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Who lacks pension knowledge, why and does it matter? Evidence from Swedish retirement savers[a]

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Abstract

Recent pension reforms have shifted a larger responsibility towards savers. Individuals therefore need better knowledge of the rules and incentives embedded in the pension system to adequately save and prepare for retirement. In this paper, we use a novel Swedish survey matched with high-quality administrative data to show that many lack, and feel that they lack, such pension-specific knowledge. We also show that the most economically vulnerable groups know the least. Linking pension knowledge to behavior, we find that knowing less is associated with lower preparedness for retirement, even after controlling for financial literacy and subjective knowledge. Moreover, a large majority state the complexity of the pension system, or that they have planned to learn more about pensions but that it just hasn't happened, as reasons for why they do not have sufficient knowledge. That the complexity of the pension system and individuals' proclivity to procrastinate are plausible causal factors for low pension knowledge is supported by analyses showing that individuals with low math skills and procrastination tendencies have lower pension knowledge.

Keywords: bounded rationality, financial literacy, saving, pension system

JEL codes: H55, D80, D83

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Contents

1 Introduction

During the last decades, pension systems have in many countries been reformed in such a way that individuals or households bear a larger responsibility for their pension incomes. Typically, pension systems have changed from relying on a defined benefit to a defined contribution structure. This transition means that the demographic and financial risks have been shifted from the pension plan administrator to the individual retirement saver. These reforms thus increase the number of choices individuals need to make in the labor market and within the pension system to appropriately prepare for retirement. This heavy reliance on individual competence in the realm of financial decision-making may thus affect economic well-being in the long run and income inequality in old age.[1]

As pension choices are complex and contingent on many rules, these reforms require individuals to learn more about the pension system in order to make good choices and plan adequately for retirement. Previous studies have documented a link between retirement planning and general financial literacy (Lusardi and Mitchell 2014). In particular, those with lower financial literacy amass less retirement wealth (Behrman et al. 2012), and are less likely to plan for retirement (Lusardi and Mitchell 2011b).[2] However, while general financial knowledge is important for making good financial decisions, it may not be enough, as discussed by Hastings and Skimmyhorn (2013) and Fernandes et al. (2014), to prepare individuals for the relatively sophisticated and infrequent choices related to pensions, such as how much to save, where to invest and when to retire. Individuals may need to have more specific knowledge about the pension system to make rational decisions.

As a result, other studies have examined the role of knowledge more specifically linked to pensions. In particular, many retirement savers have been shown to be ignorant about their own pension situation and the incentives they face. As for such *individual-specific* knowledge, individuals may not know about how much they contribute to retirement (Gustman and Steinmeier 2005; Chan and Stevens 2008), the potential size of their future pension (Gustman and Steinmeier 2004; Maunu 2007; Barrett et al. 2015) and pension choices they may have made in the past (Hagen ming). Chan and Stevens (2008) further show that those who are ill-informed or ignorant about their pension wealth during the savings phase are more likely to choose sub-optimal retirement dates and fail to respond to built-in incentives in the pension system, compared to the well-informed.[3]

[1] Lusardi et al. (2017) show that 30–40 percent of retirement wealth inequality in the US can be accounted for by differences in financial knowledge.

[2] Individuals with lower financial literacy have also been shown to be less good at detecting financial fraud (Engels et al. 2019) and less likely to choose mutual funds based on fundamentals (Hastings et al. 2011). Lack of financial knowledge can also explain people's generally low levels of investment and low participation in the stock market (van Rooij et al. 2011).

[3] Knowledge or information has been suggested to reduce planning costs as knowledge on how pensions are built-up or paid out may facilitate planning of retirement savings. For example, Duflo and Saez (2003) show how individuals being induced to get information about retirement savings had a positive significant effect on participation

In contrast to such *individual-specific* knowledge, individuals may also lack knowledge about the rules and incentives embedded in the pension system at a more general level. Landerretche and Martínez (2013) explore the importance of *system-specific* knowledge and show that Chileans with greater knowledge about the pension system are more likely to have additional retirement savings. Exploiting time and cross-country variation in pension regulations in several European countries, Bucher-Koenen et al. (2019) show that the effect of pension reforms on individuals' labor supply decisions is driven by individuals with a good knowledge of such reforms.[4]

Using a novel and detailed large-scale survey on individuals' knowledge about pensions we evaluate how well-informed the public is about their own pension and the pension system, document socioeconomic and demographic gradients in pension knowledge, as well as reasons for why so many seem to lack adequate pension knowledge. We also analyze the relationship between pension knowledge and preparedness for retirement and compare the role of pension knowledge with financial literacy for a large battery of questions capturing various aspects of retirement planning.

With our broad survey design we can also differentiate between many aspects of pension knowledge. First, we differentiate between *system-specific* knowledge that is related either to the phase of building up a pension capital—the accumulation phase, or to the phase when the pension is taken out—the decumulation phase. Second, by matching administrative register data to our survey results, we can identify the *individual-specific* pension knowledge in terms of accumulated contributions and pension fund management choices. Third, we compare if individuals' subjective knowledge of the pension system works different from their objective pension knowledge in explaining retirement preparedness. Previous studies have shown that self-perceptions of financial knowledge—-conditional on actual knowledge—-may influence financial behaviors and retirement preparedness (Allgood and Walstad 2016; Anderson et al. 2017; Angrisani and Casanova 2019). To our knowledge, we are the first to study the role of subjective vs actual *pension* knowledge on retirement preparedness. Finally, we contrast our measures of pension knowledge vis-à-vis more general financial knowledge by controlling for financial literacy. The only study we are aware of that simultaneously considers the role of financial literacy and knowledge about the pension system for retirement planning is Pedroni and Rieskamp (2015).[5]

The survey was conducted at the end of 2017 and early 2018 and was sent to 12,000 randomly selected individuals between the ages of 31 and 60 (born 1957–1986) with a response rate of about

rates in retirement savings plans.

[4]There are also studies which examine how *expectations* about future retirement age and replacement rates are updated when individuals are hit by reforms that change eligibility ages or benefit calculations. While Okumura and Usui (2014) find that Japanese individuals update their expectation by almost the same amount as the increase in the pensionable age, Coppola and Wilke (2014) and Bottazzi et al. (2006) find evidence of limited expectations revision among German and Italian retirement savers, in particular among the most vulnerable indivudals.

[5]In line with our findings, they find that knowledge about the specifics of the pension system is more strongly correlated with private retirement savings than financial literacy among Swiss retirement savers.

30 percent. In the survey, we ask factual questions about the Swedish pension system that pertain both to the accumulation phase (e.g. fee levels and at what levels pension contributions are capped or increases) and payout phase of retirement (e.g. retirement ages and withdrawal periods). We also ask the "Big 3" questions on financial literacy (Lusardi and Mitchell 2014), allowing us to address the role of specific pension knowledge while accounting for financial literacy. The survey responses are matched to individual-level administrative data on pension contributions and fund management choices in the public pension system, as well as a rich set of socioeconomic and demographic variables.

We ask respondents a number of questions that relate to retirement planning: whether they have tried to figure out how much they need to save for retirement, if they save for their retirement, if they have planned at what age they will retire and if they have made a forecast of their pension. We also ask how they feel about their retirement preparedness: if they are happy with the amount that they save, and to what extent they worry about their pension.

Our first finding suggests that a large fraction of the population of retirement savers lack basic pension knowledge. More than two thirds of the respondents in our survey also say that they do not have sufficient knowledge to understand how their own choices affect their future pension. When analyzing the answers to a large number of factual questions, this picture is reinforced as a large majority was not able to answer even half of the questions correctly.

Second, we also document a large degree of heterogeneity in pension knowledge: it is on average lower among younger, the less educated, low-income earners and women. Notably, these groups are more vulnerable to economic distress, suggesting that those who lack knowledge could be those that need it the most.

Third, we find that individuals are more informed about rules surrounding the decumulation (payout) phase compared to the accumulation (savings) phase or their individual-specific circumstances (e.g., own pension wealth).

Fourth, using multiple regression analysis, we find that pension knowledge is highly correlated with different retirement planning outcomes. Those who have more knowledge about the Swedish pension system are more likely to have planned or be prepared for their retirement than those who have less of that specific knowledge. In addition, we find that specific knowledge about the pension system is more important for decision-making related to retirement than general financial literacy. Similar to the results for objective knowledge, we find that those who believe they lack adequate pension knowledge are also less likely to plan for retirement. In addition—and different from the results for objective knowledge—we find that they are more worried about their pension and less likely to be satisfied with their current savings. Individuals who are more ignorant about their own pension, i.e. score lower on the *individual-specific* pension questions, also worry more about their future pension.

Fifth, to get at the question of why so many lack adequate knowledge, we ask individuals who perceive themselves as ignorant why they have not acquired sufficient pension knowledge. Close to 80 percent point out the complexity of the pension system as an obstacle to acquire adequate knowledge, and about as many state that they had planned to learn more about the pension system, but that it "just hasn't happened". In fact, the latter share is fairly constant across different age groups, indicating substantial procrastination. To explore whether individuals' ability to understand the pension system, as well as whether procrastination plays a role in explaining individuals' lack of pension knowledge, we use questions about respondents' time preferences and math skills.[6] We find that those who are impatient, tend to procrastinate and have low math skills have comparatively little pension knowledge, supporting the notion that the complexity of the pension system and individuals' tendencies to procrastinate are plausible causal mechnisms for the lack of pension knowledge.

