RESEARCH PAPER

Risk Literacy

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Abstract I examine financial literacy—specifically knowledge of risk—using data from surveys in the United States and other countries. I show that risk literacy is very low; the majority of individuals lack knowledge of concepts such as risk diversification and do not understand the relationship between risk and return. Findings are strikingly similar across countries; a third of survey respondents in most countries report that they do not know the answer to risk literacy questions. I also show that risk literacy matters for financial decisions; those who are more knowledgeable about risk are more likely to have precautionary savings and to plan for retirement. Given that individuals have much greater responsibility for their financial well-being before and after retirement than in the past, addressing lack of financial literacy, including risk literacy, may provide new ways to promote saving and financial security.

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1 Introduction

Shifting economic policies and changes in the pension and economic landscape have forced individuals around the world to assume greater responsibility for their own financial well-being. For example, consumer credit has become much more available than in the past and individuals have to deal with substantially changed terms for credit cards, mortgages, and other borrowing vehicles. Against a backdrop of increasingly complex financial instruments, individuals must determine how much to save for retirement and how to allocate that retirement wealth. The ability to meet this expanded responsibility not only has a critical impact on individuals' future financial security but carries important implications for the macro economy and the strength and stability of countries.

How prepared are individuals to take on this greater responsibility and to process the economic information needed to make informed decisions about their current and future finances? Over the past 10 years, I have worked with central banks, treasury departments, financial regulators, and other institutions around the world to collect information to gauge 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 across degrees of financial sophistication. More than 20 countries have added these three questions to their national surveys. Moreover, new surveys have been developed to measure knowledge of critically important financial concepts, such as risk and risk diversification. It is clearly important to focus on knowledge of risk because risk is a common feature of financial instruments and most decisions that deal with the future (which is inherently uncertain) contain elements of risk.[1]

Findings are sobering. Globally, only a very small percentage of individuals possess basic knowledge of the concepts that form the basis for financial decision making. This is as true in the United States and countries with well-developed financial markets as it is in developing countries (Lusardi and Mitchell 2014b). One finding stands out: in every country studied and in financial contexts, individuals display very low knowledge of risk. Strikingly, one-third of respondents state they do not know the answer to the questions that measure understanding of risk. This is important because risk literacy is an important component of financial literacy and financial illiteracy carries significant consequences. Financially knowledgeable individuals are more likely to save, to plan for future events, and to invest in the stock market; they are also less likely to engage in high-cost borrowing (Lusardi and Mitchell 2014b; Lusardi and Tufano 2009).[2] The sheer number of people who lost their home during the recent financial crisis is a painful reminder of how important financial decisions are for families and the economy. As I will discuss in more detail in this paper, knowledge of risk is a particularly powerful predictor of how competent individuals are with saving and planning decisions.

The paper is organized as follows: In Sects. 2 and 3, I review the questions used for measuring financial and risk literacy. In Sect. 4, I review the evidence for Italy. In

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[1] See the overview of our existing work on financial literacy in Lusardi and Mitchell (2014b).

[2] For other and more critical views of the importance of financial literacy, see Hastings et al. (2013) and Fernandes et al. (2014).

Sect. 5, I show the link between risk literacy and behavior and in Sect. 6, I discuss financial advice. In Sect. 7, I describe how we can improve risk literacy and provide concluding remarks in Sect. 8.

2 Measuring Financial and Risk Literacy

The traditional approach to saving and investment decisions posits that individuals will consume less than their income in times of high earnings to support consumption when income falls (e.g., after retirement or during spells of unemployment). In this context, building on Modigliani and Brumberg (1954) and Friedman (1957), the consumer is expected to arrange optimal saving and decumulation patterns to smooth marginal utility over the life-cycle. 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 complex calculations. Moreover, saving decisions are inherently about the future, which is uncertain; thus, individuals have to be able to deal with risk. And portfolio management requires knowledge of concepts such as risk diversification and the relationship between risk and return.

To demonstrate how individuals understand risk and other concepts in a financial context, I will first make use of the data from the U.S. National Financial Capability Study (NFCS), which incorporates the questions that were originally designed to measure financial literacy. Supported by the FINRA Investor Education Foundation, the survey was first conducted in 2009 to assess and establish a baseline measure of the financial capability of American adults.[3] With a sample size of more than 28,000, the overarching research objectives of the NFCS are to benchmark key indicators of Americans' financial capability and evaluate how these indicators vary with underlying demographic, behavioral, attitudinal, and financial literacy characteristics. As mentioned earlier, of particular relevance to this paper are the financial literacy questions that were included in this survey.[4]

Several fundamental concepts lie at the root of saving and investment decisions as modeled in a life-cycle setting. Three such concepts are (1) *numeracy and capacity to do calculations related to interest rates*; (2) *understanding of inflation*; and (3) *understanding of risk diversification*. Translating these into easily measured financial literacy metrics is difficult, but Lusardi and Mitchell (2008, 2011a) have designed a standard set of questions around these ideas and the questions have been incorporated into numerous surveys in the United States, including the NFCS. The exact wording of the questions is reported below (the correct answer is indicated in bold). Note that questions are multiple choice. Moreover and importantly, respondents are not forced to pick an answer; they have the option to reply that they do not know the answer or that they do not want to answer.

