

DNB Working Paper

No. 231 / November 2009

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* Views expressed are those of the authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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November 2009

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Financial Literacy and Retirement Planning in the Netherlands

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Abstract

The complexity of financial decisions households are faced with has increased to unprecedented levels. At the same time, recent research documents large differences in economic knowledge among households and indicates that household financial skills may be inadequate to cope with the increasing responsibility for making retirement decisions. In this paper, we examine the relationship between financial knowledge and retirement planning in the Netherlands. For this purpose, we have designed a customized module for the DNB (De Nederlandsche Bank) Household Survey. We identify a strong and positive association between financial knowledge and retirement planning. Using information on economics education when young, we show that the nexus of causality goes from literacy to planning rather than the other way around.

JEL Classification: J26, D12

Key words: Thinking about Retirement, Knowledge of Finance and Economics, Financial Sophistication, Economics Schooling.

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1. Introduction

Large household surveys on financial capability and money management in, for example, the United States, Australia, Japan, the UK, and the Netherlands have documented significant heterogeneity in financial behavior and shown that the typical household does not manage household finances efficiently (OECD, 2005; Atkinson et al., 2007; Van Raaij, Antonides and De Groot, 2008). One particular shortcoming is that households tend to be short-sighted when making financial decisions and may be ill-prepared for retirement. This is a matter of concern for policymakers as, over the past two decades, individuals and households have been increasingly expected to take responsibility for their retirement security. Indeed, Lusardi (2003, 2004) and Lusardi and Mitchell (2007a) document that many U.S. employees on the verge of retirement have very little savings.

At the same time, researchers have started to examine financial literacy and the implications that a lack of basic cognitive skills and economic knowledge have for household financial decisions. Lusardi and Mitchell (2006) have designed three questions for inclusion in the U.S. Health and Retirement Survey (HRS) to identify numeracy levels of households and understanding of basic economic concepts such as inflation, interest compounding, and risk diversification. The evidence exhibits a clear relationship between financial knowledge and skills and planning for retirement. This is an important observation as planners are likely to accumulate more wealth than non-planners (Ameriks, Caplin and Leahy, 2003; Lusardi and Mitchell, 2007a). Indeed, the mere fact of a household trying to calculate how much is needed to be saved for retirement and devising a saving plan is shown to correlate with greater savings close to retirement (Lusardi and Mitchell, 2006; Van Rooij, Lusardi and Alessie, 2008).

Most research on the relationship between financial literacy and planning for retirement has focused on older cohorts in the U.S. Health and Retirement Survey. An important exception is provided in recent work by Lusardi and Mitchell (2008) based on the RAND American Life Panel (ALP), which includes younger households, albeit mostly with relatively high levels of income and education. In the present paper, we report evidence from a representative household survey in a different country with a completely different institutional setting. We use the results of a customized survey designed to gather information about Dutch households and to then better understand the relationships between financial knowledge, demographic characteristics, and retirement planning.

The survey module we have designed allows for a more detailed assessment of financial literacy than was feasible with earlier surveys. It gathers information on

respondents' level of financial skills and knowledge, self-reported knowledge, and financial education when young as well as identifying the impact of small variations in wording on response patterns (Van Rooij, Lusardi and Alessie, 2007). The survey was answered by members of the CentERpanel, which gives us the opportunity to merge our data set with an extensive set of background information from the DNB Household Survey, data for which is also collected annually at the CentERpanel and which includes extensive information on economic and psychological saving concepts (Van Rooij, Lusardi and Alessie, 2008).

Our main conclusions are as follows: Most households lack knowledge of fundamental financial concepts. Moreover, there exist vast differences in knowledge levels among respondents; women and those with low educational attainment display the lowest levels of financial knowledge. Most importantly, more financially knowledgeable households are more likely to plan for retirement, even after controlling for a large set of socioeconomic characteristics, including education and income. The positive association between financial sophistication and planning for retirement is an important observation in itself, but we go one step further and attempt to assess the direction of causality. The results suggest that financial sophistication does boost retirement planning. Our findings have important policy implications as they show that the design of financial education programs and the implementation of measures aimed at improving household financial literacy go hand in hand with a higher propensity to plan for retirement. Financial education programs as well as initiatives to increase awareness should be designed for those groups with the lowest levels of financial literacy.

The outline of the paper is as follows. In Section 2, we discuss the rationale for this paper, present background information, and review related literature. In Section 3, we discuss the survey data. In Section 4, we discuss levels of financial knowledge in the Netherlands and the methodology used to measure financial literacy. In Section 5, we document the rate of retirement planning and present descriptive results on its relationship to demographic and socioeconomic variables. In Section 6, we report the outcome of a multivariate regression analysis to explain the variations seen in retirement planning. We focus on the role of financial literacy herein, using information on economics education when young to overcome potential endogeneity problems in the empirical analysis. In Section 7, we perform a sensitivity analysis to investigate the robustness of our results. In section 8, we put the results into perspective and conclude with policy implications.

2. Motivation

Differences in individual traits, such as the propensity to plan, contribute to differences in wealth holdings for otherwise similar households (Lusardi, 1999, 2002, 2003; Lusardi and Mitchell, 2007a, b; Lusardi and Beeler, 2007; Ameriks, Caplin and Leahy, 2003). Lusardi and Mitchell (2007a) document evidence among U.S. respondents nearing retirement age that the mere fact of thinking about retirement results in households being much better prepared in terms of financial buffers. While participation in company retirement plans in the Netherlands is compulsory, many employees display a lack of pension knowledge and lack of interest in pension issues (Van Rooij, Kool, and Prast, 2007; Van Els, Van den End, and Van Rooij, 2004). Nevertheless, there is a strong need for Dutch households to plan for retirement. Recent research shows that many employees are too optimistic about expected replacement rates as, in reality, existing retirement plans are mostly inadequate to fulfill desired consumption paths (Van Duijn et al., 2009; Binswanger and Schunk, 2008).¹ Indeed, studies show that when Dutch households make calculations to determine their actual desired income replacement rate for retirement, they then make concrete saving plans and are able to accumulate substantially more wealth than non-planners (Van Rooij, Lusardi and Alessie, 2008).

Bernheim (1995, 1998) was among the first to suggest that the role of financial capability and knowledge in household decision-making deserved more attention from policy makers and researchers. Since then, financial literacy has been shown to be related to several types of behavior. Higher levels of financial sophistication are associated with more efficient money management (Hilgert, Hogarth and Beverly, 2003). Less knowledgeable home owners tend to take out mortgage loans with unfavorable terms (Moore 2003; Miles, 2004) and to forego refinancing mortgage rates when interest rates decline (Campbell, 2006). Less sophisticated investors are more likely to hold under-diversified portfolios (Calvet, Campbell and Sodini, 2009) or stay away from the stock market entirely (Van Rooij, Lusardi and Alessie, 2007; Kimball and Shumway, 2006; Christelis, Jappelli and Padula, 2006; Vissing-Jorgensen, 2004). Lusardi and Mitchell (2006, 2008a) suggest that planning might be related to financial literacy and pension knowledge. Indeed, numerous studies reveal a striking lack of pension knowledge among workers. Gustman and Steinmeier (2004), for example, report that U.S. workers are unaware of the characteristics of their retirement plans, a finding that is confirmed in studying Dutch workers by Van Els, Van Rooij and Schuit (2007).

¹ Moreover, collective pension plans offer an increasing number of options for individuals to choose their retirement age and save for early retirement accordingly.

Our financial literacy survey contains a large number of questions aimed at measuring knowledge related to financial decision-making and builds upon the three questions that Lusardi and Mitchell have devised for the U.S. HRS to measure levels of numeracy and the understanding of inflation, interest compounding and risk diversification. In a previous paper we provide a detailed description of the financial skills of Dutch households and show that those with higher levels of financial sophistication are more likely to invest in stocks or mutual funds (Van Rooij, Lusardi, and Alessie, 2007). Moreover, using the same measures of financial sophistication, we find that financial literacy boosts the accumulation of wealth in the Netherlands (Van Rooij, Lusardi and Alessie, 2008). Lusardi and Mitchell (2008b) have incorporated this extensive set of literacy questions devised for the DNB Household Survey into the RAND American Life Panel and have created detailed financial literacy measures for the United States to assess a correlation between financial knowledge and retirement planning. The present paper investigates this relationship for the Netherlands.

3. Data

We have developed a customized survey with a large set of questions to measure financial literacy and retirement planning. Respondents are members of the CentERpanel, which is run by CentERdata at Tilburg University.² Panel members participate in weekly Internet surveys via a computer or a set-top box for their television set. The provision of the equipment to participate via a television connection is necessary as the selection of panel members is not dependent on use and/or availability of Internet. The same panel members participate in the annual DNB Household Survey, which collects information on a variety of the usual demographic characteristics and socioeconomic attributes (education, age, sex, income, wealth) as well as information on economic and psychological concepts related to saving and investment behavior (see, e.g., Webley and Nyhus, 2006). Twice a year, refreshment samples are drawn to deal with attrition: new panel members are selected to keep the panel representative of the Dutch population. The questions are answered by the household member who is primarily responsible for the household finances.