Our design and results broadly contribute to the large literature on pension choices, addressing the question on how to prepare individuals for retirement and the role of knowledge. In addition, our study contributes by studying Sweden, a particularly interesting case to study as it was one of the first countries to reform the pension system in response to the challenge imposed by an ageing population. The reform, which was implemented in 1999, resulted in a shift from defined benefit to defined contribution, and introduced individually managed mutual fund portfolios (Barr 2013; Hagen 2017). Because the reform shifted responsibility from the government to the individual retirement savers, individuals need to be more knowledgeable about the pension system in order to plan well for their financial well-being at older ages. Moreover, in 2017, 16 percent of all elderly (65+) in Sweden were at risk of poverty, i.e. having an income lower than 60 percent of median income (Eurostat, 2019), indicating that many have not saved enough. This share is slightly below the EU average, but well above the other Nordic countries where 6–13 percent of the elderly are at risk of poverty. The design of the Swedish pension system has also caught considerable attention, most recently by Cronqvist et al. (2018) showing that nudges built into the choice architecture have had persistent effects on choices within the system (see also e.g Cronqvist and Thaler 2004; Palme et al. 2007; Cesarini et al. 2010; Hagen et al. 2018). However, while this previous literature has studied the outcome of these choices, we study the direct knowledge of the choice-architecture. The system has now been in effect for around twenty years, giving individuals ample time to adapt. It is therefore a good time to evaluate whether individuals know enough about the pension system to make informed choices regarding their future retirement.

The rest of the paper is structured as follows. Section 2 provides an institutional background to the Swedish pension system. Section 3 describes the survey and the register-based data sources. Section 4 presents the results and Section 5 concludes.

[6]Our questions are inspired by recent work on general economic preferences (see, e.g., Falk et al. 2018)

2 Institutional background

The Swedish pension system has three pillars: a universal public pension system, quasi-mandatory occupational pensions (for workers whose employer is tied to some occupational pension plan) and private savings. Below, we discuss these pillars briefly (for a more detailed description of the Swedish pension system, see Barr 2013 and Hagen 2013, 2017). The purpose is to provide some essential information about the system retirement savers need to be knowledgeable about.

The public pension is the most important source of pension income for most retirees. The current public pension system in Sweden was introduced in 1999, being changed from a defined-benefit (DB) to a predominantly defined-contribution (DC) system. The total contribution to the public pension system is 18.5 percent of the salary and other taxable benefits up to a maximum level (the income ceiling).[7]

The public pension system has in itself three tiers. The first two tiers are income-related and are referred to as the income pension and the premium pension, to which 16 percent and 2.5 percent of earnings are contributed, respectively. The income pension is a pay-as-you-go system which indexes pension rights to the average wage growth in Sweden. Contributions to the premium pension are allocated to individual financial accounts where individuals choose how to invest their funds. The Swedish Pensions Agency keeps track of the accounts and executes the desired portfolio investments. It is also the Swedish Pensions Agency that administers the public pension and related pension benefits and provides information about them. The third tier is called the minimum guarantee and is paid out to pensioners above 65 years of age who have low or no earnings-related pension.

There is no set age at which people must retire in Sweden, nor is there an upper age limit on how long an individual may work. However, the public pension can be paid out at the earliest at age 61, while unemployment protection is lifted at age 67.

The second pillar consists of a number of different occupational, employer-provided pension plans. A similar transition to a DC system as that in the public pension has taken place also in the occupational pension system. In the old DB system, transferability of accumulated assets was limited, and benefits after retirement were typically received in the form of life annuities. Currently, individuals can choose how to invest their occupational pension wealth and the pension can be paid out during a fixed number of years (minimum of five years) as an alternative to lifetime annuitization (Hagen 2015). Available estimates suggest that at least 90 percent of the total work force today are covered by the four major occupational pension plans (Kjellberg 2018; Inspektionen för socialförsäkringen 2018). Contributions to the second pillar are essentially proportional to

[7]The ceiling is currently at 7.5 income base amounts, which for 2018 meant an annual income of 468,750 SEK. This figure corresponds to roughly 52,000 USD (1 USD $\approx$ 9 SEK) or 47,000 EUR (1 EUR $\approx$ 10 SEK) per year.

income up to the income ceiling. The employer is mandated to contribute between 4 percent and 6 percent of the wage that does not exceed the income ceiling. For wages above this threshold, marginal contribution rates are much higher, typically around 30 percent. The minimum claiming age is in most cases 55, and the pension is typically paid out from age 65 if no action is taken.[8]

The third pillar consists of private savings. Up until 2016 there were tax incentives to save in individual retirement accounts, but the tax rebate has since been abolished. Any long term savings can thus be considered as retirement savings, depending on the intention behind the saving and how it eventually affects personal finances during retirement.

In 2018, the average pension in Sweden was 17,589 SEK (roughly equivalent to 2,000 USD or 1,800 EUR) per month before taxes, of which 68%, 27% and 5% can be attributed to the first, second and third pillar (only the tax-favored individual retirement accounts mentioned above), respectively.[9] The net replacement rate was 53.4%, slightly below the OECD average of 58.6% (OECD, 2020).

3 Data

At the end of 2017 and early 2018, we conducted the survey Economy and Pension 2017.[10] The purpose of the study was to measure Swedish retirement savers' knowledge of—and attitudes towards—the pension system.

The survey was sent to 12,000 randomly selected individuals between the ages of 31 and 60 (born 1957–1986). The sample was stratified on age such that 6,000 individuals in the age group 31–50 (born 1967–1986) were selected (300 each year), while 6,000 individuals in the age group 51–60 (born 1957-1966) were selected (600 each year). The age range is motivated by the fact that the focus is on retirement savers, i.e. people of working age who have not yet retired.

The survey consisted of 96 questions divided into four parts. In the first part, we tested respondents' knowledge of the pension system by asking factual questions on, for example, fee levels, retirement ages and withdrawal periods, within both the occupational pension and the public pension. In the second part, we asked questions about the survey participants' own pension, for example if they had tried to figure out how much they need to save for retirement, at what age they plan to retire, if they know how much pension capital they have, if they save privately for retirement and if they are satisfied with their savings. We also asked whether the respondents

[8]For a more detailed discussion about the development and rules of occupational pensions in Sweden, see Hagen (2013); Elinder and Hagen (2018).

[9]Own calculations based on information from the website of the Swedish Pensions Agency: https://www.pensionsmyndigheten.se/statistik/pensionsstatistik/?domain=tab-6&report=report-6-1, accessed November 9th 2020.

[10]The survey was a collaboration between IFAU (Institute for Evaluation of Labor Market and Education Policy), ISF (The Swedish Social Insurance Inspectorate) and Uppsala University.

considered themselves to have sufficient knowledge about the pension system to understand how their own choices affect their future pension income. In the third part, we asked questions about the respondents themselves, including about their income level, housing type, debt and assets, and perceived health. Finally, a number of questions on financial literacy, economic preferences and attitudes towards different economic situations were drawn from international research in the field.

The survey data are matched with register-based data from several different sources. From Statistics Sweden we retrieve data on gender, marital status, labor market status and highest attained education level. From the Swedish Pensions Agency we observe each individual's earned pension rights in both the income and premium pension, as well as the entire history of fund choices for the individual's premium pension capital. Finally, from the Swedish Military Archives we obtain the results from a cognitive ability test used by the Swedish military in preparation for the compulsory military service. More information about the register-based variables are given in Section A.1 in the appendix.

3.1 Sample selection

Out of the target population, 3,526 individuals answered the survey, resulting in a response rate of about 30 percent. Out of these, slightly fewer than 60 percent of the survey respondents agreed to let us add register data to their responses. After removing respondents who did not finish the survey, respondents where the register data suggest a different person than the intended answered the survey, as well as observations where register data is missing, we are left with 1,976 respondents.

Because these respondents are self-selected, it is important to study to what extent they are representative of the target population of interest. Table A1 in the appendix shows how the register-based covariates in the sample compare to known values of the target population. The table shows that the response rate is higher among older individuals, women, married, employed, highly educated and individuals with larger income pension capital.

Based on these results, respondents seem likely to be in a better economic situation than non-respondents, and we may also suspect that they are more knowledgeable about the pension system and more financially literate.[11] For our results to be representative of the Swedish population age 31–60, we therefore need to account for the sample selection. We do so by using the entropy balancing technique suggested by Hainmueller (2012). With this method, weights are constructed such that the weighted sample has means of the observed covariates that exactly correspond to the means in the target population. A unique set of weights are found by minimizing the deviation from some base weights, which in our case is one for all observations.[12] The covariates we use

[11] For instance, Lusardi and Mitchell (2014) find that financial literacy is lower among individuals with low levels of education and income.

[12] Because dummy variables for age groups 31–40, 41–50 and 51–60 are included as balancing covariates, the

are those that are listed in Table A1. In Section 4.1, we discuss in more detail how the entropy balancing helps to mitigate the issue of sample selection.

3.2 Measuring knowledge

To measure individuals' objective knowledge about their own pension and the Swedish pension system, we asked a total of 19 questions, listed in Table 1, which had one correct answer per question. Three of the questions dealt directly with the survey participants' individual pension capital, where the correct answers come from the register data from the Swedish Pensions Agency. The three questions covered knowledge of the total income pension and premium pension capital of the survey participants, as well as whether they could correctly identify the number of active fund choices they had made in their premium pension portfolio. Ten of the questions covered knowledge of the public pension system, while the final six questions pertained to the occupational pension system. We construct a "pension knowledge index" as the share of correct answers on the 19 questions. The full questions and answers are provided in Table A2 in the appendix.

We further divide the pension knowledge index into three sub-indexes to measure different aspects of pension knowledge: two of these are *system-specific*—knowledge about the accumulation phase of a pension wealth[13] and knowledge about the decumulation phase[14], while the third is *individual-specific*—knowledge about accumulated pension wealth in the public pension components, along with knowledge about how often they have made changes to their individual fund portfolio in the premium pension[15]. The indexes are constructed as the share of correct answers on the respective questions.

These pension knowledge indexes give a detailed account of individuals' knowledge of several aspects of their pension and the pension system. However, depending on individual circumstances, different aspects of the pension system may be more or less important to adequately prepare for retirement. We therefore complement our objective measure of pension knowledge in the survey with the following question: "Do you have sufficient knowledge about the pension system to understand how your own choices affect your future pension?" We contrast this subjective knowledge with objective knowledge about pensions.