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[3] For a detailed analysis of the 2009 NFCS data, see Lusardi (2011).

[4] For an overview of these questions and an overview of the work on financial literacy, see the survey of Hastings et al. (2013) as well as Lusardi and Mitchell (2014b).

1. Understanding of Interest Rate (Numeracy)

Suppose you had $100 in a savings account and the interest rate was 2 % per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

>**More than $102**
>Exactly $102
>Less than $102
>Do not know
>Refuse to answer

2. Understanding of Inflation

Imagine that the interest rate on your savings account was 1 % per year and inflation was 2 % per year. After 1 year, how much would you be able to buy with the money in this account?

>More than today
>Exactly the same
>**Less than today**
>Do not know
>Refuse to answer

3. Understanding of Risk Diversification

Please tell me whether this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund."

>True
>**False**
>Do not know
>Refuse to answer

The first question measures numeracy, or the capacity to do a simple calculation related to compounding of interest rates. The second question measures understanding of inflation, again in the context of a simple financial decision. The third question evaluates knowledge of risk and risk diversification.[5]

Statistics summarizing the responses to these questions are shown in Table 1 (Panel I). About 78 % of respondents correctly answered the interest rate question. Ten percent got this question wrong and another 10 % responded that they do not know the answer. The inflation question elicited a lower proportion of correct answers: 65 % of respondents correctly answered this question, 14 % got this question wrong, and about 20 % selected the "do not know" option. The most important finding is that the pattern of answers changes when looking at the risk diversification question. Now the proportion of do not know answers jumps to more than one-third of respondents (40 %). In other words, this is the question that respondents had the most difficulty answering; only a little more than half (53 %) correctly answered the question and 6 % were incorrect, but the proportion of those who said they do not know the answer is not only high but much higher than for the other two questions.

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[5] The NFCS also asks questions related to bond pricing and mortgages; see Lusardi (2011) for detail. Since these questions are not included in the surveys conducted in other countries and do not relate to risk, I do not report them here.

Table 1 Financial literacy in the 2009 National Financial Capability Study (NFCS)

	Correct (%)	Incorrect (%)	DK (%)	RF (%)
Panel I: Responses in the online State by State survey				
A: Interest question	77.7	10.4	10.5	1.4
B: Inflation question	64.5	14.4	19.4	1.7
C: Risk question	53.4	5.9	39.7	1.1
Panel II: Responses in the telephone survey				
A: Interest question	64.9	20.5	13.5	1.0
B: Inflation question	64.3	20.2	14.2	1.4
C: Risk question	51.8	13.3	33.7	1.2

Number of observations: 28,146 (online survey); 1,488 (phone survey)
DK "do not know" responses, *RF* "refuse to answer"

In addition to an online survey, the NFCS also included a nationally projectable telephone survey of 1,488 American adults, making it possible to assess how answers vary across data collection methods. Panel II in Table 1 shows the findings from the telephone survey. Findings are very similar and, most important, the risk diversification question is again the one that elicited the lowest number of correct answers and the highest proportion of do not know responses. In this survey as well, the proportion of do not know answers is as high as one-third (33 %).

This response pattern is strikingly similar not only across surveys that use different data collection methods but also across respondent age groups and over time. In Table 2, I report the responses to the three financial literacy questions in the 2004 Health and Retirement Study (HRS) and the 2007–2008 National Longitudinal Survey of Youth (NLSY).[6] The HRS surveys an older population (50 and older) while the NLSY surveys a younger population (23–28 years old), making it possible to assess whether knowledge of risk differs across age/generations (see Lusardi and Mitchell 2011a; Lusardi et al. 2010, for detail). The two surveys also cover different time periods, making it possible to assess changes in risk knowledge over time. For example, do we see different survey results after the financial crisis, an event which may have heightened the perception of risk?

Table 2 shows the patterns of responses in the HRS and NLSY data. Findings are very similar to those in the NFCS; even among older individuals (HRS data), who are more likely to have experienced risk or invested in risky assets such as stocks and stock mutual funds, knowledge of risk is rather limited. Most importantly, as in the NFCS, one-third (34 %) of older (HRS) respondents state they do not know the answer to the risk question. The pattern of responses is strikingly similar among young (NLSY) respondents, with more than one-third (37 %) stating they do not know the answer to the risk question.