The questionnaire was fielded from September 23 until September 27, 2005, and repeated a week thereafter for those households that had not yet responded. The response rate was 74 percent (1,508 out of 2,028 households). The average age of the sample is almost 50, and most respondents are between the ages of 30 and 60 when they are expected to take important financial decisions on home ownership, mortgage financing, and retirement

² For more information, we refer to <http://www.uvt.nl/centerdata/en>.

savings. There is a lot of heterogeneity in formal education with on the one hand 13 percent having a university degree and 26 percent having completed higher vocational training, and on the other hand 4 percent not attaining a high school diploma after finishing primary school. To account for heterogeneity in personal circumstances, we control for respondents' employment status in the regression analysis. Somewhat more than half of respondents work for an employer, 5 percent are self-employed and one-third are in (early) retirement. Men are slightly overrepresented (55 percent), and 31 percent of respondents are married or living with a partner.

4. Measuring Financial Literacy

We have designed different sets of questions to measure financial literacy and to be able to distinguish between different levels of financial knowledge and skills. The first set of questions aims at measuring very basic financial skills, which are a prerequisite for day-to-day financial transactions. Box 1 reports the precise wording of the basic financial literacy questions that explore numerical skills and the understanding of basic concepts such as inflation, interest rates, compound interest, and the time value of money.

Figure 1A summarizes the responses to the five basic literacy questions.³ Nine out of ten respondents provided the correct answer to the first question: a very simple numerical exercise. Somewhat more than eight out of ten respondents got the inflation question right, while the number of “do not know” answers and incorrect responses are in balance. The proportion of correct answers decreases to about 75 percent when respondents are asked to do a simple compound interest calculation. More than a quarter of the participants could not provide the correct answer to the question that relates to the time value of money and a similar fraction suffers from money illusion. Overall, it seems that respondents have some grasp of basic economic concepts. It is striking, however, that less than half (40 percent) of the respondents were able to provide correct answers to all five questions (Figure 1B).

Figure 2 shows how the total number of correct answers is distributed across age cohort, sex, and different levels of formal education. Obviously, there is a strong relationship between education and financial literacy, although the average number of correct responses for those with a university degree is still below the maximum possible score of five. Studies measuring numeracy, verbal fluency, and memory suggest a decline in cognitive abilities at

³ Throughout the paper, we use household weights to calculate the descriptive statistics. These weights make a correction for the fact that, overall, high-income households seem to be somewhat overrepresented in the final sample of 1,508 households.

advanced ages (Christelis, Jappelli, and Padula, 2006). Indeed, we find that respondents older than 50, and especially those older than 60, seem less knowledgeable, although age differences are not statistically significant.⁴ Differences in basic financial literacy by sex, however, are strongly significant: women know much less than men.

Box 1. Basic Literacy Questions

Q1) 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? (i) More than €102; (ii) Exactly €102; (iii) Less than €102; (iv) Do not know; (v) Refusal.

Q2) Interest compounding

Suppose you had €100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total? (i) More than €200; (ii) Exactly €200; (iii) Less than €200; (iv) Do not know; (v) Refusal.

Q3) 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? (i) More than today; (ii) Exactly the same; (iii) Less than today; (iv) Do not know; (v) Refusal.

Q4) Time value of money

Assume a friend inherits €10000 today and his sibling inherits €10000 3 years from now. Who is richer because of the inheritance? (i) My friend; (ii) His sibling; (iii) They are equally rich; (iv) Do not know; (v) Refusal.

Q5) Money illusion

Suppose that in the year 2010, your income has doubled and prices of all goods have doubled too. In 2010, how much will you be able to buy with your income? (i) More than today; (ii) The same; (iii) Less than today; (iv) Do not know; (v) Refusal.

To be able to further refine our assessment of financial literacy, we devised a second set of literacy questions that explores knowledge related to more complex financial instruments, such as stocks, bonds, and mutual funds, and the understanding of concepts such as risk diversification and the trade-off between risk and return. The precise wording is reported in Box 2. Some of the advanced literacy questions are similar to existing questions from U.S. surveys (with minor changes to tailor them to the Dutch situation), as we did not

⁴ Moreover, in analyzing a cross section we cannot distinguish cohort from age effects.

have the opportunity to do a pilot study to assess how well respondents understood the questions.⁵

Box 2. Sophisticated Literacy Questions

Q6) *Which of the following statements describes the main function of the stock market?* (i) The stock market helps to predict stock earnings; (ii) The stock market results in an increase in the price of stocks; (iii) The stock market brings people who want to buy stocks together with those who want to sell stocks; (iv) None of the above; (v) Do not know; (vi) Refusal.

Q7) *Which of the following statements is correct? If somebody buys the stock of firm B in the stock market:* (i) He owns a part of firm B; (ii) He has lent money to firm B; (iii) He is liable for firm B's debts; (iv) None of the above; (v) Do not know; (vi) Refusal.

Q8) *Which of the following statements is correct?* (i) Once one invests in a mutual fund, one cannot withdraw the money in the first year; (ii) Mutual funds can invest in several assets, for example invest in both stocks and bonds; (iii) Mutual funds pay a guaranteed rate of return which depends on their past performance; (iv) None of the above; (v) Do not know; (vi) Refusal.

Q9) *Which of the following statements is correct? If somebody buys a bond of firm B:* (i) He owns a part of firm B; (ii) He has lent money to firm B; (iii) He is liable for firm B's debts; (iv) None of the above; (v) Do not know; (vi) Refusal.

Q10) *Considering a long time period (for example 10 or 20 years), which asset normally gives the highest return?* (i) Savings accounts; (ii) Bonds; (iii) Stocks; (iv) Do not know; (vi) Refusal.

Q11) *Normally, which asset displays the highest fluctuations over time?* (i) Savings accounts; (ii) Bonds; (iii) Stocks; (iv) Do not know; (v) Refusal.

Q12) *When an investor spreads his money among different assets, does the risk of losing money:* (i) Increase; (ii) Decrease; (iii) Stay the same; (iv) Do not know; (v) Refusal.

Q13) *If you buy a 10-year bond, it means you cannot sell it after 5 years without incurring a major penalty. True or false?* (i) True; (ii) False; (iii) Do not know; (iv) Refusal.

Q14) *Stocks are normally riskier than bonds. True or false?* (i) True; (ii) False; (iii) Do not know; (iv) Refusal.

(Q15) *Buying a company stock usually provides a safer return than a stock mutual fund. True or false?* (i) True; (ii) False; (iii) Do not know; (iv) Refusal.

Q16) *If the interest rate falls, what should happen to bond prices?* (i) Rise; (ii) Fall; (iii) Stay the same; (iv) None of the above; (v) Do not know; (vi) Refusal.

⁵ In particular, we took question 6 from the National Council of Economic Education Survey, questions 7 and 9 from the NASD Investor Knowledge Quiz, question 15 from the 2004 HRS module on financial literacy, questions 8, 10, 11, 12, 13, 14, and 16 from the Survey of Financial Literacy in Washington State, the Survey of Consumers, and the John Hancock Financial Services Defined Contribution Plan Survey.

Figure 3A shows that respondents appear to find this set of questions much more difficult than the basic literacy questions. The fraction of “do not know” responses is substantial, ranging from 11 to 38 percent, which suggests that respondents acknowledge that they have little understanding of these more complicated economic concepts. In addition, the responses given display a much higher level of inaccuracy. For example, 30 percent of the respondents incorrectly answered that either savings accounts or bonds provide higher returns in the long run than stock investments (47 percent answered correctly). Two-thirds of the respondents correctly perceive stocks as the most volatile component of the three asset categories, which makes this question apparently the easiest to answer out of the eleven sophisticated literacy questions. The questions related to bonds appear to be the most difficult to answer, with only a quarter of respondents providing the correct answer to the question on the relationship between the price of bonds and interest rates.

Questions 14, 15, and 16 in Box 2 have been phrased in two different ways to examine the sensitivity of responses to the wording of the question. Van Rooij, Lusardi, and Alessie (2007) report the results in detail and show that the wording is clearly relevant to the number of correct responses. We take this as evidence of guessing behavior by respondents, which creates noise in the measurement of literacy. Therefore, we have to deal with the effect of measurement error in the empirical regressions later.

Figure 3B shows the distribution of the total number of correct responses. Only one out of twenty respondents could answer each of these questions accurately, and three-quarters of respondents missed the correct answer to three or more questions (out of eleven). We can conclude that there is a lot of heterogeneity among households but that, in general, sophisticated financial literacy does not seem to be particularly widespread in the Netherlands. Unfortunately, we are not able to draw a comparison with the knowledge level of U.S. citizens that is reported in the survey by Lusardi and Mitchell (2008b), as the latter sample is dominated by high income, highly educated respondents, who might be expected to perform better on financial literacy tests.⁶

Indeed, Figure 4 shows that there is a steep education-literacy gradient. Respondents with an academic degree answer, on average, almost eight out of eleven questions accurately, which is more than double the average score of those who completed primary school only. We also see that younger respondents are less well informed than middle aged respondents and, to a lesser extent, older respondents, suggesting - apart from cohort-specific explanations

⁶ Besides, given the evidence of the impact of small changes in wording, the translation from Dutch to English also hinders a direct comparison of results from the literacy surveys in both countries.

- that people accumulate financial knowledge related to investments in financial markets as they age and that only at more advanced ages is this offset by a decline in cognitive abilities.⁷ Regarding differences across gender, men are again shown to be more knowledgeable than women.