To assess the role of pension knowledge separately from that of financial literacy, we also asked the three standard questions on financial literacy (the "Big 3" for measuring financial literacy, see more details in Lusardi and Mitchell 2014) on interest compounding, inflation and diversification

resulting balancing weights are identical to the balancing weights that would be achieved if the design weights (see Section A.1 in the appendix) were used as base weights.

[13] Questions 4, 5, 7, 8, 13, 14, 15 in Table A2.

[14] Questions 1, 2, 3, 6, 9, 10, 11, 12, 16 in Table A2.

[15] Questions 17, 18, 19 in Table A2.

Table 1: Descriptive statistics of knowledge questions

	Share correct	Share correct, EB weights	Nr answers
Accumulation questions			
What percentage of income does the public pension contribution correspond to?	0.11	0.09	6
When will a higher income not lead to a higher public pension?	0.26	0.21	7
Is it possible to choose how the public pension is managed?	0.45	0.39	5
Can the premium pension be transfered between spouses?	0.15	0.14	4
What percentage of income does the occupational pension contribution correspond to?	0.42	0.39	6
When will a higher income not lead to a higher occupational pension?	0.05	0.05	7
Is it possible to choose how part of the occupational pension is managed?	0.63	0.56	3
Decumulation questions			
When is the public pension paid out?	0.53	0.50	3
When is the earliest public pension can be paid out?	0.48	0.43	5
For how long is the public pension paid out?	0.73	0.71	3
Is it possible to work while receiving public pension?	0.69	0.65	3
How much do retirees receive in public pension on average?	0.51	0.49	5
What is the lowest pension a Swedish person can receive?	0.38	0.37	5
When is the occupational pension paid out?	0.26	0.27	3
For how long is the occupational pension paid out?	0.61	0.53	3
How much do retirees receive in occupational pension on average?	0.45	0.41	5
Individual-specific questions			
Know income pension capital	0.15	0.15	6
Know premium pension capital	0.15	0.14	5
Know how many premium pension choices has been made	0.55	0.53	4
Financial literacy questions			
Interest question	0.89	0.85	4
Inflation question	0.77	0.71	4
Risk question	0.72	0.65	3

Note: The table shows the share who correctly answered each knowledge question. The individual-specific questions have been matched with register data on actual capital stocks and choices. In the first column, design weights accounting for the fact that we over-sample older people have been used (see the discussion in Section A.1 in the appendix). In the second column, entropy balancing (EB) weights have been used to account for sample selection, The last column shows the number of answers it was possible to give for each question. The total number of observations is 1,976. The questions listed in this table are abbreviated; the full questions and answers are listed in Table A2 in the appendix (in the order they were asked in the survey, which is different from the order listed in this table).

(stock risk). In Section A.2 in the appendix we list the three questions and show that results are comparable to previous evidence from Sweden.

4 Results

4.1 The distribution of pension knowledge

A first notable result from assessing our pension knowledge index is shown in Figure 1, which shows the distributions of our measures of pension knowledge: nobody answered all questions correctly and a clear majority answered less than half of the questions correctly. The solid line shows the distribution of knowledge among the sample of the 1,976 individuals who agreed to let us add register data. On average, these individuals answered 7.5 of the 19 questions correctly.[16] The figure also shows how the share answering that they have sufficient knowledge about the pension system is related to the pension knowledge index (dotted line). The strong upward trend makes it clear that subjective knowledge is strongly related to objective knowledge as respondents with more correct answers to the objective knowledge questions are also more likely to say that they have sufficient knowledge about the pension system. For instance, among individuals with more than 15 correct answers, almost 90 percent said that they had sufficient knowledge, whereas among those with fewer than 5 correct answers the corresponding number was 15 percent. On average, 28 percent claimed to have sufficient knowledge.

As discussed in Section 3.1, our survey sample is most likely selected in the sense that those who are more knowledgeable about the pension system are more likely to answer the survey. To mitigate the issue of sample selection, we balance on variables which we believe are likely to cause such selection issues, such as education, age and gender. The dashed line in Figure 1 shows that after we use entropy balancing weights (EB weights), the distribution of knowledge is shifted slightly to the left with the estimate of the average number of correct answers dropping to 7.0 out of 19. The fact that the knowledge level drops when we use entropy balancing weights strengthens the notion that the sample is positively selected from the population (see the discussion in Sections 3.1 and A.1)[17]

Because our sample may also be selected in terms of who agreed to match register-based information to their survey responses, Figure 1 also shows the distribution of pension knowledge in the full sample, including the individuals who did not agree to the use of register data. Reassuringly,

[16] Note that we here use design weights to account for the over-sampling of older individuals. See the discussion in Section A.1 in the appendix.

[17] Of course, it is possible that even conditional on all the observed variables, individuals who answered the survey are different from those who did not. In such a case, our estimate of the knowledge level will likely be an upper bound of the knowledge level in the population.

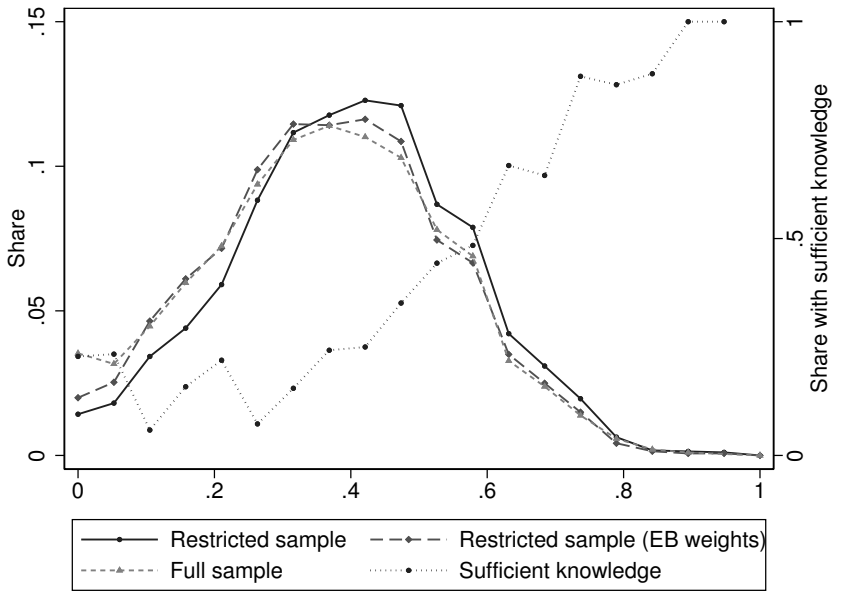

Figure 1: Distribution of pension knowledge

Note: The figure shows the distribution of share of correct answers (the pension knowledge index) for the restricted sample, using design weights (solid line, see Section A.1 in the appendix) or entropy balancing weights (long dashed line). The distribution of the pension knowledge index is also shown for the full sample weighted with design weights (short dashed line). The dotted line shows the share of individuals for a given knowledge level who consider themselves to have sufficient knowledge to understand how their own choices affect their future pensions (for the restricted sample, weighted with entropy balancing weights). The number of observations is 1,976 for the restricted sample and 3,436 for the full sample.

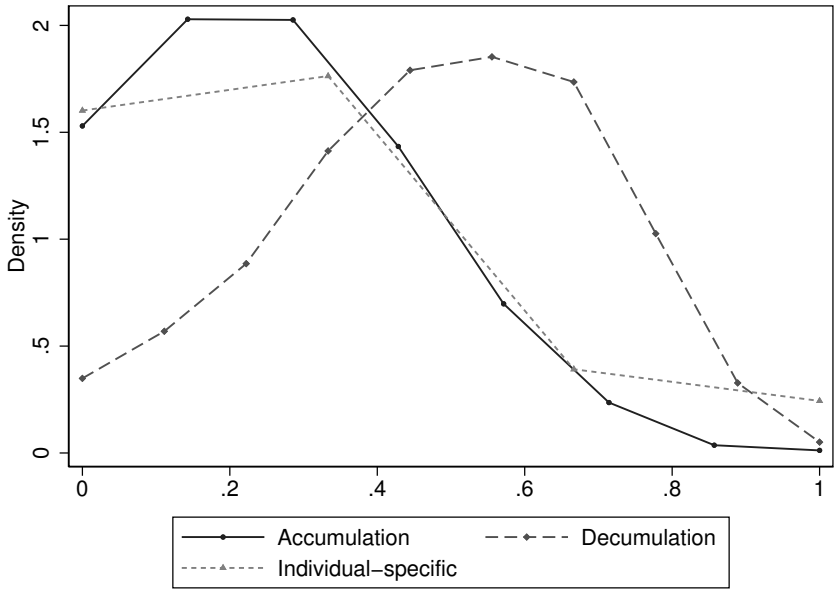

Figure 2: Distribution of sub-indexes of pension knowledge

Note: The figure shows the distribution of the share of correct answers for the three sub-indexes of pension knowledge. Note that the *y*-axis has a different scale from that of Figure 1 (with density insted of share) to account for the fact that each index is based on a different number of questions. Entropy balancing weights have been used and the number of observations is 1,976.

the distribution for the full sample is quite similar to the distribution in the restricted sample (the average number of correct answers in the full sample is 6.9), especially once entropy balancing weights are used, in which case the distributions are virtually identical.

We conclude that regardless of how we deal with sample selection, most individuals lack significant knowledge about their pension and the pension system. The results also suggest that the entropy balancing weights work well in dealing with the sample selection issue and for the rest of the paper, we only show results for the restricted sample with entropy balancing weights.

Figure 2 shows the distribution for the three subindexes: the accumulation index, the decumulation index and the individual-specific index. From the figure, it can be seen that respondents in general are more knowledgeable about the decumulation part of the pension system than they are about the accumulation part or their own pension. On average, the average share of correct answers is around a half for the decumulation index, but only around a quarter for the other two indexes.

