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Bounded Rationality and Use of Alternative Financial Services

The increasing pervasiveness of high-cost alternative financial services (AFS) has captured the attention of policymakers, consumer educators, and financial counselors. Using data from the 2009 to 2012 waves of the National Financial Capability Study (NFCS), this article investigates AFS borrowing behaviors through the lens of a boundedly rational choice framework, with an emphasis on overconfidence. Through repeated testing of isolated samples of individuals with characteristics that make them less likely to objectively need such products, the roles of actual (objective) and perceived (subjective) financial knowledge in the decision-making process are explored. Consistent results indicate that individuals with lower objective financial knowledge and those that are overconfident in their self-assessed knowledge level are significantly more likely to utilize AFS instruments. These results suggest that a significant portion of AFS users may select these products without conducting adequate search, resulting in less than optimal financial decisions holding all else equal.

The decision to borrow on the part of a household involves a series of complex considerations related to current available resources, expected income, perceived need, and costs of borrowing. Individuals must be equipped with adequate understanding of financial markets and the relevant instruments and options available to assess borrowing decisions effectively. The growth of high-cost debt instruments, including payday loans, rent-to-own (RTO) financing, pawn shops, title loans, and refund anticipation loans, has raised significant questions with regard to consumer understanding of these alternative financial services (AFS). According to the Federal Deposit Insurance Corporation (FDIC 2009), estimating the actual size of this industry is difficult due to the variety of services that may be classified as AFS and the very nature of the sector, as there are many different providers and many are privately held. Conservative estimates from

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The Journal of Consumer Affairs, Summer 2015: 407–435
DOI: 10.1111/joca.12071

2009 suggest an overall industry size in excess of $320 billion USD, with evidence that the industry has grown since that time (FDIC 2009, 2012). Roughly a quarter of Americans reported use of at least one AFS loan in 2011, indicating that this is no longer a niche industry (FDIC 2012).

In the United States, policy approaches have ranged from those that emphasize disclosure of information to those that restrict access or product types. In the case of AFS, each state has adopted its own policy, resulting in a broad range of regulations and considerable variation from one state to the next. Many of the states have enforced restrictions based on loan rates and amounts that can be borrowed within a given time frame. Only a few states have engaged in an outright ban of certain AFS options, placing greater importance on the structure of available disclosures.

The growing concern about the impact of alternative sources of liquidity on consumer well-being has also encouraged the search for solutions at the federal level. The federal policies regarding AFS in the past had been limited to enforcement of existing law and consumer education; however, some more authoritarian regulations have recently been implemented. For example, through the 2007 amendments to defense budget authorization bills, military families received some protection against "predatory" payday lending. This federal law enacted first-of-its-kind interest rate limits on payday loans to military service members and their relatives (36% APR). Moreover, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 created the Consumer Financial Protection Bureau (CFPB) and authorized the new agency to regulate lending services and restrict unfair, deceptive, or abusive practices.

Our article establishes a current picture of the AFS industry, noting that a growing percentage of individuals report utilization of these instruments between 2009 and 2012. Using data from the 2009 to 2012 National Financial Capability Study (NFCS), each of the five high-cost borrowing decisions is assessed separately with an emphasis on the role of consumer financial knowledge. We utilize a complex measure of knowledge that incorporates objective components as well as subjective components (see Allgood and Walstad 2013). Previous studies (Allgood and Walstad 2013; Lusardi and Scheresberg 2013; Seay and Robb 2013) have established a strong connection between financial knowledge and high-cost borrowing behavior. This study combines aspects from these studies to present a more nuanced picture of the role of financial sophistication for each unique market behavior, while also attempting to control for incidents of rational borrowing, i.e., those triggered by an objective need.

Financial knowledge is a critical component in the consumer decision-making process, and questions persist whether, and to what degree, these

borrowing decisions are rational (i.e., fully informed individuals making utility-maximizing choices in the market). Whereas national level analysis of AFS borrowing has previously been completed with the 2009 NFCS data (Allgood and Walstad 2013; Lusardi and Scheresberg 2013; Seay and Robb 2013), the implications of the observed relationships between financial knowledge and borrowing decisions have been confounded by the presence of rational borrowing behavior among respondents due to financial conditions. In the absence of alternative sources of liquidity, emergencies may rationalize AFS use. At the same time, the onset of many emergencies (e.g., job loss, difficulties paying bills, facing necessary car or home repairs) may be correlated with financial knowledge, thus leading to unreliable regression coefficient estimates. To isolate less than optimal borrowing decisions, repeated testing is conducted on subsamples of populations with positive financial characteristics that would limit the rationality of using AFS products. This analysis presents an argument in support of overconfidence on the part of borrowers as a predictor of "boundedly rational choice" (Conlisk 1996), indicating that use is more commonly noted among those who overestimate their own understanding of financial markets, holding conditions of relative need constant.

BACKGROUND

A number of recent studies highlight the significant growth in AFS use in the United States (FDIC 2012; Gross et al. 2012; Lusardi and Scheresberg 2013). Karpatkin (1999) argued that fundamental changes in the economic landscape, including an increasing number of low-paying jobs, increased bank fees, decreased availability of banks in low-income areas, and a lack of available credit for more marginal consumers, have effectively driven some consumers to pursue high-cost alternatives such as RTO, title loan, or payday loan institutions. These services outlined by Karpatkin (1999) are typically lumped together with utilization of pawn shops and refund anticipation loans into the broad category of AFS. These five distinct behaviors are interrelated based on the fact that each one represents higher cost (or higher risk) borrowing, as each of these services entails relatively high transactions costs (fees) relative to more traditional options (Agarwal, Skiba, and Tobacman 2009; Center for Responsible Lending 2004; Melzer 2011). All of these services appeal to consumers who lack adequate cash or who do not have access to any other forms of credit (whether this lack of access is real or perceived). Much of the available research centers on the discussion of whether or not those who utilize these services fully

understand the relevant costs, and we will consider each of these AFS briefly.

Alternative Financial Services

Payday Loans

In the typical payday loan model, consumers apply for a loan based on their current pay cycle, with the expectations that for each $100 borrowed, they will be required to repay the principal plus a fee of roughly $15–$17. These loans tend to be short-term in nature (one or two weeks in length), although many borrowers find themselves relying on five or more such loans annually (Center for Responsible Lending 2004). The effective percentage charged by payday lenders, based on annualized figures, can be in excess of 400%, causing many to question whether or not these loans take unfair advantage of vulnerable consumers (Bertrand and Morse 2011). Bertrand and Morse (2011) tested the degree to which different methods of information disclosure might influence borrowing decisions, and found evidence to support the argument that disclosures aimed at targeting cognitive biases and limitations were associated with decreased usage, in terms of both frequency and amount borrowed. However, their findings also indicated that a high percentage of borrowers were not impacted by the new disclosures, indicating that many consumers may in fact be choosing such lending methods rationally. Research on the use of payday loans suggests that the typical user is younger, low to moderate income, and credit constrained, suggesting that such instruments may be fulfilling a critical need by relaxing constraints (Lawrence and Elliehausen 2008).

Rent-to-Own

RTO transactions provide easy access to merchandise in cases where consumers might lack adequate cash or credit (Lacko, McKernan, and Hastak 2002). In many cases, credit qualifications are not necessary to engage in these transactions, and they offer the advantages of low monthly payments and flexibility because the merchandise may be returned at any time. However, the total transaction cost in the event of a purchase is often high relative to relevant retail prices (Lacko, McKernan, and Hastak 2002). Previous studies into the use of RTO instruments indicated that users tended to be African American, younger, less educated, lower income, in households with children, and renters (Lacko, McKernan, and Hastak 2002; McKernan, Lacko, and Hastak 2003). RTO users were also less likely to own a credit card, or have a checking or savings account when compared

with the rest of the US population (Lacko, McKernan, and Hastak 2002; McKernan, Lacko, and Hastak 2003). However, research indicated that most RTO customers were employed, owned an automobile, and had some form of credit card or bank account. Further, consumers who used RTO options reported generally high satisfaction rates and a majority indicated that they entered into the transaction with the intention to buy (Lacko, McKernan, and Hastak 2002).

