,000–74,999	0.65	**	0.59	**	0.58	***	0.77	
75,000–99,999	0.54	***	0.63	**	0.43	***	0.65	**
100,000–149,999	0.40	***	0.54	**	0.30	***	0.56	**
150,000+	0.31	***	0.50	**	0.24	***	0.44	***
One	1.79	***	1.61	***	2.06	***	2.07	***
Two	1.99	***	1.79	***	2.15	***	2.30	***
Three	2.42	***	1.60	***	2.59	***	2.58	***
Four+	1.81	***	1.93	***	2.02	***	2.56	***
Home	0.68	***	1.14		0.80	**	0.62	***
Full	1.12		1.20		0.96		1.19	
Financial risk								
Risk class 2	1.03		1.35		1.14		0.81	
Risk class 3	1.13		1.47	**	1.40	**	1.06	
Risk class 4	1.46	***	2.26	***	1.76	***	1.53	**
Highest risk	3.08	***	5.00	***	4.06	***	3.88	***
Financial capacity								
Drop in income	2.60	***	3.08	***	2.89	***	3.39	***
Emergency fund	0.76	***	1.11		1.13	*	0.63	***
Cash surplus	0.69	***	0.71	***	0.69	***	0.72	***
Health insurance	0.61	***	0.46	***	0.58	***	0.66	***
Year 15	1.03		1.30	***	1.12	*	0.98	
R^2	0.26		0.27		0.28		0.31	

Note: Binary logistics regression. Reference variables not included in regression: age 25–34, income lower than $25,000, no financially dependent children, self-employed, lowest risk tolerance. ***$p < .01$, **$p < .05$, *$p < .1$.

home are 32% less likely to engage in HCB. Consistent with the expectation that a drop in income might lead someone to participate in HCB, we find that a decline in income increases the likelihood of engaging in HCB by 160%, relative to respondents with stable or increasing incomes. Accounting for financial capacity, we see that having an emergency fund decreases the likelihood of HCB by 24%. Likewise, the presence of a positive cash flow and health insurance reduces the likelihood of HCB.

Column 2 provides results from a logistic regression on the likelihood of respondents stating that they have an auto title loan. We observe a strong negative relation between financial literacy and having a title loan. Financial literacy reduces the likelihood of having a title loan by 66%. Respondents with a recent drop in income are more than twice as likely to have an auto title loan than respondents with no such income shock. Having a cash surplus reduces having a title loan by 29%, and having health insurance reduces the likelihood of having that type of loan by 54%. Column 3 provides results from the logistic regression analysis, showing the likelihood of respondents using Pawn Shops in the past five years. The likelihood of taking a loan from a Pawn Shop decreases by 63% with financial literacy. Individuals who experience a drop in income are 189% more likely to have a pawn shop loan. Having a positive cash flow reduces the likelihood of taking a loan from a Pawn Shop by 31%. Similarly, having health insurance reduces it by 42%.

Column 4 then provides results from a logistic regression on the likelihood of respondents stating that they have a payday loan. Financial literacy decreases the likelihood of having a payday loan by 70%. As expected, those who experience a drop in income are 239% more likely to access a Pawn Shop loan than respondents whose income remained stable.

5.3. Financial literacy and improper borrowing

Table 6 provides results from six binary logistic regression analyses displaying the likelihood of a respondent engaging in improper borrowing. Specifically, we focus on the likelihood of evidence of myopic spending such as taking a cash advance on a credit card, incurring a bank overdraft, or maxing out a credit card. We then included an interaction term (financially literate*drop in income) and reran the analyses using our empirical models.

