

Financial literacy of U.S. households: Knowledge vs. long-term financial planning

Yasser Alhenawi^a, Khaled Elkhal^b

^a*Schroeder School of Business, University of Evansville, Evansville, IN 47722, USA*

^b*Department of Accounting and Finance, The University of Southern Indiana, Evansville, IN 47712, USA*

Abstract

We examine the relationship between financial knowledge and long-term financial planning behavior. This analysis is important in light of the recent financial crisis and the current level of economic uncertainty. Survey responses from U.S. households are analyzed using analysis of variance, subgroup analysis, and logistic regressions. Results show that surveyed households are financially knowledgeable (mean score is 75.1%), but exhibit poor financial planning skills (mean score is 59.8%). The findings also show that the correlation between knowledge and financial planning is low, albeit positive. To promote financial literacy, we suggest that public policies strive to embolden financial education during early stages of life; preferably during college years. © 2013 Academy of Financial Services. All rights reserved.

JEL classification: D14

Keywords: Financial literacy; Personal finance; Household behavior; Survey; Public policy

1. Introduction

The importance of financial literacy to the well-being of the financial sector and the economy has been noted by several government agencies including The Federal Reserve (see Hilgert, Hogarth, and Beverly, 2003; Greenspan, 2005; Morton, 2005; Cole, Paulson, and Shastry, 2012). Citing the U.S. House of Representatives, Financial Services Committee 2009, Huston (2010) notes that increasing consumer financial literacy is a public policy

* Corresponding author. Tel.: +1-504-208-7749; fax: +1-812-488-2872.

E-mail address: ya22@evansville.edu (Y. Alhenawi)

objective to improve welfare through better decision making. Several authors believe that the late 2000s financial crisis was triggered, in part, by erroneous financial decisions made at the household level. For instance, Anthes (2004) predicted that the United States would fall into a financial crisis because of Americans' lack of financial literacy. Gerardi, Goette, and Meier (2010) find that limitation in certain aspects of financial literacy played a nontrivial role in the subprime mortgage crisis. Recently, several states mandated high school courses in personal finance in an attempt to promote financial literacy (Mandell and Klein, 2007). It is not surprising, therefore, that academic interest in the topic of financial literacy has increased (see Huston, 2010; Remund, 2010).

Given the importance of financial literacy and its impact on economic activity, it is natural to ask the following: What are the factors that shape households' financial literacy? Recently, the U.S. government adopted a definition of financial literacy introduced by the Jump\$tart Coalition for Personal Financial Literacy (2011; see Remund, 2010). The definition states that:

“Financial literacy is the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being.”

In that sense, financial literacy encompasses not only adequate understanding of financial concepts, but also the ability to make sound financial decisions. According to Cude (2010), Remund (2010), Huston (2010), and Knoll and Houts (2012), however, the definition of financial literacy is still debatable and there is a general disagreement on how financial literacy is measured. A distinctive attempt to define financial literacy is that of Remund (2010) who screens the literature¹ on financial literacy and compares alternative definitions used by researchers. He synthesizes the following conceptual definition of Financial Literacy:

Financial literacy is a measure of the degree to which one understands key financial concepts and possesses the ability and confidence to manage personal finances through appropriate, short-term decision-making and sound, long-range financial planning, while mindful of life events and changing economic conditions (Remund 2010, p. 284).

Therefore, financial knowledge, while necessary, may not be sufficient to assure financial well-being. The definition asserts that adequate financial knowledge coupled with careful financial planning are the main driving forces behind long-term financial well-being of households.

In this article, we investigate whether households are financially apt in the spirit of Remund (2010) definition. In other words, we examine the long-term financial planning behavior of American households and assess the linkage between planning and financial knowledge. Specifically, we attempt to identify what type of knowledge, if any, is useful in formulating adequate long-term financial plans. Previous studies have examined the relationship between knowledge and financial practice in general. However, to the best of our knowledge, the literature on financial literacy did not investigate what type of financial knowledge is more critical in establishing better financial practices. We attempt to fill this gap by examining the characteristics of the “better” financial planners in terms of the type of knowledge acquired, that is, through college, following financial news overtime, work

experience and so forth. Other financial and nonfinancial factors (e.g., socio-economic factors) that may influence one's ability to make sound financial decisions are also addressed.

This inquiry is important in light of the recent financial crisis that caught many households by surprise. In December 2010, the Rockefeller Foundation published a report that describes how U.S. households were impacted by the recent financial crisis and finds evidence of poor financial planning (see Hacker, Rehm, and Schlesinger, 2010). For instance, the study finds that only 23% of U.S. households can go without income for three to six months before hardship sets in. The results also show that 20% of U.S. households will fall into financial distress if they have no income for two weeks or less.² Thus, the findings of our research may also enable us to discern whether households are ready for another possible economic downturn. This has important implications on the U.S. economy because households who play the roles of consumers, investors, and savers, among others, if financially apt, would significantly contribute to a speedy recovery.

Overall, our results show that financial knowledge and long-term financial planning are weakly associated. Specifically, we show that financial knowledge accumulated over time does not lead to better planning. However, we find evidence that financial knowledge acquired through formal academic experiences is positively correlated with financial planning abilities. We infer that to promote financial planning, we should strongly foster financial education at early stages of life, mainly at the college level.

Section 2 examines the literature on financial literacy. Section 3 describes the sample used as well as the methodology. Section 4 presents the results and Section 5 concludes the article with a summary of findings.

2. Literature review

The interest in financial literacy started long before the recent financial crisis. Researchers have examined the financial knowledge and practice of various components of society including students. For instance, Volpe, Chen, and Pavlicko (1996) survey university students and report an average correct answer of 44% in the area of investment and conclude that they have inadequate investment knowledge. In addition, Mandell (1997) survey high school students and find that the average correct answer of participants is 57% in several areas of personal finance. He concludes that students are graduating without the necessary knowledge to make sound financial decisions. Similarly, Volpe and Chen (1998) survey college students to measure their knowledge of personal finance and find that they answer 53% of questions correctly. Murray (2000) shows that students have serious issues with credit card use. In addition, Reed (2008) finds that young people are graduating with tens of thousands of dollars in student loans and little financial knowledge before they navigate a complex financial system in which mistakes are unforgiving and potentially catastrophic. Perhaps more importantly, a survey by Sallie Mae (2009) shows that young people recognize the importance of financial knowledge as 84% of polled students reported needing more financial education. Collectively, extant literature demonstrates lack of financial knowledge among students and households alike.

Several other studies examined financial literacy of households in countries other than the

U.S. For instance, Van Rooij, Lusardi, and Alessie (2011a) examine the relationship between financial knowledge and retirement planning in the Netherlands and find a strong and positive relationship between financial knowledge and retirement planning. In addition, Van Rooij, Lusardi, and Alessie (2011b) show that financially literate households in the Netherlands are more likely to watch financial news and participate in the stock market. Moreover, Monticone (2010) uses a sample of Italian households and finds that financial well-being is determined by gender (in favor of males), marital status (in favor of the married), education (in favor of educated individuals), age (hump shaped profile), and profession (in favor of managers). In addition, Calvert, Campbell, and Sodini (2009, 2007) investigate the efficiency of Swedish household investment decisions. They find that financially sophisticated households invest more efficiently but more aggressively and their investment is generally marked with underdiversification. They reported that underdiversification, inertia in risk taking, and the disposition effect in direct stockholding were all negatively impacted by family size, financial wealth, and education levels. Moreover, Worthington (2006) shows that financial literacy in Australia is lower for the unemployed.

The linkage between financial literacy and economic behavior has been well documented in the literature. For instance, Cude (2010), Grimes, Rogers, and Smith (2010) as well as Walsted, Rebeck, and MacDonald (2010) conclude that financial education improves financial literacy in adults. More specifically, the level of financial education is shown to have an effect on whether consumers have transaction accounts (Hogarth, Anguelov, and Lee, 2005), whether people age 50 and older have thought about retirement (Lusardi and Mitchell, 2007a), and whether households consider relatively risky assets in their investment portfolios (Calvert, Cambell, and Sodini, 2005). In addition, Campbell (2006) showed evidence that well educated White households are more inclined to refinance their relatively expensive houses when interest rates dropped during the 2001–2003 period. In addition, Bernheim, Garret, and Maki (2001) finds that middle-age individuals who take a financial management course in high school tend to save a higher proportion of their incomes than others. On the other hand, Volpe, Chen, and Liu (2006) show a widespread lack of knowledge among working-age adults. Similarly, Lusardi and Mitchell (2007b) find that households generally are ill-informed about mortgages, interest rates, pensions, and social security. Cole, Paulson, and Shastry (2012) show that education significantly increases investment income and retirement savings. They also show that educated people have higher credit score and are less likely to be delinquent or bankrupt. They concluded that increasing education attainment in the United States could dramatically improve financial management, reduce bankruptcy and default, and may facilitate a more stable financial system.

Several aspects of financial planning skills have been addressed by previous studies. For instance, Lusardi and Mitchell (2007b) established that financial literacy influences financial planning behavior that consequently increases wealth. Wealth accumulation can be interpreted as an indicator of the ability to save money for the future (see Browning and Lusardi, 1996). Savings in turn may prepare households well for possible economic hardships like the recent financial crisis. In addition, Lusardi and Tufano (2009) note that lower literacy leads to more debt-related problems. Furthermore, Koenig (2007) argues that literacy constitutes planning for future financial needs and investing. However, a report by the Rockefeller Foundation finds evidence of poor planning for future financial needs (Hacker, Rehm, and

Schlesinger, 2010). The study finds that 20% of U.S. households can go without income for only less than two weeks before hardship sets in. In addition, about 9%, 19%, and 23% of U.S. households can survive without income for three to four weeks, two months, and three to six months, respectively. On the other hand, the study finds that about 30% can survive economic hardship for six months or more. The findings also suggest that the issues Americans worry about the most are: retirement, too much debt, and health care costs.

Meier and Sprenger (2012) highlight the importance of time preferences, originally modeled by Liabson (1997), in the process of acquisition of financial information. Individuals incur costs in the present to acquire financial literacy to obtain a future return on their human capital investment. In accordance with this notion, Meier and Sprenger (2012) show that individuals who discount the future less see greater value in the future benefits of being financially literate. Thus, they are more likely to choose to acquire financial knowledge. Lynch, Netemeyer, Spiller, and Zammit (2012) consider planning for money versus planning for time and report meaningful differences. They show that people plan more for time, but not for money, in the short run than the long run. Financially constrained consumers, however, show an opposite pattern.

Our work is different from previous research in two ways. First, while a significant portion of existing literature focuses on students and young adults' financial literacy; we survey financial decision makers at the household level. Second, we examine financial literacy in terms of financial knowledge *and* its association with long-term financial planning aspects (investing, budgeting, and saving). Specifically, we attempt to identify what type of financial knowledge is useful in formulating adequate financial plans.