The simple correlations reported before are broadly confirmed by a multivariate regression of two indices for basic and sophisticated literacy, respectively, on a large set of covariates presented in Table 1. The basic and sophisticated literacy indices follow from a factor analysis on the five basic and eleven sophisticated literacy questions, respectively. In both cases, there is clearly one factor which describes a large part of the variation in responses.⁸ The first factor then provides us with a measure for cognitive ability and very basic financial skills. The second factor measures more sophisticated financial skills. Given the importance of the “do not know answers” in these more complicated questions, we take this category explicitly into account. Appendix A provides details on the construction of the financial literacy indices.⁹ Besides age, gender, and education, we control for labor market status (with dummies for being an employee, self-employed, or retired), household composition (number of kids within the household and being single versus married¹⁰), and measures for economic well-being, i.e., quartile dummies for net disposable household income and a dummy for home ownership. The regression outcomes in Table 1 show that high-income households possess better financial knowledge and that home owners are more literate than renters. The correlation between age and sophisticated financial literacy is not significant once we correct for individual characteristics.

Apart from sets of basic and sophisticated financial literacy questions, we have also collected information on self-reported financial literacy. At the beginning of the survey, we asked respondents to evaluate their own understanding of economics. This question is relevant because household actions could be driven by perceived financial literacy instead of actual knowledge. Note that Agnew and Szykman (2005) find large differences between actual and self-reported knowledge. The precise wording of the question is as follows: “*How would you assess your understanding of economics (on a 7-point scale, 1 means very low and*

⁷ This mechanism also works for other complex decisions, such as those related to loan markets. Agarwal et al. (2007), for example, find that financial mistakes are concentrated among the very young and the very old.

⁸ If we perform a factor analysis on the sixteen questions altogether, we find two different factors which show the highest factor loadings on the five basic and the eleven sophisticated financial literacy questions, respectively. Therefore, we decided to run two different factor analyses consistent with the way we have devised the questionnaire.

⁹ See also Van Rooij, Alessie and Lusardi (2007).

¹⁰ The variable *married* also includes unmarried couples and is de facto measuring whether the household head lives with a partner.

7 means very high)?” A quarter of the respondents opted for the middle of the range, indicating that they think their understanding of economics is not low and not high. Strikingly, while only one in six respondents chose one of the bottom three categories, the majority (56 percent) are quite optimistic about their economic knowledge, rating themselves at 5 or higher. Nevertheless, the beauty of the self-assessment question is its simplicity (recall that there is no mention of stocks, bonds, or other financial instruments), and respondents might base their self-assessment on financial activities such as balancing the household budget or keeping track of expenses. Indeed, on a self-reported literacy question that directly relates to investment knowledge, the vast majority of Dutch employees recognize that they are not knowledgeable at all (Van Rooij, Kool and Prast, 2007).

Figure 5 summarizes results of a correlation of objectively measured basic and sophisticated financial knowledge with respondents’ self-assessed level of financial literacy. We see that there is a strong positive correlation, especially between the number of correct responses to the sophisticated literacy questions and self-assessments of financial knowledge.¹¹ Respondents who claim to be not very economically knowledgeable also score particularly low on the literacy questions. Those who claim to have a good understanding of economics on average provide a correct answer to a considerably larger number of the questions. This shows that our set of literacy questions is able to adequately proxy economic knowledge as perceived by households themselves.

5. Measuring Retirement Planning

Our main interest is to explain why some households prepare for retirement better than others. We have included the following question in our survey: *How much have you thought about retirement: A lot, some, little, or hardly at all?* Lusardi (2003) has shown that thinking about retirement is strongly associated with wealth holdings of U.S. households nearing retirement. She documents that those respondents who report to have thought a little, some, or a lot about retirement have double the amount of wealth than those who report having given hardly any thought to retirement. Lusardi and Beeler (2007) analyze the 1992 and 2004 HRS waves and conclude that financial education initiatives in the intervening years have not altered this relationship; wealth differences between planners and non-planners appear robust over time. Lusardi and Mitchell (2007a) confirm that thinking about retirement leads to greater wealth after also including a wide set of other controls, including for income and

¹¹ Agnew and Szykman (2005) also found a positive correlation between financial literacy test scores and self-assessed knowledge for the participants in their experiment at a US university campus.

education. In principle, the relationship could work in the other direction, i.e., wealthy households could have more reason to think about what to do with their money at retirement or might just be more inclined to state that they have thought about retirement, but Lusardi and Mitchell (2007a) show that this is not the case.

Turning to the responses on the retirement planning question in the Netherlands, we find that only a small group (12.9 percent) of respondents has thought a lot about retirement. About a third acknowledge that they have thought only a little (28.1 percent) or hardly at all (7.2 percent) about retirement. The majority (51.1 percent) take an intermediate position and report to have thought about retirement, although not a lot.

Interestingly, these data are distinctly different from U.S. data, as Lusardi and Mitchell (2007a, 2008b) report that close to 30 percent of older households surveyed in the HRS and close to 40 percent of the highly educated ALP sample have thought a lot about retirement. The difference in the number of Dutch respondents who think a lot about retirement (basically just one out of eight) versus the same category of U.S. respondents is huge and cannot be explained by differences in the sample composition alone, albeit the fraction who think a lot about retirement does increase with age and education, as we will see below. Differences in response style between American and Dutch respondents may also contribute to the different outcome for retirement planning as vignette studies by Kapteyn, Smith and Van Soest (2008) have shown that US respondents are more inclined to choose the extremes of a scale and thus might be less reluctant to report that they have thought a lot about retirement.

An alternative explanation for the low number of Dutch respondents who spend much time thinking about retirement lies with the institutional differences between the two countries. After having applied for a job, employees in the Netherlands are tight to their firm's retirement plan and have no say in either the level of retirement savings or in how the savings are invested (Van Rooij, Kool and Prast, 2007). However, the pension benefit is relatively safe as pension funds are required to hold capital buffers to keep the probability of shortfalls low and to be able, with a high degree of certainty, to pay out a nominal pension benefit. Moreover, the pension funds aim for indexation of the pension rights in nominal terms to either price or wage increases. Together with the perception that a regular pension benefit provides for high replacement rates with respect to wage income, Dutch employees might not feel the need to think a lot about retirement. Yet in the United States, the need for employees to think about whether to save, how much to save, and how to allocate savings is much greater. Of course, it is not uncommon for Dutch employees to save more than the compulsory contribution to their company's retirement plan, but this occurs mostly because of

the intention to retire before the regular retirement age of 65. Intentions to retire early are widespread and the prevalence of early retirement plans might very well explain the low number of respondents who have not thought about retirement at all.

To investigate these issues in more detail, we tabulate the responses to the retirement planning question across labor force status in Table 2A. If the argument holds that Dutch employees do not devote much thinking to retirement because they are typically covered by mandatory occupational retirement plans, we would expect to see sharp differences in responses between employees and those who are self-employed. Because the self-employed are not covered by mandatory retirement plans, we could expect that they would make independent provisions for retirement. Indeed, we see that the fraction of self-employed who have given much thought to retirement is double that for employees (15 versus 8 percent). Nevertheless, the number of self-employed respondents who think a lot about retirement in the Netherlands is still well below the number of U.S. respondents who think a lot about retirement. Thus we can conclude that mandatory pension plan participation alone does not explain the difference. Note also that if we sum up the fraction of respondents who have thought “a lot” and “some” about retirement, the difference between respondents in the two countries disappears. In this extended definition, two-thirds of Dutch respondents plan for retirement, a figure that lies between the numbers found for U.S. respondents in the studies by Lusardi and Mitchell (2007a, 2008b). It is striking that compared to the Netherlands, a much higher fraction, namely a quarter to a third, of older U.S. employees has hardly thought about retirement at all (Lusardi and Mitchell, 2007a).

Table 2B presents tabulations across age, education, sex, and marital status. As is to be expected, the young do not think much about retirement, but planning for retirement becomes more prevalent as respondents age (although people in the age range 41–50 still do not think a lot about retirement). Men and couples tend to think more about retirement than women and singles. It is interesting that there is no monotonic increasing relationship between the level of education and thinking about retirement. Respondents with only preparatory vocational training and with higher vocational training think the most about retirement. The opposite is true for respondents with primary education and, to a lesser extent, those with a university education. As regards the U.S. data, tabulations of retirement planning across respondents with less than high school, high school, and more than high school educations do not reveal a non-monotonic pattern (Lusardi, 2003). Differences in retirement planning across education groups in the Netherlands are not statistically significant, however, once we exclude the lowest education category, which contains the small group of respondents who did not

complete any form of secondary education after finishing primary school (at age 12). This result is especially remarkable because in each of the financial literacy measures that we consider below, we do find a strong positive correlation between financial knowledge and thinking about retirement.

Table 2C reports descriptive statistics on the association between retirement planning and our measures of financial literacy. The data show that - similar to the previous results for formal education - the basic financial literacy index is non-monotonically related to thinking about retirement. Those respondents who have thought at least some about retirement are much more prevalent in the group who score just below the maximum score on the basic literacy questions. The link between the index for sophisticated financial literacy and planning for retirement, however, is monotonic: the more financially sophisticated respondents are, the more they think about retirement. These issues arise again in the discussion of the multivariate regression results, below.

6. Multivariate Analysis of Retirement Planning

While the descriptive statistics reveal a strong correlation between financial literacy and thinking about retirement, we are interested to see whether this result holds once we control for a range of socioeconomic characteristics. We therefore perform a multivariate analysis of the relationship between retirement planning and financial literacy. Our dependent variable is a dummy variable that takes the value 1 if the respondent has thought “a lot” or at least “some” about retirement, and 0 otherwise. We include controls for age, education, sex, household composition (marital status and number of children), income, and labor force status to take into account individual heterogeneity that might affect the literacy-planning relationship.