4.2 Socioeconomic and demographic differences in knowledge

To examine knowledge heterogeneity among Swedish retirement savers, we regress pension knowledge on the different socioeconomic and demographic variables listed in Table A1. The results are

shown in column (1) of Table 2, where the pension knowledge index have been standardized to have a mean of zero and standard deviation of one, to facilitate the interpretation of the different variables.

We find that pension knowledge is increasing with age; those aged 41–50 and 51–60 have significantly higher scores on the pension knowledge index compared to individuals aged 31–40. Gender is also important with women being on average less knowledgeable about pensions than men. Furthermore, pension knowledge differs by marital and labor market status, although there is substantial uncertainty in the estimates. Compared to singles (the baseline category), married individuals know slightly more while divorced know less. We also find that those with an unemployment history during 2016 are less knowledgeable.

As may be expected, there is a strong positive gradient along income history and education. These characteristics (together with age) are also the most important in terms of magnitude in explaining differences in pension knowledge. To measure income history we use the accumulated pension wealth in the income pension component of the public pension system which is a rough indicator of an individual's labor income history.[18] We standardize this variable by removing the average value within the same birth cohort. Our results show that having a large pension wealth relative to others in the same birth cohort is a strong predictor for pension knowledge. Having a higher education is also associated with having a higher level of pension knowledge.

Taken together, we find stark differences in pension knowledge among different groups. For instance, based on the regression results, an unemployed woman aged 31–40 with elementary schooling and with an average income pension capital, are predicted to have almost two standard deviations lower pension knowledge than an employed man aged 51–60 with university education and with 1 million SEK more in pension capital relative to his peers.

To investigate if some groups have more or less knowledge about the rules and incentives applicable to the time when they accumulate the pension income, to the time when the retirement capital is taken out, or to their own pension levels, columns (2), (3) and (4) of Table 2 report corresponding estimates of socio-economic and demographic differences for the sub-indexes relating to the accumulation phase (2), decumulation phase (3) and the individual's own pension (4), respectively.[19]

While we mainly see a similar pattern to the one shown for the full pension knowledge index, some characteristics stand out. The strong age gradient found for pension knowledge is mainly

[18] 16 percent of earnings (up to a ceiling) are contributed to the income pension, and these contributions are indexed to the average wage growth in Sweden.

[19] We have also examined pillar-specific knowledge, i.e. whether retirement savers know more or less about the public pension (first pillar) compared to the occupational pension (second pillar). To this end, we used six questions that were framed in the same way regarding the two pillars. We find that individuals are marginally less knowledgeable about the occupational pension compared to the public pension and only minor differences in socio-economic gradients (these results are not reported but are available upon request).

explained by knowledge of the decumulation phase. This result makes sense as knowledge of these issues are more important for individuals closer to the retirement age. In addition, no gender gap is prevalent in knowledge of the decumulation phase, while there is a significant gap in the knowledge of the accumulation phase or of the individuals' own pension knowledge. The fact that women are significantly less knowledgeable about the accumulation phase is especially noteworthy as women are more likely to work part-time and take longer parental leave than men, decisions which generally have a negative effect on pension accumulation.

4.3 Pension knowledge and retirement planning

To understand how pension knowledge and retirement planning are correlated in our survey, we use six retirement related questions or statements.[20]

1. *Plan retirement saving*: "I have tried to figure out how much I need to save for retirement". Respondents could give an answer from one to five ranging from "completely disagree" to "completely agree". This question has been used frequently in the literature when studying retirement planning and financial literacy (see Lusardi and Mitchell 2011b for an overview of this research). We consider respondents to have planned if they answered at least a three on the five-point scale, which is true for 32 percent of respondents in the sample.

2. *Plan retirement age*: "At what age do you plan to retire?" Possible answers include five age intervals and "I have started to collect my pension" and "I have not thought about that yet". The dependent variable is a dummy that equals one if the respondent mentions a specific age interval or have already started to collect pension, and zero otherwise. 66 percent of respondents in the sample had a planned retirement age or were already retired (see Table A4).[21]

3. *Saves privately*: "Do you save privately for retirement?". Possible answers include "No, I have never saved privately for retirement", "No, I saved earlier but not anymore", "Yes, but no fixed amount each month", and four SEK intervals between 0 and +2000 per month. The dependent variable takes a value of one for any of the five "Yes"-answers and zero for the two "No"-answers. 55 percent of respondents in the sample saved privately.

4. *Forecast pension*: "Have you made a pension forecast on minpension.se"?[22] Possible answers include "Yes", "No", and "Don't know". The dependent variable is a dummy that

[20] Further details about the distributions of answers and coding of the variables are presented in Table A4.

[21] While the oldest individuals in the sample should be 60 years old—and hence not eligible for public pension—they may have started collecting their occupational pension. In our data, only around one percent claimed to be retired.

[22] Minpension.se is an online tool that helps individuals to figure out how much money they will receive once they retire. The service is a collaborative project between the government and participating pension funds.

Table 2: Socioeconomic and demographic differences in knowledge

	General index	Sub-indexes		
	(1) Pension knowledge	(2) Accumulation	(3) Decumulation	(4) Individual -specific
Age 41–50	.14**	.092	.2***	-.078
	(.071)	(.069)	(.075)	(.073)
Age 51–60	.31***	.2***	.35***	.026
	(.069)	(.065)	(.072)	(.068)
Female	-.14**	-.1**	-.039	-.26***
	(.055)	(.052)	(.058)	(.056)
Married	.056	.061	.053	-.0089
	(.058)	(.055)	(.061)	(.061)
Divorced	-.074	-.07	-.07	-.0053
	(.079)	(.083)	(.083)	(.086)
Self-employed	.1	.032	.11	.091
	(.11)	(.098)	(.11)	(.12)
Not employed	-.046	-.079	-.11	.21*
	(.1)	(.096)	(.11)	(.11)
Unemployed	-.2	-.094	-.22	-.089
	(.12)	(.11)	(.14)	(.11)
Income pension capital (rel. to age cohort avg.)[a]	.62***	.63***	.56***	.029
	(.067)	(.059)	(.073)	(.074)
High school	.2*	.18*	.18	.064
	(.12)	(.11)	(.12)	(.12)
Less than 3 years higher educ.	.51***	.51***	.34***	.34**
	(.13)	(.12)	(.13)	(.13)
At least 3 years higher educ.	.55***	.61***	.34***	.33***
	(.13)	(.11)	(.13)	(.12)
Constant	-.41***	-.38***	-.39***	-.052
	(.14)	(.12)	(.14)	(.13)
R^2	0.17	0.17	0.14	0.04
Obs.	1,976	1,976	1,976	1,976

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The dependent variable in Column (1) is the pension knowledge index (standardized to have mean of zero and standard deviation of one). Each sub-index in the remaining columns is based on a subset of these questions pertaining to the accumulation phase (2), decumulation phase (3), and the respondent's own pension (4) (also standardized to have mean of zero and standard deviation of one, see Section 3.2 for details). All regressions are weighted with entropy balancing weights.

[a] Measured in million SEK (std. dev. .47).

equals one if the answer is "Yes". 31 percent of respondents in the sample had made such a forecast.

5. *Satisfied with saving*: "Are you satisfied with the amount that you currently save?" Possible answers include "Yes", "No, I should save more", "No, but I cannot afford to save more", and "No, I think I save too much". The dependent variable is a dummy that equals one if the answer is "Yes". 33 percent of respondents in the sample were satisfied with their savings level.

6. *Worried pension*: "I worry that my pension will be too low". Respondents could give an answer from one to five ranging from "completely disagree" to "completely agree". We consider a respondent to be worried if they answered at least a three on the five-point scale, which is true for 66 percent of respondents in the sample.

Table 3 presents six sets of estimates, one for each of the retirement planning variables listed above. The first column for each set of estimates in Table 3 shows the result from regressing the given dependent variable on the pension knowledge index. In the second column, we include a set of other variables. First, as control variables we use the set of socioeconomic and demographic, register-based, controls that were included in the previous regressions in Table 2. Second, we control for general financial literacy (share of the three financial literacy questions that were answered correctly, standardized to have a mean of zero and standard deviation of one) to account for pension knowledge having a separate role from financial literacy. Third, we account for subjective pension knowledge using an indicator for whether the respondents consider themselves sufficiently knowledgeable about the pension system.

We first note that pension knowledge is positively correlated with having planned how much to save and at which age to retire. On average, a standard deviation increase in pension knowledge is associated with an increase of 10 percentage points in the probability of having planned retirement saving and 11 percentage points increase in the probability of having planned when to retire.

When adding controls, the point estimates for pension knowledge drop somewhat, but there is still a clear positive relationship. The point estimate for financial literacy however is actually negative, although close to zero, indicating that financial literacy does not explain retirement planning once pension knowledge is controlled for. In line with previous literature (Lusardi and Mitchell 2011b), we also find that financial literacy is positively correlated with planning by itself (see Table A7 in the appendix), hence it is notable that all that correlation disappears once we condition on pension knowledge.