Table 3 shows responses to the same three financial literacy questions from surveys conducted in Canada, Germany, and the Netherlands, all of which have financial

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[6] Note the HRS was the first survey to add these financial literacy questions. They were added in a special module on financial literacy and retirement planning. For detail, see Lusardi and Mitchell (2011a).

Table 2 Financial literacy in the Health and Retirement Study (HRS) and in the National Longitudinal Survey of Youth (NLSY)

	Correct (%)	Incorrect (%)	DK (%)	RF (%)
Responses in the Health and Retirement Study				
A: Interest question	67.1	22.2	9.4	1.3
B: Inflation question	75.2	13.4	9.9	1.5
C: Risk question	52.3	13.2	33.7	0.9
Responses in the National Longitudinal Survey of Youth				
A: Interest question	79.3	14.7	5.9	–
B: Inflation question	54.0	30.4	15.4	–
C: Risk question	46.7	15.8	37.4	–

Number of observations: 1,269 (HRS); 7,417 (NLSY)
DK "do not know" responses, *RF* "refuse to answer"

Table 3 Responses to the three financial literacy questions in the Netherlands, Germany, and Canada

	Correct (%)	Incorrect (%)	DK (%)	RF (%)
A: Interest question				
The Netherlands	84.8	5.2	8.9	1.1
Germany	82.4	6.7	11[a]	–
Canada	77.9	13.2	8.8	–
B: Inflation question				
The Netherlands	76.9	8.4	13.5	1.2
Germany	78.4	4.7	17[a]	–
Canada	66.2	17.7	16.1	
C: Risk question				
The Netherlands	51.9	13.3	33.2	1.6
Germany	61.8	5.9	32.3[a]	–
Canada	59.3	9.4	31.3	–

Number of observations: Netherlands (1,665); Germany (1,059); Canada (6,805)
DK "do not know" responses, *RF* "refuse to answer"
[a] Includes "refuse to answer" responses

markets similar to those in the United States; the data are from the Canadian Securities Administrators (CSA) survey, the German SAVE, and the Dutch Central Bank survey.[7] Findings are again strikingly similar. In each country, the proportion of incorrect and do not know answers to the interest rate or inflation questions is rather low. By contrast, in each country, the proportion of do not know responses to the risk question is high, ranging from 31 to 33 %, a proportion much like that seen in the United States. A more detailed analysis of the financial literacy questions in these countries is reported in Bucher-Koenen and Lusardi (2011), Alessie et al. (2011), and Boisclair et al. (2014).

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[7] These questions have also been added to surveys in many other countries (sometimes with small modifications) but for brevity I report only three. For an analysis of the data in as many as 12 countries, see Lusardi and Mitchell (2014b).

3 Focusing on Risk Literacy

Because risk is such an important and fundamental concept, in 2009 Peter Tufano and I were able to engage TNS Global, an international data collection agency, to field the Global Economic Crisis survey across a set of countries. The survey was administered via an Internet panel fielded between June and September of 2009 to a total of 13,853 individuals in the United States as well as in a number of comparison countries. The country samples were designed to be nationally representative and were subsequently weighted to reflect each nation's population. In that survey, we designed three questions to measure risk literacy, as reported below (correct answers are in bold):

Q1. For the same amount of money, a person can enter either one of these two lotteries. Lottery A pays a prize of (US $200, GB £140, GER & FRA 150 Euros) and the chance of winning is 5 %. Lottery B pays a prize of (US $90,000, GB £60,000, GER & FRA 65,000 Euros) and the chance of winning is 0.01 %. In either case, if one does not win, one does not get any money. Which lottery pays the higher average amount?

(Please pick one option only)

1. **Lottery A**
2. Lottery B
3. These two lotteries pay the same average amount
4. I do not know
5. I refuse to answer

Q2. You can invest in two projects. Project A will either deliver a return of 10 or 6 %, with either outcome equally likely. Project B will either deliver a return of 12 or 4 %, with either outcome equally likely. Which of the following is true?

Compared to Project B, Project A has….

(Please pick one option only)

1. Higher return and lower risk
2. **Same average return and lower risk**
3. Lower return and higher risk
4. I do not know
5. I refuse to answer

Q3. As a general rule, if you were investing in stocks (GB change to: investing in stocks and shares), which of the two types of investments listed below is likely to be riskier?