3. Sample descriptive and methodology

This study uses a questionnaire designed to gauge financial knowledge and financial planning of U.S. households. The participants are asked to answer 31 questions including: 10 questions on their long-term financial choices (budgeting, saving, and investing); seven questions on their financial knowledge; and 12 questions on financial and demographic data. The survey questions related to financial choices focus on different aspects of financial planning including budgeting, saving, and investing. A copy of the final survey can be found in the appendix. The questions included in the instrument are largely inspired by Remund's (2010) definition of financial literacy that primarily highlights the importance of the linkage between knowledge and practice.³

Three pilot surveys were conducted to improve clarity and effectiveness of the instrument. First, two individuals who are knowledgeable in personal finance (bankers) assessed the validity of the survey. Second, few business faculty took the survey and commented on its structure and effectiveness. Third, we asked our students to have their parents and relatives take the survey and comment on its clarity. Comments from pilot surveys were used to improve the quality and effectiveness of the final instrument but answers were not included in the final dataset. Finally, the consistency of the knowledge section and the planning section⁴ is evaluated using Cronbach's α . The large alphas obtained indicate that each section

captures the intended construct that is, financial knowledge and quality of financial planning (Cronbach's α is 0.894 for the knowledge questions and 0.751 for the planning questions).

The final 31-question survey used in this study was distributed in paper and electronically to a random sample of U.S. households. The printed survey was distributed predominantly to households in the southern Indiana area while the electronic survey was distributed via www.surveymonkey.com Web site to respondents across the country. Questions 1 and 2 are qualifying questions. We require that the respondent is a U.S. citizen or permanent resident and he or she is a primary financial decision-maker in the household. Respondents who did not meet either of these two requirements were not allowed to continue the electronic survey and were eliminated from the paper survey. Participants of the electronic survey are not allowed to skip any question. Therefore, to ensure consistency among all participants, we have eliminated all paper surveys that have missing answers. Answers are graded and respondents are given numerical scores.

There were 350 useable responses out of 515 received. Among the usable responses, 113 came from the printed survey (out of 190 received) and 237 were electronic responses (out of 325 received). For the online survey, we have initially sent out emails to potential respondents and we urged them to forward the survey link to their friends and family members. As a result, it is difficult to accurately determine the number of people solicited online and the overall response rate for the online version of the survey. For the paper survey, the number of responses solicited are 400 representing a paper response rate of $190/400 = 47.5\%$. Table 1 below shows the characteristics of the sample.

T1

Compared with most previous studies, an average respondent in this survey study is older and more experienced⁵ but more importantly, the sample used in this article is strictly limited to the primary financial decision makers in U.S. households that is, individuals who *make* personal finance decisions.

In this sample, 3.71% and 3.43% of respondents are in the age categories of "18–23" and "60 or older," respectively. As a result, 92.86% of respondents are in their late 20s, 30s, 40s, or 50s. In addition, 32.57% of respondents have no finance or economics-related education or training of any kind. On the other hand, 58.57% (34.29%+9.43%+14.86%) of respondents have some finance or economic education or training but not an academic degree, compared with only 8.86% of respondents who say they are finance or economic majors or minors. In addition, 73.71% (66%+7.71%) of respondents work or own a business in the nonfinancial sector compared with 11.43% (10.49%+ 1.14%) who work or own a business in the financial sector. Moreover, the sample is reasonably balanced between males and females indicating that males and females are equally likely to be primary financial decision makers. The geographical representation of the sample is heavily concentrated in the Southeast, Ohio Valley, North, Midwest, and South regions (92% of respondents). In contrast, only 63% of the U.S. population lives in these areas (U.S. Census Bureau, 2011). Moreover, the sample over-represents the Whites (88.57%), compared with only 72.4% of Whites in the U.S. population, along with 12.85% African Americans, and 14.75% of other minorities (U.S. Census Bureau, 2011). All households in our sample have completed high school (at least) while the latest census suggests 85% only. In addition, 32.29% of respondents have a bachelor degree compared with 29.2% reported in the 2010 census. In terms of higher education, 22.86% of respondents hold a master's degree (compared with 8.4% for the

Table 1 Characteristics of the sample

		Number of respondents	Percentage
Question 14	Borrowing behavior (respondent can choose more than one)		
	a. Mortgage loan	198	41.42%
	b. Car loan	165	34.52%
	c. Educational loan	136	28.45%
	d. Other	58	12.13%
	e. None	67	14.02%
Question 16	Late fees		
	a. Never	246	70.29%
	b. Once a year	54	15.43%
	c. 2–5 times a year	44	12.57%
	d. 6–10 times a year	6	1.71%
	e. More than 10 times a year	0	0.00%
Question 20	Follow financial news		
	a. Every day	74	21.14%
	b. 2 days per week	55	15.71%
	c. Once per week	57	16.29%
	d. Once per month	70	20.00%
	e. Rarely or never	94	26.86%
Question 22	Self-assessment of financial knowledge		
	a. None	0	0.00%
	b. Unsatisfactory	31	8.86%
	c. Satisfactory	104	29.71%
	d. Good	147	42.00%
	e. Excellent	68	19.43%
Question 24	Finance or economic education (respondent can choose more than one but we take the highest)		
	a. Major or minor	31	8.86%
	b. Some university courses	120	34.29%
	c. Some training courses	33	9.43%
	d. Economic-related content	52	14.86%
	e. None	114	32.57%
Question 25	Current work		
	a. Employed in financial field	36	10.29%
	b. Employed in nonfinancial field	231	66.00%
	c. Own business (financial)	4	1.14%
	d. Own business (nonfinancial)	27	7.71%
	e. Student	28	8.00%
	f. Unemployed	12	3.43%
	g. Retired	12	3.43%
Question 26	Age		
	a. 18–23	13	3.71%
	b. 24–29	44	12.57%
	c. 30–39	50	14.29%
	d. 40–49	120	34.29%
	e. 50–59	111	31.71%
	f. 60 or older	12	3.43%
Question 27	Gender		
	a. Male	182	52.00%
	b. Female	168	48.00%
Question 28	Zip Code		
	First digit is 0 or 1 (North East)	4	1.14%
	First digit is 2 (East Coast)	20	5.71%

Continued

Table 1 (Continued)

		Number of respondents	Percentage
	First digit is 3 (South East)	76	21.71%
	First digit is 4 (Midwest/Ohio Valley)	109	31.14%
	First digit is 5 (North Midwest)	58	16.57%
	First digit is 6 (Midwest)	48	13.71%
	First digit is 7 (South)	31	8.86%
	First digit is 8 (South West)	3	0.86%
	First digit is 9 (West Coast)	1	0.29%
Question 29	Race Ethnicity		
	a. White/Caucasian	310	88.57%
	b. African-American	0	0.00%
	c. Hispanic	4	1.14%
	d. American Indian	14	4.00%
	e. Asian	2	0.57%
	f. Other	20	5.71%
Question 30	Education level (respondent can only choose one; the highest degree obtained)		
	a. Less than high school	0	0.00%
	b. High school	35	10.00%
	c. Some college	47	13.43%
	d. Associates	25	7.14%
	e. Bachelor	113	32.29%
	f. Masters	80	22.86%
	g. Doctorate	50	14.29%
Question 31	Income		
	a. No income	4	1.14%
	b. Under \$10,000	2	0.57%
	c. \$10,000–\$29,999	35	10.00%
	d. \$30,000–\$49,999	38	10.86%
	e. \$50,000–\$69,999	49	14.00%
	f. \$70,000–\$89,999	46	13.14%
	g. \$90,000–\$109,999	49	14.00%
	h. More than \$110,000	127	36.29%

Notes: This table describes the sample used including the number of responses and average score per survey question. U.S. households were surveyed between March and August of 2011. We obtained 350 usable responses out of a total of 515. Questions shown in this table address respondents' financial and nonfinancial characteristics.

U.S. population) and 14.29% hold a doctoral degree (compared with 2.91% for the U.S. population). In terms of income, the U.S. Census Bureau 2010 Economic Survey shows that the mean household income in the United States is \$64,528 (the median is \$44,534). In our sample, 63.43% reported an income higher than \$70,000 and 77.43% reported an income higher than \$50,000. In summary, the sample is slightly tilted toward the Whites, the educated and the high income.

It is also important to note that we used two grading systems to evaluate respondents' financial planning. The strict grading system gives respondents full mark for choosing the best answer and zero otherwise. The lenient grading system allows for partial grading that is, respondents get half mark for choosing the next best answer(s). Please note that most results

shown in this article are based on the more conservative view, that is, the lenient system results. A comparison between the overall results of the two systems is pointed out when necessary.

3.1. Analysis of variance test

One-way analysis of variance (ANOVA) model is employed to investigate whether there are any differences in mean scores of subgroups based on financial and nonfinancial background. We test the null hypothesis that there is no significant difference between the means of the subgroups. If the test returns significant results (high F-stat), then we accept the alternative hypothesis that there are at least two means that are significantly different from each other. Using ANOVA implicitly assumes that: 1) the dependent variable is continuous, 2) the independent variable consists of categorical independent groups, 3) the dependent variable is approximately normally distributed for each category of the independent variable, 4) variances are homogenous, and 5) cases are independent. It is safe to assume that Assumptions 1, 2, and 5 hold. Assumption 3 is granted by the central limit theorem. This however implies that caution must be taken when the number of cases in a subgroup is too small. Homogeneity of variances (Assumption 4) is tested with Levene's test that tests the null that the variances of subgroups are not significantly different. If we reject the null, we conclude that there is a difference between the variances of subgroups that sheds doubt on ANOVAs results. To overcome this possible shortcoming, we use Welch's test for the equality of the means. The importance of the Welch's statistic is that it enables us to test for the equality of the means of subgroups in the absence of the homogeneity of variance assumption.

Both ANOVA and Welch tests are weak in the sense that rejection of the null is easily obtained with a single violation of the equality of the means. Specifically, both tests would reject the equality of all means even if only one mean is found to be significantly different. This will leave us with an unanswered question: which means are unequal? To overcome this shortcoming, we apply a Tukey's HSD test that compares all possible pairs of means. For clarity of presentation, we will not report the detailed multiple comparison table of Tukey's test results. Instead, we will only show the homogenous subsets in different columns and the *p*-value of the Tukey's statistic under each column. Similar to ANOVA test, Tukey's test requires homoscedasticity; therefore, results must be interpreted with caution when Levene's test indicates different variances.

Questions 24 and 28 are not included in the subgroup analysis. Question 24 violates the requirement of categorical independent subgroups because respondents may choose more than one answer. Question 28 asks respondents to identify their geographical location (zip code) that is not an economically meaningful determinant of financial literacy.