We start with reporting, as a benchmark, the results of a simple OLS (Ordinary Least Squares) regression of retirement planning on socioeconomic controls, excluding a specific measure for financial literacy. The results in the first column of Table 3 show that, as in the bivariate statistics, respondents do not tend to think much about retirement when they are young and retirement is a distant concept. Home ownership is strongly correlated with retirement planning. At the time of the survey, Dutch housing prices had, over a long time period, increased considerably. This creates the opportunity to use home equity as an additional source of retirement savings, which is supported by evidence from a direct question on the intention by households to use their home equity to finance retirement (see also Lusardi and Mitchell, 2007a). The empirical results point to some evidence of those who are

self-employed thinking more about retirement, which makes sense given that they are not covered by mandatory retirement plans. Strikingly, there is no role for education in explaining retirement planning once we control for other individual characteristics and personal circumstances. While according to simple correlation statistics men think more often about retirement than women, the effect of gender disappears in the multivariate setting.

Next, we include among the regressors our measures for basic and advanced financial literacy. Table 3 (column 2) shows that sophisticated financial literacy is strongly associated with thinking about retirement, while the basic literacy index does not predict planning for retirement and the contribution of other control variables does not change qualitatively. This is an important result as it suggests that sophisticated literacy may be an important driver of retirement planning, above and beyond the effects of age, income, education, and other controls for individual heterogeneity in characteristics and circumstances. The size of the estimated financial sophistication coefficient (0.047) suggests that a one standard deviation higher level of financial sophistication is associated to an almost 5 percentage points higher probability of having thought at least some about retirement.

Although, the positive association between financial skills and retirement planning is an interesting finding in itself, we must be careful in interpreting the OLS estimates. First, there might be an endogeneity problem due to omitted variable bias, e.g. the impact of innate ability. We address the impact of the omitted variable ‘ability’ by adding the basic literacy index as a regressor to proxy for very basic cognitive skills and innate ability. Second, the sophisticated literacy index might be surrounded with measurement error and the OLS estimate might be biased towards zero (attenuation bias). More importantly, however, if households who think a lot about retirement would become more financially sophisticated because they gather information or discuss retirement plans with others, then the link might also work in the other direction: from planning for retirement to becoming knowledgeable. All in all, based on these simple estimates, we cannot give a causal interpretation to the fact that sophisticated literacy helps in explaining the observed variation in retirement planning because of the possibility that sophisticated literacy is not determined exogenously but is in fact endogenous. To address the issue of reverse causality, we have gathered information on education of respondents. Specifically, we have asked respondents to report *how much of their education was devoted to economics (a lot, some, little, or hardly at all)*?¹² We assume that economic knowledge acquired during the school period is not related to planning for retirement since for children and young adults the age of retirement is in the very distant

¹² The precise wording is given in appendix B.

future and they are not very likely to have assets, labor income, or coverage by a retirement plan. Table 3 (column 3) shows the outcome of a GMM (General Method of Moments) regression that employs economics education as an instrument for financial sophistication to deal with these problems. The F-statistic reported at the bottom of the table shows that our economics education instrument is a strong predictor of the sophisticated financial literacy index, and the Hansen J statistic does not give rise to a rejection of the overidentifying restrictions. Most importantly, the coefficient of financial sophistication remains positive and strongly significant, increasing by a factor of six, and the empirical results thus suggest that financial knowledge indeed boosts planning for retirement. The effect is also economically meaningful as a one standard deviation increase in financial sophistication goes hand in hand with a non-negligible 28 percentage points higher chance that the respondent plans for retirement.

Surprising at first sight is that the estimate of the basic literacy index is negative and significant (Table 3, column 3). The sophisticated literacy index in the GMM estimates seems to take up all descriptive power and offset the basic literacy effect.¹³ It reflects what we have witnessed in the bivariate statistics: those respondents with a top score for basic literacy tend to think less about retirement than respondents who score just below the highest possible score. Note that we see the same pattern for educational attainment, which might explain the negative coefficient of university education in the retirement planning regression. In Table 3 (columns 4 and 5) we report OLS and GMM estimates in which we exclude the basic financial ability index from the set of control variables to investigate the impact of the interdependency between basic and sophisticated financial literacy. The GMM estimate for the impact of sophisticated financial literacy decreases somewhat but remains positive and strongly significant and is four to five times as large as the OLS estimate. The exogeneity test that compares the OLS and GMM estimates is clearly rejected and supports the notion that it is critically important to use exogenous information to instrument sophisticated financial literacy and to overcome endogeneity problems.

7. Sensitivity Analysis

The multivariate regression estimates suggest that sophisticated financial literacy forms a clear stimulus for retirement planning. To investigate this relationship in more detail, we address the sensitivity of our results to alternative financial literacy measures as well as to

¹³ Indeed, when we run a regression including only the basic literacy index, the estimated coefficient has a positive sign and is statistically significant (results available upon request).

different samples, and we extend our analysis by including measures for risk and time preferences.

Responses to the literacy questions that form the basis for our measure of sophisticated financial literacy are surrounded by noise. For three of the sophisticated financial literacy questions we have experimented with two different wordings of each question.¹⁴ The results indicate a strong impact on response patterns, in particular for the more complicated questions (Van Rooij, Lusardi and Alessie, 2007). Therefore one potential concern with our measure of financial literacy is measurement error. To assess the impact hereof, we have created a financial literacy index that excludes those three questions. Panel A of Table 4 reports the results of the multivariate analysis when we include this alternative measure of financial sophistication. For brevity, we only report the estimates of the variable of our interest, i.e., the sophisticated financial literacy index. This coefficient appears virtually unaffected, i.e., it is positive, statistically significant, and of similar magnitude when compared to results shown in Table 3 (column 3).

Another way to cope with measurement error is by employing a completely different approach to understanding respondents' economic knowledge. In panel B of Table 4 we report the results of a regression using self-reported economic literacy instead of our index of sophisticated financial literacy. Recall that the question on self-reported understanding of economics is simple, refers to day to day economic behavior and might capture other, perhaps more basic, aspects of literacy and economic knowledge as it does not refer to complicated financial products. Indeed, we have seen that there is a strong, albeit not perfect, correlation between self-reported literacy and the other proxies for cognitive ability and financial skill. Both the OLS and GMM estimates of the self-reported literacy variable are positive and strongly significant. Therefore, the effect of literacy on retirement planning is robust to different measures of financial knowledge.

Panel C of Table 4 restricts the sample for the regression analysis to those who are younger than 65 and who did not retire early. The idea is that the respondents who are excluded in this sample split might have quite different characteristics as they have already reached retirement status, thus the planning for retirement response refers to the (distant) past. The younger respondents who remain in the restricted sample still have much to gain from planning for retirement. Note, however, that the estimation results are robust to this age split and, notwithstanding the reduced sample size, the GMM estimate for the financial

¹⁴ Basically, we have reversed the order of the words in questions 14 and 15 in Box 2 and replaced the word *falls* in question 16 with *rises*. For details, we refer to Van Rooij, Lusardi and Alessie (2007).

sophistication coefficient remains strongly statistically significant and even increases somewhat in value.

As a final sensitivity analysis we consider an alternative specification that includes measures for time preference and risk aversion, as experimental evidence and survey research suggest that these preferences might be related to cognitive skills (Benjamin, Brown and Shapiro, 2006; Dohmen et al., 2007). Individuals who are risk averse may, for instance, choose both to invest in becoming literate *and* to prepare for retirement. This would create a spurious correlation between literacy and planning that would, in fact, be driven by an omitted variable. Therefore, to control for this we include risk aversion in our set of control variables. At the same time, people who care a lot about the future have a greater incentive to invest in financial education. Indeed, a field study by Meier and Sprenger (2007) documents evidence that impatient individuals are not willing to sign up for free credit counseling. To exclude the possibility that level of impatience drives the relationship between financial literacy and planning for retirement, we use the planning horizon selected by respondents as the most important in making spending and savings decisions.

Table 5 reports the results of a regression that also includes a crude measure of risk aversion, i.e., it contains the answers to the question measuring to what extent respondents agree or disagree with the statement that they prefer safe investments above taking risk (also used by Donkers and Van Soest, 1999). We thus employ subjective information on time preference and risk aversion, as suggested by Donkers and Van Soest (1999) and Kapteyn and Teppa (2002) since these direct measures appear more informative than objective lottery or gamble based proxies that rely heavily on respondents' cognitive skills. The precise wording of the questions is reported in appendix B. The number of observations is lowered somewhat as we have to retrieve the information on risk and time preferences from the module on economic and psychological concepts in the annual DNB Household Survey and merge the available observations into our data set. Table 5 shows that while risk aversion and, in particular, impatience contribute to the understanding of the observed heterogeneity in retirement planning, their inclusion has no impact on the relationship between financial literacy and thinking about retirement.

Overall, the robustness checks support the conclusion that those who attain higher levels of financial literacy are more likely to think about retirement. The positive and strongly significant financial sophistication coefficient has proven to be robust to different measures of literacy, different samples, and the inclusion of additional explanatory variables. These findings for the Netherlands confirm the conclusions for the U.S. population as reported by

Lusardi and Mitchell (2008b) that the accumulation of economic knowledge and financial skills, which may be obtained via economics education in high school or retirement seminars offered by employers, is an important driver of retirement planning.

8. Discussion

Our findings suggest that Dutch households do not plan much for retirement. These results are consistent with the outcomes of the Dutch Financial Capability Survey commissioned by the Treasury Department showing that many citizens do not have clear long-term financial plans (Van Raaij, Antonides and De Groot, 2008). We document a significantly positive and economically meaningful association between financial sophistication and planning for retirement. While this positive association is an important observation, we also have attempted to assess the causal impact of financial literacy using information on economics education when young. Indeed, we do find a strong causal impact. Although, this result admittedly hinges upon the assumption that our instrument is valid, our conclusion proves robust across different model specifications, samples and sensitivity checks.