Also, subjective pension knowledge, as measured by the indicator for whether respondents consider themselves to have sufficient knowledge, has a strong positive relationship with planning for retirement saving, although less so for planning for retirement age. This is in line with van

Table 3: Pension knowledge and preparedness for retirement

	Plan retirement saving		Plan retirement age	
Pension knowledge	.099***	.069***	.11***	.081***
	(.013)	(.015)	(.015)	(.016)
Financial literacy		-.02		-.0033
		(.018)		(.018)
Sufficient knowledge		.23***		.049
		(.033)		(.031)
Controls		✓		✓
Obs.	1,962	1,947	1,964	1,950
	Saves privately		Forecast pension	
Pension knowledge	.043***	-.0043	.17***	.083***
	(.015)	(.017)	(.01)	(.012)
Financial literacy		.0021		.037***
		(.018)		(.011)
Sufficient knowledge		.052		.24***
		(.034)		(.028)
Controls		✓		✓
Obs.	1,963	1,949	1,958	1,951
	Satisfied with saving		Worried pension	
Pension knowledge	.073***	-.0052	-.057***	-.021
	(.013)	(.015)	(.015)	(.016)
Financial literacy		.012		-.0095
		(.016)		(.016)
Sufficient knowledge		.21***		-.098***
		(.034)		(.034)
Controls		✓		✓
Obs.	1,936	1,922	1,960	1,945

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The pension knowledge and financial literacy indexes have been standardized to have mean of zero and standard deviation of one. The "Sufficient knowledge" variable is an indicator for whether respondents consider themselves to have sufficient knowledge to understand how their own choices affect their future pensions. All outcome variables are dummy variables (see Section 4.3 for exact definitions). Control variables are the same as those in Table 2. Sample sizes vary slightly because a few respondents have not answered all questions related to the outcome variables. All regressions are weighted with entropy balancing weights.

Rooij et al. (2012) showing that those with more confidence in their financial literacy knowledge accumulate more wealth as compared to those with less confidence in their knowledge.

When it comes to actual savings behavior the relationship is weaker, and once control variables are added the relationship disappears. On the other hand, all three knowledge variables are positively related to having made a pension forecast although the correlation is smaller for financial literacy than the two other variables.

For the last two variables, the relationship is most pronounced for subjective knowledge. One interpretation of this finding is that the last two variables—in contrast to the first four—measure *attitudes* towards pension planning rather than actual *behavior*. It makes sense that subjective knowledge matters more than objective knowledge for such attitudinal outcomes.

Finally, we also tested if there is a heterogeneous association between the different types of pension knowledge—accumulation, decumulation or individual-specific knowledge—and retirement preparedness (see tables A8, A9 and A10 in the appendix). Analyzing each of these knowledge indexes separately, we find the same qualitative pattern as that for the full pension knowledge index for the four planning variables. However, knowledge of one's own pension has a different association with individuals' attitudes towards their preparedness compared to general pension knowledge, where those who know more about their pension wealth are significantly less likely to report being worried about their pension being too low. This result suggests that increasing savers' awareness of their own pension situation could mitigate feelings of stress towards retirement.

Taken together, the results show that pension knowledge has a positive relationship with different variables relating to pension planning, but less so for attitudes towards planning. Subjective knowledge is related to both retirement planning and to attitudes towards planning. Financial literacy, on the other hand, has, for most outcomes, virtually no relationship with the outcomes conditional on objective and subjective pension knowledge.

4.4 Why do so many lack adequate knowledge?

Having documented that a large share of pension savers lack knowledge about the pension system, and that those with less knowledge are less prepared for retirement, it is natural to ask why so many seem to be lacking in knowledge? To explore this question, we asked respondents who stated that they lacked sufficient knowledge why they haven't acquired that knowledge. Respondents could choose from a list of answers with the ability to mark more than one answer. Figure 3 shows the responses.

77 percent of respondents gave the complexity of the pension system as the reason for lack of knowledge, 76 percent of respondents stated that they had planned to acquire knowledge but that it just hadn't happened yet, whereas 63 percent said that they plan to do it when they approach

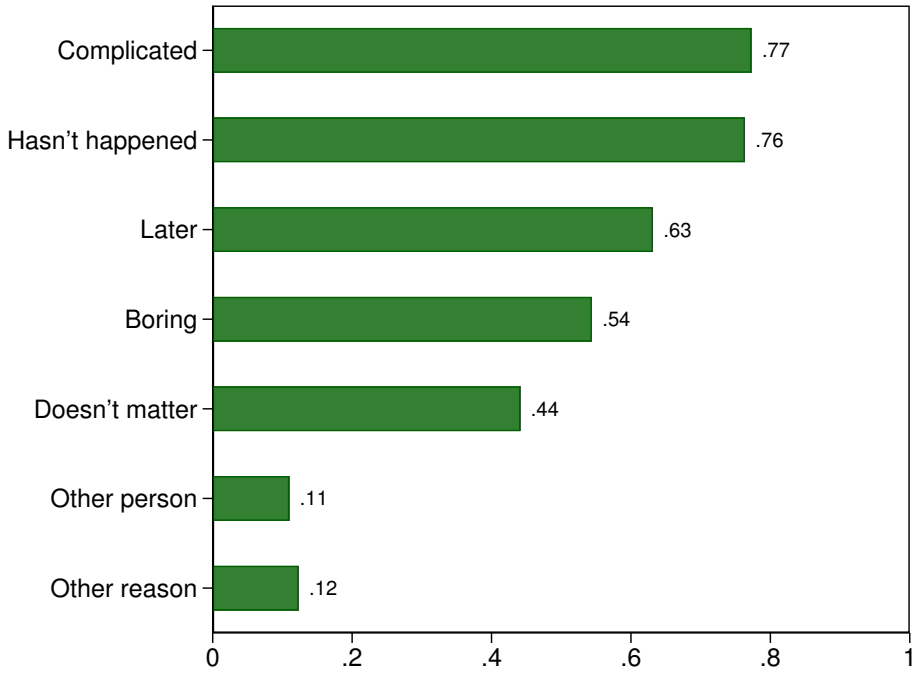

Figure 3: Reasons for lack of knowledge

Note: The figure shows the reasons respondents gave for why they did not have sufficient knowledge of the pension system to understand how their own choices affect their future pension. Respondents could mark more than one alternative and the bars and numbers indicate the share of respondents who marked each alternative. The alternatives were i) "The pension system is too complicated", ii) "I have been thinking about doing it, but it just hasn't happened", iii) "I will do it once I get closer to retirement", iv) "Thinking about pension is boring", v) "I do not think it matters much if I learn how it works", vi) "A person I trust looks after my pension" and vii) "Other reason". The entropy balancing weights have been used to estimate the shares.

retirement. In total 87 percent marked at least one of the two latter answers and, interestingly, even for those aged 56–60, this number does not change much (83 percent), suggesting substantial procrastination with potentially severe effects for the individuals. Furthermore, 54 percent gave the fact that they considered thinking about pensions to be boring as a reason for not having acquired sufficient knowledge, whereas 44 percent did not believe that it matters much to know how the pension system works. Only a few said that another another person is looking after their pension (11 percent) or claimed that there were other reasons for not having sufficient knowledge (12 percent).

A small but growing literature has focused on how task characteristics affect individuals' propensity to procrastinate. Related to our findings, it has been shown that task complexity increases the propensity to procrastinate (Ackerman and Gross 2005, 2007) and that people are more inclined to procrastinate a task which is perceived to be boring (Ackerman and Gross 2005). While acquiring knowledge about the pension system is undoubtedly important for the individual, it is always possible to postpone for a little while. The fact that many perceive the pension system to be complicated and boring to think about is likely to increase the likelihood that individuals procrastinate the task to acquire relevant knowledge about the pension system.

Of course, the reason many individuals lack pension knowledge could also be because they value future consumption less, i.e., that they have a high discount factor. If so, standard economic theory tells us that it is unproblematic that many individuals postpone information acquisition, it merely reflects the individuals' rational decision-making.[23]

The fact that many individuals lack knowledge may also simply be because it is difficult to understand how the pension system works. The large literature on financial literacy suggests that many individuals lack even basic financial knowledge, and the fact that so many respondents highlight that the pension system is "too complicated" may be a reflection of the difficulty to understand the intricacies of the pension system.

To deepen our understanding of the mechanisms at play we make use of questions previously used in the Global Preference Survey (GPS, see Falk et al. 2016, 2018). In particular, just as in the GPS, we asked the respondents to rate how willing they are to give up something today in order to benefit in the future, on a scale from 0 to 10, where 0 corresponds to "not at all willing to do so" and 10 "very willing to do so". To use it in regressions below, we reverse the order, such that a higher value means individuals discount the future more, and we also standardize it such that its standard deviation is one. We label this variable *Discounting*.

[23]While a profound discussion on whether individuals optimally save for their retirement is beyond the scope of the paper, Caliendo and Findley (2019) show that it is not only with dynamically inconsistent choices (like hyperbolic discounting) that individuals may end up with lower savings at retirement than what they would want, it can also happen when past utility is discounted relative to present utility (backward discounting). Thus, from a normative perspective, it is important to distinguish between the rationales for inadequate savings.

Table 4: Pension knowledge, time preferences and cognitive ability

	(1)	(2)	(3)	(4)	(5)
Procrastination	-0.076***			-0.087***	-0.083***
	(0.029)			(0.029)	(0.029)
Discounting		-0.12***		-0.085***	-0.095***
		(0.031)		(0.030)	(0.031)
Good at math			0.23***	0.21***	0.20***
			(0.027)	(0.028)	(0.028)
Controls					✓
Obs.	1,929	1,887	1,941	1,864	1,864

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The dependent variable is the pension knowledge index (standardized to have mean of zero and standard deviation of one). The "procrastination", "discounting" and "good at math" variables are all standardized to have a standard deviation equal to one. A constant is always included but omitted from the table. Control variables are age dummies for ages 41–50 and 51–60 and a female dummy. All regressions are weighted with entropy balancing weights.

We also asked the respondents how well the following statement describes them: "I tend to procrastinate tasks even if I know that it would be better to undertake them immediately". The answers are on a scale from 0 to 10, where 0 corresponds to "Does not describe me at all" and 10 corresponds to "Describes me perfectly". We standardize this question to have a standard deviation of one and label the resulting variable *Procrastination*.