(Please pick one option only)

1. **Investing in a single stock**
2. Investing in a fund that holds 100 different stocks
3. I don't know
4. I refuse to answer

Table 4 Responses to risk questions in five countries from the 2009 Global Economic Crisis Survey

	Correct (%)	Incorrect (%)	DK (%)	RF (%)
A: Lottery question				
Germany	41	26	23	10
United Kingdom	40	22	35	4
France	39	27	30	3
United States	39	30	29	3
Canada	36	28	33	4
B: Project investment question				
Germany	39	18	29	13
United Kingdom	39	19	37	5
France	24	28	44	5
United States	41	28	29	3
Canada	37	28	33	2
C: Stock investment question				
Germany	50	27	24	–
United Kingdom	61	18	21	–
France	42	26	32	–
United States	61	18	21	–
Canada	57	21	23	–

DK "do not know" responses, *RF* "refuse to answer"

These questions were designed with a specific focus on knowledge of risk and risk diversification and provide a much richer set of information to assess knowledge of risk in a financial setting across countries.

Table 4 shows the responses to these questions in five high-income countries (United States, Great Britain, Canada, France, and Germany) that we have studied in our work (Lusardi et al. 2011, 2014b). These countries have relatively similar financial markets, and investors in these countries should be familiar with the stock market, investment in stocks, and the concept of risk and return.

As the table shows, the proportion of correct answers is rather low for each question. Respondents do not seem to have a good grasp of probability and many are unable to calculate expected returns. This result holds true across countries. For example, the proportion of correct answers to the lottery question is only about 40 %. The proportion of correct answers to the risk-return question is even lower; for example, in France, the correct response rate is only 24 %. A higher proportion of respondents across countries seem to understand that a single stock is riskier than many stocks, but the proportion of correct answers ranges only from 50 to 60 %. Most importantly, in all of these countries and for each question, the proportion of do not know answers is quite high—similar to the percentages we saw in data from the NFCS, HRS, and NLSY. Again, the proportion of do not know answers hovers around one-third.

Recently, ING collected financial literacy information across a set of countries using a mix of the questions we have described above. They assessed interest rate and

Table 5 Results from the ING International Survey

	Correct (%)	Incorrect (%)	DK + RF (%)
A: Interest question	79	11	10
B: Inflation question	75	11	16
C: Lottery question	41	27	32

Statistics are average responses among 11 countries

DK "do not know" responses, *RF* "refuse to answer"

inflation knowledge using questions similar to those used in the NFCS and assessed understanding of risk using the lottery question that was part of the Global Economic Risk survey.[8] Table 5 shows the findings from the ING International Survey fielded by TNS and aggregated across the eleven countries that were covered in that survey (Austria, Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Poland, Spain, Turkey, and the United Kingdom). As in the surveys discussed previously, the data from the ING survey also show that respondents have some grasp of interest compounding or inflation. However, knowledge of risk is much lower; the proportion of correct answers to the lottery question is a little more than 40 %. Moreover, and similar to what is seen in many other surveys, the proportion of do not know answers to the risk question is about one-third (32 %).[9]

4 Financial and Risk Literacy in Italy

There is a burgeoning set of work on financial literacy in Italy. Survey questions designed to assess financial literacy are not always similar to the ones used in other surveys, so comparisons are not always straightforward, but Fornero and Monticone (2011) provide a very thorough analysis of responses to a set of financial literacy questions from the 2006 Bank of Italy's Survey of Household Income and Wealth (SHIW). Questions in this survey are as comparable as possible with the three questions mentioned previously. Their findings show that financial literacy is very low in Italy and that even simple questions, such as the one used to assess numeracy, elicit a correct response rate of only 40 %. Contrary to other countries, the proportion of do not know answers is rather high for all questions in Italy; even questions about numeracy and inflation have do not know responses of about 30 %. There is no question in the SHIW similar to the one used in other countries to assess understanding of risk diversification; rather there is a question about equity funds and whether respondents are better or worse off when stock market prices fall. The percentage of correct answers is low for this question, too (52 %), and the proportion of do not know responses is rather high at 34 %.

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[8] The question about interest rates was slightly different; it was worded as follows: Suppose you had €100 in a savings account and the interest rate was 2 % per year. After 5 years, how much do you think you would have in the account if you left the money to grow? Possible answers: (a) around €102, (b) around €105, (c) around €110, (d) Do not know, (e) Prefer not to answer.

[9] For detail, see Bright and Keller (2012).