3.2. Logit regression models

In addition to ANOVA, the survey question scores are further subjected to alternative logit regression models to examine the impact of financial and nonfinancial variables on the financial literacy measures of respondents. It is common in survey studies to run a binary

logistic regression where the regressand is a dichotomous variable that denotes an event or nonevent. The regressors are explanatory variables that capture cases' characteristics theorized to influence the probability of event occurrence. In the context of this study, the events are defined as “being relatively more knowledgeable” and “being a relatively better financial planner.” We classify participants into two classes using the median percentage of scores (see Volpe and Chen, 1998). Specifically, respondents with knowledge scores higher than the section median are classified as relatively more knowledgeable. Participants with scores equal to or below the median are classified as those with relatively less knowledge. This creates a dichotomous variable, KNOW, which equals 1 if a participant is classified as relatively more knowledgeable, 0 otherwise. Using the same procedure, another dichotomous variable, PLAN, is created. PLAN equals 1 if a participant is classified as relatively better financial planner, 0 otherwise. KNOW and PLAN are then used as the dependent variables in the binary logistic regressions shown below:

$$\text{Log} \left[\frac{p_k}{1 - p_k} \right] = C + \delta(\text{PLAN}) + X_i' \beta \quad (1)$$

$$\text{Log} \left[\frac{p_p}{1 - p_p} \right] = C + \delta(\text{KNOW}) + X_i' \beta \quad (2)$$

where:

- p_k = the probability of a participant being relatively more knowledgeable.
- p_p = the probability of a participant being a relatively better financial planner.
- β is a vector of estimated coefficients.
- X_i is a vector of independent variables that represent respondents' financial and nonfinancial characteristics. These variables are:
 - LOAN = 1 if a participant has any sort of a loan, 0 otherwise.
Reference group is “no loans.”
 - LATE = 1 if a participant pays late fees on an outstanding loan, 0 otherwise.
Reference group is “never.”
 - NEWS = 1 if a participant follows financial news at least once a week, 0 otherwise.
Reference group is “less than once a week.”
 - SELF-S = 1 if a participant regards his financial knowledge as satisfactory, 0 otherwise.
 - SELF-G = 1 if a participant regards his financial knowledge as good, 0 otherwise.
 - SELF-E = 1 if a participant regards his financial knowledge as excellent, 0 otherwise.
Reference group is “unsatisfactory.”⁶
 - INC-4 = 1 if a participant is in the income group of “\$30,000–\$49,999”; 0 otherwise.
 - INC-5 = 1 if a participant is in the income group of “\$50,000–\$69,999”; 0 otherwise.
 - INC-6 = 1 if a participant is in the income group of “\$70,000–\$89,999”; 0 otherwise.
 - INC-7 = 1 if a participant is in the income group of “\$90,000–\$109,999”; 0 otherwise.
 - INC-8 = 1 if a participant is in the income group of “more than \$110,000”; 0 otherwise.
Reference group is “under \$29,000.”⁷

FEE-1 = 1 if the participant has a major or minor in finance or economics, 0 otherwise.

FEE-2 = 1 if the participant has taken some university courses in finance or economics, 0 otherwise.

FEE-3 = 1 if the participant has received some nonacademic training in finance or economics, 0 otherwise.

FEE-4 = 1 if the participant has taken courses that included some finance or economics content, 0 otherwise.

Reference group is “none.”

JOB-EF = 1 if a participant is employed in the financial field, 0 otherwise.

JOB-EN = 1 if a participant is employed in a nonfinancial field, 0 otherwise.

JOB-OF = 1 if a participant owns a business in the financial field, 0 otherwise.

JOB-ON = 1 if a participant owns a business in a nonfinancial field, 0 otherwise.

Reference group is “student, unemployed, or retired.”

AGE-3 = 1 if a participant is in the age group of “30–39”; 0 otherwise.

AGE-4 = 1 if a participant is in the age group of “40–49”; 0 otherwise.

AGE-5 = 1 if a participant is in the age group of “50–59”; 0 otherwise.

AGE-6 = 1 if a participant is in the age group of “60 or older”; 0 otherwise.

Reference group is “18–29.”⁸

GENDER = 1 if the participant is a male, 0 otherwise.

Reference group is “female.”

ETH-WC = 1 if the participant is a White/Caucasian, 0 otherwise.

Reference group is “all other minorities.”

EDUAS = 1 if the participant education level is “associates”; 0 otherwise.

EDUBS = 1 if the participant education level is “bachelor”; 0 otherwise.

EDUMS = 1 if the participant education level is “master’s”; 0 otherwise.

EDUDR = 1 if the participant education level is “doctorate”; 0 otherwise.

Reference group is “high school or some college.”

Although symmetrical around 0.50, the cumulative distribution function for the LOGIT response model is nonlinear in probabilities (it is S-shaped implying that a fixed change in X has smaller impact on the probability when it is near zero and near one than when it is around 0.5). Therefore, the coefficients are scaled differently and are not comparable in terms of their magnitudes. Their signs, however, are informative. Further, marginal effects are often presented in LOGIT regressions in addition to the coefficients themselves. Marginal effects show the effect if a variable is changed while keeping the other variables at their mean levels.

A positive, and statistically significant, coefficient implies movement up the probability scale; thus it implies increased probability of event occurrence.⁹ In other words, the coefficients in the models above represent the effects on the odds of event occurrence compared with a selected reference group. For instance, GENDER is coded as 1 if a participant is a male, 0 otherwise; so the reference group is a female. If the logistic coefficient of the GENDER variable is positive and statistically significant, then we say that the males,

compared with the females, are associated with an increased log odds ratio of being more knowledgeable (Model 1) or being better financial decision makers (Model 2). If the coefficient for GENDER is not significantly different from zero, we conclude that the dependent variable does not vary across genders. The coefficient δ in Models 1 and 2 is of special importance. In the first regression it tests the null hypothesis that being a better decision maker does not imply being more knowledgeable. In the second regression it tests the null that knowledge does not imply better decision making skills.

4. Results

4.1. Financial knowledge

Questions 10, 11, 13, 15, 17, 19, and 23 address financial knowledge. Consistent with previous studies, these questions cover major aspects of personal finance. The responses from each participant are used to calculate the mean percentage of correct answers for each question and for the entire knowledge section. Consistent with existing literature (Volpe, Chen, and Pavilcko, 1996; Volpe and Chen, 1998), the score is grouped into three levels: a relatively high level (more than 80%), a medium level (60% to 79%), and a relatively low level (less than 60%). The results are shown in Table 2.

The sample mean score is 75.10%, indicating that participants answered about $\frac{3}{4}$ of the knowledge questions correctly. The median score is 85.57% indicating that half of participants were able to identify the correct answers to at least six out of the seven questions asked. Moreover, results from Table 1 indicate that 86% of participants have at least one outstanding loan, 30% pay late fees at least once a year, and 73% of respondents report watching financial news at least once a month. Further, 88.57% of participants do not work or own a business in the financial sector; a fact suggesting that higher knowledge score may not necessarily be explained by specific work experience.

Compared with previous studies, the financial knowledge of participants in this survey is significantly higher. For instance, Volpe, Chen, and Pavlicko (1996) and Volpe and Chen (1998) survey college students and report mean percentage of correct answers of 44% and 52.87%, respectively. While surveying high school students, Mandell (1997) finds that the average correct answer is 57%. More recently, Volpe, Chen, and Liu (2006) examine 12 academic and professional studies¹⁰ on financial literacy. These studies report average correct answers varying between low 40's and high 50's. In light of the relatively high level of financial knowledge exhibited by the respondents to our sample, we ask the following question: is financial knowledge associated with adequate financial planning? The next section addresses households' financial planning.

4.2. Financial planning

Questions 3, 4, 5, 6, 7, 8, 9, 12, 18 and 21 address financial practices. Following Remund's (2010) conceptual and operational definitions of financial literacy, we evaluate households' long-term financial choices in terms of budgeting, saving, and investing.

Table 2 Mean and median percentages of correct answers: knowledge questions

	Level of personal finance knowledge						
	Low	Medium	High				
Panel A: mean percentage of correct answers	Below 60%	60–80%	Over 80%				
Question 10 Interest compounding		78.00%					
Question 11* Interest rate movements and financial decisions		65.43%					
Question 13 Assets liquidity†	53.71%						
Question 15 Obtaining lowest interest rate in the market			83.71%				
Question 17‡ Risk-return trade-off and age			80.57%				
Question 19 Diversification			87.14%				
Question 23 Interest-inflation relation		77.14%					
Mean score: all knowledge questions		75.10%					
Median score: all knowledge questions			85.71%				
Panel B: correlation and survey validity							
	Question 10	Question 11*	Question 13	Question 15	Question 17‡	Question 19	Question 23
Question 10	1						
Question 11*	0.6581	1					
Question 13	0.2510	0.2054	1				
Question 15	0.6437	0.5254	0.2376	1			
Question 17‡	0.6283	0.5389	0.2658	0.7613	1		
Question 19	0.2493	0.3310	0.1118	0.5241	0.3507	1	
Question 23	0.3187	0.4341	0.2840	0.3127	0.3690	0.1771	1
Cronbach α		0.894					

Notes: Questions 10, 11, 13, 15, 17, 19, and 23 address financial knowledge. Consistent with existing literature (Danes and Hira, 1987; Volpe, Chen, and Pavilcko, 1996; Volpe and Chen, 1998), for each question, we calculate the mean percentage of correct answers. We also calculate the mean and median percentage of correct answers for the entire section that is, all knowledge questions. Scores are grouped into three levels. The table also shows the correlation between scores of all questions as well as Cronbach's α of the section. Cronbach's α is a statistical measure of internal consistency. It is commonly calculated in survey studies to gauge the reliability of psychometric measurements (measurements of knowledge, abilities, attitudes, personality traits, education, and so forth). Alpha is the ratio of two variances and varies between zero and one. Higher values of α reflect more internal consistency with 0.7 is typically used as an acceptable threshold (see, e.g., Chen and Volpe, 1998).

*This question intends to see if respondents are knowledgeable about interest rate movements and whether they know how to plan their loans and savings to take advantage of such expectations. For instance, if interest rates are currently low and expected to rise, as the question suggests, individuals should plan to save short term and at the same time borrow long term.

†If the respondent shows ability to rank assets correctly by their liquidity, he gets full score. If not, he gets half score for partially correct ranking and zero for completely wrong ranking.

‡Risk taking or aversion by individuals is not considered as it does not apply to this study. For instance, even if an elderly is risk seeking, it is not appropriate for him or her to invest in highly risky assets. The question is not whether it is appropriate but rather most appropriate.