Auto-Title Loans

Auto-title loan use has seen significant growth in the past decade. These loans are based on vehicle values and are typically repaid at the end of the month, with median finance charges of close to 25% (Fox and Guy 2005). Effectively, these products may have an APR of 300%. These products are often offered without credit checks or considerations of the borrower's ability to repay the loan, resulting in revolving of this debt. Evidence suggests that these products are most commonly accessed by lower income borrowers and those that are likely to be most credit constrained (Fox and Guy 2005).

Tax Refund Anticipation Loans

Tax refund anticipation loans are short-term loans that vary in amount depending on an individual's tax refund, less loan fees, and tax preparation costs that may apply. Refund anticipation loans are repaid by the tax refund itself, and terms vary based on IRS processing time, although typical terms are between one and two weeks. Based on this relatively short-time frame, refund anticipation loans often carry high effective percentage rates (annual percentage rates are often in excess of 100%). Users tend to be younger, lower to middle income, and are among those more likely to be credit constrained (Elliehausen 2005).

Pawn Shops

Pawn shops provide a more traditional form of short-term cash consumer lending wherein the consumer deposits collateral in the form of personal property in exchange for a short-term fixed-rate loan. Default on loan payments is met with forfeiture of the collateral. Most pawn-shop transactions average close to $150, and repayment rates are 80%. Transactions are not disclosed to credit tracking companies and so remain confidential. Fees vary widely between jurisdictions with interest rates ranging from 2% to 25% per month, with some states specifying no cap on rates. In addition, small storage fees may be charged or may be included in the interest rate (Bos, Carter, and Skiba 2012).

Financial Knowledge and Bounded Rationality

Neoclassical economic theory holds that consumers will engage in utility-maximizing behaviors based on full information with regard to costs, constraints, and alternatives in the market. In the context of this model, individuals utilizing AFS are doing so as a choice, and such actions reveal underlying preferences for AFS instruments on the part of users. The concept of optimal borrowing lies at the heart of this discussion. Utility maximization theory would suggest that, before utilizing an AFS product, an individual would exhaust other less costly options, such as drawing from personal savings or using less costly methods of borrowing.

Critics of these services argue that individuals may be forgoing other (cheaper) available options, indicating that AFS use may not be entirely rational in all instances. Such arguments often rely on the assumption that decision makers may be limited in their capacity to process and incorporate all relevant information, also referred to as bounded rationality. As Simon (2000) noted, decisions are not simply a result of individuals pursuing consistent goals in light of relevant external factors. Rather, components such as individual knowledge and the ability to apply or draw from that knowledge in light of alternatives and uncertainty must be taken into consideration (Simon 2000). Borrowing decisions are complicated in that they require individuals to make accurate forecasts of future utility or well-being based on limited present information. Sunstein (2006) articulated a number of factors that might lead to excessive borrowing, including lack of information.

Irrespective of the specific AFS behavior being analyzed, utilization tends to occur among younger, less knowledgeable consumers (Allgood and Walstad 2013; Lusardi and Scheresberg 2013; Seay and Robb 2013). The fact that younger consumers are more likely to utilize these instruments may be consistent with theory, as this fits with the assumption of greater credit constraints and life-cycle income theory. However, the findings on knowledge require some further exploration.

The decision to borrow via AFS may be impacted significantly by individuals' ability to understand financial markets (objective knowledge). Even under the assumption of imperfect information (or bounded consumer rationality), economic theory broadly suggests that greater information should result in more effective decision making, ceteris paribus (Liebermann and Flint-Goor 1996). Previous research indicates that individual objective financial knowledge has a significant impact on behavior (Allgood and Walstad 2013; Hilgert, Hogarth, and Beverly 2003; Liebermann 2007; Lusardi and Mitchell 2006; Robb 2011; Robb and Woodyard 2011;

Xiao et al. 2011). The significance of subjective knowledge has varied depending on the behavior being analyzed. Research by Robb and Woodyard (2011) analyzing best practice financial behavior noted that subjective financial knowledge had a stronger association with positive financial behaviors when compared with objective financial knowledge. Seay and Robb (2013) noted the opposite when analyzing high-cost credit behaviors using the 2009 NFCS data. These results are suggestive of critical differences in how consumers make different kinds of financial decisions.

More critical to understanding decisions in complex financial markets might be an understanding of how these different types of knowledge influence the process. Recent research highlights the importance of subjective aspects of knowledge as they relate to objective aspects, as inaccurate appraisals of one's financial status might result in less than optimal financial decisions (Courchane, Gailey, and Zorn 2008; Perry 2008; Zinman 2009). Moulton et al. (2013) suggested that overconfident consumers are more likely to engage in suboptimal borrowing decisions in the case of mortgage instruments. Higher confidence is also associated with lower likelihood of consumers' take-up of financial coaching in the event of missed payments (Moulton et al. 2013).

In the case of AFS behavior, the available evidence indicates a strong connection between knowledge, both objective and subjective, and behavior (Allgood and Walstad 2013; Lusardi and Scheresberg 2013; Seay and Robb 2013). Our study divides the sample into four distinct groups based on their overall knowledge levels (both objective and subjective). Individuals may be classified as high objective–high subjective, high objective–low subjective, low objective–high subjective, or low objective–low subjective. Based on these conceptual groupings, economic theory, and the available literature, the following hypotheses are posited:

H1: AFS use will be most prominent among individuals classified as low objective–high subjective, ceteris paribus, as this classification best aligns with overconfidence as defined by Koellinger, Minniti, and Schade (2007).

H2: AFS use will be higher among respondents in the low objective–low subjective group when compared with those in the high objective–high subjective or high objective–low subjective groups, ceteris paribus.

Assessing the relationship between knowledge and behavior is further complicated in the context of AFS decisions by the factor of need. It is highly possible that well-informed, rational individuals would use high-cost borrowing instruments should financial conditions dictate it. However, a significant correlation between financial knowledge and AFS utilization assessed among individuals who are not experiencing an objective need suggests that AFS utilization is determined by bounded rationality. Our

study seeks to measure the correlations between financial knowledge and AFS utilization in samples of individuals who are less likely to objectively need high-cost liquidity, i.e., samples limited to individuals who have emergency funds, did not experience an income shock within the past year, have high credit score, own health insurance, are free from medical or student debt, and are homeowners.

H3: Previous hypothesized effects will hold true even for cases where assessments of objective need suggest that AFS use may be less than optimal behavior.

METHODOLOGY

Data

Data were taken from the 2009 and 2012 state-by-state versions of the NFCS sponsored by the Financial Industry Regulatory Authority (FINRA) Investor Education Foundation. The pooled sample consists of 53,655 adults of age 18 or older (28,146 from 2009 wave, 25,509 from 2012 wave), with roughly 500 respondents per state per wave, including the District of Columbia. The NFCS survey oversampled certain demographic groups in both waves, thus descriptive statistics presented later in the article were weighted to be representative of the general adult US population.