Similar findings are described in a recent report, which compares financial literacy in Italy to that in other European countries.[10] Italian respondents are found to have very low levels of financial literacy; knowledge is low even on simple numeracy questions or questions about interest compounding, and often lower than that found in other European countries. Questions also measured risk literacy—both knowledge of risk diversification and understanding of risk and return (the latter was assessed with a question similar to Q2 in the Global Economic Survey). Italians display lower knowledge of risk and risk diversification than that seen in many other countries, including Estonia, Poland, or the Czech Republic. Guiso and Viviano (2013) use data from a survey conducted by an Italian bank on a sample of its clients with at least 10,000 euros in financial wealth. While the sample is not representative of the Italian population, it has the advantage of providing information about financial literacy and risk literacy in particular. Even in this sample of wealthier individuals and investors, more than 43 % of respondents score below the median (defined by considering the responses to five financial literacy questions).

One of the most alarming findings about financial literacy in Italy is provided by the Programme for International Student Assessment (PISA). In 2012, PISA added a financial literacy assessment that was undertaken by 15-year-old students in 18 countries, including Italy (OECD 2014).[11] Findings are startling; students in Italy scored second to last, just above Colombia, and the mean score in Italy is significantly lower than the OECD average. Thus, not only do adults in Italy have low financial literacy but the generation that is still in school is also poorly equipped in terms of financial knowledge.

5 Does Risk Literacy Matter?

While it is important to determine what individuals know and do not know, the critical question is whether financial literacy matters for behavior. One way to assess the importance of financial literacy is to add it to models of saving behavior and assess its effects. This is the approach taken by Lusardi et al. (2014a). They consider an intertemporal model of saving with many sources of risk (income, health, and capital market returns) and incorporate financial literacy into the model. They show that financial literacy can account for more than 30 % of the wealth inequality in the United States.[12]

Empirically, I have studied the importance of financial literacy in several contexts (for example, savings) in which individuals are required to do calculations or have some grasp of basic concepts. For example, in many of my papers, I have documented that a significant number of workers do not plan for retirement, even when they are not far away from it (Lusardi 1999, 2014). Yet planning for retirement pays off: planners end up at retirement with three times the amount of wealth of non-planners (Lusardi 1999; Lusardi and Mitchell 2011a).

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[10] See PattiChiari (2014).

[11] Knowledge of risk was one component of the PISA financial literacy assessment. I chair the Financial Literacy Expert Groups (FEG) that designed the PISA financial literacy assessment.

[12] See Lusardi et al. (2014a) and the references therein.

In my work, I have also studied the extent of precautionary savings and how much households insure against risk (Lusardi 1998; Browning and Lusardi 1996). As mentioned above, saving models are starting to incorporate financial knowledge and this and many other papers show financial literacy cannot be taken for granted; knowledge of risk is particularly low and this could have consequences for saving behavior, since saving is inherently about the future, which is uncertain.

There is a simple variable in the NFCS that can be used as an indicator for retirement planning. Specifically, the following question is asked:

Have you ever tried to figure out how much you need to save for retirement?

This question was previously asked in the module that Olivia Mitchell and I designed for the HRS and has been shown to be a strong predictor of retirement wealth (Lusardi and Mitchell 2008, 2011a, c). Unfortunately, and despite the need for self-reliance in retirement saving, the data show that most Americans do not engage in retirement planning. Only about 37 % of NFCS respondents say they have ever even *tried* to figure out how much they should save for retirement, and the percentage is not much higher if we restrict our sample to the working age population (25–65).

In addition to retirement, there are other life events that families need to plan for. Because the future is inherently uncertain, families need to make provisions to buffer themselves against shocks. The ability to weather shocks not only contributes to financial stability at the micro level but also increases the stability of the macro economy. The NFCS asked respondents about their provisions against shocks as follows:

Have you set aside emergency or rainy day funds that would cover your expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies?

Responses indicate that a large proportion of the population have not set aside funds that could cover them in case of shocks. Only 35 % of respondents have set aside emergency or rainy day funds. While shocks and the financial crisis may have contributed to lack of precautionary savings, the data show that many families are vulnerable to shocks.

Does financial and especially risk literacy play a role in saving behavior? Saving decisions are relatively complex, and—as we have seen—most people have a limited knowledge of risk and risk diversification. Table 6 shows regression results that include many of the determinants of savings that I have used in my previous work (Lusardi 1998, 1999, 2014) and also include measures of financial literacy.