As we mentioned earlier, two grading systems (strict and lenient) are used to grade respondents' answers to practice questions. In the strict grading system, the best choice is given full mark and all other choices are marked zero. Accordingly, a respondent receives a point for choosing the best answer, zero otherwise. While this system works well with knowledge questions (hence it is frequently used in the financial literacy literature) we find it unfair to grade practice questions as correct versus incorrect. Take for example Questions 3 and 4. Keeping a written plan is superior but keeping a nonwritten plan cannot be considered as bad as not having a plan at all. Another example is Question 6; being debt-free is definitely

Table 3 Financial planning questions and rationale for the grading system

		Number of respondents	Percentage	Earned score		Definition and scoring rationale
Question 3	Record of net worth?					
	a. Plan: written	150	42.86%	1.00	Good	Working on a written plan is good. Having a nonwritten plan is OK but not planning is bad.
	b. Plan: not written	105	30.00%	0.50	Mediocre	
	c. Do not know	29	8.29%	0.00	Bad	
	d. No	66	18.86%	0.00	Bad	
Question 4	Record of budget?					
	a. Plan: written	132	37.71%	1.00	Good	Same as question 3
	b. Plan: not written	146	41.71%	0.50	Mediocre	
	c. Do not know	24	6.86%	0.00	Bad	
	d. No	48	13.71%	0.00	Bad	
Question 5*	Projection of net worth and budget					
	a. Net worth only	50	14.29%	0.50	Mediocre	Projecting both net worth and budget is good. Projection of either one is considered OK but projecting neither one is bad.
	b. Budget only	69	19.71%	0.50	Mediocre	
	c. Both	84	24.00%	1.00	Good	
	d. None	147	42.00%	0.00	Bad	
Question 6†	Plan to be debt-free					
	a. Written plan	96	27.43%	0.50	Mediocre	Being debt-free indicates superior practice. Being in debt but working actively on it is OK but being in debt and not having a plan to be debt-free is bad.
	b. No plan to payoff debt	168	48.00%	0.00	Bad	
	c. Already debt-free	86	24.57%	1.00	Good	
Question 7	Emergency expense					
	a. Yes: severe financial risk	44	12.57%	0.00	Bad	No previous emergency expense indicates good planning. Being prepared to deal with emergency expenses is satisfactory. Experiencing an emergency expense that leads to severe financial risk indicates poor planning.
	b. Yes: well-prepared	83	23.71%	0.50	Mediocre	
	c. No	223	63.71%	1.00	Good	
Question 8	Regular deposits to saving or investment account					
	a. Regular	199	56.86%	1.00	Good	Making regular deposits to a saving and/or investment account is good. Not having one at all is bad but having one with irregular deposits is OK.
	b. No regular	101	28.86%	0.50	Mediocre	
	c. No	50	14.29%	0.00	Bad	
Question 9‡	Percentage goes to saving or investment account					
	a. <5%	62	17.71%	1.00	Good	Dedicating a certain percentage of household's income to saving and/or investment account is a good practice regardless of percentage amount (it depends on income). Not making any payments to saving and/or investment account is bad.
	b. 6–15%	127	36.29%	1.00	Good	
	c. 16–25%	77	22.00%	1.00	Good	
	d. >25%	32	9.14%	1.00	Good	
	e. Do not make any payments	52	14.86%	0.00	Bad	

Continued

Table 3 (Continued)

		Number of respondents	Percentage	Earned score		Definition and scoring rationale
Question 12	Match liquidity of saving with financial needs					
	a. Yes	151	43.14%	1.00	Good	Matching liquidity is a good practice.
	b. No	199	56.86%	0.00	Bad	
Question 18	Retirement plan					
	a. None	51	14.57%	0.00	Bad	Taking an active stance in managing retirement account is good. Not having a retirement plan is bad but having one is OK.
	b. Managed by a professional	67	19.14%	0.50	Mediocre	
	c. Through employer	133	38.00%	0.50	Mediocre	
	d. Self-managed	99	28.29%	1.00	Good	
Question 21	Credit score					Credit score implies
	a. Poor (under 600)	7	2.00%	0.00	Bad	creditworthiness that depends on financial performance. In the context of this article, we presume that maintaining a poor credit score is just as bad as not knowing what it is that is, both indicate poor financial practice.
	b. Fair (601–700)	30	8.57%	0.50	Mediocre	
	c. Good (above 700)	230	65.71%	1.00	Good	
	d. Do not know	83	23.71%	0.00	Bad	

Notes: Two grading systems (strict and lenient) are used to grade answers. In the strict grading system, a respondent earns full mark for choosing the best answer, and zero otherwise. In the lenient grading system, responses are graded ‘good’ (1), ‘mediocre’ (0.5), or ‘bad’ (0). We only show detailed results from the lenient grading system. The rightmost column explains the grading rationale. The results show that 27% of surveyed American households do not maintain a record of their net worth. About 20% live without a budget and 42% do not project either a net worth or a budget. Only 24.57% of surveyed households are debt-free and 27.43% are making serious efforts to pay off debt. About 50% are in debt with no clear plans to become debt free. Furthermore, 14.29% of surveyed households do not have savings and/or investment accounts and 14.57% do not have a retirement plan.

*The intention behind this question is to show how seriously respondents think about their financial future. The question is not meant to gauge how accurately respondents predict their net worth but rather to reflect any discipline or seriousness in planning for the future, and whether they are working towards an objective.

†Some individuals may plan to carry debt until death. Here, we should note that this decision may not be made as a first choice, but rather because of unfavorable financial situation. For instance, using a reverse mortgage, while a plausible solution for certain individuals, reflects poor financial planning at the early stage of one’s life.

‡While this question measures the percentage of respondents’ income saved (which is a function of income, size of family, and life style, among others) we focus on its occurrence not on its level. That is, we accord the value of 1 to all nonzero responses (% saved). A value of zero is given only when a respondent does not save at all.

a good thing but making conscious efforts to be debt-free is still better than not doing anything. Therefore, we also apply a lenient grading system where responses are graded “good” (full score), “mediocre” (half score), or “bad” (zero score). For clarity of presentation, we will only show detailed results from the lenient grading system. However, results from the strict grading system are also discussed when meaningful differences arise. Table 3 below shows the responses to each planning question as well as the rationale for the lenient grading system used.

The results show that about 27% of surveyed American households do not maintain a record of their net worth (whether written or not); a little more than 20% live without a

budget; and 42% do not project either a net worth or a budget. Moreover, 24.57% of surveyed households are debt-free, while 27.43% of them report making conscious efforts to become debt-free. On the other hand, almost half of surveyed households are in debt and do not have plans to pay it off. In addition, more than half of the respondents do not match the liquidity of their savings with their anticipated financial needs. Moreover, 14.29% of surveyed households do not have savings and/or investment accounts while 14.57% do not have a retirement plan. Furthermore, 12.57% of U.S. households have had an emergency expense that was not well prepared for, and which turned into a severe financial problem.

Similar to the knowledge test scores, the responses from each participant are used to calculate the mean for each question and for the entire planning section. The mean percentage of scores is grouped into: a relatively high level (more than 80%), a medium level (60% to 79%), and a relatively low level (less than 60%). The results are shown in Table 4 below.

The overall mean score is 59.77% (median is 60.00%). This relatively low score suggests a possible weakness in financial planning skills of surveyed households since almost 40% of financial decisions made by participants are not optimal. This result is unexpected given the relatively high level of financial knowledge exhibited by the households in our sample. The table also shows that personal financial planning is mediocre at best. For instance, respondents score 41.00% on Question 5 (projection of net worth and budget) and 38.29% on Question 6 (plan to be debt-free). Moreover, liquidity matching (Question 12) is also a concern as the mean score is below average (43.14%). The area of least concern seems to be saving or investment (mean score is 85.14%). However, when the strict grading system is applied, the mean score falls to below 48% (median is 40%).

4.3. Subgroup analysis: knowledge versus planning

One-way ANOVA is used to test the null hypothesis that there is no significant difference between the means of the subgroups. Table 5 below shows the mean percentage of knowledge and planning scores sorted by financial and nonfinancial characteristics of participants.

The results show that participants who never paid late payment fees (Question 16) score higher on planning test than those who make at least one late payment a year. Note that Tukey's test indicates that knowledge scores of all subgroups form a single homogenous subset. That is, the level of financial knowledge of those who pay late payment fees is not significantly different from those who do not. Moreover, results show that watching financial news (Question 20) improves the knowledge score but is not necessarily associated with higher planning score. This finding, however, should be interpreted with caution because Levene's test implies unequal variances among subgroups. In addition, results related to Question 22 show that those who regard themselves as more financially literate score higher in both practice and knowledge tests.

The findings also suggest that those who have a major or minor in finance or economics and those who took some finance or economics courses while in college (Question 24) score significantly higher on both planning and knowledge tests compared with households without such background. For instance, participants who have a major or minor in finance or economics scored 95% in the knowledge test (sample average is 75.1%) and scored 70% in the practice test (sample average is 59.77%). This lends support to Volpe and Chen (1998)

Table 4 Mean and median percentages of scores (financial planning questions)

	Quality of financial planning			Quality of financial planning						
	Lenient grading system			Strict grading system						
	Low	Medium	High	Low	Medium	High				
Panel A: mean percentage of correct Answers	Below 60%	60–80%	Over 80%	Below 60%	60–80%	Over 80%				
Q3 Record of net worth?	57.86%			42.86%						
Q4 Record of budget?	58.57%			37.71%						
Q5 Projection of net worth and budget	41.00%			24.00%						
Q6 Plan to be debt-free	38.29%			24.57%						
Q7 Emergency Expense		75.57%			63.71%					
Q8 Regular deposits to saving or investment account		71.29%		56.86%						
Q9 Percentage goes to saving or investment account			85.14%			85.14%				
Q12 Match liquidity of saving with financial needs	43.14%			43.14%						
Q18 Retirement Plan	56.86%			28.29%						
Q21 Credit Score			70.00%		65.71%					
Mean score: all planning questions	59.77%			47.20%						
Median score: all planning questions			60.00%	40.00%						
Panel B: correlation and survey validity test										
	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q12	Q18	Q21
Q3	1									
Q4	0.3205	1								
Q5	0.6359	0.6244	1							
Q6	0.0717	0.2113	0.2476	1						
Q7	0.1614	−0.0742	0.0419	0.1229	1					
Q8	0.2224	0.2872	0.2170	0.5409	0.0931	1				
Q9	0.2461	0.3014	0.1789	0.2630	0.0975	0.7848	1			
Q12	0.3318	0.3033	0.3363	0.5027	0.0552	0.5206	0.2990	1		
Q18	0.0840	0.1546	0.1276	0.5517	0.0596	0.5245	0.5413	0.3271	1	
Q21	0.3803	0.0531	0.0963	0.0112	0.1320	0.0334	0.0444	0.1833	0.0298	1
Cronbach α		0.751								
Correlation between practice score and knowledge score					0.242					

Notes: For each question, we calculate the mean score under the strict and the lenient grading systems (see Table 3 above). We also calculate the mean and median score for the entire section that is, all planning questions. Following extant literature, scores are grouped into three levels. The table also shows the correlation between scores of all questions and Cronbach's α of the section. Please refer to Table 2 for more details on Cronbach's α . The overall mean score is 59.77% and the median is 60.00%. When the strict grading system is applied, the mean score falls to below 48% and the median falls to 40%.