Finally, we asked respondents to consider the statement: "I am good at math", again on a scale from 0 to 10, where 10 corresponds to "Describes me perfectly". We label this variable *Good at math* (also standardized to have a standard deviation of one), with the presumption that this variable measures individuals' cognitive ability (that subjective math skills is a proxy for cognitive ability has been argued in the previous literature, see, e.g., the discussion in Falk et al. 2018).[24]

As can be seen in Table 4, answers to these three questions all correlate with pension knowledge. A one standard deviation increase in *Procrastination* is associated with about .08 standard deviations lower pension knowledge. Similarly, a one standard deviation increase in *Discounting* is associated with .12 standard deviations lower pension knowledge. Finally, for self-rated math skills the corresponding increase in pension knowledge is about .23 standard deviations.

The results are very similar when all variables are included in the same regression, and inclusion of control variables for age and gender do not change the results in any important way. We do

[24]For a subsample of the data (mainly older men), we also have access to test scores on a cognitive ability test taken in preparation for the mandatory military service around each individual's 18th birthday. This cognitive ability measure shows a very similar correlation with pension knowledge as the "Good at math" variable (see Table A6), suggesting that math skills is a good proxy for cognitive ability also in our context.

not include any additional controls as other controls are all likely to be endogenous with respect to these personal traits.

To conclude, we find that time preferences, such as the tendency to procrastinate and to discount the future, are related to pension knowledge acquisition. Furthermore, cognitive ability, as measured by subjective math assessment or by actual test scores are also strongly related to knowledge. These findings lend support to the idea of using behavioral tools to encourage individuals to make better decision for their future (see, e.g., Thaler and Benartzi 2004) and for the providing simplified information about individuals' pensions and the pension system.

5 Concluding remarks

The transition from a defined benefit to a defined contribution pension system that we see in many developed countries today implies that individual retirement savers need to take on more responsibility for their financial well-being at older ages. Defined contribution pensions typically come with more choices and greater uncertainty about the future pension. Individuals therefore need to be well-informed about the rules and incentives embedded in the pension system for individuals to adequately save and prepare for retirement.

Using novel survey and high-quality register data, we have shown that context-specific pension knowledge is a rare asset. Most individuals aged 31 to 60 years old lack important knowledge about the pension system. Without knowledge of the rules of—and incentives in—the pension system, it is likely that individuals will not save optimally for retirement. In line with previous studies, we also find that many individuals lack information on their own expected level of pension wealth (see e.g. Gustman and Steinmeier 2004, 2005; Maunu 2007; Chan and Stevens 2008; Barrett et al. 2015). There is also a strong socioeconomic gradient in pension knowledge, meaning that individuals with low income or low education are less likely to have adequate knowledge about the pension system. The fact that pension knowledge is highly correlated with socioeconomic status and preparedness for retirement, therefore adds to the worry that the socioeconomic gradient in ability to make sound financial decisions may contribute to economic inequality.

Notably, we also find that while previous studies have shown that financial literacy is highly correlated with retirement planning (Almenberg and Säve-Söderbergh 2011; Lusardi and Mitchell 2011b, 2014), measured as having tried to estimate how much one needs to save for retirement, we found that this correlation virtually disappears once we control for pension knowledge. However, pension knowledge is highly correlated with retirement planning even when controlling for financial literacy.[25] This pattern is repeated for several other measures of retirement planning,

[25]Note that we cannot necessarily interpret the correlation as completely reflecting a causal effect of knowledge on planning. For instance, the correlation may also reflect that individuals who plan for retirement will acquire knowledge

such as having thought about when to retire. Our findings thus suggest that system-specific and individual-level specific pension knowledge has a role to play beyond that of financial knowledge.

Our survey furthermore reveals that a large fraction of respondents point out the complexity of the pension system as an obstacle to acquire adequate knowledge. Moreover, an overwhelming majority state that they had planned to learn more about the pension system, but that "it just hasn't happened". Motivated by these results, we show that people who are intrinsically more prone to procrastination, are impatient or have lower cognitive ability are more likely to lack knowledge about the pension system. The complexity of the pension system as well as individual procrastination therefore seem to be plausible causal mechanisms for individuals' lack of pension knowledge.

A well-designed choice architecture, including sound default options and easily available information about the pension system should therefore be key priorities for policy makers and pension plan administrators. Digital tools that collect and personalize information on accumulated pension capital in different pension plans could also provide a potential means to reduce the perceived complexity and allow retirees to get a better overview of their financial situation.

as a result of planning, suggesting a degree of reverse causality. At the same time, knowledge that is acquired when planning may still be a prerequisite for adequate planning and may therefore still lie on a causal path (start to plan $\rightarrow$ acquire knowledge $\rightarrow$ adequate plan). Our approach is analogous to the literature analyzing the relationship between retirement preparedness and financial literacy, see for instance the discussion in Lusardi and Mitchell (2011a) regarding reverse causality.

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A Appendix

A.1 Register-based variables and sample selection

The register data from Statistics Sweden (birth year, gender, marital status, labor market status and highest attained education level) all come from the year 2016. We measure age as 2017 minus the birth year. The "employed", "self-employed" and "not employed" variables are all measured in November of 2016. The "unemployed" variable is an indicator for having at least one day registered as looking for jobs at the public employment service during the year. This variable is therefore not mutually exclusive with any of the other three labor market status variables.

From the Swedish Pensions Agency we have data on accrued capital in the income pension and premium pension systems for 2017. These variables are used when determining whether respondents correctly could name how much capital they had in each of these two systems. We also observe the total number of active choices made in the premium pension system (i.e., which mutual funds manage the capital) since the system was instituted in 2000.

Finally, from the Swedish Military Archives we get data on a cognitive ability test performed in preparation for the mandatory military service. For the age cohorts studied in this paper, most men were called to do this test around their 18th birthday. Our data primarily cover men born in 1976 and earlier. The test consisted of four parts testing verbal, technical, spatial and logical ability. On each test, the score was standardized to a scale from 0-9 and our measure of cognitive ability is a simple average of these four scores.

To study sample selection, we make use of the fact that for most of the register data we have access to known population values for all individuals born 1957–1986 from Statistics Sweden's LISA database. Table A1 shows the means of all register-based variables we use to study the socioeconomic and demographic distribution of pension knowledge in the paper for the final sample (Column 1) compared to the target population (all individuals in Sweden aborn 1957–1986, shown in Column (2), and the difference between the two (Column 3). For the values in Column (1), we use design weights to account for the fact that we oversample older and undersample younger individuals.[26]

There are a number of notable differences between the final sample and the target population. The response rate is higher among older individuals, women, married, employed, highly educated, and individuals with larger income pension capital (relative to their age cohort).

[26] In the population, 33 percent are born 1977–1986, 34 percent are born 1967–1976 and 32 percent are born 1957–1966. The design weights to account for the stratification is $4 \cdot 0.33$, $4 \cdot 0.34$ and $2 \cdot 0.32$ respectively.

Table A1: Sample selection

	Final sample	Target population	Difference
Age 31–40	0.29	0.33	-0.046***
			(0.012)
Age 41–50	0.32	0.34	-0.025**
			(0.012)
Age 51–60	0.40	0.32	0.071***
			(0.011)
Female	0.51	0.49	0.017
			(0.012)
Single	0.36	0.38	-0.019*
			(0.012)
Married	0.52	0.48	0.039***
			(0.012)
Divorced	0.11	0.13	-0.018**
			(0.0071)
Widow/widower	0.0053	0.0067	-0.0014
			(0.0015)
Employed	0.87	0.80	0.077***
			(0.0078)
Self-employed	0.064	0.077	-0.013**
			(0.0057)
Not employed	0.062	0.13	-0.064***
			(0.0056)
Unemployed[a]	0.059	0.087	-0.028***
			(0.0059)
Income pension capital	0.12	0	0.12***
(rel. to age cohort avg.)[a,b]			(0.0091)
Elementary school	0.042	0.11	-0.070***
			(0.0044)
High school	0.37	0.45	-0.079***
			(0.011)
Less than 3 years higher educ.	0.18	0.15	0.028***
			(0.0091)

Table A1: Sample selection

	Final sample	Target population	Difference
At least 3 years higher educ.	0.41	0.29	0.12***
			(0.012)

Note: The table shows the mean for a number of register-based covariates for the final sample of respondents agreeing to let us add register-based covariates (weigthed with design weights, column 1), as well as for the target population (column 2). The third column shows the mean difference between the first two columns. Robust standard errors are shown in parenthesis. *, **, and *** indicate a statistically significant difference at the 10%, 5%, and 1% level.

[a] Register data for the full population are unavailable for these variables. The full sample data (both respondents and non-respondents) have been used instead.

[b] Measured in million SEK (std. dev. .47).