Our study confirms the evidence provided by U.S. surveys of the positive impact of financial literacy on planning for retirement using a representative sample for the Netherlands, a country with a completely different pension system and other financial education practices. For instance, the approach and attention devoted to economics education in school curricula is different and there is no Dutch equivalent of employer-based retirement seminars. Regarding the pension system for Dutch employees: typically most of the retirement saving decisions are beyond employees' control and the general perception is that the Dutch system is quite generous. This might contribute to the fact that an astonishingly low number of households (one in eight) claim to have thought a lot about retirement. The information obtained from the query on how much thought has been given to retirement, while being a simple and easily understandable question, is able to capture an important aspect of Dutch household behavior, just as U.S. evidence has revealed a clear relationship between thinking about retirement and the accumulation of wealth. Being a simple question which is easily understandable, it has proven to capture important aspect of household behavior as U.S. evidence has revealed a clear relationship to the accumulation of wealth.

The reason why this indicator of retirement planning is so powerful is that it captures information about the first step in a process of awareness about the importance of planning for retirement. Realizing that it is important to prepare for retirement is the first step; the next

step is to calculate saving needs and develop a concrete saving plan. Psychological research has shown that concrete plans with specific steps are very powerful in increasing self-discipline. Experiments by Gollwitzer (1996, 1999) demonstrate that the development of concrete plans enables people to translate intentions into actions, thus leading to a greater likelihood of attaining stated goals. In this regard, simple planning activities might enable consumers who want to save but who find it difficult to control their expenses to overcome problems of self-control (Ameriks et al., 2007). If these techniques provide a mechanism through which consumers can remedy a lack of self-control, this might explain why merely thinking about retirement contributes to large differences in the accumulation of retirement wealth (Lusardi and Mitchell, 2007a).

That thinking about retirement and how to accumulate retirement savings is by no means a superfluous act has become painfully clear in the current financial crisis. The worldwide stock market downturn has not only caused substantial losses in pension wealth in DC (defined contribution) retirement savings plans but also has affected the capital buffers of many funded DB (defined benefit) pension plans and impaired expectations of financial security at retirement. Moreover, additional evidence that retirement planning impacts the way households experience their retirement is given by Lusardi (2003): She documents evidence that those who prepare for retirement also tend to feel much more comfortable with how their retirement actually turns out.

Our study is also related to the findings by Bernheim, Garret and Maki (2001) and Bernheim and Garrett (2003), who show that financial education in the United States (either in high school or via workplace seminars) has a positive impact on savings. Nevertheless, the debate on how to increase the effectiveness of financial education and saving programs is ongoing (Lusardi, 2009). Our study contributes to the empirical evidence that shows that high levels of financial literacy often correlate with financial household behavior that is consistent with recommended practices for retirement planning (Hilgert, Hogarth and Beverley, 2003; Van Rooij, 2009). Moreover, it strengthens the case for investing in economics education of the young as this might be an important driver to increase overall levels of financial knowledge. This is an important notion for policymakers who are concerned about whether household capabilities are adequate in an economic environment in which households are increasingly required to make intrinsically complicated financial decisions.

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Appendix A. Construction of the basic and sophisticated literacy index

The construction of the basic and sophisticated literacy indices is explained in detail in a previous paper (Van Rooij, Lusardi and Alessie, 2007). In short, the basic literacy index follows from a factor analysis based on five simple questions. For each question, we create a dummy measuring whether the respondent provides the correct answer. The five questions measure numeracy and the understanding of economic concepts (related to the working of inflation and interest rates) that are more or less necessary in day-to-day transactions. The index of sophisticated literacy is based on eleven questions about more advanced concepts like the understanding of stocks and bonds, the relationship between risk and return and the benefits of diversification. To do justice to the important role of “do not know” answers, we have created two dummies for each question, measuring whether the question is answered correctly, and whether the respondent indicated that he did not know the answer, respectively. A factor analysis on these 22 dummies clearly points to one factor that adequately describes the variation in responses. The procedure employed takes into account the use of minor variations in wording for three out of eleven questions. We retain one factor which summarizes respondents’ sophisticated financial literacy using factor scores derived with the Bartlett (1937) method.

Appendix B. Wording of questions and construction of variables used in empirical work

This appendix provides information on important variables used in the regression analysis.

Retirement planning

How much have you thought about retirement?

- A lot
- Some
- Little
- Hardly at all
- Do not know
- Refusal

In the regression analysis, we use a dummy which takes the value 1 if respondents have thought ‘a lot’ or ‘some’ about retirement, and 0 otherwise.

Economics education

How much of your education was devoted to economics?

- A lot
- Some
- Little
- Hardly at all
- Do not know
- Refusal

The instrument variable *economics education in the past* is used in the regression analysis by including four dummy variables for the response categories ‘some’, ‘little’, ‘hardly at all,’ and ‘do not know/refusal’ respectively. The reference group consists of those respondents whose education was devoted ‘a lot’ to economics.

Self-reported literacy

How would you assess your understanding of economics (on a 7-points scale; 1 means very low and 7 means very high)?

- | | | | | | | |
|--------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| <i>Very low</i> | | | | | | <i>Very high</i> |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| <input type="checkbox"/> Do not know | | | | | | |
| <input type="checkbox"/> Refusal | | | | | | |

The index of *reported literacy* used in the regression analysis is constructed by grouping together the two lowest categories (very few respondents have chosen the lowest level), recoding the remaining six levels of self-assessed literacy from 1 to 6 and excluding ‘do not know’ answers and ‘refusals.’

Spending/saving horizon

People use different time horizons when they decide about what part of the income to spend, and what part to save. Which of the time horizons mentioned below is in your household MOST important with regard to planning expenditures and savings?

- The next couple of months
- The next year
- The next couple of years
- The next 5 to 10 years
- More than 10 years from now

In the regression analysis, we group together the last two categories into a single 'more than 5 years from now' category since the original 'more than 10 years from now' category has a limited number of observations. The reference group in the empirical work consists of those respondents who state that the most important time horizon is shortest, i.e. the next couple of months.

Risk aversion

To what extent do you agree or disagree with the statement '*I think it is more important to have safe investments and guaranteed returns than to take risk to have a chance to get the highest possible returns*' (on a scale from 1 to 7, where 1 means 'completely disagree' and 7 means 'completely agree')?

- | | | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| <i>Completely disagree</i> | | | | | | <i>Completely agree</i> |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |

Because the first three categories have a limited number of observations, we group them together into one single category in the regression analysis. The new category contains the least risk averse respondents and serves as a reference group in the empirical work.

Figure 1A Distribution of responses to basic literacy questions

Weighted percentage of total number of respondents (N = 1508)

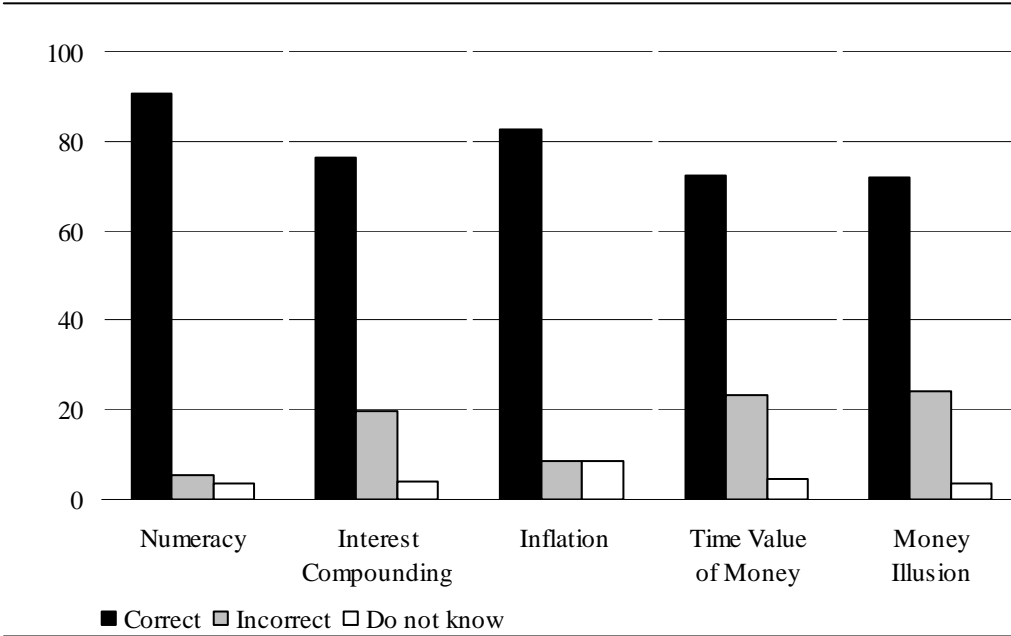


Figure 1B Distribution of the number of correct responses to five basic literacy questions

Weighted percentage of total number of respondents (N=1508)