Dependent Variables

Five high-cost borrowing instruments were analyzed: auto-title loans, tax refund anticipation loans, pawn shops, RTO stores, and payday loans. The NFCS provides a series of questions pertaining to risky borrowing behavior, with respondents indicating the number of times they have engaged in each of these financial behaviors within the previous five years (options ranging from "*never*" to "*4 or more times*"). These variables were dummy coded to create five unique variables signifying any reported use of each of these instruments in the five years prior to the survey as either a Yes ("1") or no ("0") response.[1] For each of the listed behaviors,

1. Analysis of AFS use with the NFCS data is necessarily complicated by the nature of the question. Respondents provide data on the utilization of these services over a five-year span, whereas the available controls (knowledge, emergency savings, credit score, etc.) reflect individuals' current condition. The interpretations of empirical results in this article are provided with an implicit assumption that the respondent's conditions have not evolved substantially because of the AFS use. However, it must be acknowledged that the identification of need at the time of AFS use is not perfect. For example, a consumer who currently has adequate emergency savings may have not been in the same financial position a few years ago and thus rationally utilized a payday loan to meet short-term cash need.

respondents had the option of responding "Don't know" or "Prefer not to say." Observations with these responses were excluded from the analysis.[2]

Independent Variables

The objective measure of financial knowledge was based on a short personal finance quiz composed of five multiple-choice questions:

1. "Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 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 1 year, how much would you be able to buy with the money in this account?"
3. "If interest rates rise, what will typically happen to bond prices?"
4. "A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less."
5. "Buying a single company's stock usually provides a safer return than a stock mutual fund."

Each of the above questions provided a choice set of alternative answers (in random order): the correct answer, 1–3 incorrect answers, "Don't know," and "Prefer not to say." The objective financial knowledge was measured as an index variable with the value set equal to the sum of correct answers to the financial literacy quiz questions.

The subjective measure of financial knowledge was based on the respondents' answers to the following question: "On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your overall financial knowledge?" To examine the impact of subjective financial knowledge among individuals with approximately the same level of objective knowledge, as well as the impact of objective financial knowledge among individuals with approximately the same level of perceived knowledge, four additional mutually exclusive dummy variables were created to indicate: (1) high objective and high subjective knowledge, (2) high objective and low subjective knowledge, (3) low objective and high subjective knowledge, and (4) low objective and low subjective knowledge. Respondents were classified to the high knowledge category (either

2. For each behavior, the respective number of "Don't know" and "Prefer not to say" responses are listed: 189 and 186 for auto title, 200 and 205 for payday loans, 212 and 200 for tax refund anticipation loans, 195 and 201 for pawn shops, and 172 and 181 for rent-to-own.

objective or subjective) if their knowledge was assessed to be higher than the respective sample median. Distributions of both objective and subjective financial knowledge for the sample, as well as detailed histograms showing the distribution of subjective knowledge by the number of objective knowledge questions answered correctly, are provided in Figure 1. The median score on the measure of objective knowledge was 3, whereas the median score for the measure of subjective knowledge was 5.[3] An analysis of histograms in Figure 1 suggests that both measures of knowledge are skewed toward higher knowledge. Also, the histograms reveal overconfidence, as significant percentages of individuals evaluate their abilities as high despite performing poorly on the financial knowledge quiz.

Based on prior research detailing AFS use, a number of additional demographic and financial variables were included in this analysis. Demographic variables included age, gender, ethnicity, education level, marital status, number of children, and labor force participation. Variables related to household financial standing included income, health insurance coverage, whether individuals reported having a bank account, whether they have an emergency fund, reported difficulty paying bills, whether the household experienced an income shock in the 12-month period prior to the survey, and attitude toward risk.

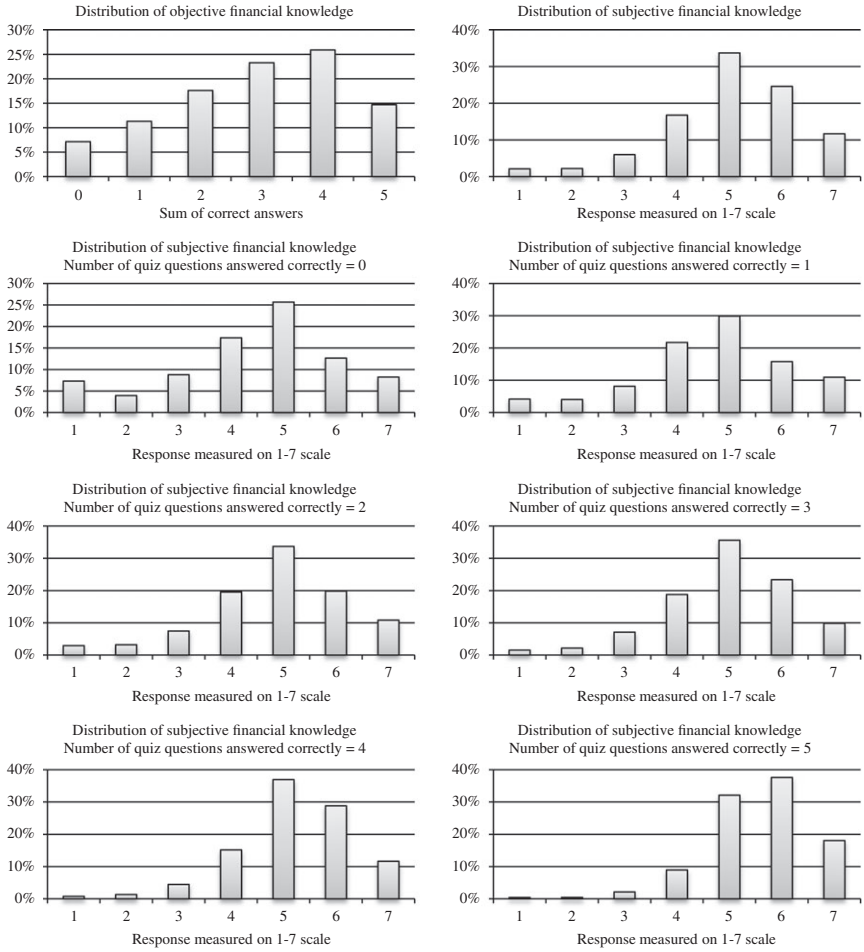
Estimation Strategy

Repeated estimations are conducted to better isolate how bounded rationality might be effecting an individual's decision to utilize high-cost debt instruments. First, the basic relationship between financial knowledge and AFS behavior is analyzed through a series of logistic regressions, indicating whether or not individuals report any utilization for each separate service. These models are generated with the full sample, providing analyses similar to previous work (Allgood and Walstad 2013; Lusardi and Scheresberg 2013; Seay and Robb 2013) to examine the consistency of observed relationships over time given the addition of 2012 NFCS data.

Next, to better isolate the borrowing decision in conditions where objective need for an AFS product may be less salient, a series of analyses that restrict the sample based on observable characteristics related to consumer need are generated. Specifically, a series of separate logistic

3. The cut-off values that we used for grouping respondents to low or high categories of financial knowledge are median values of both measures (=3 for objective knowledge, =5 for subjective knowledge). Medians were applied to guarantee somewhat equal cell counts for each knowledge category. Sensitivity of these results was tested for cut-offs equal to 2 and 4 for the objective measure and 4 and 6 for the subjective measure. Primary findings hold regardless of cut-off values applied.

FIGURE 1
Distribution of Financial Knowledge



regression analyses are run with samples restricted to individuals who report having an emergency fund, those who have not experienced an income shock in the previous 12 months, homeowners, individuals who have health insurance, individuals who self-reported credit scores in excess of 720, and respondents that have no medical or student loan debt. This repeated testing is done to test for correlations between various aspects of financial knowledge and AFS utilization in situations where the rational use of AFS products is limited.

