


# Financial literacy: Do people know the ABCs of finance?

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## Abstract

Increasingly, individuals are in charge of their own financial security and are confronted with ever more complex financial instruments. However, there is evidence that many individuals are not well-equipped to make sound saving decisions. This article looks at financial literacy, which is defined as the ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions. Failure to plan for retirement, lack of participation in the stock market, and poor borrowing behavior can all be linked to ignorance of basic financial concepts. Financial literacy impacts financial decision making, with implications that apply to individuals, communities, countries, and society as a whole. Given the lack of financial literacy among the population, it may be important to remedy it by adding financial literacy to the school curriculum.

## Keywords

financial decision making, financial literacy, numeracy

## 1. Introduction

The aging of the population has put considerable strain onto public and employer-directed pension systems. As a result, recent decades have seen a rise in use of defined contribution (DC) savings programs, meaning that individuals have increasingly been put in charge of their own financial security following retirement. The shift to DC pensions and private retirement accounts has meant that workers today have to decide both how much they need to save for retirement and how to allocate their pension wealth. Moreover, individuals have to make these decisions in the context of much more complex financial markets and sophisticated financial products than in the past. Credit is also more accessible than ever before, and opportunities to borrow are plentiful. With instruments like credit cards or subprime mortgages, it is the individual who is in charge of deciding how much to borrow. And young people have to make very important decisions early in life, for example, whether to go to college and how to finance that education.

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This increase in individual responsibility has implications not just for individuals but also for society. For example, if a large number of individuals engage in the wrong mortgage or fail to save for retirement, what must governments do? Similarly, individuals are asked to make decisions not just about their own finances but also about public finances. In the past few years, many countries have asked their citizens to vote on economic reforms, which entails an understanding of how reducing expenses today (such as for individual saving) will translate into different opportunities in the future. Finally, we see a large increase in the student loan market and a rise in bankruptcy on these loans.

But are individuals well-equipped to make these types of decisions? In other words, do they possess the basic financial knowledge required for the many financial decisions they have now to make? As explained later, saving, borrowing, and portfolio decisions (among other financial decisions) require an understanding of concepts such as the power of interest compounding and the workings of risk diversifications. Are these concepts understood by the public?

In this article, I review the evidence on how much people know, based on responses to survey questions specifically designed to measure comprehension of the *ABCs*—the basics—of finance as well as more sophisticated financial concepts. I cover the evidence in the United States and in other countries around the world.

Findings are sobering: Most individuals in the United States and in other countries cannot perform simple calculations and do not understand basic financial concepts such as interest compounding, the difference between nominal and real values, and risk diversification. Knowledge of more complex concepts, such as the difference between bonds and stocks, the workings of mutual funds, and basic asset pricing, is even scarcer. Financial illiteracy is widespread among the general population and particularly acute among specific demographic groups, such as women, the young and the old, and those with low educational attainment. These findings are important because financial literacy affects behavior. Ignorance about basic financial concepts can be linked to lack of retirement planning, lack of participation in the stock market, and poor borrowing behavior; all of these behaviors can affect individual well-being and have spill-over effects as well, in case governments or other institutions have to intervene. I conclude with a brief discussion of the importance of incorporating financial literacy into school curricula as well as directions for future work.

## 2. Financial literacy

The academic approach to saving and investment decisions posits that individuals will consume less than their income in times of high earnings so as to support consumption when income falls (e.g. after retirement). In this framework, which builds on the work of Nobel prize winners Franco Modigliani and Milton Friedman, the consumer is expected to arrange his optimal saving and decumulation patterns to keep consumption smooth over his or her lifetime.<sup>1</sup> Theoretical models incorporating such key aspects of consumer behavior and the economic environment implicitly assume that people are able to formulate and execute saving and decumulation plans, all of which require expertise in dealing with financial markets, knowledge of purchasing power, and the capacity to undertake present value calculations. Moreover, saving decisions are inherently about the future, which is uncertain; thus, individuals have also to be able to deal with risk. And portfolio management requires knowledge of concepts such as risk diversification.