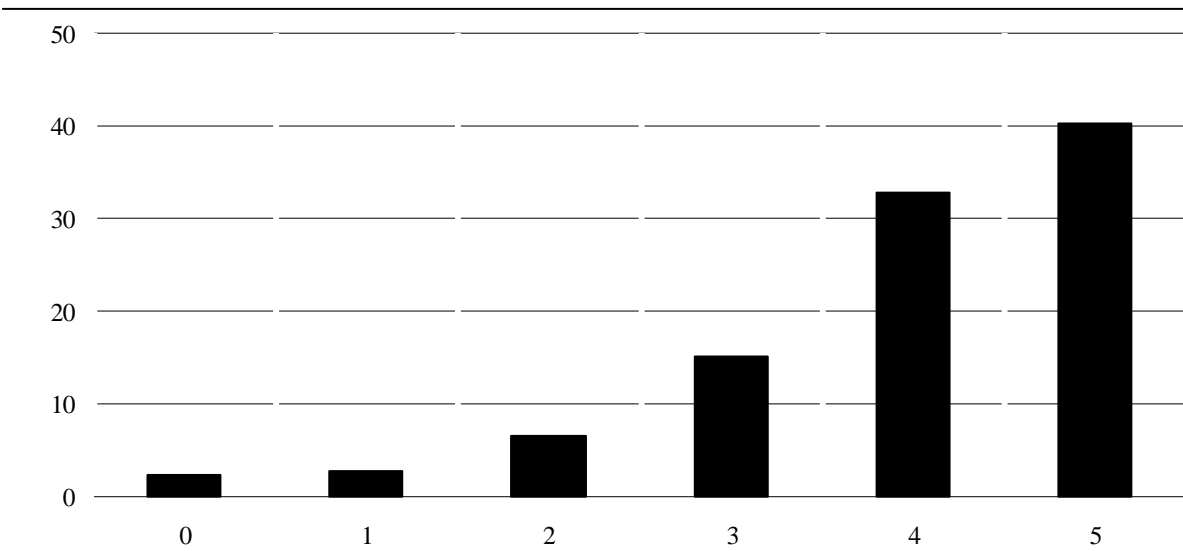


Figure 2 Basic literacy across demographics

Average number of correct answers (out of five)

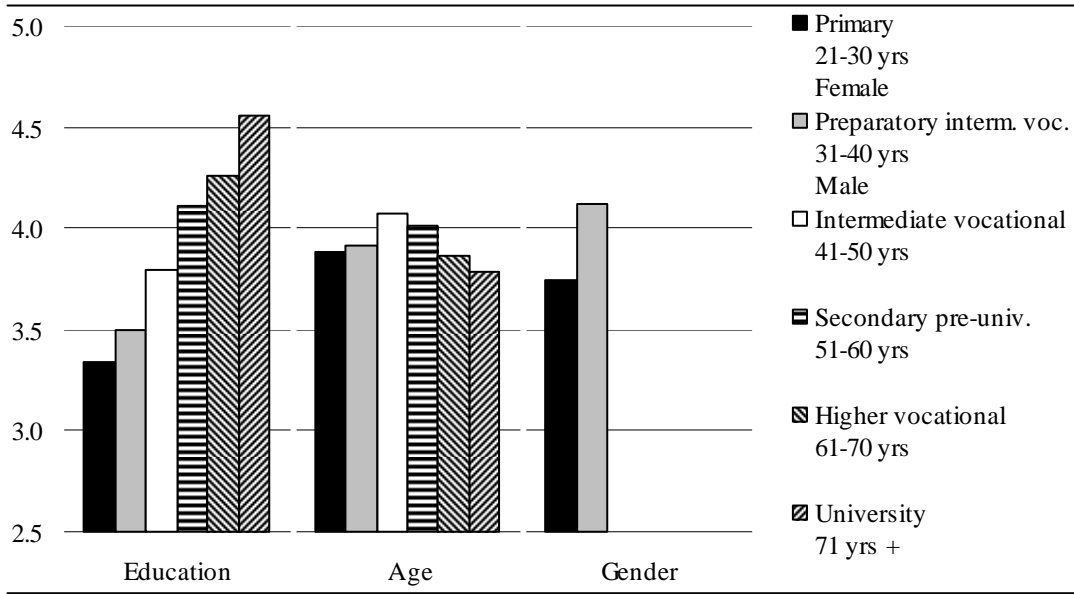
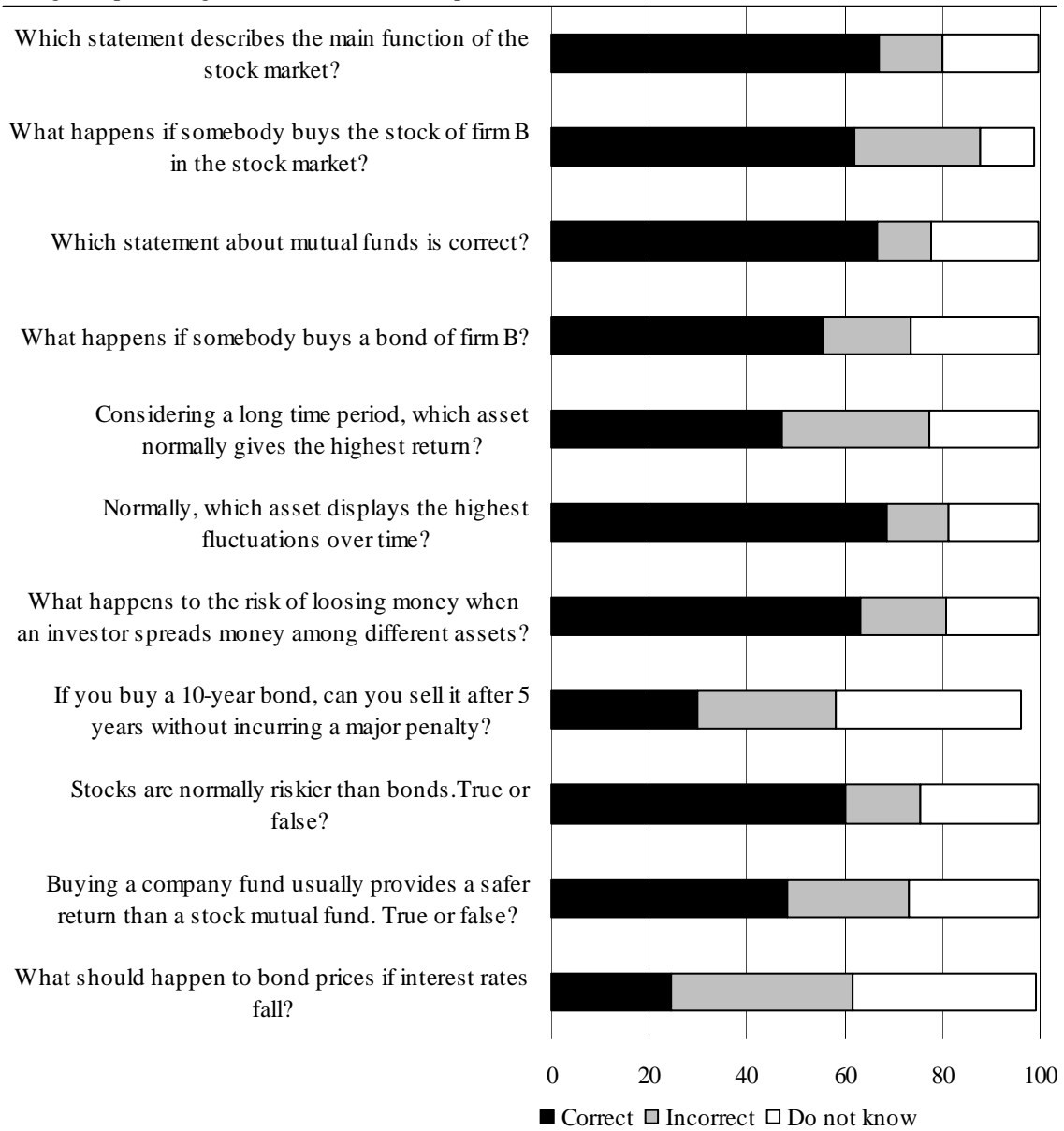


Figure 3A Distribution of responses to sophisticated literacy questions

Weighted percentages of total number of respondents (N = 1508)



Note: See Box 2 in the text for the exact wording and the answer options of the sophisticated literacy questions. Correct, incorrect and do not know responses do not sum up to 100% because of refusals.

Figure 3B Sophisticated literacy: Summary of responses

Weighted percentages of total number of respondents (N = 1508)

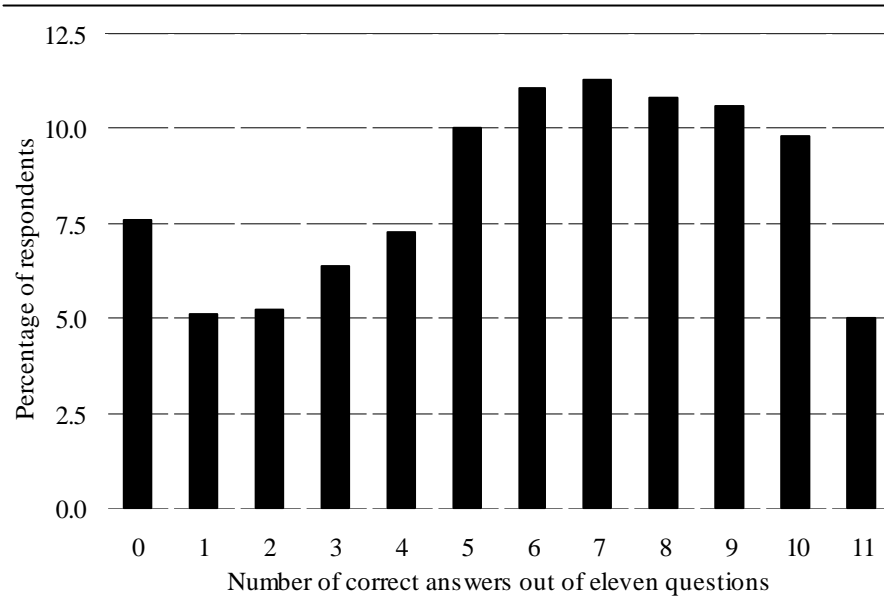


Figure 4 Sophisticated literacy across demographics in the Netherlands

Average number of correct answers (out of eleven)