Of course, these tests are not definitive because none of the variables used for delimiting the sample perfectly identifies the condition in which

individuals experience objective need for AFS. Thus, two additional tests are designed to alleviate this concern. First, a separate logistic regression is run for a subsample of individuals that meet all of the aforementioned characteristics. Second, a propensity score of using a particular AFS product is calculated from logit models that simultaneously control for status of emergency savings, recent experiences of income shocks, homeownership, health insurance coverage, and a set of socio-demographic variables (age, gender, education, marital status, number of children, labor force participation, race, risk attitude, difficulties with bill payments, ownership of bank accounts, NFCS wave year, and state of residence). The models of AFS use are then re-estimated with financial knowledge variables for the samples of individuals with below-median propensity of particular AFS product utilization. This test assumes that high propensity score correctly identifies individuals with objective need to use an AFS product (which would be true if, on average, objective need is a more important determinant of the AFS use than bounded rationality).

RESULTS

Descriptive Statistics

Weighted descriptive statistics are provided for the full, pooled sample as well as for the individual waves in Table 1. These data suggest that AFS use is more common in 2012 as compared with 2009. The growth of demand for AFS products between two NFCS surveys is quantitatively significant and ranges between 35% increase in use of payday loans and 60% increase in use of RTO stores. This observation may appear surprising given that other descriptive statistics are indicative of improving economic conditions between the survey waves. For example, fewer respondents indicate having experienced an income shock, difficulty paying bills is less prevalent, a larger percentage of respondents report having an emergency fund, and there is a noticeable improvement in aggregate risk attitudes in the 2012 wave. Overall financial knowledge (objective) appears to have declined slightly, but individuals report greater subjective knowledge on average.

Table 2 summarizes the descriptive statistics on financial knowledge and AFS utilization across subsamples of respondents who are presumed to have lesser objective and immediate need for cash. Respondents in all these samples have higher objective and subjective financial knowledge, and the AFS utilization rates appear to be lower compared with measurements for the full sample. However, despite a more favorable financial situation, many respondents still report frequent reliance on AFS and most utilization

TABLE 1
Weighted Descriptive Statistics by NFCS Wave

Variable	NFCS Wave		
	Pooled Waves	2009	2012
In the past 5 years, respondent has …			
taken an auto-title loan	.07	.06	.09
taken a "payday" loan	.11	.09	.13
taken a tax refund anticipation check	.07	.06	.08
used a pawn shop	.15	.12	.18
used a rent-to-own store	.08	.07	.11
Objective financial knowledge (sum of correct answers)	2.94	2.99	2.88
Interest question correct	.76	.78	.75
Inflation question correct	.63	.65	.61
Bond price question correct	.28	.28	.28
Mortgage question correct	.75	.76	.75
Risk question correct	.51	.53	.48
Subjective financial knowledge (subjective on 1–7 scale, 1 = *low*, 7 = *high*)	5.04	4.95	5.15
Objective–subjective financial knowledge categories:			
High objective, high subjective	.19	.18	.20
High objective, low subjective	.22	.25	.19
Low objective, high subjective	.18	.16	.21
Low objective, low subjective	.40	.41	.40
Respondent's age:			
18–24	.13	.14	.12
25–34	.18	.17	.18
35–44	.17	.18	.16
45–54	.20	.20	.20
55–64	.17	.16	.18
65 or older	.15	.15	.16
Female	.51	.51	.51
Respondent's education:			
No high school	.06	.03	.09
High school	.29	.29	.29
Some college	.39	.42	.36
College	.16	.16	.16
Post grad	.10	.09	.10
Married	.62	.61	.62
Number of children (top coded at 4)	.74	.74	.74
Homeowner	.59	.59	.59
Labor force participation:			
Works full-time	.08	.08	.08
Works part-time	.36	.36	.36
Self-employed	.10	.10	.09
Homemaker	.10	.09	.10
Student	.05	.06	.05
Disabled	.05	.04	.05
Unemployed	.09	.10	.09
Retired	.17	.17	.18
Minority	.32	.31	.34

TABLE 1
Continued

Variable	NFCS Wave		
	Pooled Waves	2009	2012
Covered by health insurance	.80	.80	.80
Respondent's (household) income:			
Income less than $15K	.14	.14	.14
At least $15K and less than $25K	.13	.13	.12
At least $25K and less than $35K	.12	.13	.11
At least $35K and less than $50K	.15	.16	.15
At least $50K and less than $75K	.19	.19	.19
At least $75K and less than $100K	.11	.11	.11
At least $100K and less than $150K	.10	.09	.11
$150K and greater	.05	.05	.06
Income shock	.36	.41	.30
Attitude toward risk (scale from 1 to 10)	4.56	4.34	4.79
Difficulty paying bills:			
Very difficult	.18	.18	.16
Somewhat difficult	.43	.44	.42
Not at all difficult	.39	.37	.41
Has emergency funds to cover 3 months of typical expenses	.39	.37	.42
Has a bank account	.94	.95	.93
N=	53, 655	28, 146	25, 509

Note: Some categories may not sum up to 100% due to rounding.

rates are only negligibly lower than the averages for the full sample. Noticeably, among respondents who have emergency funds sufficient to cover three months of typical expenses, 6% report a recent incidence of using a payday loan. Perhaps even more puzzling, 4% of the high credit score respondents have taken an auto-title loan in the past five years.

Multivariate Analysis

First, a series of five full-sample logistic regression analyses were estimated to predict the likelihood of an individual using each of the individual AFS products. The results for these initial analyses are presented in Table 3. For the purpose of brevity, our discussion emphasizes the effect of financial knowledge (both objective and subjective) on AFS utilization. Consequently, the full model results are not presented, but are largely consistent with prior research with regard to AFS use (Lusardi and Scheresberg 2013; Seay and Robb 2013).

Results of the five initial analyses indicate consistent relationships between financial knowledge and product utilization across each AFS

TABLE 2
Financial Knowledge and AFS Utilization by Sample

				In the Past 5 Years …				
	N	Objective Financial Knowledge	Subjective Financial Knowledge	Has Taken an Auto-Title Loan	Has Taken a "payday" Loan	Has Taken a Tax Refund Anticipation Check	Has Used a Pawn Shop	Has Used a Rent-to-Own Store
Full sample	53,665	2.94	5.04	.07	.11	.07	.15	.08
Sample limited to individuals who …								
have emergency funds	20,776	3.35	5.50	.06	.06	.05	.08	.05
have not experienced an income shock	34,291	3.06	5.14	.06	.08	.05	.10	.06
own a home	32,907	3.26	5.27	.07	.07	.05	.09	.06
have health insurance	43,064	3.08	5.12	.07	.10	.06	.12	.07
report credit score > = 720	5,069	3.64	5.45	.04	.01	.01	.02	.01
do not have medical or student debt	15,254	3.07	5.26	.05	.06	.04	.10	.05
have emergency funds, and have not experienced an income shock, and own a home, and have health insurance, and report credit score > = 720 or do not have debt	7,659	3.73	5.70	.03	.01	.02	.02	.01

behavior. The magnitudes of estimated coefficients suggest that a unit increase in objective financial knowledge diminished the odds of AFS use between 12.5% (pawn shop) and 19.6% (tax refund anticipation loan). Conversely, subjective financial knowledge is positively related to utilization of payday loans (3.3%), auto-title loans (5.9%), tax refund anticipation loans (6.8%), and RTO transactions (8.2%). No relationship was found between subjective financial knowledge and pawn shop use.