A.2 Additional data description

Table A2: Pension knowledge questions (in the order the appear in the survey)

Question	Possible answers	Distribution of answers
1. When do you think that the public pension is paid out?	• Unless I apply for it to be paid out earlier, it will be paid out automatically when I turn 65.	.32
	• **I have to apply for it to be paid out**	**.50**
	• Do not know	.17
	• No answer	.01
2. From what age do you think that the public pension normally can be paid out at the earliest?	• 59	.05
	• **61**	**.43**
	• 63	.22
	• 65	.20
	• Do not know	.10
	• No answer	.00
3. For how long do you think that the public pension is paid out?	• **It is always paid out as long as the person is alive**	**.71**
	• The complete, or part of it, can be paid out during a shorter timespan than lifelong, such as 5 or 10 years	.14
	• Do not know	.15
	• No answer	.01
4. How many percent of the wage do you think the public pension contributions correspond to for an employee earning 25,000 SEK per month before tax?	• 0-5%	.25
	• 6-10%	.23
	• 11-15%	.08
	• **16-20%**	**.09**
	• More than 20%	.03
	• Do not know	.32
	• No answer	.00
5. At what monthly income (before tax) do you think that a higher income does not lead to a higher public pension?	• Approx. 20,000 SEK per month	.03
	• Approx. 30,000 SEK per month	.09
	• **Approx. 40,000 SEK per month**	**.22**
	• Approx. 50,000 SEK per month	.15
	• Approx. 150,000 SEK per month	.04
	• There is no such limit	.11
	• Do not know	.35
	• No answer	.01
6. Do you think it is possible to work while receiving public pension?	• **Yes**	**.65**
	• No	.18
	• Do not know	.16
	• No answer	.01

Table A2: Pension knowledge questions (in the order the appear in the survey)

Question	Possible answers	Distribution of answers
7. Do you think people can choose how their contributions to the public pension should be managed?	• Yes, both the income pension and the premium pension	.20
	• Yes, but only the income pension	.04
	• **Yes, but only the premium pension**	**.40**
	• No, such a possibility does not exist	.10
	• Do not know	.25
	• No answer	.01
8. Do you think that the premium pension can be transferred between spouses?	• **Yes, the yearly contribution can be transferred between spouses, but not previously earned premium pension**	**.14**
	• Yes, the whole premium pension capital can be transferred between spouses	.10
	• No, that is not possible	.24
	• Do not know	.52
	• No answer	.01
9. How much do you think a retiree receives, on average, in public pension per month (before tax)	• Approx. 9,000 SEK	.25
	• **Approx. 13,000 SEK**	**.49**
	• Approx. 17,000 SEK	.13
	• Approx. 21,000 SEK	.02
	• Do not know	.10
	• No answer	.01
10. What is the lowest pension (before tax), a person who has been living in Sweden his or her whole life can receive?	• Approx. 5,000 SEK per month	.22
	• **Approx. 7,000 SEK per month**	**.37**
	• Approx. 9,000 SEK per month	.19
	• Approx. 11,000 SEK per month	.07
	• Do not know	.14
	• No answer	.01
11. When do you think that the occupational pension is paid out?	• **In most occupational pension plans, the payment starts automatically at age 65**	**.27**
	• In most occupational pension plans, I have to apply to receive the pension	.51
	• Do not know	.22
	• No answer	.01
12. For how many years do you think that the occupational pension is paid out?	• It is always paid out as long as the person is alive	.22
	• **The complete, or part of it, can be paid out during a shorter timespan than lifelong, such as 5 or 10 years**	**.53**
	• Do not know	.24
	• No answer	.01

Table A2: Pension knowledge questions (in the order the appear in the survey)

Question	Possible answers	Distribution of answers
13. How many percent of the wage do you think the contributions for the occupational pension correspond to for an employee earning 25,000 SEK per month before tax?	• **0-5%**	**.39**
	• 6-10%	.20
	• 11-15%	.05
	• 16-20%	.03
	• More than 20%	.01
	• Do not know	.32
	• No answer	.01
14. At what monthly income (before tax) do you think that a higher income normally does not lead to a higher occupational pension?	• Approx. 20,000 SEK per month	.02
	• Approx. 30,000 SEK per month	.05
	• Approx. 40,000 SEK per month	.11
	• Approx. 50,000 SEK per month	.12
	• **Approx. 150,000 SEK per month**	**.05**
	• There is no such limit	.23
	• Do not know	.41
	• No answer	.01
15. Is it normally possible to choose how the complete, or part of, the occupational pension should be managed?	• **Yes**	**.56**
	• No	.11
	• Do not know	.32
	• No answer	.01
16. How much do you think a retiree receives, on average, in occupational pension per month (before tax)	• **Approx. 4,000 SEK**	**.41**
	• Approx. 8,000 SEK	.21
	• Approx. 12,000 SEK	.07
	• Approx. 16,000 SEK	.02
	• Do not know	.28
	• No answer	.01
17. Do you remember approximately how much pension capital you had in income pension in the most recent orange envelope?	• Yes, 0 – 499,999 SEK	.12
	• Yes, 500,000 – 999,999 SEK	.05
	• Yes, 1,000,000 – 1,499,999 SEK	.07
	• Yes, 1,500,000 – 1,999,999 SEK	.03
	• Yes, 2,000,000 SEK or more	.03
	• No	.69
	• No answer	.01
18. Do you remember approximately how much pension capital you had in premium pension in the most recent orange envelope?	• Yes, 0 – 99,999 SEK	.08
	• Yes, 100,000 – 249,999 SEK	.08
	• Yes, 250,000 – 499,999 SEK	.07
	• Yes, 500,000 SEK or more	.01
	• No	.75
	• No answer	.01
19. Have you ever made an active choice in investing your premium pension capital?	• Yes, once	.28
	• Yes, several times	.25
	• Do not remember for sure	.16
	• No	.30
	• No answer	.01

Note: The table lists all 19 knowledge questions used to construct the pension knowledge index, possible answers and the distribution of answers (share, after weighting with entropy balancing weights). The correct alternative is indicated in boldface. Individuals who finished the survey, but did not respond to the knowledge questions, are coded as not knowing the answers. For the last three questions, the correct answer is different for different respondents, where we know the correct answer from the register data from the Swedish Pensions Agency.

Below we list the "Big 3" financial literacy questions we use. To test representativeness of our sample we can compare the share who answered each financial literacy question correctly with Almenberg and Säve-Söderbergh (2011) and Almenberg et al. (ming) who asked the same questions in Sweden 2011 and 2014. Our survey compares well to the shares found previously in Sweden. On the inflation question, we received 71 percent correct answers after weighting the sample (compared to 66 percent and 71 percent in the age group 25–65 in Almenberg and Säve-Söderbergh 2011 and Almenberg et al. ming, respectively) and on the diversification question there were 65 percent correct answers (compared to 74 percent and 78 percent). For the interest compounding question we received 85 percent correct answers compared to 82 percent in Almenberg et al. (ming), while Almenberg and Säve-Söderbergh (2011) only received 40 percent. The reason for this latter difference is likely that Almenberg and Säve-Söderbergh (2011) asked a more difficult version of the compounding question using an open-ended reply.

Table A3: Financial literacy questions

Question	Possible answers	Distribution of answers
1. Suppose you have 100 SEK in a savings account with a 2% yearly interest rate. How much would you have on the account after 5 years if you left the money to grow?	• **More than 102 SEK**	**.85**
	• Exactly 102 SEK	.03
	• Less than 102 SEK	.03
	• Do not know	.09
	• No answer	.00
2. Suppose that the interest rate on your savings account is 1% and inflation is 2%.If you let your money be for one year, would you be able to buy more, as much, or less for the money at the end of the year?	• More	.05
	• As much	.05
	• **Less**	**.71**
	• Do not know	.18
	• No answer	.00
3. Is the following statement true or false? Buying stocks in a single company is generally safer than buying shares in a stock mutual fund.	• True	.02
	• **False**	**.65**
	• Do not know	.32
	• No answer	.00

Note: The table lists the three financial literacy questions, possible answers and the distribution of answers (share, after weighting with entropy balancing weights). The correct alternative is indicated in boldface. Individuals who finished the survey, but did not respond to the knowledge questions, are coded as not knowing the answers.

Table A4: Details on outcome variables in Table 3

Question	Possible answers	Distribution of answers
1. Plan retirement saving		
"I have tried to figure out how much I need to save for retirement."	1. Completely disagree	.50
	2.	.19
$N = 1,962$	**3.**	**.16**
	4.	**.09**
	5. Completely agree	**.07**
2. Plan retirement age		
"At what age do you plan to retire?"	**Age 61 or earlier**	**.10**
	Age 62–64	**.16**
$N = 1,964$	**Age 65**	**.24**
	Age 66-67	**.08**
	After age 67	**.06**
	I have started to collect my pension	.01
	I have not thought about that yet	.34
3. Saves privately		
"Do you save privately for retirement?"	No, I have never saved privately for retirement	.27
	No, I saved earlier but not anymore	.18
$N = 1,963$	**Yes, but no fixed amount each month**	**.08**
	Yes, 0–499 SEK per month	**.15**
	Yes, 500–999 SEK per month	**.12**
	Yes, 1,000–1,999 SEK per month	**.12**
	Yes, 2,000 SEK or more per month	**.09**
4. Forecast pension		
"Have you made a pension forecast on minpension.se?"	**Yes**	**.31**
	No	.64
$N = 1,958$	Do not know	.05
5. Satisfied with saving		
"Are you satisfied with the amount that you currently save?"	**Yes**	**.33**
	No, I should save more	.39
	No, but I cannot afford to save more	.27
$N = 1,936$	No, I think I save too much	.01
6. Worried pension		
"I worry that my pension will be too low"	1. Completely disagree	.16
	2.	.19
$N = 1,960$	**3.**	**.22**
	4.	**.16**
	5. Completely agree	**.08**

Note: The table shows the question, possible answers and the distribution of answers (share, after weighting with entropy balancing weights) for the six different outcome variables in Table 3. The answers in boldface denote the value one in the constructed dummy variables. Sample sizes are slightly smaller than the full sample of 1,976 respondents because not all respondents answered all questions.

Table A5: Details on variables used in Table 4

Question	Possible answers	Distribution of answers
1. Procrastination		
"I tend to procrastinate tasks even if I know that it would be better to undertake them immediately"	0. Does not describe me at all	.05
	1.	.05
	2.	.08
	3.	.10
$N = 1,972$	4.	.06
	5.	.11
	6.	.11
	7.	.16
	8	.14
	9.	.05
	10. Describes me perfectly	.04
	Do not know	.01
	Do not want to answer	.03
2. Discounting		
"How willing are you to give up something today in order to benefit in the future?"	10. Not at all willing to do so	.02
	9.	.01
	8.	.03
	7.	.07
$N = 1,973$	6.	.06
	5.	.15
	4.	.11
	3.	.18
	2.	.20
	1.	.05
	0. Very willing to do so	.07
	Do not know	.04
	Do not want to answer	.02
3. Good at math		
"I am good at math"	0. Does not describe me at all	.04
	1.	.03
$N = 1,969$	2.	.04
	3.	.08
	4.	.07
	5.	.13
	6.	.13
	7.	.16
	8	.15
	9.	.08
	10. Describes me perfectly	.06
	Do not know	.01
	Do not want to answer	.02

Note: The table shows the question, possible answers and the distribution of answers (share, after weighting with entropy balancing weights) for the variables used in Table 4. Sample sizes are slightly smaller than the full sample of 1,976 respondents because not all respondents answered all questions.