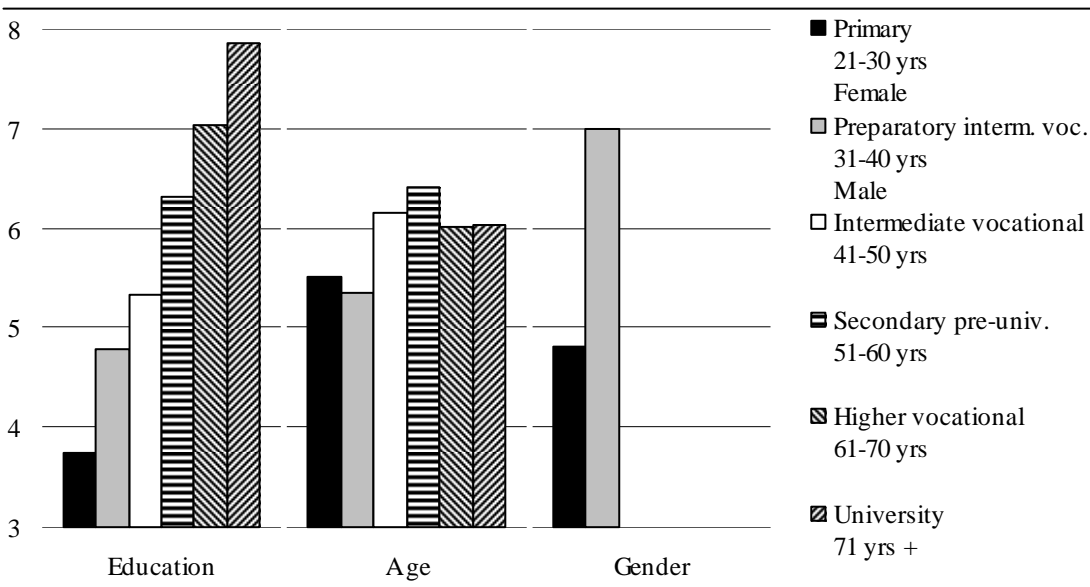
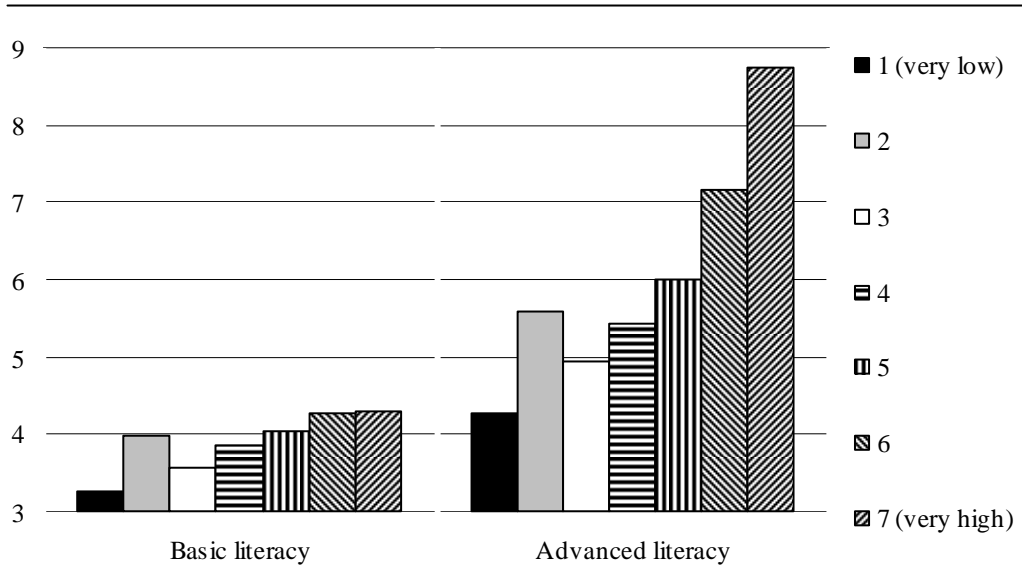


Figure 5 Basic and sophisticated literacy and self-reports of literacy

Average number of correct answers



Note: Self-reported literacy is measured on a scale from 1 (very low) to 7 (very high)

Table 1 Multivariate regression analysis of basic and sophisticated financial literacy

Dependent variable	Basic literacy	Sophisticated literacy	Sophisticated literacy
Basic financial literacy index			0.31*** (13.4)
Age dummy (30<age<=40)	0.0086 (0.073)	-0.076 (-0.78)	-0.079 (-0.90)
Age dummy (40<age<=50)	0.13 (1.19)	0.028 (0.30)	-0.013 (-0.16)
Age dummy (50<age<=60)	0.049 (0.42)	0.13 (1.39)	0.12 (1.35)
Age dummy (60<age<=70)	0.064 (0.44)	0.13 (1.08)	0.11 (0.98)
Age dummy (age>70)	-0.037 (-0.20)	0.088 (0.66)	0.099 (0.79)
Intermediate vocational education	0.21* (1.94)	0.16* (1.89)	0.096 (1.24)
Secondary pre-university education	0.64*** (6.82)	0.46*** (5.61)	0.26*** (3.39)
Higher vocational education	0.54*** (5.89)	0.45*** (6.24)	0.28*** (4.21)
University education	0.65*** (6.39)	0.59*** (7.65)	0.39*** (5.28)
Male	0.25*** (3.59)	0.41*** (7.70)	0.33*** (6.69)
Married	-0.041 (-0.49)	-0.16** (-2.42)	-0.14** (-2.36)
Number of children	-0.065* (-1.70)	-0.048 (-1.62)	-0.028 (-1.09)
Employee	-0.071 (-0.70)	-0.15* (-1.80)	-0.13* (-1.68)
Self-employed	0.019 (0.13)	0.015 (0.12)	0.0089 (0.078)
Retired	-0.12 (-0.93)	-0.13 (-1.35)	-0.090 (-1.01)
Home	0.19** (2.39)	0.23*** (3.75)	0.17*** (2.99)
Net disposable HH income (q2)	0.11 (0.84)	0.26** (2.52)	0.23** (2.37)
Net disposable HH income (q3)	0.29** (2.19)	0.28** (2.54)	0.19* (1.87)
Net disposable HH income (q3)	0.37*** (2.65)	0.52*** (4.52)	0.40*** (3.78)
Constant	-0.76*** (-4.51)	-0.78*** (-6.03)	-0.55*** (-4.46)
Observations	1508	1508	1508
R-squared	0.10	0.18	0.30
p-value test age=0	0.73	0.25	0.18
p-value test education=0	0.00	0.00	0.00
p-value test HH income=0	0.02	0.00	0.00

Note: OLS estimation results. Absolute value of robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 2A Retirement planning across labor force status

Weighted percentages

Labor market status	How much have you thought about retirement?					N
	A lot	Some	A little	Hardly	DK	
Employees	8.2	56.6	26.1	7.7	1.5	795
Self-employed	15.0	54.6	25.3	5.2	0.0	68
Retired	24.4	51.5	21.5	2.7	0.0	302
Other	12.7	42.5	35.1	9.3	0.3	343
Total	12.9	51.1	28.1	7.2	0.8	1508

Pearson $\chi^2(12) = 61.64$ (p=0.000)

Note: Note: DK = 'Do not know' or 'Refusal'; Percentages may not sum up to 100 due to rounding.

Table 2B Retirement planning across demographics

Weighted percentages

Education	How much have you thought about retirement?					N
	A lot	Some	A little	Hardly	DK	
Primary	20.0	26.0	37.1	16.0	0.8	67
Preparatory intermediate voc.	13.0	54.0	26.2	6.4	0.4	345
Intermediate vocational	9.4	53.8	26.0	9.3	1.6	295
Secondary pre-university	11.9	47.6	30.4	9.4	0.7	207
Higher vocational	13.3	58.5	24.9	2.8	0.5	397
University	15.5	44.7	33.1	5.9	0.8	197
Total	12.9	51.1	28.1	7.2	0.8	1508

Pearson chi2(20) = 38.82 (p=0.007)

Age	How much have you thought about retirement?					N
	A lot	Some	A little	Hardly	DK	
21-30 years	1.9	36.7	38.3	22.4	0.7	179
31-40 years	7.7	48.3	33.8	9.2	1.0	306
41-50 years	8.8	56.9	28.8	4.5	0.9	333
51-60 years	17.4	55.1	21.9	4.2	1.4	311
61-70 years	20.3	56.1	21.4	2.2	0.0	217
71 years and older	24.9	49.6	24.0	1.5	0.0	162
Total	12.9	51.1	28.1	7.2	0.8	1508

Pearson chi2(20) = 160.12 (p=0.000)

Gender	How much have you thought about retirement?					N
	A lot	Some	A little	Hardly	DK	
Male	14.9	53.1	24.5	6.6	0.8	834
Female	10.8	48.9	31.8	7.8	0.7	674
Total	12.9	51.1	28.1	7.2	0.8	1508

Pearson chi2(4) = 21.72 (p=0.000)

Marital status	How much have you thought about retirement?					N
	A lot	Some	A little	Hardly	DK	
Single/divorced/widow	11.7	47.0	31.8	8.9	0.6	476
Married/living together	13.8	54.2	25.2	5.9	0.9	1032
Total	12.9	51.1	28.1	7.2	0.8	1508

Pearson chi2(4) = 8.05 (p=0.090)

Note: Note: DK = 'Do not know' or 'Refusal'; Percentages may not sum up to 100 due to rounding.