Whereas these results are insightful, this study further explores personal financial knowledge by investigating the effects of the interaction between objective and subjective financial knowledge on AFS use. Results of the subsequent analyses suggest that the combined knowledge measure displays a consistent relationship, regardless of the particular behavior

TABLE 3
Odds Ratios from Logistic Regressions for Objective and Subjective Financial Knowledge and Objective–Subjective Knowledge Indicators

	(1)	(2)
Dependent variable is 1 if respondent has taken an auto-title loan in the past 5 years and 0 otherwise.		
Objective financial knowledge	.853***	
Subjective financial knowledge	1.059***	
Objective–subjective financial knowledge categories (Ref: low–low)		
High objective, high subjective		.651***
High objective, low subjective		.836***
Low objective, high subjective		1.511***
N	47,079	47,079
Dependent variable is 1 if respondent has taken a "payday" loan in the past 5 years and 0 otherwise.		
Objective financial knowledge	.851***	
Subjective financial knowledge	1.033*	
Objective–subjective financial knowledge categories (Ref: low–low)		
High objective, high subjective		.627***
High objective, low subjective		.714***
Low objective, high subjective		1.371***
N	37,054	37,054
Dependent variable is 1 if respondent has taken a tax refund anticipation check in the past 5 years and 0 otherwise.		
Objective financial knowledge	.796***	
Subjective financial knowledge	1.068***	
Objective–subjective financial knowledge categories (Ref: low–low)		
High objective, high subjective		.552***
High objective, low subjective		.614***
Low objective, high subjective		1.478***
N	47,181	47,181
Dependent variable is 1 if respondent has used a pawn shop in the past 5 years and 0 otherwise.		
Objective financial knowledge	.875***	
Subjective financial knowledge	1.016	
Objective–subjective financial knowledge categories (Ref: low–low)		
High objective, high subjective		.667***
High objective, low subjective		.755***
Low objective, high subjective		1.273***
N	47,223	47,223
Dependent variable is 1 if respondent has used a rent-to-own store in the past 5 years and 0 otherwise.		
Objective financial knowledge	.824***	
Subjective financial knowledge	1.082***	
Objective–subjective financial knowledge categories (Ref: low–low)		
High objective, high subjective		.586***
High objective, low subjective		.656***
Low objective, high subjective		1.537***
N	47,265	47,265

Note: All regressions also control for respondent's age, gender, education, marital status, number of children, homeownership, labor force participation, race, health insurance coverage, recent experiences of income shocks, risk attitude, difficulties with bill payments, status of emergency savings, ownership of bank accounts, NFCS wave year, and state of residence. Sample sizes vary across models due to missing values.
Significance levels:
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

being analyzed. As hypothesized (H_1), low objective–high subjective individuals are significantly more likely to report engaging in each of the high-cost borrowing behaviors relative to low objective–low subjective individuals. Hypothesis 2 is also supported, as both high objective–high subjective and high objective–low subjective respondents are less likely to report AFS use relative to low objective–low subjective respondents. Significant effect sizes are noted. For example, compared with low objective–low subjective individuals, the odds of high objective–high subjective and high objective–low subjective respondents utilizing an AFS product are 33%–45% and 16%–39% lower depending on the AFS product, respectively. Relative to the same reference group, the odds of a low objective–high subjective respondent utilizing an AFS product are 27%–54% higher.

While establishing a relationship between knowledge and use, the previous analyses did not provide adequate controls for financial need. Consequently, a series of restricted sample analyses were conducted in an attempt to better isolate situations with limited objective need for AFS services. Results from these analyses (Tables 4–5) further support the initial hypotheses, as well as providing strong evidence in support of Hypothesis 3. The associations between both knowledge types and AFS use are explored individually in light of the restricted samples (Table 4). Consistent with the full sample analyses, objective knowledge is a strong predictor of AFS use, as individuals with greater objective knowledge are less likely to report use. The effect sizes for the subsample analyses are comparable (sample of respondents who have not experienced an income shock) or higher in absolute value (all other subsamples) than those revealed in the full sample analyses. In particular, based on estimates obtained from a sample of individuals with high self-reported credit score, each unit performance increase in the objective financial knowledge quiz results in a decrease of the odds of AFS use by 22%–56%.

The results pertaining to the relationship between subjective financial knowledge and AFS borrowing behavior (Table 4) are largely consistent with the results for objective knowledge. When significant, a positive relationship between subjective knowledge and AFS borrowing behavior is observed, indicating increased self-assessed financial knowledge scores are associated with an increased likelihood of use (holding all else equal). Notably, the effects of self-assessed knowledge estimated for subsamples of individuals who are less likely to suffer from an objective need to engage in risky borrowing tend to be much larger than the equivalent effects estimated for the full sample. Perhaps the most revealing is the example of substantial correlation between subjective financial knowledge and the

TABLE 4
Odds Ratios from Logistic Regressions for Objective and Subjective Financial Knowledge

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	=1 if respondent has taken an auto-title loan in the past 5 years; = 0 otherwise	=1 if respondent has taken a "payday" loan in the past 5 years; = 0 otherwise	=1 if respondent has taken a tax refund anticipation check in the past 5 years; = 0 otherwise	=1 if respondent has used a pawn shop in the past 5 years; = 0 otherwise	=1 if respondent has used a rent-to-own store in the past 5 years; = 0 otherwise
Sample limited to individuals who have emergency funds					
Objective financial knowledge	.751***	.703***	.657***	.768***	.685***
Subjective financial knowledge	1.163***	1.283***	1.255***	1.127***	1.267***
N	19,529	16,980	19,563	19,575	19,577
Sample limited to individuals who have not experienced an income shock					
Objective financial knowledge	.876***	.860***	.794***	.879***	.838***
Subjective financial knowledge	1.043†	1.002	1.086***	0.987	1.046*
N	30,835	25,766	30,904	30,930	30,954
Sample limited to individuals who own a home					
Objective financial knowledge	.805***	.774***	.693***	.791***	.729***
Subjective financial knowledge	1.141***	1.095***	1.128***	1.053*	1.136***

TABLE 4
Continued

	(1)	(2)	(3)	(4)	(5)
N	29,941	24,890	30,025	30,045	30,059
Sample limited to individuals who have health insurance					
Objective financial knowledge	.835***	.836***	.751***	.846***	.793***
Subjective financial knowledge	1.060***	1.041*	1.095***	1.017	1.118***
N	38,720	31,868	38,810	38,834	38,864
Sample limited to individuals who report credit score > = 720					
Objective financial knowledge	.809***	.592***	.470***	.702***	.430***
Subjective financial knowledge	1.136	1.844***	1.297	1.279*	1.666*
N	4,744	4,175	4,767	4,771	4,768
Sample limited to individuals who do not have medical or student debt					
Objective financial knowledge	.815***	.821***	.781***	.856***	.762***
Subjective financial knowledge	1.067†	1.034	1.053	1.011	1.115**
N	13,578	11,044	13,564	13,559	13,578
Sample limited to individuals who have emergency funds, have not experienced an income shock, own a home, have health insurance, and report credit score > = 720 or do not have debt					
Objective financial knowledge	.867*	.632***	.587***	.743***	.662***
Subjective financial knowledge	1.052	1.358*	1.197	1.135	.975
N	7,481	6,811	7,483	7,485	7,487
Sample limited to individuals with below-median propensity of using the particular AFS product					
Objective financial knowledge	.878***	.732***	.740***	.818***	.771***
Subjective financial knowledge	1.068†	1.236***	1.077	1.052	1.378***
N	18,519	18,602	18,585	18,613	18,604

Note: Unless a particular variable is used to define sample limitations, all regressions control for respondent's age, gender, education, marital status, number of children, homeownership, labor force participation, race, health insurance coverage, recent experiences of income shocks, risk attitude, difficulties with bill payments, status of emergency savings, ownership of bank accounts, NFCS wave year, and state of residence. Data on credit score are only available in the 2009 NFCS. Data on medical or student debt are only available for 2012 NFCS.