While much work has been done testing the predictions of this model and whether people actually do save in anticipation of the drop in income during retirement, a fundamental question is *Do people even possess the basic level of financial knowledge needed to make these decisions?*

Assessing whether people are financially literate is something that has only recently been undertaken. Up until 10 years ago, surveys provided details about assets, debt, and many other financial

variables but did not provide information about knowledge of finance and financial concepts. Over the past decade, I have worked with central banks, treasury departments, financial regulators, and other institutions around the world to collect information to gauge levels of financial literacy. Together with many collaborators, I have been able to show that three simple questions can be used to measure levels of financial knowledge as well as to differentiate among degrees of financial sophistication.

Four principles informed the design of these questions. The first was *Simplicity*: The questions measure knowledge of the building blocks fundamental to decision making in an intertemporal setting. The second was *Relevance*: The questions relate to concepts pertinent to peoples' day-to-day financial decisions over the life cycle. Moreover, they capture general rather than context-specific ideas. The third was *Brevity*: The number of questions had to be kept short to secure widespread adoption. The fourth was *Capacity to differentiate*: The questions have to differentiate financial knowledge to permit comparisons across respondents. These criteria led to the development of three financial literacy questions designed by Lusardi and Mitchell (2008, 2011a):

### 1. Numeracy/knowledge of interest compounding

Suppose you had US\$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: (more than US\$102, exactly US\$102, less than US\$102? Do not know (DK). Refuse to answer.)

### 2. Knowledge of inflation

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy: (more than, exactly the same as, or less than today with the money in this account? DK. Refuse to answer.)

### 3. Knowledge of risk diversification

Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund." (DK. Refuse to answer.)

The first two questions evaluate whether respondents display knowledge of fundamental economic concepts and competence with basic (financial) numeracy.<sup>2</sup> The third question evaluates respondents' knowledge of risk diversification, a crucial element of any informed investment decision.<sup>3</sup>

These questions were introduced in a special module on financial literacy in the 2004 Health and Retirement Study (HRS). They were subsequently added to other national surveys in the United States, such as the National Longitudinal Survey of Youth (NLSY), the American Life Panel (ALP), and the National Financial Capability Study (NFCS). Moreover, they were added to national surveys in as many as 11 other countries (Lusardi and Mitchell, 2011c, 2014). The inclusion of these types of questions in existing surveys allows researchers to evaluate levels of financial knowledge both domestically and internationally. Most importantly, it makes it possible to link financial literacy to a rich set of information about household financial behavior.

The 2004 HRS module covered respondents who are aged 50 years or older, with the average age being 65 years. Results from that survey module revealed an alarmingly low level of financial literacy among older individuals in the United States. One in five HRS respondents answered the first question (*numeracy/knowledge of interest compounding*) incorrectly, indicating that

**Table 1.** Financial literacy among respondents 50 and older.

Question type	Correct (%)	Incorrect (%)	Do not know (%)
Compound interest	67.1	22.2	9.4
Inflation	75.2	13.4	9.9
Stock risk	52.3	13.2	33.7

Source: 2004 Health and Retirement Study. Adapted from Lusardi and Mitchell (2011a). Percentages may not sum to 100 due to a few respondents who refused to answer the questions.

**Table 2.** Financial literacy among the US population.

Question type	Correct (%)	Incorrect (%)	Do not know (%)
Compound Interest	64.9	20.5	13.5
Inflation	64.3	20.2	14.2
Stock Risk	51.8	13.3	33.7

Source: 2009 National Financial Capability Study. Adapted from Lusardi and Mitchell (2011b). Percentages may not sum to 100 due to a few respondents who refused to answer the questions.

they could not do a simple 2% calculation. One in four answered the second question incorrectly, displaying lack of understanding of the effects of inflation (Table 1). Respondents had the most difficulty with the risk diversification question, and here, the pattern of response is different than the other two questions; the proportion of correct answers is the lowest of the three questions, and more than one-third of respondents stated that they did not know the answer to the question. Considering the questions together, only 56% of respondents in the sample were able to correctly answer the first two questions, and about one-third (34%) of respondents were able to answer all three questions correctly.