Table 5 Subgroup analysis

	Tested characteristic	Number Planning			Knowledge		
Survey Respondents*							
	One-way ANOVA test (<i>F</i> -statistic)	0.00			0.04		
	Homogeneity of variance (Levene statistic)	0.64			0.05		
	Robust test of equality of means (Welch statistic)	0.00			0.04		
	a. Online survey	237	59.75%		75.32%		
	b. Paper survey	113	59.82%		74.65%		
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	NA			NA		
Question 16							
	Late fees						
	One-way ANOVA test (<i>F</i> -statistic)	20.00	***		3.34	**	
	Homogeneity of variance (Levene statistic)	0.22			0.99		
	Robust test of equality of means (Welch statistic)	20.32	***		3.08	**	
	a. Never	246	65.12%		75.35%		
	b. Once a year	54	51.57%		82.67%		
	c. 2–5 times a year	44	42.61%		66.23%		
	d. 6–10 times a year	6	40.00%		61.90%		
	e. More than 10 times a year	0					
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	0.32	0.19		0.097		
Question 20							
	Follow financial news						
	One-way ANOVA test (<i>F</i> -statistic)	3.02	**		21.31	***	
	Homogeneity of variance (Levene statistic)	5.08			26.13		
	Robust test of equality of means (Welch statistic)	3.46	**		28.63	***	
	a. Every day	74	67.57%		92.66%		
	b. 2 days per week	55	59.09%	59.09%	85.19%	85.19%	
	c. Once per week	57	56.84%		77.57%		
	d. Once per month	70	58.29%	58.29%	65.20%		
	e. Rarely or never	94	56.91%		61.25%		
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	0.98	0.11		.89	0.4	0.42
Question 22							
	Self-assessment of financial knowledge						
	One-way ANOVA test (<i>F</i> -statistic)	14.55	***		7.15	***	
	Homogeneity of variance (Levene statistic)	.82			0.88		
	Robust test of equality of means (Welch statistic)	14.66	***		7.27	***	
	a. None	0					
	b. Unsatisfactory	31	47.42%		63.59%		
	c. Satisfactory	104	53.37%	53.37%	67.72%	67.72%	
	d. Good	147	61.19%		80.90%		
	e. Excellent	68	72.13%		79.10%		
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	0.4	0.17		1.00	0.83	0.09
Question 24							
	Finance or economic education						
	One-way ANOVA test (<i>F</i> -statistic)	2.73	**		6.28	***	
	Homogeneity of variance (Levene statistic)	1.47			0.12		

Continued

Table 5 (Continued)

	Tested characteristic	Number Planning		Knowledge	
	Robust test of equality of means (Welch statistic)	3.17	**	25.82	***
	a. Major or minor	31	70.00%		94.70%
	b. Some university courses	120	59.75%		73.27%
	c. Some training courses	33	64.00%	83.33%	
	d. Economic-related content	52	56.83%	75.14%	
	e. None	114	57.06%	69.30%	
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	0.549	0.121	0.071	0.217
Question 25	Current work				
	One-way ANOVA test (<i>F</i> -statistic)	9.44	***	1.97	*
	Homogeneity of variance (Levene statistic)	2.48		2.41	
	Robust test of equality of means (Welch statistic)	15.17	***	1.47	
	a. Employed in financial field	36	62.22%		78.17%
	b. Employed in nonfinancial field	231	59.83%	77.49%	
	c. Own business in financial field	4	71.25%	71.43%	
	d. Own business in nonfinancial field	27	60.37%	70.90%	
	e. Student*	28	63.57%	66.33%	
	f. Unemployed	12	19.17%	55.95%	
	g. Retired	12	77.92%	70.24%	
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	1.00	0.28	0.365	
Question 26	Age				
	One-way ANOVA test (<i>F</i> -statistic)	0.76		10.96	***
	Homogeneity of variance (Levene statistic)	3.70	***	17.38	***
	Robust test of equality of means (Welch statistic)	0.74		8.14	***
	a. 18–23	13	60.00%	39.45%	
	b. 24–29	44	55.11%	61.53%	
	c. 30–39	50	56.80%	62.00%	62.00%
	d. 40–49	120	60.92%		80.04%
	e. 50–59	111	61.58%		84.04%
	f. 60 or older	12	60.83%		83.81%
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	0.896		0.482	0.09 0.697
Question 27	Gender				
	One-way ANOVA test (<i>F</i> -statistic)	0.00		1.05	
	Homogeneity of variance (Levene statistic)	0.78		0.08	
	Robust test of equality of means (Welch statistic)	0.00		1.05	
	a. Male	182	59.78%	76.57%	
	b. Female	168	59.76%	73.51%	
	Homogenous subsets (<i>p</i> -value of Tukey HSD)	NA		NA	
Question 29	Race ethnicity				
	One-way ANOVA test (<i>F</i> -statistic)	1.16		0.97	
	Homogeneity of variance (Levene statistic)	3.97	***	2.50	**

Continued

Table 5 (Continued)

	Tested characteristic	Number Planning		Knowledge		
Question 30	Robust test of equality of means (Welch statistic)					
	a. White/Caucasian	310	59.10%		75.65%	
	b. African-American	0				
	c. Hispanic	4	52.50%		64.29%	64.29%
	d. American Indian	14	70.36%			85.20%
	e. Asian	2	60.00%		21.43%	
	f. Other	20	64.25%			67.14%
	Homogenous subsets (<i>p</i> -value of Tukey HSD)		0.66		0.067	0.701
	Education level					
	One-way ANOVA test (<i>F</i> -statistic)		1.35		4.23	***
	Homogeneity of variance (Levene statistic)		6.29	***	1.19	
	Robust test of equality of means (Welch statistic)		0.84		7.23	***
	a. Less than high school	0				
	b. High school	35		65.86%	61.63%	
c. Some college	47	48.09%			72.80%	
d. Associates	25	60.20%	60.20%		86.86%	
e. Bachelor	113	59.87%	59.87%		79.14%	
f. Masters	80		63.50%		69.64%	
g. Doctorate	50	60.10%	60.10%	80.43%		
Homogenous subsets (<i>p</i> -value of Tukey HSD)		0.093	0.785	0.368	0.408	0.136
Question 31	Income					
	One-way ANOVA test (<i>F</i> -statistic)		4.81	***	5.03	***
	Homogeneity of variance (Levene statistic)		3.06	***	2.51	**
	Robust test of equality of means (Welch statistic)					
	a. No income	4	50.00%		78.57%	78.57%
	b. Under \$10,000	2		100.00%		100.00%
	c. \$10,000–\$29,999	35	52.29%		56.73%	
	d. \$30,000–\$49,999	38	55.53%		70.30%	70.30%
	e. \$50,000–\$69,999	49	58.47%		65.89%	65.89%
	f. \$70,000–\$89,999	46	62.07%		78.57%	78.57%
	g. \$90,000–\$109,999	49	50.51%		79.01%	79.01%
	h. More than \$110,000	127	66.02%		81.89%	81.89%
	Homogenous subsets (<i>p</i> -value of Tukey HSD)		0.76	1	0.479	0.12

Notes: ANOVA test is used to identify subgroups that score differently on knowledge and planning tests. Subgroups that are significantly different are shown in separate columns. Each column represents a homogenous subgroup. Homogeneity of variances is tested with Levene’s test. High Levene’s statistic indicates that there is a difference between the variances of subgroups that sheds doubt on ANOVAs results. To overcome this potential problem, we use Welch’s test for the equality of the means. Both ANOVA and Welch can reject the equality of all means even if only one mean is found to be significantly different. Thus, we also apply a Tukey’s HSD test which compares all possible pairs of means. We only show the homogenous subsets in different columns and the *p*-value of the Tukey’s statistic under each column. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively.

*This is a comparison between knowledge and planning scores of online versus paper responses. The statistics indicate no significant differences between the two groups in terms of planning and knowledge scores.

and Volpe, Chen, and Pavlicko (1996) who find that business majors are more financially knowledgeable than nonbusiness majors. Interestingly, the average score of those who took

some training courses and those who took courses with economic-related content are placed in the same homogenous subset with those who never took any course in finance.

While participants in our sample who work in the financial field outscore all others in the knowledge test (Question 25), they do not perform any better in the financial planning test. This finding implies that those who work in the financial field benefit in terms of having more knowledge but not in terms of acquiring better financial practical skills. This may suggest that high level of knowledge may not necessarily be associated with better financial practice. This argument is further supported by results related to Question 26. The findings show that while older people are more financially literate they do not necessarily make better financial decisions. Ignoring the first and the last subgroups (because of too few cases), Tukey's test places subgroups of older people in homogenous subsets that exhibit significantly higher knowledge scores. At the same time, average planning scores for all age subgroups are not significantly different.

Questions 27 and 29 indicate that gender and ethnicity do not affect knowledge or planning scores. This is inconsistent with several previous studies. For instance, Chen and Volpe (2002), Lusardi and Mitchell (2008), and Wagland and Taylor (2009) show that females, African Americans, and Hispanics have lower levels of financial literacy than their male and White counterparts. Our findings, however, may not be reliable for two reasons. First, 310 out of 350 individuals polled in this survey are White/Caucasian and the number of cases in all other subgroups are too few to make meaningful comparisons. Second, Levene's test is statistically significant meaning that we should reject the null hypothesis of variance equality; a necessary assumption for ANOVA and Tukey's tests.

Question 30 shows that higher academic degrees, except doctorate,¹¹ are associated with higher financial knowledge scores. Specifically, Associates, Bachelor, and Master's degree holders score higher than those who did not finish college. This is not surprising and is consistent with Monticone (2010) who finds that higher education is associated with better financial literacy because acquiring more financial knowledge seems to be less costly for the highly educated compared with the less educated population. Worthington (2006) also shows that financial literacy in Australia is higher for university graduates.

Finally, Question 31 addresses how financial literacy is related to the level of income. We find the Levene's statistic to be significant for both practice and knowledge tests. This undermines the validity of ANOVA and Tukey's tests. The Welch statistic, however, is insignificant implying no difference between the means of subgroups. That is, the level of financial knowledge and planning does not vary across the income spectrum. This result is contradictory to findings in other related studies. For instance, Bernheim (1998) and Peress (2004) suggest that wealth can be a reason for becoming more financially literate. Moreover, Monticone (2010) finds that wealth has a small, but positive correlation with financial literacy. Specifically, he finds that wealthy households are more likely to invest in financial knowledge and become financially literate.