Results presented in column 1A shows that financial literacy reduces the likelihood of maxing out credit cards by 63%. Those who have a drop in income in the last year are 189% more likely to max out their credit cards, while a positive cash flow reduces the likelihood by 31%. In column 1B, we observe the relation between our interaction term and the likelihood of maxing out credit cards. Even when faced with an income shock, we find that being financially literate reduces the likelihood of maxing out credit cards by 38% compared with non-financially literate individuals. As shown in column 2A, financial literacy reduces the likelihood of having a bank overdraft by 43%. Individuals who experience a drop in income are nearly three times as likely to have an overdraft. Having an emergency fund decreases the likelihood of overdraft by 53%, and a positive cash flow reduces the likelihood by 52%. In column 2B, we add interaction terms to account for the effects of an income drop plus financial literacy on the likelihood of having an overdraft. We see that when faced with a

Table 6   Binary logistic regression on the likelihood of three forms of inappropriate borrowing

Variable	Maxed CC		Maxed CC w/ interactions		Overdraft		Overdraft w/ interactions		Cash adv on CC		Cash adv on CC w/ interactions	
	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
Intercept	0.35	***	0.13	***	0.40	***	0.38	***	0.18	***	0.17	***
Financial literacy (all correct)	0.37	***	0.48	***	0.57	***	0.67	***	0.44	***	0.52	***
Financial literacy (all correct)	0.37	***	0.48	***	0.57	***	0.67	***	0.44	***	0.52	***
Socio-demographic												
Male	1.47	***	1.04		0.96		0.96		1.24	**	1.24	**
White	0.81	**	0.83	**	0.80	***	0.79	***	0.81	**	0.81	**
35–44	0.71	***	0.67	***	0.91		0.92		0.71	***	0.72	***
45–54	0.52	***	0.46	***	0.68	***	0.69	***	0.68	***	0.69	***
Married	0.88		1.05		1.09		1.09		0.78	**	0.78	**
25,000–34,999	0.70	*	0.67	*	0.77		0.78		0.91		0.92	
35,000–49,999	0.53	***	0.70	*	0.79		0.80		0.89		0.90	
50,000–74,999	0.58	***	0.55	**	0.74	*	0.76	*	0.75		0.76	
75,000–99,999	0.43	***	0.60	**	0.81		0.83		0.70	*	0.71	*
100,000–149,999	0.30	***	0.63	**	0.77	**	0.79	**	0.67	**	0.67	**
150,000+	0.24	***	0.48	**	0.65	***	0.65	***	0.56	***	0.56	***
One	2.06	***	1.52	***	1.55	***	1.54	***	1.49	***	1.49	***
Two	2.15	***	1.74	***	1.69	***	1.68	***	1.76	***	1.76	***
Three	2.59	***	1.60	**	1.74	***	1.75	***	1.61	***	1.61	***
Four+	2.02	***	2.46	***	2.28	***	2.27	***	1.82	***	1.82	***
Home	0.80	**	1.18	*	0.98		0.97		1.21	**	1.20	**
Full	0.96		1.02		1.01		1.01		0.75	**	0.75	**
Financial risk												
Risk class 2	1.14		1.28		1.37	**	1.37	**	1.21		1.21	
Risk class 3	1.40	**	1.55	**	1.41	**	1.42	**	1.36	*	1.36	*
Risk class 4	1.76	***	1.75	**	1.62	***	1.61	***	1.92	***	1.91	***
Highest risk	4.06	***	5.11	***	3.16	***	3.10	***	4.56	***	4.52	***
Financial capacity												

Table 6   (Continued)

Variable	Maxed CC		Maxed CC w/ interactions		Overdraft		Overdraft w/ interactions		Cash adv on CC		Cash adv on CC w/ interactions	
	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
Drop in income	2.89	***	4.10	***	2.83	***	3.45	***	2.43	***	2.78	***
Emergency fund	1.13	*	0.69	***	0.47	***	0.47	***	0.85	**	0.83	**
Cash surplus	0.69	***	0.59	***	0.48	***	0.48	***	0.63	***	0.62	***
Health insurance	0.58	***	0.68	**	0.97		0.96		0.79	*	0.78	*
Fin lit*drop income			0.62	**			0.58	***			0.60	**
Year 15	1.12	*	0.89		0.92		0.91	*	1.01		1.00	
R^2	0.26		0.27		0.22		0.23		0.19		0.20	

Note: Binary logistics regression. Reference variables not included in regression: age 25-34, income lower than $25,000, no financially dependent children, self-employed, lowest risk tolerance. CC = credit card; adv = advance.

***$p < .01$, **$p < .05$, *$p < .1$.

decline in income, financially literate individuals are still 42% less likely to have an overdraft.