Findings do not change much when looking at more recent data from the 2009 NFCS, which surveyed a representative sample of the US population.<sup>4</sup> Summary statistics for responses to the NFCS questions appear in Table 2. Some 65% of respondents could correctly answer the question measuring numeracy/knowledge of interest compounding, and 20% got this question wrong. Only 64% of respondents correctly answered the question measuring knowledge of inflation. About 20% of respondents got this question wrong, and another 14% indicated they could not answer it. The third question, on risk diversification, appears to have given NFCS respondents the most difficulty, as was the case with HRS respondents. Only about half of this representative sample of the US population got it right, while around one-third could not answer the question. Moreover, only 46% were able to answer the first two questions correctly, while only 30% were able to answer all three questions correctly.<sup>5</sup>

Several other studies confirm these findings. Bernheim (1995, 1998) was one of the first to emphasize that most individuals lack basic financial knowledge and numeracy. The Organisation for Economic Co-Operation and Development (OECD) (2005) report and Smith and Stewart (2008) examine the evidence on financial literacy in the United States and other countries and report similar findings. Lusardi and Tufano (2009) report that the vast majority of respondents in a representative sample of US households have limited *debt literacy*. Lusardi and Mitchell (2014) offer an overview of the evidence in the United States and across countries and further document a lack of knowledge of basic financial concepts.

### 3. Advanced financial literacy

To make sound savings and investment decisions, individuals need knowledge beyond the previously discussed financial concepts. They need to understand the relationship between risk and return; how bonds, stocks, and mutual funds work; and basic asset pricing. To quantify how knowledgeable individuals are in these areas, I designed several additional questions for the ALP. Most of these questions had earlier been added to the Dutch De Nederlandsche Bank (DNB) Household Survey<sup>6</sup> and are similar to questions used in other US surveys. Because the risk diversification question was found hard to answer, it was included in the set of advanced financial literacy questions.

The exact wording of these additional questions is as follows:

#### 1. *Function of stock market*

Which of the following statements describes the main function of the stock market? (1) The stock market helps to predict stock earnings; (2) The stock market results in an increase in the price of stocks; (3) The stock market brings people who want to buy stocks together with those who want to sell stocks; (4) None of the above; (5) DK; (6) Refuse.

#### 2. *Knowledge of mutual funds*

Which of the following statements is correct? (1) Once one invests in a mutual fund, one cannot withdraw the money in the first year; (2) Mutual funds can invest in several assets, for example, invest in both stocks and bonds; (3) Mutual funds pay a guaranteed rate of return which depends on their past performance; (4) None of the above; (5) DK; (6) Refuse.

#### 3. *Relationship between interest rates and bond prices*

If the interest rate falls, what should happen to bond prices? (1) Rise; (2) Fall; (3) Stay the same; (4) None of the above; (5) DK; (6) Refuse.

#### 4. *Risk diversification: company stock or mutual fund?*

True or false? Buying a company stock usually provides a safer return than a stock mutual fund. (1) True; (2) False; (3) DK; (4) Refuse.

#### 5. *Riskier: stocks or bonds?*

True or false? Stocks are normally riskier than bonds. (1) True; (2) False; (3) DK; (4) Refuse.

#### 6. *Long period returns*

Considering a long time period (e.g. 10 or 20 years), which asset normally gives the highest return? (1) Savings accounts; (2) Bonds; (3) Stocks; (4) DK; (5) Refuse.

#### 7. *Highest fluctuations*

Normally, which asset displays the highest fluctuations over time? (1) Savings accounts; (2) Bonds; (3) Stocks; (4) DK; (5) Refuse.

**Table 3.** Advanced financial literacy.

Weighted percentages of total number of respondents (N = 989)

	Correct	Incorrect	Do not Know
1. Which statement describes the main function of the stock market? <sup>a</sup>	71.5	20.2	8.3
2. Function of mutual fund. <sup>a</sup>	63.0	13.6	23.3
3. If the interest rate falls/rises, what should happen to bond prices: rise/fall/stay the same/none of the above? <sup>b</sup>	31.6	43.8	24.5
4. Buying a company fund/stock mutual usually provides a safer return than a stock mutual fund/a company fund. True or false? <sup>b</sup>	71.4	4.0	24.5
5. Stocks/Bonds are normally riskier than bonds/stocks. True or false? <sup>b</sup>	80.2	5.4	14.4
6. Considering a long time period (e.g. 10 or 20 years), which asset normally gives the highest return: savings accounts, bonds, or stocks?	62.3	27.5	10.1
7. Normally, which asset displays the highest fluctuations over time: savings accounts, bonds, or stocks?	88.3	4.5	7.1
8. When an investor spreads his money among different assets, does the risk of losing money increase, decrease, or stay the same?	74.9	18.4	6.7

Source: American Life Panel. Adapted from Lusardi and Mitchell (2009).