4.4. Logistic regression analysis

In addition to ANOVA, we also subject the data to alternative logit regression models to examine the impact of financial and nonfinancial variables on the financial literacy measures

of respondents. We run Models (1) and (2) in two different forms, with and without the dichotomous variables PLAN and KNOW. Results of the logistic regressions are shown in Table 6.¹²

T6

The explanatory power of the alternative models is tested in two ways. First, the models exhibit high rates of correct predictions, in that, they correctly classify observations about 82% of the time for model 1 and more than 71% of the time for Model 2. This implies an adequate overall fit of the models. Second, the likelihood ratio test statistics (above 203 for Model 1 and 132 for Model 2) are significant at the 95% level of significance, suggesting that we reject the null hypothesis that all slope coefficients equal zero. In addition, we run the Variance Inflation Factor (VIF) test and conclude that multicollinearity is not of serious concern in the model. In fact, as shown on Table 6 above, all the 29 independent dichotomous variables have a VIF below the commonly used threshold of 10.¹³

The results show that the coefficient on KNOW and PLAN, δ , is statistically insignificant in both Models (1) and (2) implying no meaningful association between knowledge and financial planning. A participant who makes better financial plans is not more likely to be financially knowledgeable and vice versa.

Consistent with our previous findings from the subgroup analysis, paying late payment fees on outstanding debt implies worse planning but not less knowledge. Specifically, participants who pay late payment fees are less likely to make better financial planning decisions than those who do not. At the same time, they are as likely to be knowledgeable as those who do not pay late fees. In addition, results show that watching financial news is associated with higher level of knowledge but not better financial planning. That is, participants who watch financial news are more likely to be more knowledgeable than those who do not. At the same time, they are as good in making financial decisions as those who do not watch financial news. Also consistent with subgroup analysis, gender and ethnicity do not significantly impact knowledge or planning.¹⁴

Higher income seems to be a determinate of knowledge, but not planning. All income coefficients in Model 2 are positive and statistically significant which implies that participants endowed with higher income are more likely to be financially knowledgeable compared with those who make less than \$29,000 per year. The dP/dX ratios are consistently increasing in higher income brackets.¹⁵ This is consistent with Bernheim (1998), Peress (2004), and Monticone (2010) who show that wealth and financial literacy are positively correlated.

Furthermore, the results show that participants who have a major or minor in finance or economics are more likely to be financially knowledgeable and better financial planners than participants who never had any sort of finance or economics training. This finding is based on the positive and statistically significant coefficient on the variable FEE-1. In addition, taking courses in finance or economics (variable FEE-2), taking some training courses (variable FEE-3) or taking courses with economic-related content (variable FEE-4) is not likely to make one more knowledgeable or better financial planner.

Contrary to results from the subgroup analysis, we found that working in the financial sector does not have any impact on knowledge. Surprisingly, working in the nonfinancial sector increases the likelihood of being more financially knowledgeable. The results also

Table 6 Logistic regressions

	Model (1)				Model (2)				VIF
	Dependent variable: KNOW				Dependent variable: PLAN				
	Coefficient	dP/dX	Coefficient	dP/dX	Coefficient	dP/dX	Coefficient	dP/dX	
C	-9.25***	-1.19	-8.88***	-1.14	2.01**	0.33	1.68*	0.28	
PLAN	0.46	0.06	—	—	—	—	—	—	
KNOW	—	—	—	—	0.60	0.10	—	—	
LOAN	-0.28	-0.04	-0.37	-0.05	-1.94***	-0.32	-1.98***	-0.33	1.58
LATE	0.31	0.04	0.16	0.02	-2.05***	-0.34	-1.99***	-0.33	1.32
NEWS	2.83***	0.36	2.82***	0.36	0.28	0.05	0.53	0.09	1.53
SELS	1.89**	0.24	1.91**	0.25	-0.83	-0.14	-0.62	-0.10	4.29
SELFG	2.40***	0.31	2.50***	0.32	-0.04	-0.01	0.14	0.02	4.73
SELFE	0.77	0.10	1.03	0.13	0.58	0.10	0.69	0.12	4.09
INC4	1.52***	0.22	1.59***	0.23	0.42	0.07	0.59	0.10	2.30
INC5	1.76*	0.23	1.84*	0.24	0.74	0.12	0.89	0.15	2.97
INC6	2.63***	0.34	2.67***	0.34	0.66	0.11	0.84	0.14	2.84
INC7	2.97***	0.38	2.97***	0.38	0.01	0.00	0.15	0.03	3.06
INC8	3.53***	0.45	3.55***	0.46	0.94	0.16	1.19*	0.20	5.69
FEE1	4.58***	0.59	4.62***	0.60	2.09***	0.35	1.89***	0.32	2.18
FEE2	0.67	0.09	0.68	0.09	-0.65	-0.11	-0.64	-0.11	2.19
FEE3	0.12	0.02	0.21	0.03	-0.09	-0.01	0.13	0.02	1.54
FEE4	0.32	0.04	0.32	0.04	-0.24	-0.04	-0.25	-0.04	1.72
JOBEB	0.23	0.03	0.14	0.02	-0.87	-0.15	-0.88	-0.15	2.67
JOBEN	1.38**	0.18	1.32*	0.17	-0.09	-0.02	-0.04	-0.01	3.61
JOBFB	—	—	—	—	-0.44	-0.07	-0.50	-0.08	1.48
JOBON	-0.69	-0.09	-0.78	-0.10	-0.41	-0.07	-0.43	-0.07	2.19
AGE3	0.40**	0.05	0.29*	0.04	0.58	0.10	0.55	0.09	2.26
AGE4	0.92**	0.12	0.98***	0.13	0.44	0.07	0.53	0.09	3.20
AGE5	1.53**	0.20	1.60***	0.21	0.72	0.12	0.83	0.14	3.02
AGE6	2.28**	0.29	2.33**	0.30	1.02	0.17	1.28	0.21	1.47
GENDER	-0.42	-0.05	-0.43	-0.06	-0.62	-0.10	-0.59	-0.10	1.53
ETHWC	1.01	0.13	0.89	0.11	-1.16**	-0.19	-1.13**	-0.19	1.69
EDUAS	2.11***	0.27	2.08**	0.27	-0.39	-0.06	-0.16	-0.03	1.56
EDUBS	0.08	0.01	0.00	0.00	0.69	0.11	0.72	0.12	2.54
EDUMS	-0.10	-0.01	-0.17	-0.02	0.49	0.08	0.49	0.08	2.13
EDUDR	1.34	0.17	1.29	0.17	-0.40	-0.07	-0.37	-0.06	2.58
R ²	0.4957		0.4907		0.3389		0.3346		
Scaled R ²	0.5326		0.5292		0.3635		0.3563		
LR (zero slopes)	204.5***		203.1***		134.9***		132***		
Log Likelihood	-138.7		-139.4		-174.2		-175.6		
Correct Prediction	82.00%		82.00%		71.71%		73.14%		

Notes: We run the following two logistic regression models to examine the association between a set of explanatory variables and the financial literacy measures of respondents. The two models are as follows:

$$\text{Log} \left[\frac{p_k}{1 - p_k} \right] = C + \delta(\text{PLAN}) + X_i' \beta \quad (1)$$

$$\text{Log} \left[\frac{p_p}{1 - p_p} \right] = C + \delta(\text{KNOW}) + X_i' \beta \quad (2)$$

The cumulative distribution function for the logit response model is nonlinear in probabilities. Therefore, the magnitudes of the coefficients are not comparable but their signs are informative. A positive sign implies increased probability. Therefore, p_k in the first regression model tests whether being a better financial planner implies being more knowledgeable. In the second regression equation, p_p tests if more knowledge implies better financial planning. Further, marginal effects show the impact of a variation in one independent variable while keeping all other variables at their mean levels. ***, **, and * represent statistical significance at 1%, 5%, and 10% respectively. In untabulated results, we run the four models with an additional dichotomous variable that controls for the differences between online survey respondents and paper survey respondents. The coefficient of this dummy was found statistically insignificant (p -value is above 0.5 in all four regressions) indicating no meaningful differences between the two groups. Moreover, all the Variance Inflation Factor, VIF, values are below the commonly used critical level of 10 indicating no serious multicollinearity problem in the model.

JOBFB was eliminated from Model (1) because it perfectly predicted KNOW.

show that there is no association between the type of work (whether in the financial sector or not) and financial planning.

Consistent with the subgroup analysis, the coefficient on the age variable is positive and statistically significant at the 1% level of significance. That is, participants in all age subgroups are found to be more knowledgeable than those in the reference group of “18–29.” The positive dP/dX ratios of the age variable further imply that financial knowledge gets better with age. In contrast, the findings show that age is not associated with better financial planning.

4.5. Discussion

To summarize, based on our sample, the findings suggest that an average U.S. citizen leaves the educational system with insufficient financial education;¹⁶ he or she learns more as they navigate through the financial world; but they do not necessarily become better financial planners. Subgroup analysis and logistic regression results support this view because we find that financial knowledge increases with age while financial planning and age are independent.

Why is it that knowledge acquired through normal activities does not associate well with planning? Two possible explanations are in order. First, it is possible that agents may become better equipped with personal finance skills or knowledge after it is too late. Some financial decisions are irreversible and have long-term consequences. For instance, consider someone buying a house that he could not afford. This decision may later lead to a series of bad financial choices. For example, he would save less and potentially would pay more late payment fees. As he ages, he becomes more aware of the mistake he had made but that does not mean that he can completely correct it. This explanation is similar to Roberts and Jones (2001) who show that debt at an early age could lead to bankruptcy later and low financial literacy levels compound this problem. A U.S.A. Today/National Endowment for Financial Education (NEFE, 2006) poll of young adults finds that increasing debt levels adversely affect financial decisions such as the decision to contribute to retirement savings and causes frequent concerns among nearly a third of young adults.

Second, it is also possible that swings in mindset, emotions, and other psychological factors prevent one from making the right decisions even when he or she is well aware of it. An individual may learn a lot about the financial world but he or she could still make bad choices. Greed, hastiness, envy, and laziness may encourage bad decisions. For instance, one may choose not to save for, say retirement, just because they desire to spend more in order to match the lifestyle of others. Similarly, one could make a bad choice just because they are too lazy to explore available options.

5. Summary and concluding remarks

In this article we poll financial decision makers in U.S. households and we investigate whether they are financially apt in the spirit of Remund (2010) definition. That is, we gauge financial literacy in terms of financial knowledge *and* the ability to apply the knowledge to

formulate adequate long-term financial plans. Further, we attempt to identify the type of financial knowledge that is critical in instituting effective financial planning. This inquiry is important in light of the recent financial crisis that caught many households by surprise. The findings of this research may enable us to discern whether households are ready for another possible economic downturn.

Data on financial literacy was collected between March and August of 2011 and resulted in 350 useable responses out of 515 received. We used ANOVA model as well as alternative logit regression models to examine the impact of financial and nonfinancial variables on the financial literacy measures of respondents.