In column 3A, we observe a strong negative relation between financial literacy and the likelihood of taking a cash advance; those who are financially literate are 56% less likely to do so. Males compared with females are 24% more likely to get a cash advance loan, and Whites are 19% less likely than non-whites. Respondents indicating a drop in income in the last 12 months are 143% more likely to have to take a cash advance loan than those with stable incomes. Individuals who report having an emergency fund are 15% less likely to take cash advance than those who have no such funds, and those who have a positive cash flow are 37% less likely relative to those who have a deficit in spending. In column 3B, we add interaction terms to account for the effects of having both a drop in income and financial sophistication simultaneously. We observe that individuals with financial literacy and a decrease in income are 40% less likely to take a cash advance loan.

5.4. Financial literacy and loan choice

Table 7 provides the results of a multinomial logistic regression. The dependent variable is loan type with four levels: high-cost loan and plan loan, high-cost loan only, plan loan only, and no loan. 'Plan loan only' is the base reference for this table and the rest of this section. In comparison to having only a retirement plan loan, financially literate respondents are 65% less likely to have taken a high-cost loan and a retirement plan loan, 20% less likely to have taken only a high-cost loan, but are 58% more likely to have neither loan type relative to non-financially literate respondents. In column B, we include an interaction variable, financial literacy*drop in income. We observe that financial literacy appears to exert a moderating effect on decision-making, even when individuals are faced with a decline in income. Financially literate respondents with a recent drop in income are 52% less likely to take out a high-cost loan alternative such as a payday loan, in addition to a retirement plan loan. Recall that in column A, a drop in income was strongly associated with choosing to have both types of loans.

6. Conclusion

In an era of higher debt levels, working Americans bear greater responsibility for saving for retirement, while being at odds with traditional lenders. Using data from the NFCS 2015 State-by-State Tracking Dataset, in this paper, we study the use of two alternatives to conventional borrowing: retirement plan loans (defined as "leakage") and high-cost lenders. Furthermore, we investigate the impact of financial literacy on either accessing retirement savings before retirement or using high-cost lenders. We also touch on how financial literacy relates to optimal liquidity in a mental accounting context.

First, we show that one in four Americans are likely to borrow money from high-cost lenders, while one in six turn to their retirement plans for loans. High-cost borrowers and plan loan users display lower levels of financial literacy. When we look specifically at how

Table 7   Multinomial regression on the likelihood of loan type with plan loan only being the reference

Variable	Odds ratio	p	Odds ratio	
Financial literacy (all correct)	0.35	***	0.49	***
Financial literacy (all correct)	0.80	**	0.78	**
Financial literacy (all correct)	1.58	***	1.52	***
Socio-demographic				
Male	1.60	***	1.60	***
Male	1.27	**	1.27	**
Male	1.05		1.05	
White	0.86		0.86	
White	0.92		0.92	
White	1.21	**	1.21	**
35–44	0.63	***	0.64	***
35–44	0.81	*	0.81	*
35–44	1.01		1.01	
45–54	0.37	***	0.37	***
45–54	0.66	***	0.66	***
45–54	0.94		0.94	
Married	0.90		0.91	
Married	0.87		0.87	
Married	0.87		0.87	
25,000–34,999	0.90		0.92	
25,000–34,999	0.90		0.90	
25,000–34,999	1.04		1.04	
35,000–49,999	0.67		0.68	
35,000–49,999	0.59	*	0.59	*
35,000–49,999	0.92		0.92	
50,000–74,999	0.68		0.68	
50,000–74,999	0.59	*	0.59	*
50,000–74,999	0.95		0.94	
75,000–99,999	0.52	*	0.53	*
75,000–99,999	0.35	***	0.35	***
75,000–99,999	0.72		0.72	
100,000–149,999	0.41	**	0.41	**
100,000–149,999	0.24	***	0.24	***
100,000–149,999	0.69		0.68	
150,000+	0.33	**	0.33	**
150,000+	0.17	***	0.17	***
150,000+	0.65		0.65	
One	1.49	**	1.49	**
One	1.12		1.12	
One	0.65	***	0.65	***
Two	1.96	***	1.96	***
Two	1.47	**	1.48	**
Two	0.79	**	0.79	**
Three	1.90	**	1.92	**
Three	1.89	***	1.89	***
Three	0.76	*	0.76	*
Four+	1.61	*	1.61	*
Four+	1.09		1.09	
Four+	0.65	**	0.65	**
Home	0.93		0.92	
Home	0.64	***	0.64	***
Home	1.07		1.07	