Correct, incorrect, and do not know responses do not sum up to 100% because of refusals.

<sup>a</sup>See exact wording in the text.

<sup>b</sup>This question has been phrased in two different ways.

### 8. Risk diversification: spreading money among different assets

When an investor spreads his money among different assets, does the risk of losing money (1) Increase; (2) Decrease; (3) Stay the same; (4) DK; (5) Refuse.

As the wording of the questions reveals, these are advanced concepts; however, most individuals make portfolio or investment decisions that require mastering these concepts. Findings from the ALP are reported in Tables 3 and 4.<sup>7</sup> Table 3 shows that about three-quarters of respondents got most of the answers right, indicating they have some knowledge of how the stock market and risk diversification work. Respondents are also more likely to be knowledgeable about asset fluctuations than about patterns of asset returns. But only about one-third of the sample demonstrate knowledge of the relationship between bonds and interest rates, indicating lack of understanding of asset pricing. Moreover, while the large majority of respondents correctly answered several of the more advanced questions, only 16% were able to answer all of these questions correctly (Table 4). In other words, advanced knowledge is not widespread, even among a sample of highly educated respondents.<sup>8</sup>

Several other surveys covering the US population or specific sub-groups have also documented low levels of advanced financial knowledge across the age spectrum. For example, data from several surveys from the Jump\$tart Coalition for Personal Financial Literacy show that only a small percentage of high school students score above a passing grade on assessments designed to measure financial literacy. Low scores are not only pervasive among high school students but have changed little over time (Mandell, 2008). These findings are confirmed by the National Council on Economic Education (NCEE) (2005), which periodically surveys high school students and

**Table 4.** Advanced literacy: summary of responses.

Weighted percentages of total number of respondents (N = 989)

	Number of correct, incorrect, and do not know answers (out of 11 questions)									
	None	1	2	3	4	5	6	7	All	Mean
Correct	0.6	3.0	3.6	11.0	10.2	15.4	14.6	22.6	16.5	5.4
Incorrect	30.2	33.0	18.1	10.7	5.2	1.7	1.2	0.0	0.0	1.4
Do not know	50.0	18.5	12.3	9.1	6.1	2.0	0.4	1.2	0.4	1.2

Source: American Life Panel. Adapted from Lusardi and Mitchell (2009).

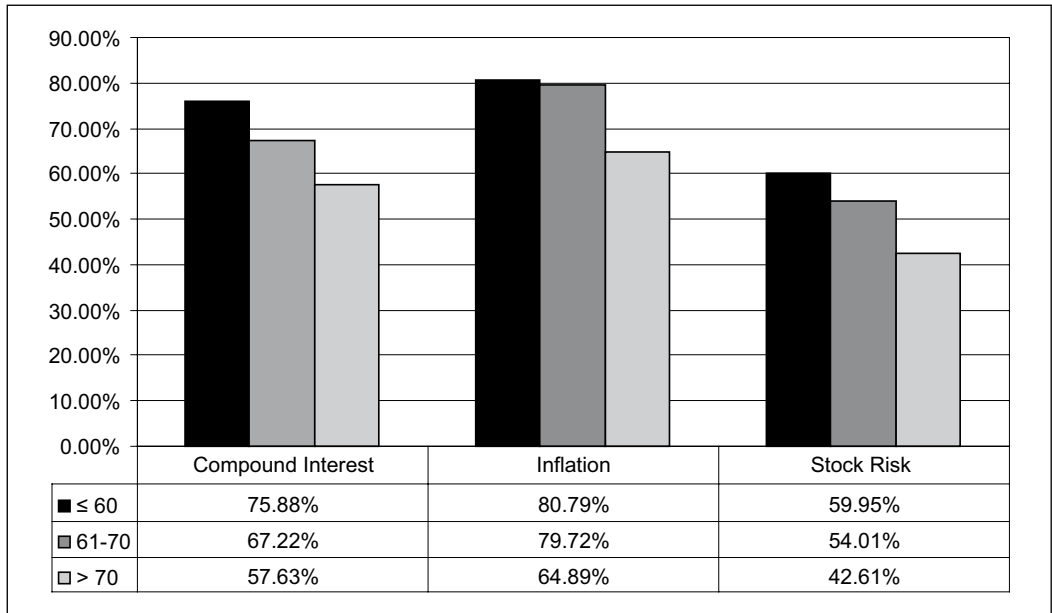
Categories do not sum up to 100% because of rounding.