The overall results of this article show that while surveyed households are financially knowledgeable, with a knowledge score of 75.1%, they tend to exhibit poor financial planning behavior, with a planning score of 59.77%. The findings also show that the correlation between knowledge and financial planning is low, albeit positive. Moreover, subgroup analysis indicates that financially knowledgeable people could make bad financial choices and those who score high in the planning test are not always the most knowledgeable ones. For instance, we find that those who frequently pay late payment fees have lower score in planning test but their knowledge score is surprisingly not significantly different from the score of those who never paid late payment fees. Similarly, those who watch financial news regularly score higher in the knowledge test, which is expected, but their planning score is not significantly different from those who do not. More interestingly, respondents who work in the financial sector and respondents who have higher academic degrees (regardless of specialty) know relatively more about finance but there is no convincing evidence that they make better financial planning decisions. Furthermore, logistic regression analysis shows that being financially knowledgeable is not associated with higher log odd ratio of being a better financial planner and vice versa.

In addition, the findings show that participants with academic finance or economics education tend to make better financial planning decisions. Surprisingly, however, workers in the financial field do not seem to be better financial planners than those who are employed in the nonfinancial sector. Both subgroup analysis and logistic regression analysis indicate that having a major or minor in finance or economics is associated with better knowledge and planning skills. Subgroup analysis, but not logistic regression, indicates that taking few finance or economics courses in college is associated with higher level of knowledge and ability to make better planning decisions. This is in line with Bernheim, Garret, and Maki (2001) finding that students who receive adequate financial education make better decisions in the future. This finding is important to policy makers because it indicates that the most effective way to raise the level of financial literacy is through emboldening financial education at early stages of life, mainly at the college level. Financial knowledge acquired over time may not be as effective because we find it to be weakly associated with better financial planning.

Other financial literacy findings are also important to note. First, about 15% of surveyed households do not have a retirement plan. Second, a significant proportion of U.S. households live either without savings (14%) or with illiquid savings (50%) and are, therefore, vulnerable to financial distress or bankruptcy. Third, out of each four polled respondents, three are in debt and only two have a plan to pay off their debt. Fourth, out of each five

surveyed households, one lives without any sort of budget; two do not record their net worth; and two do not project their financials. Finally, about 15% of surveyed U.S. households have been in real financial difficulty because of an unexpected emergency expense. The overall findings suggest that an important proportion of households in our study may not be ready for another possible economic downturn. Perhaps more importantly, 90% of respondents believe that their financial literacy is satisfactory or better implying that they may not respond to any initiative to tweak it.

It is also important to highlight the limitations of this study. First, the sample of respondents is geographically concentrated in the Midwest region, mainly White and highly educated. While it is still useful to examine the level of financial literacy of this group of people, results from this study may not be comparable with results of other studies who examined a more diverse group. Therefore, our results may not be generalized, and caution should be taken before any broad policy recommendations are made.

Appendix: the questionnaire

Dear respondent,

The recent financial crisis demonstrates the importance of improving financial literacy among U.S. households. We are conducting a research study to help improve our understanding of financial literacy in order to improve the effectiveness of financial education and support the decision-making process in America.

We need your help in filling out this brief survey. By contributing 10–15 min of your time, you will assist in helping develop a strategy to help our country prosper and avoid a crisis like the recent economic recession.

To aid in the accuracy of our results, please answer the questions from the standpoint of your entire household. If you do not understand or know a question, please choose “I do not know” rather than guessing. The survey is completely anonymous; your answers will not be associated with you in any way.

Thank you!

1. Are you currently a U.S. citizen or a permanent resident of the U.S.?
 - a) Yes
 - b) No
2. Are you one of the primary financial decision makers in your household?
 - a) Yes
 - b) No

Please answer each question by choosing only one answer, unless otherwise instructed. Answer as best and accurately as possible, from the standpoint of your entire household. Thank you for your participation!

3. Does your household keep a record of how much you own (assets) and owe (debts)?
 - a) Yes, I make a *physical* record (paper or computerized) at least once a year.
 - b) Yes, I make a *mental* record (not written) at least once a year.

- c) No, I do not know how to make it.
 - d) No, I do not make one although I know how.
4. Does your household keep a record of your household monthly income and expenses (this is called a household budget)?
- a) Yes, I make a physical document (paper or computerized) of monthly household budget.
 - b) Yes, I make a mental record (not written) of household budget.
 - c) No, I do not know how to make it.
 - d) No, I do not make one although I know how.
5. Do you also predict your future net worth and/or budget?
- a) I make a physical document (paper or computerized) of future net worth.
 - b) I make a physical document (paper or computerized) of future budget.
 - c) I make a physical document (paper or computerized) of BOTH future net worth and future budget.
 - d) No, I do not predict either one.
6. Have you prepared a definite plan to be debt-free at a specific point of time in the future?
- a) I have a written plan and am working on it.
 - b) I would like to be debt-free, but I have not established a plan.
 - c) I am debt-free right now (you do not have any outstanding loan of any kind).
7. Has your household ever had a large expense resulting from an emergency?
- a) Yes, and my household was at severe financial risk.
 - b) Yes, but I was well prepared for it.
 - c) No, I have never had a large expense resulting from an emergency.
8. Does your household make regular deposits to a saving and/or investment account?
- a) A specific amount of my income goes to a savings account and/or investment account.
 - b) I make deposits to a savings and/or investment account, but not on a regular basis.
 - c) I do not have either a savings or investment account.
9. On average, how much of your total annual income goes to a savings and/or investment account?
- a) Less than 5%.
 - b) 6% to 15%.
 - c) 16% to 25%.
 - d) More than 25%.
 - e) I do not make payments to a savings or investment account.
10. Bank A offers monthly compounding and Bank B offers yearly compounding. Both banks offer the same interest rate. In your opinion, which bank would you choose if you wanted a higher return?
- a) Bank A.
 - b) Bank B.
 - c) Both banks offer the same return.
 - d) I do not know.
11. If interest rates are currently low but are expected to rise, which one of the following is the most appropriate action?
- a) Use long-term loans and short-term savings.

- b) Use short-term loans and long-term savings.
 - c) Do nothing.
 - d) I do not know.
12. Do you attempt to match the liquidity of your savings with your expected financial needs?
- a) Yes.
 - b) No.
13. Some assets are easier to turn into cash (i.e., liquidate) than others. Rank the following financial assets from (1) most liquid to (4) least liquid. (type your answer in the blanks, do not use each rank more than once)
- a) Real estate.
 - b) Checking account.
 - c) Certificate of deposit (CD).
 - d) Investment account.
14. Which of the following statements describes your household's current borrowing behavior? (circle all that apply)
- a) I have at least one mortgage loan.
 - b) I have at least one car loan.
 - c) I have at least one educational loan.
 - d) I have at least one loan of other type (*not* including credit cards).
 - e) I do not have any loans.
15. You are likely to obtain the lowest interest on loans with _____. (circle one)
- a) Credit card companies.
 - b) Banks or credit unions.
 - c) Check-cashing firms¹⁷
 - d) I do not know.
16. How often do you pay "late fees" because you are late in making payment on an outstanding loan or bill?
- a) Never.
 - b) Once a year.
 - c) 1–5 times a year.
 - d) 6–10 times a year.
 - e) More than 10 times a year.
17. High-risk and high-return investments are most appropriate for: (circle one)
- a) A young single professional.
 - b) A young married couple without children.
 - c) A middle-aged couple saving.
 - d) An elderly couple living on fixed retirement income.
 - e) All of the above because everyone likes a high return.
 - f) I do not know.
18. Which one of the following best describes your retirement plan?
- a) I do not have one.
 - b) I do have a retirement plan that is actively controlled and managed by a professional financial advisor or company.

- c) I have a retirement plan through my employer.
 - d) I do have a retirement plan and it is strictly under my control.
19. Do you think buying stock in a single company is safer than buying stock in several different companies?
- a) Yes.
 - b) No.
20. As a general rule, I watch or read about financial news: (circle one)
- a) Every day.
 - b) A couple days per week.
 - c) Once per week.
 - d) Once per month.
 - e) Rarely or never.
21. What is your current credit score?
- a) Poor (under 600).
 - b) Fair (601–700).
 - c) Good (above 700).
 - d) I do not know my credit score.
22. How would you describe your household's knowledge and skills in managing personal finances?
- a) None.
 - b) Unsatisfactory.
 - c) Satisfactory.
 - d) Good.
 - e) Excellent.
23. If 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?
- a) More than today.
 - b) Exactly the same amount as today.
 - c) Less than today.
 - d) Do not know.
24. Which of the following best describes your education in finance or economics? (mark all that apply)
- a) I have a major or a minor in finance or economics.
 - b) I have taken some university courses in finance or economics.
 - c) I have taken some training (nonacademic) courses in finance or economics.
 - d) I have taken noneconomic courses that included some economic-related content (political science, legal studies, etc.).
 - e) I do not have any kind of previous education or training in finance or economics.
25. Which one of the following most accurately describes your current work?
- a) I am employed in a financial field (banking, finance, insurance).
 - b) I am employed in a nonfinancial field.
 - c) I own my own business within the financial field.
 - d) I own my own business *not* within a financial field.
 - e) I am a student.

- f) I am currently unemployed.
- g) I am retired.

Thanks!

Now please tell us a bit about yourself

26. What is your age?
 - a) 18–23.
 - b) 24–29.
 - c) 30–39.
 - d) 40–49.
 - e) 50–59.
 - f) 60 or older.
27. What is your gender?
 - a) Male.
 - b) Female.
28. Please type your zip code: _____
29. What is your race or ethnicity?
 - a) White/Caucasian.
 - b) African American.
 - c) Hispanic.
 - d) American Indian.
 - e) Asian.
 - f) Other.
30. Which best describes your current education level?
 - a) Less than high school.
 - b) High school diploma.
 - c) Some college.
 - d) Associates.
 - e) Bachelors.
 - f) Masters.
 - g) Doctorate.
31. Which of the following best describes your total annual household income?
 - a) No income.
 - b) Under \$10,000.
 - c) \$10,000–\$29,999.
 - d) \$30,000–\$49,999.
 - e) \$50,000–\$69,999.
 - f) \$70,000–\$89,999.
 - g) \$90,000–\$109,999.
 - h) More than \$110,000.