The sample is restricted to non-retired respondents younger than age 65, so as to exclude those in the decumulation phase of the life cycle. I also omit those younger than age 25, so as to eliminate those who are in school or not yet working. The list of controls includes age dummies to capture the hump-shaped profile of savings. I also include demographic variables such as gender, race, and marital status that can account for heterogeneity in preferences. In addition, I include dummies for region of residence. I include a set of dummies for education and income as a proxy for lifetime income. I also add an indicator for the self-employed, as they are very different from the rest of the population both in terms of lifetime income and wealth (Hurst et al. 2010). To proxy for household shocks and liquidity constraints, I add an indicator for

Table 6 Regression results: 2009 NFCS

	(1)	(2)
	Planning for retirement	Precautionary savings
Interest question correct	0.026***	0.015*
	(0.009)	(0.008)
Inflation question correct	0.054***	−0.007
	(0.008)	(0.007)
Risk question correct	0.113***	0.050***
	(0.007)	(0.007)
Age 30–34	0.001	−0.031**
	(0.013)	(0.012)
Age 35–39	−0.005	−0.035***
	(0.013)	(0.012)
Age 40–44	−0.002	−0.039***
	(0.013)	(0.012)
Age 45–49	0.040***	−0.023*
	(0.014)	(0.013)
Age 50–54	0.071***	−0.014
	(0.013)	(0.013)
Age 55–59	0.072***	0.020
	(0.014)	(0.014)
Age 60–64	0.104***	0.051***
	(0.017)	(0.016)
Female	−0.026***	−0.045***
	(0.007)	(0.006)
High school	0.057***	0.015
	(0.020)	(0.019)
Some college	0.104***	0.026
	(0.020)	(0.019)
College	0.146***	0.095***
	(0.021)	(0.020)
Post graduate	0.175***	0.093***
	(0.023)	(0.021)
Single	0.009	0.024***
	(0.010)	(0.009)
Separated	−0.020**	−0.046***
	(0.010)	(0.010)
Widow	0.051**	−0.013
	(0.025)	(0.024)
Income USD 15–25k	0.051***	0.016
	(0.014)	(0.013)

Table 6 continued

	(1)	(2)
	Planning for retirement	Precautionary savings
Income USD 25–35k	0.055***	0.050***
	(0.014)	(0.013)
Income USD 35–50k	0.084***	0.056***
	(0.014)	(0.013)
Income USD 50–75k	0.147***	0.120***
	(0.014)	(0.013)
Income USD 75–100k	0.214***	0.186***
	(0.016)	(0.015)
Income USD 100–150k	0.277***	0.265***
	(0.017)	(0.016)
Income USD 150k+	0.355***	0.407***
	(0.020)	(0.018)
Self-employed	0.008	0.069***
	(0.011)	(0.010)
Unemployed	−0.018	0.019*
	(0.011)	(0.010)
Income shock	0.064***	−0.089***
	(0.007)	(0.007)
Constant	−0.048*	0.190***
	(0.026)	(0.024)
Observations	19,184	19,184
R-squared	0.145	0.174

Sample restricted to non-retired respondents age 25–65. Standard errors in parentheses. Other controls include number of financially dependent children, dummies for race/ethnicity, being a homemaker, region of residence, and being a homeowner

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

having experienced a large and unexpected drop in income during the past year, for non-work (which includes the unemployed), and for the number of children financially dependent on the respondent. I also include a dummy for home ownership as a proxy for wealth. Financial literacy is measured by a set of three dummy variables indicating whether the respondent correctly answered each of the three financial literacy questions discussed in the previous section.

The empirical estimates show that financial literacy has an effect on both retirement planning and precautionary savings. Thus, even after accounting for household resources such as income and home ownership and individual characteristics such education, those who are more financially literate are more likely to plan for retirement and to have precautionary savings. Knowledge of risk diversification is the variable that matters most in terms of financial knowledge. Specifically, those who are knowledgeable about risk are 11 percentage points more likely to plan for retirement and

5 percentage points more likely to have made provisions to insure against shocks. Education is also a strong predictor of saving; those who have at least a college degree are much more likely to plan for retirement and to have precautionary savings. Thus, both general knowledge, as measured by education, and more specialized knowledge, as measured by financial literacy, matter for planning and saving.

Other variables have the expected sign. For example, those who have higher income are more likely to plan for retirement and hold precautionary savings. Those who face higher income risk, such as the self-employed, are also more likely to hold precautionary savings. Being hit by income shocks has two different effects. Those who have suffered an income shock are less likely to have precautionary savings, perhaps because the shock depleted their buffer of savings. But those who have been hit by an income shock are *more* likely to plan for retirement. This is a finding that has been consistently reported in many data sets. I first reported on it in 1999 while examining data from the first wave of the HRS, but it has been a persistent finding in other data sets as well (Lusardi and Mitchell 2011b). People seem to be learning from bad experiences and income shocks may induce individuals to plan for retirement.