working-age adults to measure financial and economic knowledge. The NCEE survey consists of a 24-item questionnaire on topics including “Economics and the Consumer,” “Money, Interest Rates, and Inflation,” and “Personal Finance.” Adult respondents got an average score of C on these questions, while the high school population fared even worse, with most earning an F. Hilgert et al. (2003) examine data from the 2001 Survey of Consumers, where some 1000 respondents (aged 18–98 years) were given a 28-question true/false financial literacy quiz covering knowledge of credit, saving patterns, mortgages, and general financial management. Again, most respondents earned a failing score on the quiz, documenting widespread illiteracy among the population. Similar findings are reported in smaller samples or among specific groups of the population (Agnew and Szykman, 2005). For example, Moore (2003) examines financial literacy in Washington State and reports low levels of financial knowledge in that state.

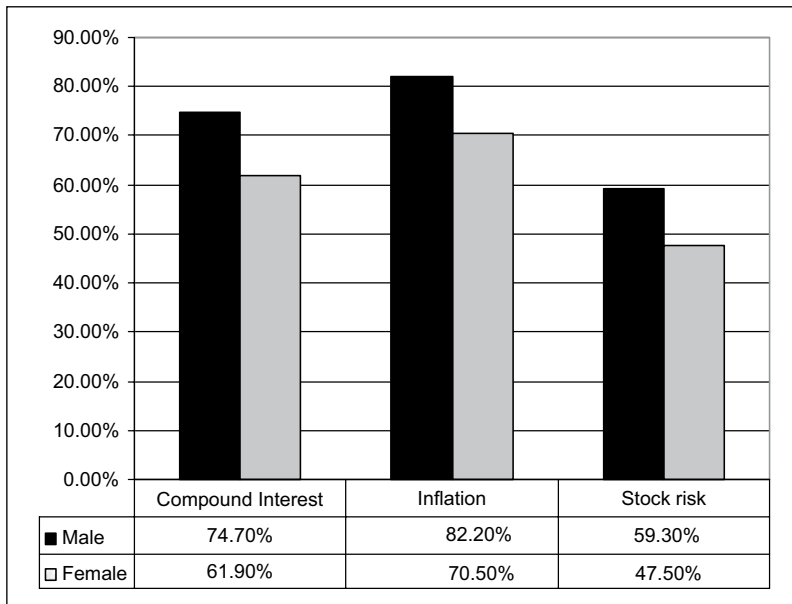
#### 4. Who is financially literate?

Financial illiteracy is not only widespread but is also particularly acute among specific demographic groups. For example, financial literacy, as measured by the three questions in the 2004 HRS module, declines strongly with age (Figure 1). While in a single cross-section it is not possible to distinguish between age and generation effects, financial literacy is very low at an advanced age. This is an important finding as individuals are required to make financial decisions until late in the life cycle and there is mounting concern about the prevalence of financial scams that prey upon the elderly. There are sharp sex differences in financial literacy, with women displaying lower levels of knowledge than men, particularly with regard to risk diversification (Figure 2). Lusardi and Mitchell (2008) examine this issue in more detail and warn about the difficulties women may face in making financial decisions, particularly after the death of a spouse. Lusardi and Mitchell (2011c) show that these gender differences hold across countries as well.

Financial literacy varies widely among education groups. Looking at data from the NFCS, I find that only half of respondents with less than a high school education correctly answer the question requiring a simple calculation of interest rates, and 25% state they do not know the answer. The large majority of those without a college degree do not know the answer or incorrectly answer the risk diversification question. There are major differences in financial literacy across racial groups, with African Americans and Hispanics displaying much lower levels of financial literacy than Whites. Approximately 60% of African Americans correctly answer the interest rate question; the proportion of correct answers is even smaller among Hispanics (Lusardi and Mitchell, 2011b).