Table 7 (Continued)

Variable	Odds ratio	p	Odds ratio	
Full	0.99		0.99	
Full	0.94		0.94	
Full	0.88		0.89	
Financial risk				
Risk class 2	1.68	*	1.68	*
Risk class 2	1.05		1.05	
Risk class 2	1.15		1.15	
Risk class 3	1.87	**	1.89	**
Risk class 3	1.04		1.04	
Risk class 3	1.05		1.05	
Risk class 4	2.25	**	2.25	**
Risk class 4	1.28		1.28	
Risk class 4	0.99		0.99	
Highest risk	4.73	***	4.75	***
Highest risk	1.18		1.19	
Highest risk	0.56	***	0.56	***
Financial capacity				
Drop in income	2.66	***	3.00	***
Drop in income	0.79	**	0.76	**
Drop in income	0.39	***	0.36	***
Emergency fund	1.62	***	1.59	***
Emergency fund	1.44	***	1.44	***
Emergency fund	2.21	***	2.22	***
Cash surplus	0.88		0.87	
Cash surplus	1.09		1.09	
Cash surplus	1.53	***	1.53	***
Health insurance	−0.19		0.82	
Health insurance	−0.78		0.46	***
Health insurance	−0.15		0.86	
Fin lit*drop income			0.48	**
Fin lit*drop income			1.09	
Fin lit*drop income			1.21	
Year 15	1.45	**	1.44	**
Year 15	1.28	**	1.28	**
Year 15	1.37	***	1.37	***

Note: Multinomial logistics regression. The dependent variable is loan type with four levels: high-cost loan and plan loan, high-cost loan only, plan loan only, neither loan. Plan loan only is the based reference. Reference variables not included in regression: age 25-34, income lower than $25,000, no financially dependent children, self-employed, lowest risk tolerance. ***$p < .01$, **$p < .05$, *$p < .1$.

respondents answer each question, plan loan users were more likely to correctly respond to the interest rate question but not the questions on inflation and risk diversification. We observe similar results among high-cost borrowers. Nevertheless, if respondents only used plan loans and failed to use any high-cost loans in the last five years, they were more likely to answer the questions correctly, when compared with respondents that had both types of loans or high-cost loans only. This provides evidence of higher financial knowledge among respondents who only use plan loans.

Our empirical results indicate that individuals using retirement plan loans are more likely to be younger males, to be non-White, to have children, to have seen a recent drop in income, and to have an affinity for financial risk-taking. When determining the likelihood of having a retirement plan loan, income appears to have no effect while having health insurance increases the use of plan loans; however, we provide evidence that users of high-cost lenders are less likely to have incomes at or above $35,000, and less likely to borrow to meet health shocks. Moreover, the findings on the effect of financial capacity on these two loan alternatives show that respondents who report deficit spending and no precautionary savings are more likely to borrow from their retirement plan and/or high-cost lenders. Notably, when looking individually at the three types of high-cost lenders, we observe differences in the effect of having an emergency fund. In comparison with respondents with no emergency funds, those with precautionary savings are less likely to have a payday loan.

When we consider other forms of high-cost borrowing and conduct regression analyses, we find a higher likelihood of maxing out credit cards, having bank overdrafts, and taking cash advances on credit cards. This behavior is specifically displayed among nonwhites, individuals with kids, those with an increased tolerance for financial risk, and those who have had a recent drop in income. Also, homeowners appear more likely to turn to credit cards to meet short-term liquidity needs.

A striking finding across all of our empirical analyses is the strong effect of financial literacy on borrowing decisions. Financial literacy plays a significant role in explaining why individuals use high-cost lenders and retirement plan loans. Specifically, individuals who could answer all of the financial literacy questions correctly (deemed to be "financially literate") were unlikely to turn to high-cost lenders or retirement plans as a loan option. These findings are consistent with Lusardi and Mitchell (2014) and Disney and Gathergood (2012), where both studies highlighted that users of high-cost debt are more likely to lack financial knowledge.