The link between risk literacy and retirement planning has been found in other countries as well. When summarizing the evidence from eight countries, Lusardi and Mitchell (2011b) note that while knowledge of interest rates and inflation is related to retirement planning in several countries, knowledge of risk was a much more powerful determinant of retirement planning. Estimates were sizeable in other countries as well. For example, in the Netherlands, those who are knowledgeable about risk are 14 percentage points more likely to plan for retirement (Alessie et al. 2011).

Fornero and Monticone (2011) examine the relationship between financial literacy and pension plan participation in Italy and show that those who are more financially literate are also more likely to participate in a pension plan; in the case of Italy, simple numeracy matters, too, consistent with the fact that the numeracy question had a very low proportion of correct answers and is likely to differentiate between levels of financial knowledge.

Some have argued that financial literacy is an endogenous variable and that it may be the desire to plan for retirement or to hold precautionary savings that induce people to invest in financial knowledge. Moreover, there could be a third variable influencing both financial literacy and the desire to plan or to have precautionary savings that generates the link between these two variables (for example, ability). I agree that we have to be cautious in assessing the OLS estimates. One additional reason, which is not discussed a lot in this literature but could be important empirically, is that financial literacy could be measured with errors; thus estimates may not reflect the true effect of financial literacy. van Rooij et al. (2011) show that the pattern of responses changes when inverting the wording of the financial literacy questions, and this is particularly the case for the risk diversification question; in line with the high proportion of "do not know" answers and the pervasive lack of knowledge about risk, many respondents change their answer when the wording of the question is changed.

While OLS estimates may not properly measure the effect of financial literacy on saving and planning behavior, Lusardi and Mitchell (2014b) show that instrumental variables (IV) estimates of the effects of financial literacy, which try to address the problem of endogeneity and/or measurement error, are always larger than the OLS

estimates. It is worth noting the ingenuity of some of these instruments. For example, we were able to add new variables to the Dutch Central Bank Household Survey (DHS) measuring the financial situation of older siblings (whether it is better, the same, or worse than the financial situation of the respondent). The experience of siblings is not under the control of the respondent, but he/she can learn from those around them; thus, exposure to financial problems of older siblings can increase respondents' financial literacy. Moreover, we have added information about parents' understanding of financial matters, which can be another source of financial literacy for respondents. When using these variables as instruments for financial literacy, we find stronger and larger estimates than the OLS estimates (Alessie et al. 2011). Thus, OLS estimates seem to underestimate the effects of financial literacy on behavior. Because the DHS is a panel data set and information about financial literacy (and all other variables in the regression) were collected in two separate years, it is also possible to perform fixed-effects estimations, thus addressing the issue of unobserved heterogeneity. As reported in Alessie et al. (2011), financial literacy continues to be statistically significant and affect retirement planning even when using panel data.

Other studies have used different set of instruments. For example Bucher-Koenen and Lusardi (2011) use political attitudes at the regional level to proxy for exposure to groups expected to have higher financial literacy. Lusardi and Mitchell (2011c) use information on whether respondents lived in a state (during their senior year in high school) that mandated financial education in school and the number of years that mandate was in effect (mandates implemented in the past are likely to be more effective). Fornero and Monticone (2011) use information on whether respondents have at least one household member with a degree in economics and one household member who uses a computer (either at home, at work, or elsewhere). Both variables are proxying for the cost of learning and acquiring information.[13] In all of those cases, the empirical tests show that the instruments are valid (the over-identifying restrictions are not rejected) and the IV estimates are always higher than the OLS estimates. Thus, financial and risk literacy may have big effects on economic outcomes—much bigger than some of the current estimates seem to imply.

6 Risk Literacy or Financial Advice?

Given that financial literacy—in particular, knowledge of risk—is so low, one may wonder what can be done to address this lack of knowledge. This is particularly relevant in the current economic environment where people have been put in charge of many important financial decisions, from how much to save for retirement and how to invest their retirement wealth to how to insure against income, health, and many other shocks that can occur during the course of a lifetime. Could individuals rely on financial advisors in making these decisions? In fact, is financial literacy even necessary if one can simply consult financial experts?

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[13] See the discussion in Fornero and Monticone (2011, p. 559) about these instruments and also the many other instruments that were used to test to robustness of the IV estimates.