Significance levels:

$^{\dagger}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

TABLE 5
Odds Ratios from Logistic Regressions for Objective–Subjective Knowledge Indicators

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	=1 if respondent has taken an auto-title loan in the past 5 years; = 0 otherwise	=1 if respondent has taken a "payday" loan in the past 5 years; = 0 otherwise	=1 if respondent has taken a tax refund anticipation check in the past 5 years; = 0 otherwise	=1 if respondent has used a pawn shop in the past 5 years; = 0 otherwise	=1 if respondent has used a rent-to-own store in the past 5 years; = 0 otherwise
Reference category for coefficient estimates below is low objective, low subjective financial knowledge. Sample limited to individuals who …					
have emergency funds					
High objective, high subjective	.556***	.476***	.502***	.564***	.450***
High objective, low subjective	.580***	.510***	.374***	.593***	.353***
Low objective, high subjective	1.700***	2.125***	1.990***	1.556***	1.811***
N	19,529	16,980	19,563	19,575	19,577
have not experienced an income shock					
High objective, high subjective	.692***	.582***	.599***	.624***	.577***
High objective, low subjective	.834*	.658***	.537***	.700***	.617***
Low objective, high subjective	1.388***	1.169*	1.344***	1.159*	1.381***
N	30,835	25,766	30,904	30,930	30,954
own a home					
High objective, high subjective	.685***	.526***	.457***	.588***	.462***
High objective, low subjective	.769***	.662***	.443***	.666***	.503***
Low objective, high subjective	1.759***	1.627***	1.599***	1.482***	1.725***
N	29,941	24,890	30,025	30,045	30,059
have health insurance					
High objective, high subjective	.623***	.633***	.495***	.630***	.549***
High objective, low subjective	.826***	.701***	.534***	.697***	.619***
Low objective, high subjective	1.589***	1.408***	1.543***	1.330***	1.672***
N	38,720	31,868	38,810	38,834	38,864

TABLE 5
Continued

	(1)	(2)	(3)	(4)	(5)
report credit score > = 720					
High objective, high subjective	.919	.867	.186**	.714	.314†
High objective, low subjective	.970	.447	.199**	.633	.258*
Low objective, high subjective	2.073**	5.429***	2.712*	2.769**	4.649**
N	4,744	4,175	4,767	4,771	4,768
do not have medical or student debt					
High objective, high subjective	.578***	.498***	.553***	.574***	.447***
High objective, low subjective	.664**	.509***	.534***	.708***	.544***
Low objective, high subjective	1.303*	1.287*	1.421**	1.234*	1.535***
N	13,578	11,044	13,564	13,559	13,578
have emergency funds, have not experienced an income shock, own a home, have health insurance, and report credit score > = 720 or do not have debt					
High objective, high subjective	.719	.359*	.427*	.489**	.312***
High objective, low subjective	.691	.331*	.247**	.478*	.408*
Low objective, high subjective	1.016	1.648†	1.794†	1.160	.797
N	7,481	6,811	7,483	7,485	7,487
have below-median propensity of using the particular AFS product					
High objective, high subjective	.723**	.594***	.470***	.653***	.557***
High objective, low subjective	.744**	.645***	.512***	.574***	.459***
Low objective, high subjective	1.260†	1.965***	1.129	1.224	1.512*
N	18,519	18,602	18,585	18,613	18,604

Note: Unless a particular variable is used to define sample limitations, all regressions control for respondent's age, gender, education, marital status, number of children, homeownership, labor force participation, race, health insurance coverage, recent experiences of income shocks, risk attitude, difficulties with bill payments, status of emergency savings, ownership of bank accounts, NFCS wave year, and state of residence. Data on credit score are only available in the 2009 NFCS. Data on medical or student debt are only available for 2012 NFCS.
Significance levels:
$^{\dagger}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

odds of taking a payday loan. A negligible correlation measured for the entire sample increases to statistically and quantitatively significant levels for samples of individuals who report having emergency savings, own a home, and most notably, have a high credit score.

Results were largely consistent in the models that included individuals that were the least likely to objectively need AFS products: those reporting all of the positive characteristics and those with the below-median propensity scores. The impact of objective financial knowledge remains consistent in the subsample displaying all positive characteristics, although subjective knowledge was only significant in Model 2 (payday loan use). The observed relationships hold in the analysis that limits the sample to those with below-median propensities to use AFS products, as higher objective knowledge is associated with reduced odds of AFS use for all behaviors whereas higher subjective knowledge is associated with greater odds of AFS use when significant (not significant for tax refund anticipation loan or pawn shop use).

When using the combined measure of personal financial knowledge to assess AFS use among the restricted samples (Table 5), noted effects are similar to those reported in Table 3. As hypothesized (H_3), the anticipated knowledge–behavior relationships held in spite of the added dimension of needs assessment. Those designated as low objective–high subjective are the most likely to engage in AFS use, with notably higher magnitudes in many of the restricted sample models. For example, among individuals who report having a relatively high credit score (>720),[4] the odds of using AFS more than double for auto-title loans, tax refund anticipation loans, or pawn shops (relative to low objective–low subjective). Moreover, compared with the same reference group in the same subsample, respondents in the low objective–high subjective category are characterized by more than five, and more than four times greater odds of using payday loans and RTO stores, respectively.

The knowledge–AFS use dynamics are not as strong in the fully restricted model. The effect of objective financial knowledge remains prevalent in all models except for auto-title loans, as those with high

4. One potential limitation of this control is the fact that the credit scores are self-reported. However, evidence from Perry (2008) indicates that 63% of respondents made accurate self-assessments of their credit rating, with overestimates being more common among less knowledgeable respondents. To verify that our results are not biased by overconfident individuals reporting high credit scores, we estimated the relationship between the likelihood of reporting a high credit score and the combined measures of personal financial knowledge (not reported). Results indicated that, compared with individuals with low objective–low subjective knowledge, those with low objective–high subjective had no significantly higher likelihood of reporting a high credit score.

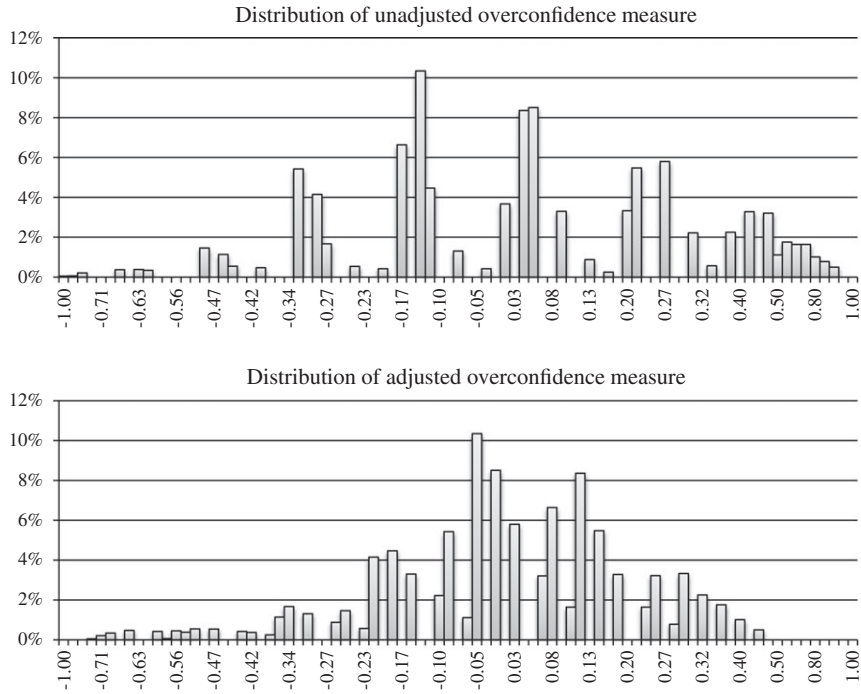
objective knowledge, regardless of their subjective knowledge categorization level, were less likely to use each of the high-cost debt instruments as compared with individuals with low objective and low subjective financial knowledge scores. However, the effect of subjective knowledge alone was muted, as either no or marginally significant differences were noted between those with low objective and high objective scores and those with low objective and low subjective scores. When the sample is restricted to those with below-median propensities for AFS use, noted findings are again largely significant with the other models, although results were not significant across all models (not significant for tax refund anticipation loan or pawn shop use).