**Figure 1.** Financial literacy by age. This figure reports the fraction of correct answers to the questions about interest compounding, inflation, and risk diversification by age.  
 Source: 2004 Health and Retirement Study.



**Figure 2.** Financial literacy by gender. This figure reports the fraction of correct answers to the questions about interest compounding, inflation, and risk diversification by sex.  
 Source: 2004 Health and Retirement Study.



These results are not specific to the age groups covered in the surveys mentioned above, but are common to the findings of many other financial literacy surveys.<sup>9</sup> Moreover, the patterns outlined above are already present among young respondents. For example, Lusardi et al. (2010) examine financial literacy among 23- to 28-year-old respondents and show that those who are financially literate are disproportionately White males from college-educated families. Mandell (2008) focuses on the small group of students defined as being financially literate (those who received a score of 75% or more on a financial literacy test) in the 2006 Jump\$tart Coalition survey. Note that this group represents a tiny fraction of the whole sample: only 7%. The financially literate students are overwhelmingly White, male, and the children of college graduates. Thus, the correlation between financial literacy and gender, race, and education is present at early stages of the life cycle.

## 5. Does financial literacy matter?

As mentioned earlier, one of the advantages of adding financial literacy questions to major US surveys is that researchers can assess whether literacy influences financial decision making. The module Olivia Mitchell and I designed for the 2004 HRS was about financial literacy and retirement planning. Several studies have shown that retirement planning is a powerful predictor of wealth accumulation (Lusardi, 1999, 2009; Lusardi and Mitchell, 2007, 2011a).

When examining the link between financial literacy and retirement planning in the 2004 HRS, Lusardi and Mitchell (2011a) report that those who are more financially knowledgeable are much more likely to have planned for retirement. In terms of economic importance, knowledge of risk diversification is the strongest predictor of planning. Financial literacy is not simply a proxy for low educational attainment, race, or gender. (As has been noted, women, minorities, and those with low levels of education are disproportionately less likely to be financially literate.) Even after accounting for many demographic characteristics, financial literacy continues to be an important determinant of planning.<sup>10</sup>

Similar findings hold true when looking at data from the 2009 NFCFS and a sample of the working population (aged 25–65 years). In that sample as well, financial literacy is an important determinant of retirement planning (Lusardi and Mitchell, 2011c). Moreover, when using data from the advanced financial literacy questions in the ALP, Lusardi and Mitchell (2009) found yet again a very strong link between financial literacy and retirement planning; thus, this relationship is robust to different measures of financial literacy, different time periods, and different sets of data.

One may argue that financial literacy and retirement planning are both decision variables and that the act of planning may enhance financial knowledge. In other words, those who want to plan for retirement may invest in acquiring financial literacy. To evaluate the relationship between literacy and planning, it is important to have information beyond individuals' current levels of financial literacy. Over the last several decades, several US states have mandated high school financial education (mostly due to political rationales rather than to stimulate retirement planning). Lusardi and Mitchell (2009) use that information to assess the direction of causality between financial literacy and planning and show that it is financial literacy that affects retirement planning and not the other way around.

Financial literacy can be linked to other financial decisions, too. Van Rooij et al. (2011) use the data from the advanced financial literacy questions that were added to the Dutch DNB Household Survey to show that financially sophisticated households are more likely to participate in the stock market.<sup>11</sup> Other studies have confirmed the positive association between financial knowledge and household financial decision making. Stango and Zinman (2009) show that those who are unable to correctly calculate interest rates out of a stream of payments end up borrowing more and accumulating lower amounts of wealth. Lusardi and Tufano (2009) find that those who severely underestimate the power of interest compounding are more likely to experience difficulties repaying

debt. Agarwal et al. (2009) show that financial mistakes are most prevalent among the young and the elderly—demographic groups that display the lowest levels of financial knowledge and cognitive ability. Hilgert et al. (2003) also document a positive link between financial knowledge and financial behavior. Campbell (2006) further demonstrates that many investors failed to refinance their mortgages during a period of falling interest rates. This finding is consistent with lack of literacy, as those who failed to refinance were disproportionately investors with low education. Moore (2003) also shows that borrowers who took out high-cost mortgages display little financial literacy. According to Gerardi et al. (2013), a lack of numerical ability was a strong predictor of mortgage defaults.