There are several factors that could limit the demand for financial advice. One fact I have documented by looking at data from several of the surveys mentioned earlier is a mismatch between demonstrated financial knowledge and perceived or self-assessed financial knowledge. While financial and risk literacy are shown to be generally low, most respondents give themselves very high scores when asked to assess their own financial knowledge, a finding documented in US, German, and Dutch data (Lusardi and Tufano 2009; Lusardi and Mitchell 2011c; Bucher-Koenen et al. 2014). Thus, many individuals may not even be aware of their low levels of knowledge and their potential need for or capacity to benefit from financial advice. Individuals with low income and low educational attainment may not be able to afford the cost of advisors, even though they are likely to be the ones with lowest levels of financial literacy. Additionally, it is not clear that individuals—particularly those with low levels of financial literacy—actually benefit from financial advice. Certain incentive structures are such that advisors may not always act in the best interest of their customers, and naïve investors may get poor advice. If aware of this, individuals may not ask for advice because they fear they will not receive relevant information from advisors, as put forward in the models by Calcagno and Monticone (2015), and Debbich (2015). These models predict a positive rather than a negative relationship between financial literacy and advice; i.e., it is those with high financial literacy who use financial advisors.

There are also supply side considerations. As discussed at length in Calcagno and Monticone (2015), advice may be biased when financial advisors act as sellers of financial products. In turn, biased advice may not improve customers' financial situation and may even harm them.[14]

Empirically, several papers have documented that financial advice is used sparsely and seldom by those with low financial literacy. Lusardi and Mitchell (2011a) document that most older respondents do not make use of formal tools (calculators or worksheet) and financial planners, advisors, or accountants to make financial decisions. Instead, they primarily rely on advice from family or friends. Similar findings are reported in Dutch data (van Rooij et al. 2011); only a small proportion of the population rely on financial advisors and those with low financial literacy rely mostly on family and friends. The positive (often monotonic) relationship between financial literacy and the use of financial advisors documented by Collins (2012), Calcagno and Monticone (2015), and Debbich (2015) using US, Italian, and French data, respectively, made these authors posit that financial literacy and financial advice are complements rather than substitutes.

7 Improving Risk Literacy

Because risk literacy is so low, an important question is how to improve risk literacy. As argued in Lusardi and Mitchell (2015), there are two initiatives that are truly scalable: financial education curricula in school and financial education programs in the workplace. Some of these programs and their effectiveness are analyzed and discussed in the survey by Lusardi and Mitchell (2014b). There are two programs that

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14 See Calcagno and Monticone (2015) and the references therein.

specifically address risk literacy. First, Heinberg et al. (2014) show that a simple way
to improve knowledge of risk diversification is via a relatively brief written or video
narrative designed to be accessible and engaging. These narratives were designed on
several well-established principles of psychology and marketing. The concept of risk
diversification was embedded in a short story that describes the concept verbally and
presents the benefits of taking action. The story focuses on a few simple takeaway
points related to the concept, and the use of complex jargon is minimized. A narrative
strategy was adopted, as in commercial advertising, adult education, and public health,
as it is an established means of creating cognitive involvement and emotional immer-
sion and has been shown to improve comprehension, in particular for poor readers.
Additionally, education research indicates that video narratives have the potential to
create fertile opportunity for cognitive engagement.

Despite the very minimal time respondents spent watching or reading the narratives
(each of the video or written narratives takes only about 3 min), this program was shown
to have sizable effects on objective measures of respondents' risk knowledge. It also
affected self-efficacy; i.e., after being exposed to the narrative, respondents stated that
*when making decisions about personal finances, they are very (or extremely) likely to
be able to effectively select a mix of investments that reflected their preferred level of
risk*.

A second program builds on the findings of the first. In this one, Lusardi et al. (2014c)
developed and evaluated a new web-based program aimed at explaining the concept
of risk diversification. Making use of the research team's expertise in financial liter-
acy, marketing, and linguistics, they designed an interactive visual tool that effectively
demonstrates the workings of risk diversification. According to the project's prelimi-
nary evaluation, this type of initiative has potential for improving knowledge of risk and
the ability of individuals to incorporate that knowledge into financial decision making.

8 Concluding Remarks

In this paper, I have used several sources of data to document the level of financial
literacy among the population. I have shown that financial literacy should not be taken
for granted; a sizeable proportion of individuals do not have a grasp of the concepts
that form the basis for financial decisions, such as basic numeracy and knowledge of
inflation. Most important, the large majority of individuals, not just in the United States
but in other countries as well, lack an understanding of risk and risk diversification.
Across countries, a strikingly similar share of respondents state they do not know the
answer to a set of questions measuring risk literacy. These findings are worrisome.
Individuals are increasingly being put in charge of their financial well-being and are
much more responsible for their retirement savings and planning than was the case
in the past. Moreover, financial and saving decisions are inherently about risk and
managing risk. Low levels of risk literacy may not only jeopardize the well-being and
stability of families but also the strength and stability of the macro economy.

These findings have implications for individuals, policy makers, and the financial
and insurance industry. While individuals are facing increasingly complex financial
and insurance instruments, their low risk literacy may limit their ability to use these

financial instruments on a micro level, and—on a macro level—impede the development and functioning of financial markets.

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