Table 2C Retirement planning and literacy

Weighted household percentages

		How much have you thought about retirement?					
Basic financial literacy		A lot	Some	A little	Hardly	DK	N
1 (low)		9.2	45.0	31.5	10.4	3.8	217
2		13.1	51.4	27.6	7.8	0.2	284
3		12.6	58.0	21.2	8.3	0.0	350
4 (high)		14.7	49.8	30.6	4.9	0.1	657
Total		12.9	51.1	28.1	7.2	0.8	1508
		Pearson chi2(12) = 75.82					(p=0.000)

		How much have you thought about retirement?					
Sophisticated financial literacy		A lot	Some	A little	Hardly	DK	N
1 (low)		8.8	46.4	31.7	10.4	2.7	330
2		10.6	49.4	31.6	8.4	0.0	354
3		14.2	52.7	26.1	7.0	0.0	371
4 (high)		18.0	55.8	22.8	3.0	0.4	453
Total		12.9	51.1	28.1	7.2	0.8	1508
		Pearson chi2(12) = 81.46					(p=0.000)

		How much have you thought about retirement?					
Self-assessed economic literacy		A lot	Some	A little	Hardly	DK	N
1 (very low)		8.0	9.4	71.4	11.2	0.0	9
2		16.6	27.8	44.2	11.5	0.0	56
3		4.8	42.7	40.8	11.1	0.6	137
4		10.5	54.4	28.1	6.7	0.2	366
5		12.7	55.6	25.2	6.5	0.0	499
6		16.9	56.0	21.6	5.1	0.4	355
7 (very high)		33.8	35.3	20.5	10.4	0.0	45
Total		13.0	51.7	28.0	7.1	0.2	1467
		Pearson chi2(24) = 92.35					(p=0.000)

Note: Note: DK = 'Do not know' or 'Refusal'; Percentages may not sum up to 100 due to rounding.

Table 3 Multivariate regression analysis of retirement planning

	OLS (1)	OLS (2)	GMM (3)	OLS (4)	GMM (5)
Sophisticated financial literacy		0.047*** (3.39)	0.28*** (4.51)	0.052*** (4.04)	0.24*** (4.77)
Basic financial literacy		0.010 (0.95)	-0.062*** (-2.75)		
Age dummy (30<age<=40)	0.13*** (2.83)	0.14*** (2.94)	0.16*** (3.14)	0.14*** (2.95)	0.15*** (3.11)
Age dummy (40<age<=50)	0.18*** (3.87)	0.18*** (3.83)	0.19*** (3.76)	0.18*** (3.87)	0.18*** (3.64)
Age dummy (50<age<=60)	0.30*** (6.70)	0.29*** (6.65)	0.27*** (5.78)	0.29*** (6.63)	0.27*** (5.94)
Age dummy (60<age<=70)	0.31*** (5.53)	0.31*** (5.46)	0.28*** (4.63)	0.31*** (5.45)	0.28*** (4.74)
Age dummy (age>70)	0.32*** (5.00)	0.32*** (4.99)	0.30*** (4.30)	0.32*** (4.97)	0.30*** (4.47)
Intermediate vocational education	0.030 (0.82)	0.020 (0.55)	-0.0024 (-0.058)	0.021 (0.59)	-0.0092 (-0.23)
Secondary pre-university education	-0.00063 (-0.016)	-0.029 (-0.74)	-0.090* (-1.88)	-0.025 (-0.63)	-0.11** (-2.28)
Higher vocational education	0.051 (1.57)	0.025 (0.75)	-0.039 (-0.98)	0.028 (0.85)	-0.055 (-1.33)
University education	-0.031 (-0.73)	-0.065 (-1.55)	-0.15*** (-3.20)	-0.061 (-1.46)	-0.17*** (-3.42)
Male	0.033 (1.32)	0.011 (0.44)	-0.065* (-1.80)	0.012 (0.46)	-0.065* (-1.82)
Married	-0.0095 (-0.30)	-0.0017 (-0.052)	0.031 (0.84)	-0.0013 (-0.040)	0.027 (0.76)
Number of children	-0.0083 (-0.61)	-0.0054 (-0.40)	0.00095 (0.065)	-0.0058 (-0.43)	0.0034 (0.24)
Employee	0.056 (1.37)	0.064 (1.57)	0.093** (2.05)	0.064 (1.57)	0.091** (2.06)
Self-employed	0.11* (1.69)	0.11 (1.64)	0.11 (1.44)	0.11 (1.64)	0.11 (1.46)
Retired	0.0078 (0.17)	0.015 (0.33)	0.038 (0.76)	0.014 (0.31)	0.041 (0.83)
Home	0.14*** (4.79)	0.13*** (4.34)	0.084** (2.44)	0.13*** (4.36)	0.082** (2.41)
Net disposable HH income (q2)	0.019 (0.41)	0.0051 (0.11)	-0.047 (-0.84)	0.0050 (0.11)	-0.042 (-0.77)
Net disposable HH income (q3)	0.042 (0.89)	0.025 (0.53)	-0.016 (-0.27)	0.027 (0.56)	-0.022 (-0.38)
Net disposable HH income (q3)	0.062 (1.24)	0.033 (0.65)	-0.059 (-0.88)	0.035 (0.68)	-0.061 (-0.92)
Constant	0.29*** (4.89)	0.33*** (5.53)	0.46*** (5.97)	0.33*** (5.47)	0.48*** (6.14)
Observations	1508	1508	1508	1508	1508
R-squared	0.09	0.11		0.10	
p-value test age=0	0.00	0.00	0.00	0.00	0.00
p-value test education=0	0.22	0.16	0.01	0.17	0.00
p-value test HH income=0	0.58	0.86	0.58	0.84	0.65
p-value Hansen J test			0.19		0.14
F-statistic first stage regression			30.8		35.2
p-value exogeneity test			0.00		0.00

Note: Dependent variable takes the value 0 if the respondent thinks 'a lot' or 'some' about retirement and 0 otherwise. The sophisticated literacy index has been instrumented using three dummy variables indicating how much the respondent's schooling was devoted to economics. The reference group in the instrument set consists of respondents whose education was devoted a lot to economics. Absolute value of robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1;

Table 4 Robustness checks: alternative literacy indices and different samples

Panel A Excluding randomized questions		
	OLS	GMM
Sophisticated financial literacy index (without randomized questions)	0.046*** (3.33)	0.30*** (4.39)
Observations	1508	1508
R-squared	0.11	
p-value Hansen J test		0.19
F-statistic first stage regression		25.7
p-value exogeneity test		0.00
Panel B Using self-reported literacy		
	OLS	GMM
Self-reported economics understanding	0.074*** (6.90)	0.16*** (4.84)
Observations	1467	1467
R-squared	0.12	
p-value Hansen J test		0.32
F-statistic first stage regression		51.8
p-value exogeneity test		0.00
Panel C Sample excluding the retired		
	OLS	GMM
Sophisticated financial literacy index (sample restricted to exclude the retired)	0.047*** (2.68)	0.33*** (3.82)
Observations	1049	1049
R-squared	0.121	
p-value Hansen J test		0.59
F-statistic first stage regression		17.0
p-value exogeneity test		0.00

Note: Dependent variable takes the value 0 if the respondent thinks ‘a lot’ or ‘some’ about retirement and 0 otherwise. The sophisticated and self-reported literacy variable has been instrumented using three dummy variables indicating how much the respondent’s school education was devoted to economics. The reference group in the instrument set consists of those respondents whose education was devoted a lot to economics. All regressions include the vector of socioeconomic variables listed in Table 3. Absolute value of robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1;

Table 5 Robustness checks: including time and risk preferences

	OLS	GMM
Sophisticated financial literacy index	0.041*** (2.73)	0.33*** (4.67)
<i>It is better to have safe investments than take risk (agree or disagree? scale 1-7)</i>		
- Risk aversion dummy for category 4 (not agree and not disagree)	0.019 (0.42)	0.071 (1.31)
- Risk aversion dummy 5	0.045 (1.03)	-0.0074 (-0.15)
- Risk aversion dummy 6	0.11*** (2.68)	0.11** (2.37)
- Risk aversion dummy 7 (completely agree)	0.065 (1.52)	0.061 (1.27)
<i>Planning horizon for expenditures and savings (dummies for:)</i>		
- One year ahead	0.11*** (3.10)	0.10*** (2.67)
- Next couple of years ahead	0.14*** (4.43)	0.16*** (4.31)
- More than 5 years from now on	0.16*** (4.25)	0.13*** (3.09)
Observations	1310	1310
R-squared	0.12	
p-value risk aversion	0.05	0.04
p-value time planning horizon	0.00	0.00
p-value Hansen J test		0.16
F-statistic first stage regression		26.8
p-value exogeneity test		0.00

Note: Dependent variable takes the value 0 if the respondent thinks ‘a lot’ or ‘some’ about retirement and 0 otherwise. The sophisticated literacy index has been instrumented using three dummy variables indicating how much the respondent’s school education was devoted to economics. The reference group in the instrument set consists of those respondents whose education was devoted a lot to economics. The reference group for risk aversion and planning horizon contains those respondents who are least risk averse (answer categories 1-3) and those who plan expenditures and savings a couple of months ahead, respectively. All regressions include the vector of socioeconomic variables listed in Table 3. Absolute value of robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1;

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