We also find that financial literacy explains myopic spending patterns. The financially literate are unlikely to turn to credit cards and bank overdrafts when faced with income shortfalls. We do not ignore the effect of a recent drop in income on borrowing choices. Noteworthy, we find that financial literacy is a moderating factor even when faced with a loss of income. This is an important finding because it provides evidence that individuals with high levels of financial literacy are unlikely to turn to high-cost borrowers even in the face of an income shock.

The authors of this study acknowledge that retirement plan loans may allow households to increase consumption during periods when they have a liquidity constraint. The higher a respondent's financial literacy level, the less likely they are to use plan loans to smooth consumption, even when faced with an income shock. However, when confronted with a choice of borrowing from either high-cost lenders or retirement plans, financially literate respondents are less likely to choose *any* loan option that includes a high-cost lender, even when faced with an income shock. Tang and Lu (2014) showcased that individuals view retirement plan loans as a last resort. It is apparent from the results of this study that financial literacy may explain reduced plan loan use among individuals with a high level of financial knowledge.

7. Implications

Undoubtedly, saving for retirement and effectively managing debt are involved processes that require financial knowledge. The U.S. retirement savings system provides plan participants with significant liquidity regardless of economic circumstance (Beshears et al., 2015). As such, access to income via retirement saving schemes leads to significant preretirement leakage—even in the face of the 10% penalty and tax liability at one's marginal tax rate (Federal and/or State) of the amount withdrawn. By 2012, 25% of American households had some form of retirement plan leakage amounting to 70 billion dollars annually, while plan participants were only contributing $175 billion (Fellowes & Willemin, 2013). Essentially, for every $1 saved, $0.40 is withdrawn DC plans (Argento, Bryant, & Sabelhaus, 2015).

Plan loans account for a significant amount of the annual defined contribution plan leakage, but plan administrators do not adequately discuss the long-term impact on accumulated retirement wealth (GAO, 2009). Individuals may not be using plan loans to meet economic shocks, but due to time-inconsistent preferences. Individuals who display low financial literacy show evidence of improper borrowing by maxing out credit cards and having bank overdrafts. If we were to add managing a retirement plan loan to this mix, along with a job, defaults are more likely. As such, there appears to be a need for greater financial education in the workplace, particularly among those who opt to use their retirement plans before retirement, to mitigate not just define contribution leakage, but myopic spending. In other words, some individuals might need to take a loan from their retirement account to meet their basic living expenses. However, they should not remove the funds from their account to take a vacation or buy a sports car.

The Pew Charitable Trust reports that annually 12 million Americans spend $9 billion in payday loan fees and another $3 billion on auto title loans. On average, a borrower takes out eight loans per year and pays more in interest payments than the original principal. Additionally, they find that payday loans are not used for unexpected income shocks or unforeseen expenses, but to meet daily living expenses possibly caused by myopic spending. Agarwal, Skiba, and Tobacman (2009) find that even in the presence of more cost-effective liquidity options (a credit card) 66% of their sample still took out a payday loan.

The results of this study indicate that financial literacy can help explain such gross debt mismanagement. From our analysis, it is apparent that most, if not all, of the fees paid to high-cost lenders are from individuals with low levels of financial literacy. Therefore, there is a need for greater financial education and financial literacy among groups more likely to use these types of high-interest loans. Payday and Auto Title Loan companies argue that they provide a service for the underserved. Although we do not argue that they provide a needed service, there is evidence that they are hurting those they claim to help. We agree with the recommendation by the Consumer Financial Protection Bureau to cap repayment levels, and clarify loan terms, but we also add that these lenders can be a catalyst for irresponsible money management.

Notes

1   According to Vanguard's 2016 Defined Contribution Survey, in 2015, 78% of all DC plans allowed plan loans and 84% allowed hardship withdrawals.
2   There are two other forms of defined contribution leakage, namely cashouts and in-service withdrawals. The NFCS allows us to explore in-service withdrawals further.
3   See Yuh and Hanna (2010) for a thorough discussion.

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