Given the results presented above, overconfidence (i.e., a condition in which subjective knowledge exceeds objective knowledge) appears to play an important role in AFS utilization. Accordingly, a separate analysis is run using a continuous measure of overconfidence developed using the two knowledge scales, modeled on the estimation techniques applied by Cesarini et al. (2009). Essentially, Cesarini et al. (2009) operationalized overconfidence as the difference between one's actual ranking on a cognitive test and their perceived ranking on the same test. This metric was applied in both raw (unadjusted) and adjusted forms. The unadjusted measure is simply the difference between the perceived and actual financial knowledge, where both measures of knowledge are scaled to 0–1 range.[5] The adjusted measure of overconfidence is the residual from least squares regression of objective knowledge on subjective knowledge, where both measures of knowledge are again scaled to 0–1 range. Distributions of both versions of the overconfidence measure are presented in Figure 2. The histograms reveal significant variation in both metrics in the analysis sample, implying that both the conditions of overconfidence and underconfidence are common.

A series of separate logistic regression analyses are run using both an adjusted and unadjusted measures of overconfidence. As shown in Table 6, regardless of whether one looks at the adjusted or unadjusted model, greater levels of overconfidence are consistently associated with greater odds of AFS utilization, although odds of use vary significantly across behaviors. For the unadjusted model, the odds of utilizing AFS increase

5. There are potential validity concerns for this measure of overconfidence as the knowledge measures provided in the NFCS do not allow us to model overconfidence exactly as Cesarini et al. (2009). As the different knowledge types are measured on different scales, subtracting one from the other results in a rough, undefined-unit measure of overconfidence. To truly implement the methodology applied by Cesarini et al. (2009), we would need the subjective knowledge question asked like this, "How many quiz questions do you think you answered correctly?"

FIGURE 2
Distribution of Overconfidence



roughly 54% to 133%. Effects are notably lower for the adjusted model, as odds of utilizing AFS increase roughly 20% to 82%.

CONCLUSIONS

Prior evidence suggests that a majority of individuals who access AFS do so knowingly, and are satisfied with their decision and the outcome (Elliehausen 2005; Lacko, McKernan, and Hastak 2002; Lawrence and Elliehausen 2008). However, there is also evidence that a significant portion of borrowers might be making decisions that are less than optimal (based possibly on a lack of information or insufficient understanding of products, costs, and alternatives) (Bertrand and Morse 2011; Lusardi and Scheresberg 2013; Seay and Robb 2013). These findings suggest that overconfidence could be a critical factor in some AFS users' decision to borrow. For the base analyses, many of the findings are similar to those reported using the 2009 wave of the NFCS (Allgood and Walstad 2013; Lusardi and Scheresberg 2013; Seay and Robb 2013). The addition of

TABLE 6
Odds Ratios for Overconfidence Measures from Logistic Regressions

	(1)	(2)
Dependent variable is 1 if respondent has taken an auto-title loan in the past 5 years and 0 otherwise.		
Unadjusted overconfidence	1.858***	
Adjusted overconfidence		1.589***
N	47,079	47,079
Dependent variable is 1 if respondent has taken a "payday" loan in the past 5 years and 0 otherwise.		
Unadjusted overconfidence	1.767***	
Adjusted overconfidence		1.387***
N	37,054	37,054
Dependent variable is 1 if respondent has taken a tax refund anticipation check in the past 5 years and 0 otherwise.		
Unadjusted overconfidence	2.336***	
Adjusted overconfidence		1.768***
N	47,181	47,181
Dependent variable is 1 if respondent has used a used a pawn shop in the past 5 years and 0 otherwise.		
Unadjusted overconfidence	1.544***	
Adjusted overconfidence		1.205***
N	47,223	47,223
Dependent variable is 1 if respondent has used a rent-to-own store in the past 5 years and 0 otherwise.		
Unadjusted overconfidence	2.155***	
Adjusted overconfidence		1.829***
N	47,265	47,265

Note: All regressions also control for respondent's age, gender, education, marital status, number of children, homeownership, labor force participation, race, health insurance coverage, recent experiences of income shocks, risk attitude, difficulties with bill payments, status of emergency savings, ownership of bank accounts, NFCS wave year, and state of residence. Sample sizes vary across models due to missing values.
Significance levels:
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

the refined financial knowledge measure and unique analysis of each AFS provide a more nuanced picture of personal knowledge factors that impact these risky financial behaviors.

All three of the primary research hypotheses are supported by these results. Specifically, individuals with low objective knowledge but high subjective knowledge (or those who might be best classified as overconfident) are significantly more likely to report use of AFS, even when controlling for a number of factors related to objective need. The separate analyses provided a number of interesting findings, although all of the results generally served to reinforce the notion that overconfidence may be influential in a suboptimal, or less informed, borrowing decision for a portion of consumers. When objective knowledge is assessed on its own, the strong inverse relationship between objective financial knowledge

and likelihood of risky borrowing implies that a significant segment of AFS customers could suffer from bounds on their ability to make rational economic decisions.

Subjective financial knowledge presents an interesting story on its own as well, with many of the associations between subjective knowledge and AFS use being positive. However, subjective knowledge is not always a significant predictor of AFS use under every condition, indicating that the behavior and situation may dictate the role it plays.

Turning to the combined knowledge measure, the data indicate that it is the individuals who not only lack knowledge but also do not realize that they lack knowledge (those scoring low on the objective measure and high on the subjective measure) that are most likely to engage in high-cost borrowing behaviors. This finding is not only consistent across the multiple models tested (controlling for need in various ways), but also the magnitudes of the effects are often greater in the restricted sample conditions. It is possible that a percentage of individuals are seeking high-cost debt instruments based solely on biased estimates and inaccurate self-perceptions.

The results of the subsample models, wherein factors related to household need are controlled for, provide a strong argument for bounded rationality being at work in the decision to utilize AFS. The impact of objective financial knowledge is not only consistent across the five different AFS behaviors analyzed, but also when controlling for the availability of emergency funds, the existence of any recent income shock, credit score, homeownership, and medical or student debt. This consistency across models sheds light on a subsection of AFS users that are not resource constrained, but are making potentially suboptimal decisions due to bounded rationality. The results presented in Table 2 serve to inform this discussion. In many cases, there is little difference between the population as a whole and subpopulations of interest in terms of AFS usage. These data suggest that there are factors at work beyond objective financial need. Results of the relationship between subjective financial knowledge and the use of AFS products are less consistent, though findings are indicative of overconfidence playing a role in these borrowing decisions. One missing component in this analysis is specification as to what borrowed dollars are being used for, as this might be a critical condition in assessing whether such decisions are truly optimal.

There are a number of limitations worth noting for this analysis. These findings are based on cross-sectional data, thus making it difficult to express any causal pathways in terms of AFS use and knowledge. Another limitation has to do with the nature of the data collection, as the assessments

of personal financial standing and knowledge are performed simultaneously with the data collection, whereas AFS usage measures past behavior. This might imply that AFS utilization may itself affect objective knowledge or reinforce high confidence. The knowledge measure for this analysis is based on a set of commonly provided questions, some of which may be less relevant to the specific high-cost borrowing decisions explored here. These associations might best be explored by the addition of a measure of cognitive ability, although such a measure is lacking from the NFCS data.