## 6. Discussion

Given the low levels of financial literacy documented in the article and the consequences of a lack of financial knowledge, it is useful to consider what the role of the government can be. As mentioned earlier, what if a large number of individuals engage in poor decisions when entering into a mortgage contract or fail to save for retirement? If taxpayers will be asked to pay for the mistakes of others, then the missteps of some individuals will impact the finances of others. In other words, there is an “externality” in having a financially illiterate population, and initiatives to increase the level of financial knowledge in the population might be more effective than incurring and paying for the societal costs of financial illiteracy. One such initiative is to add curricula designed to enhance financial literacy into schools so that people are financially literate before they engage in important personal finance decisions, including whether or not to invest in education. In the United States, the cost of college education has been increasing at a rate faster than inflation, requiring students and their families to start planning for college as soon as possible, to be savvy about financial aid, and to manage student loans effectively.

In order to reach the adult population, financial education has to go beyond schools. The workplace is an important venue. Several workplace financial education initiatives have been tested and suggestions made on how to make those initiatives most effective (Lusardi and Mitchell, 2014).

The findings reported in this article also show that communication is an important consideration when it comes to financial literacy. Both the financial industry and policy makers tend to use technical and financial jargon in their communication; the research reported herein shows that such communication may be ineffective in imparting information to large groups of the population who demonstrate low levels of financial literacy.

Scholarship addressing financial literacy is growing, but still nascent, and much more research is needed. Given the many differences in financial literacy across demographic groups, it may be important to focus on the most vulnerable groups and, for example, design programs targeted to those groups. Given the availability of data on financial literacy, it is also possible to better document the causes and consequences of financial illiteracy. That information, in turn, can help us enrich the framework we have been using to study financial decision making.

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## Notes

1. See Modigliani and Brumberg (1954) and Friedman (1957).
2. See, also, Lusardi (2012).

3. These questions were designed for developed countries. However, they have been used in other countries at different stages of economic development, for example, Russia and Romania. See Klapper and Panos (2011) and Beckmann (2013). See also the discussion of the comparison of findings across countries in Lusardi and Mitchell (2014).
4. For detail, see Lusardi and Mitchell (2011b).
5. See Lusardi and Mitchell (2011b).
6. See Van Rooij et al. (2011) for a detailed explanation and review of these questions.
7. Note that the average ALP respondent age is 45 years, some 60% of respondents are married, 48% are male, 29% have a high school education or less, about 45% have a college degree or higher, and 16% are fully retired. These sample characteristics are partly due to the fact that the survey is done online, and frequent Internet users are not necessarily a representative sample of the US population.
8. When levels of literacy are low, one may wonder whether respondents even understand the meaning of the questions they are asked. To investigate whether the wording of questions matters, two randomly chosen groups of ALP respondents were posed the same questions but with different wording. This was implemented for three questions. For the rather simple question about the risk differences between bonds and stocks, a first group was asked "Stock are normally riskier than bonds; true or false?" while a second group was asked "Bonds are normally riskier than stocks; true or false?" For a more difficult question about risk diversification, a first group was asked "Buying a company stock usually provides a safer return than a stock mutual fund; true or false?" while a second group was asked "Buying a stock mutual fund usually provides a safer return than a single company stock; true or false?" For the most difficult question about the link between bond prices and interest rates, a first group was asked "If the interest rate falls, what should happen to bond prices?" and a second group was asked "If the interest rate rises, what should happen to bond prices?" The wording of the question did not matter for the first two questions but it did matter for the third question, indicating a fair amount of guessing and measurement error in the responses to complex financial literacy questions. See Lusardi and Mitchell (2009) for details.
9. See Lusardi and Mitchell (2014) for a review.
10. See, also, Lusardi and Mitchell (2011a).
11. They address the issue of causality by using information on parents and siblings. See Van Rooij et al. (2011) for detail.

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