Notes

- 1 He examined more than 100 resources, mainly U.S. studies (incorporating other countries when appropriate) published from 2000 till the date of the start of his research.
- 2 More findings of the Rockefeller Foundation report are discussed in the literature review section.
- 3 This study was conducted during the summer of 2011. A recent article by Knoll and Houts (2012) on measuring financial knowledge supports the general validity of our instrument.
- 4 As recommended by few reviewers during the pilot survey stage, knowledge and planning questions are scrambled and are not placed under clearly titled sections.
- 5 96.29% of respondents in the sample are more than 24-years old; and 80.29% are in their 30's, 40's, and 50's. Further, 85.14% of respondents are either employees or business owners; and 76.57% have earned a college degree (see Table 1 for more sample descriptive).
- 6 None of the participants described his or her financial literacy as “none.” This subgroup is not considered.
- 7 There are only four cases in the “no income” group and only two cases in the “under \$10,000” group. We combined these two subgroups with the “\$10,000 to \$29,000” subgroup. Together, they form a reference group of less than \$29,000 in annual income.
- 8 There are too few observations in group “18–23” to be considered as a reference group. We combined it with “24–29” to form a meaningful reference group of “18–29.”
- 9 The LOGIT model assumes independence across observations. This is a plausible assumption given the fact that responses were collected from a random sample of unrelated households.
- 10 See Table 1 in Volpe, Chen, and Liu (2006).
- 11 According to the equality of means test (Welch Statistic), participants who have a doctoral degree are not placed in the same homogenous group with participants who have associate, bachelor, or master's degree. This could be a sampling error. It is also possible that this sub-group is dominated by *medical* doctors.
- 12 We run the regressions with scores graded according to the lenient grading system discussed earlier. When using the strict grading system, we find similar results in terms of sign and statistical significance of coefficients. In the interest of brevity, we only report results from the lenient grading system.
- 13 See, for instance, Menard (1995, p. 66), Neter et al. (1989, p. 409), Hair et al. (1995), Marquardt (1970), and Mason et al. (1989). Moreover, O'brien (2007) states that “Values of the VIF of 10, 20, 40, or even higher do not, by themselves, discount the results of regression analyses.”
- 14 The coefficient on ETHWC is negative and statistically significant in Model 2 but because participants in this sample are predominantly White/Caucasian, a meaningful comparison is not permissible.

- 15 Note that our findings from the subgroup analysis show no correlation between income and financial knowledge.
- 16 See in particular Volpe, Chen, and Pavlicko (1996), Volpe and Chen (1998), and Reed (2008) for similar arguments.
- 17 As pointed out by an anonymous reviewer, the term “payday lenders” should have been used instead of “check-cashing firms.” Fortunately, this error does not alter our results because it is a wrong answer anyway.

References

- AQ: 1 Anthes, W. L. (2004). Financial illiteracy in America: A perfect storm, a perfect opportunity. *Journal of Financial Service Professionals*, 58, 49–56.
- Bernheim, B. D., Garrett, D. M., and Maki, D. M. (2001). Education and saving: the long term effects of high school financial curriculum mandates. *Journal of Public Economics*, 80, 435–465.
- Bernheim, D. (1998). Financial illiteracy, education and retirement saving. In O. S. Mitchell & S. Schieber (Eds.), *Living with Defined Contribution Pensions* (pp. 38–68). Philadelphia: University of Pennsylvania Press.
- Browning, M., & Lusardi, A. (1996). Household saving: Micro theories and micro facts. *Journal of Economic Literature*, 34, 1797–1855.
- Calvert, L. E., Campbell, J. Y., & Sodini, P. (2007). Down or out: Assessing the welfare costs of household investment mistakes. *Journal of Political Economy*, 115, 707–747.
- Calvert, L. E., Campbell, J. Y., & Sodini P. (2009). Measuring the financial sophistication of households. *American Economic Review*, 99, 393–398.
- Campbell, J. (2006). Household finance. *Journal of Finance*, 61, 1553–1604.
- Chen, H., and Volpe, R. (2002). Gender differences in personal financial literacy among college students. *Financial Services Review*, 11, 289–308.
- Cole, S., Paulson, A., & Shastry, G. K. (2012). *Smart Money: The Effect of Education Financial Behavior*. Working Paper: Harvard Business School.
- Cude, B. J. (2010). Financial literacy 501. *Journal of Consumer Affairs*, 44, 271–275.
- AQ: 2 Danes, S. M., and Hira, T. K. (1987 Winter). Money management knowledge of college students. *The Journal of Student Financial Aid*, 17, 4–16.
- Gerardi, K., Goette, L., & Meier, S. (2010). Financial literacy and subprime mortgage delinquency: Evidence from a survey matched to administrative data. *Federal Reserve Bank of Atlanta: Working Paper Series*.
- Greenspan, A. (2005). The importance of financial education. *Social Education*, 69, 64–66.
- Grimes, P. W., Rogers, K. E., & Smith, R. (2010). High school economic education and access to financial services. *Journal of Consumer Affairs*, 44, 317–335.
- Hacker, J. S., Rehm, P., & Schlesinger, M. (2010). *Standing on Shaky Ground, American’s Experiences With Economic Insecurity*. New York: Rockefeller Foundation. (available at www.rockefellerfoundation.org/uploads/files/dea8c178-62d9-4b30-8c58-76b5e9033e04.pdf).
- Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate Data Analysis*, 3rd ed. New York, NY: Macmillan.
- Hilgert, M. A., Hogarth, J. M., & Beverly, S. G. (2003). Household financial management: The connection between knowledge and behavior. *Federal Reserve Bulletin*, 89, 309–322.
- AQ: 3 Hogarth, J., Anguelov, C. E., & Lee, J. (2005). Who has a bank account? Exploring changes over time, 1989–2001. *Journal of Family and Economic Issues*, 26, 7–30.
- Huston, S. J. (2010). Measuring financial literacy. *Journal of Consumer Affairs*, 44, 296–316.
- Jump\$tart Coalition for Personal Financial Literacy. (2011). (available at <http://www.jumpstartcoalition.org>).
- AQ: 5 Knoll, M. A., & Houts, C. R. (2012). The financial knowledge scale: An application of item response theory to the assessment of financial literacy. *The Journal of Consumer Affairs*, 46(3), 381–410.

- Koenig, L. (2007). Financial literacy curriculum: The effect on offender money management skills. *Journal of Correctional Education*, 58, 43–56.
- AQ: 6 Laibson, D. (1997). Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics*, 15(3), 443–477.
- Lusardi, A., & Tufano, A. (2009). Teach workers about the perils of debt. *Harvard Business Review*, 87, 22–24.
- Lusardi, A., & Mitchell, O. (2008). Planning and financial literacy: How do women fare? *American Economic Review*, 98, 413–417.
- Lusardi, A., & Mitchell, O. S. (2007a). Baby boomer retirement security: The role of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, 54, 205–224.
- Lusardi, A., & Mitchell, O. S. (2007b). Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business Economics*, 42, 35–44.
- AQ: 7 Lynch, J. G., Netemeyer, R. G., Spiller, S. A., & Zammit, A. (2012). A Generalizable Scale of Propensity to Plan: The Long and the Short of Planning for Time and for Money. *Journal of Consumer Research*, 37, 108–128.
- Mandell, L., & Klein, L. S. (2007). Motivation and financial literacy. *Financial Services Review*, 16, 105–116.
- Mandell, L. (1997). Personal finance survey of high school seniors. *Jumpstart Coalition for Personal Financial Literacy*. March/April, Washington, D.C.
- AQ: 8 Marquardt, D. W. (1970). Generalized inverses, ridge regression, biased linear estimation, and nonlinear estimation. *Technometrics*, 12, 591–612.
- Mason, R. L., Gunst, R. F., & Hess, J. L. (1989). *Statistical Design and Analysis of Experiments: Applications to Engineering and Science*. New York: Wiley.
- Meier, S., & Sprenger, C. D. (2012). Discounting financial literacy: Time preferences and participation in financial education programs. *Journal of Economic Behavior & Organization*. Available online 27 March 2012.
- Menard, S. (1995). *Applied Logistic Regression Analysis: Sage University Series on Quantitative Applications in the Social Sciences*. Thousand Oaks, CA: Sage.
- Monticone, C. (2010). How much does wealth matter in the acquisition of financial literacy? *Journal of Consumer Affairs*, 44, 403–422.
- Morton, J. S. (2005). The interdependence of economic and personal finance education. *Social Education*, 69, 66–70.
- Murray, D. (2000). How much do your kids know about credit? *Medical Economics*, 77, 58–66.
- National Endowment for Financial Education. (2006). *USA Today/ National Endowment for Financial Education 'Young Adults Finance Poll.'* (available at <http://www.nefe.org>).
- Neter, J., Wasserman, W., & Kutner, M. H. (1989). *Applied Linear Regression Models*. Homewood, IL: Irwin.
- O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, 41, 673–690.
- Peress, J. (2004). Wealth, information acquisition, and portfolio choice. *Review of Financial Studies*, 17, 879–914.
- Reed, M. (2008). *Student Debt and the Class of 2007. The Project on Student Debt.* (available at <http://projectonstudentdebt.org/files/pub/classof2007.pdf>).
- Remund, D. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of Consumer Affairs*, 44, 276–295.
- Roberts, J. A., & Jones, E. (2001). Money attitudes, credit card use, and compulsive buying among American college students. *The Journal of Consumer Affairs*, 35, 213–240.
- Sallie Mae. (2009). *How Undergraduate Students Use Credit Cards.* (available at <http://www.salliemae.com/NR/rdonlyres/0BD600F1-9377-46EA-AB1F-6061FC763246/10744/SLMCreditCardUsageStudy41309FINAL2.pdf>).
- AQ: 9 U.S. Census Bureau. (2001). 2010 Census. (available at www.census.gov).
- USA Today/National Endowment for Financial Education. (2006). *Young Adults' Finances Poll.* (available at [http://www.nefe.org/Portals/0/NEFE Files/USATodaySurvey.pdf](http://www.nefe.org/Portals/0/NEFE%20Files/USATodaySurvey.pdf)).
- Van Rooij, M., Lusardi, A., & Alessie, R. (2011a). Financial literacy and retirement planning in the Netherlands. *Journal of Economic Psychology*, 32, 593–608.

- Van Rooij, M., Lusardi, A., & Alessie, R. (2011b). Financial literacy and stock market participation. *Journal of Financial Economics*, *101*, 449–472.
- Volpe, R. P., & Chen, H. (1998). An analysis of personal financial literacy among college students. *Financial Services Review*, *7*, 107–128.
- Volpe, R. P., Chen, H., & Liu, S. (2006). An analysis of the importance of personal finance topics and the level of knowledge possessed by working adults. *Financial Services Review*, *15*, 81–99.
- Volpe, R. P., Chen, H., & Pavlicko, J. J. (1996, Fall/Winter). Personal investment literacy among college students: A survey. *Financial Practice and Education*, *6*, 86–94.
- Wagland, S. P., & Taylor, S. (2009). When it comes to financial literacy is gender really an issue? *The Australasian Accounting Business and Finance Journal*, *3*, 13–27.
- Walstad, W. B., Rebeck, K., & MacDonald, R. A. (2010). The effects of financial education on the financial knowledge of high school students. *Journal of Consumer Affairs*, *44*, 336–357.
- Worthington, A. (2006). Predicting financial literacy in Australia. *Financial Services Review*, *15*, 59–79.