The findings presented indicate that overconfidence on the part of borrowers may be a significant issue of concern, as significant portions of the population may inaccurately assess relevant factors such as their own understanding of financial instruments. This suggests that promoting policies that encourage individuals to objectively self-assess their level of financial knowledge, even without incurring actual knowledge gains, might lead to improved financial behavior in the context of high-cost debt instruments. Further work is needed to determine if these results can be generalized to other financial behaviors and provide for a more comprehensive policy response.

Overall, these findings provide evidence that a subsample of AFS users may enter into these transactions with limited financial knowledge. These data do not allow us to specify the exact nature of the association between AFS use and financial knowledge. However, results consistently indicate that the level of subjective knowledge relative to objective financial knowledge could be important. Specifically, individuals who might best be classified as overconfident are more likely to report AFS use within the past five years, even when controlling for a number of personal need-based factors. It is clear that many people do turn to these services out of necessity, but there is room for improvement with regard to information and consumer protection. Education aimed at increasing actual financial knowledge has been a dominant strategy of improving efficiency of decision making. Our results suggest that additional gains might be achieved by promoting a better understanding of limitations of one's capabilities and adjusting confidence levels to accurately reflect the lack of actual skills.

REFERENCES

Agarwal, Sumit, Paige M. Skiba, and Jeremy Tobacman. 2009. Payday Loans and Credit Cards: New Liquidity and Credit Scoring Puzzles? *The American Economic Review*, 99 (2): 412–417.

Allgood, Sam and William Walstad. 2013. Financial Literacy and Credit Card Behaviors: A Cross-Sectional Analysis by Age. *Numeracy*, 6 (2), Article 3: 1–26.

Bertrand, Marianne and Adair Morse. 2011. Information Disclosure, Cognitive Biases, and Payday Borrowing. *The Journal of Finance*, 66 (6): 1865–1893.

Bos, Marieke, Susan Carter, and Paige M. Skiba. 2012. The Pawn Industry and Its Customers: The United States and Europe. *Vanderbilt Law and Economics Research Paper No. 12–26*. http://ssrn.com/abstract=219575

Center for Responsible Lending. 2004. Quantifying the Economic Cost of Predatory Payday Lending. https://www.womeningovernment.org/files/file/az/QuantifyingtheEconomicCostofPredatoryPaydayLending.pdf

Cesarini, David, Paul Lichtenstein, Magnus Johannesson, and Bjorn Wallace. 2009. Heritability of Overconfidence. *Journal of the European Economic Association*, 7 (2–3): 617–627.

Conlisk, John. 1996. Why Bounded Rationality? *Journal of Economic Literature*, 34 (2): 669–700.

Courchane, Marsha, Adam Gailey, and Peter Zorn. 2008. Consumer Credit Literacy: What Price Perception? *Journal of Economics and Business*, 60 (1–2): 125–138.

Elliehausen, Gregory. 2005. Consumer Use of Tax Refund Anticipation Loans. Credit Research Center. *Monograph #37*. https://www.fdic.gov/bank/analytical/cfr/nov_2005/CFRSS_2005_Elliehausen.pdf

FDIC. 2009. *FDIC National Survey of Unbanked and Underbanked Households*. Washington, DC: Federal Deposit Insurance Corporation.

———. 2012. *FDIC National Survey of Unbanked and Underbanked Households*. Washington, DC: Federal Deposit Insurance Corporation.

Fox, Jean A. and Elizabeth Guy. 2005. Driven into Debt: CFA Car Title Loan Store and Online Survey. Consumer Federation of America. http://www.consumerfed.org/pdfs/Car_Title_Loan_Report_111705.pdf

Gross, Matthew B., Jeanne M. Hogarth, Adithya Manohar, and Stephen Gallegos. 2012. Who Uses Alternative Financial Services, and Why? *Consumer Interests Annual*, 58. http://www.consumerinterests.org/assets/docs/CIA/CIA2012/2012-57 who uses alternative financial services and why.pdf

Hilgert, Marianne A., Jeanne M. Hogarth, and Sondra G. Beverly. 2003. Household Financial Management: The Connection between Knowledge and Behavior. *Federal Reserve Bulletin*, 89 (July): 309–322.

Karpatkin, Rhoda H. 1999. Toward a Fair and Just Marketplace for All Consumers: The Responsibilities of Marketing Professionals. *Journal of Public Policy & Market*, 18 (1): 118–122.

Koellinger, Philipp, Maria Minniti, and Christian Schade. 2007. I Think I Can, I Think I Can: Overconfidence and Entrepreneurial Behavior. *Journal of Economic Psychology*, 28 (4): 502–527.

Lacko, James M., Signe-Mary McKernan, and Manoj Hastak. 2002. Customer Experience with Rent-to-Own Transactions. *Journal of Public Policy & Marketing*, 21 (1): 126–138.

Lawrence, Edward C. and Gregory Elliehausen. 2008. A Comparative Analysis of Payday Loan Customers. *Contemporary Economic Policy*, 26 (2): 299–316.

Liebermann, Yehoshua and Amir Flint-Goor. 1996. Message Strategy by Product-Class Type: A Matching Model. *International Journal of Research in Marketing*, 13: 237–249.

Lusardi, Annamaria and Olivia S. Mitchell. 2006. Financial Literacy and Planning: Implications for Retirement Well-Being. Working Paper No. 1, Pension Research Council, Wharton School, University of Pennsylvania, Philadelphia.

———. 2007. Baby Boomer Retirement Security: The Roles of Planning, Financial Literacy, and Housing Wealth. *Journal of Monetary Economics*, 54: 205–224.

Lusardi, Annamaria and Carlo de Bassa Scheresberg. 2013. Financial Literacy and High-Cost Borrowing in the United States. NBER Working Paper No. 18969. http://www.nber.org/papers/w18969

McKernan, Signe-Mary, James M. Lacko, and Manoj Hastak. 2003. Empirical Evidence on the Determinants of Rent-to-Own Use and Purchase Behavior. *Economic Development Quarterly*, 17 (1): 33–52.

Melzer, Brian T. 2011. The Real Costs of Credit Access: Evidence from the Payday Lending Market. *The Quarterly Journal of Economics*, 126 (38): 517–550.

Moulton, Stephanie, Cazilia Loibl, Anya Samak, and J. Michael Collins. 2013. Borrowing Capacity and Financial Decisions of Low-to-Moderate Income First-Time Homebuyers. *Journal of Consumer Affairs*, 47 (3): 375–403.

Perry, Vanessa G. 2008. Is Ignorance Bliss? Consumer Adequacy in Judgments about Credit Ratings. *Journal of Consumer Affairs*, 42 (2): 189–205.

Robb, Cliff A. 2011. Financial Knowledge and Credit Card Behavior of College Students. *Journal of Family and Economic Issues*, 32 (4): 690–698.

Robb, Cliff A. and Ann S. Woodyard. 2011. Financial Knowledge and "Best Practice" Behavior. *Journal of Financial Counseling and Planning*, 22 (1): 36–46.

Seay, Martin C. and Cliff A. Robb. 2013. The Effect of Objective and Subjective Financial Knowledge on High-Cost Borrowing Behavior. *Financial Planning Review*, 6 (4): 1–19.

Simon, Herbert A. 2000. Bounded Rationality in Social Science: Today and Tomorrow. *Mind & Society*, 1 (1): 25–39.

Sunstein, Cass R. 2006. Boundedly Rational Borrowing. *The University of Chicago Law Review*, 73 (1): 249–270.

Xiao, Jing J., Chuanyi Tang, Joyce Serido, and Soyeon Shim. 2011. Antecedents and Consequences of Risky Credit Behavior among College Students: Application and Extension of the Theory of Planned Behavior. *Journal of Public Policy & Marketing*, 30 (2): 239–245.

Zinman, Jonathan. 2009. Where Is the Missing Credit Card Debt? Clues and Implications. *Review of Income and Wealth*, 55 (2): 249–265.