A.3 Additional regression results

Table A6: Pension knowledge, time preferences and military test score

	(1)	(2)	(3)	(4)	(5)
Procrastination	0.0080			-0.034	-0.029
	(0.054)			(0.053)	(0.053)
Discounting		-0.12**		-0.12**	-0.12**
		(0.063)		(0.057)	(0.056)
Cognitive ability			0.27***	0.24***	0.25***
			(0.049)	(0.056)	(0.057)
Controls					✓
Obs.	598	592	603	591	591

Note: Regression results for the subsample of individuals with a military test (cognitive ability) score. Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The dependent variable is the pension knowledge index (standardized to have mean of zero and standard deviation of one). The "procrastination", "discounting" and "cognitive ability" variables are all standardized to have a standard deviation equal to one. A constant is always included but omitted from the table. Control variables are age dummies for ages 41–50 and 51–60 and a female dummy. All regressions are weighted with entropy balancing weights.

Table A7: Pension knowledge and preparedness for retirement, additional regression results

	Plan retirement saving					Plan retirement age				
Pension knowledge	.099***			.072***	.069***	.11***			.096***	.081***
	(.013)			(.014)	(.015)	(.015)			(.017)	(.016)
Financial literacy		.037**		-.017	-.02		.054***		.0042	-.0033
		(.015)		(.016)	(.018)		(.016)		(.017)	(.018)
Sufficient knowledge			.28***	.23***	.23***			.12***	.049	.049
			(.03)	(.033)	(.033)			(.03)	(.032)	(.031)
Controls					✓					✓
Obs.	1,962	1,962	1,947	1,947	1,947	1,964	1,964	1,950	1,950	1,950
	Saves privately					Forecast pension				
Pension knowledge	.043***			.023	-.0043	.17***			.11***	.083***
	(.015)			(.017)	(.017)	(.01)			(.013)	(.012)
Financial literacy		.04**		.025	.0021		.13***		.059***	.037***
		(.016)		(.018)	(.018)		(.0094)		(.011)	(.011)
Sufficient knowledge			.068**	.04	.052			.35***	.25***	.24***
			(.032)	(.034)	(.034)			(.029)	(.029)	(.028)
Controls					✓					✓
Obs.	1,963	1,963	1,949	1,949	1,949	1,958	1,958	1,951	1,951	1,951
	Satisfied with saving					Worried pension				
Pension knowledge	.073***			.02	-.0052	-.057***			-.023	-.021
	(.013)			(.015)	(.015)	(.015)			(.017)	(.016)
Financial literacy		.07***		.042***	.012		-.051***		-.029*	-.0095
		(.014)		(.015)	(.016)		(.015)		(.016)	(.016)
Sufficient knowledge			.25***	.22***	.21***			-.16***	-.13***	-.098***
			(.03)	(.033)	(.034)			(.031)	(.033)	(.034)
Controls					✓					✓
Obs.	1,936	1,936	1,922	1,922	1,922	1,960	1,960	1,945	1,945	1,945

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The pension knowledge and financial literacy indexes have been standardized to have mean of zero and standard deviation of one. The "Sufficient knowledge" variable is an indicator for whether respondents consider themselves to have sufficient knowledge to understand how their own choices affect their future pensions. All outcome variables are dummy variables (see Section 4.3 for exact definitions). Control variables are the same as those in Table 2. Sample sizes vary slightly because a few respondents have not answered all questions related to the outcome variables. All regressions are weighted with entropy balancing weights.

Table A8: Regression results, accumulation knowledge

	Plan retirement saving					Plan retirement age				
Accumulation pension knowledge	.087*** (.013)			.056*** (.014)	.054*** (.014)	.08*** (.014)			.061*** (.015)	.046*** (.015)
Financial literacy		.037** (.015)		-.0086 (.016)	-.013 (.018)		.054*** (.016)		.021 (.017)	.01 (.018)
Sufficient knowledge			.28*** (.03)	.24*** (.033)	.24*** (.033)			.12*** (.03)	.069** (.031)	.068** (.031)
Controls					✓					✓
Obs.	1,962	1,962	1,947	1,947	1,947	1,964	1,964	1,950	1,950	1,950
	Saves privately					Forecast pension				
Accumulation pension knowledge	.047*** (.014)			.031** (.016)	.0046 (.017)	.16*** (.01)			.098*** (.012)	.077*** (.012)
Financial lieracy		.04** (.016)		.023 (.018)	-.00055 (.018)		.13*** (.0094)		.066*** (.011)	.043*** (.011)
Sufficient knowledge			.068** (.032)	.036 (.034)	.047 (.034)			.35*** (.029)	.26*** (.029)	.25*** (.028)
Controls					✓					✓
Obs.	1,963	1,963	1,949	1,949	1,949	1,958	1,958	1,951	1,951	1,951
	Satisfied with saving					Worried pension				
Accumulation pension knowledge	.064*** (.013)			.013 (.014)	-.014 (.014)	-.041*** (.014)			-.0038 (.015)	.0018 (.015)
Financial literacy		.07*** (.014)		.045*** (.015)	.014 (.016)		-.051*** (.015)		-.037** (.016)	-.017 (.016)
Sufficient knowledge			.25*** (.03)	.22*** (.032)	.22*** (.033)			-.16*** (.031)	-.14*** (.032)	-.11*** (.033)
Controls					✓					✓
Obs.	1,936	1,936	1,922	1,922	1,922	1,960	1,960	1,945	1,945	1,945

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The pension accumulation knowledge and financial literacy indexes have been standardized to have mean of zero and standard deviation of one. The "Sufficient knowledge" variable is an indicator for whether respondents consider themselves to have sufficient knowledge to understand how their own choices affect their future pensions. All outcome variables are dummy variables (see Section 4.3 for exact definitions). Control variables are the same as those in Table 2. Sample sizes vary slightly because a few respondents have not answered all questions related to the outcome variables. All regressions are weighted with entropy balancing weights.

Table A9: Regression results, decumulation knowledge

	Plan retirement saving					Plan retirement age				
Decumulation pension knowledge	.073*** (.013)			.052*** (.013)	.045*** (.014)	.1*** (.015)			.089*** (.016)	.072*** (.016)
Financial literacy		.037** (.015)		-.0061 (.015)	-.011 (.017)		.054*** (.016)		.012 (.016)	.0022 (.017)
Sufficient knowledge			.28*** (.03)	.25*** (.033)	.25*** (.032)			.12*** (.03)	.075** (.031)	.072** (.03)
Controls					✓					✓
Obs.	1,962	1,962	1,947	1,947	1,947	1,964	1,964	1,950	1,950	1,950
	Saves privately					Forecast pension				
Decumulation pension knowledge	.042*** (.015)			.026 (.016)	-.0018 (.016)	.12*** (.011)			.064*** (.012)	.039*** (.012)
Financial lieracy		.04** (.016)		.026 (.017)	.0012 (.018)		.13*** (.0094)		.08*** (.011)	.053*** (.011)
Sufficient knowledge			.068** (.032)	.045 (.033)	.05 (.032)			.35*** (.029)	.29*** (.028)	.28*** (.028)
Controls					✓					✓
Obs.	1,963	1,963	1,949	1,949	1,949	1,958	1,958	1,951	1,951	1,951
	Satisfied with saving					Worried pension				
Decumulation pension knowledge	.057*** (.013)			.018 (.014)	-.0023 (.014)	-.034** (.015)			-.006 (.016)	-.0092 (.015)
Financial literacy		.07*** (.014)		.043*** (.015)	.011 (.016)		-.051*** (.015)		-.036** (.015)	-.014 (.016)
Sufficient knowledge			.25*** (.03)	.22*** (.032)	.21*** (.032)			-.16*** (.031)	-.14*** (.031)	-.11*** (.032)
Controls					✓					✓
Obs.	1,936	1,936	1,922	1,922	1,922	1,960	1,960	1,945	1,945	1,945

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The pension decumulation knowledge and financial literacy indexes have been standardized to have mean of zero and standard deviation of one. The "Sufficient knowledge" variable is an indicator for whether respondents consider themselves to have sufficient knowledge to understand how their own choices affect their future pensions. All outcome variables are dummy variables (see Section 4.3 for exact definitions). Control variables are the same as those in Table 2. Sample sizes vary slightly because a few respondents have not answered all questions related to the outcome variables. All regressions are weighted with entropy balancing weights.

Table A10: Regression results, individual-specific knowledge

	Plan retirement saving					Plan retirement age				
Individual-specific pension knowledge	.063*** (.013)			.032** (.014)	.036*** (.013)	.038*** (.013)			.019 (.014)	.026* (.014)
Financial literacy		.037** (.015)		.0082 (.015)	-.003 (.018)		.054*** (.016)		.041** (.016)	.019 (.017)
Sufficient knowledge			.28*** (.03)	.25*** (.033)	.24*** (.033)			.12*** (.03)	.092*** (.032)	.079** (.031)
Controls					✓					✓
Obs.	1,962	1,962	1,947	1,947	1,947	1,964	1,964	1,950	1,950	1,950
	Saves privately					Forecast pension				
Individual-specific pension knowledge	-.012 (.014)			-.028* (.014)	-.015 (.014)	.11*** (.012)			.058*** (.012)	.062*** (.011)
Financial lieracy		.04** (.016)		.039** (.017)	.0026 (.018)		.13*** (.0094)		.095*** (.01)	.055*** (.011)
Sufficient knowledge			.068** (.032)	.068** (.034)	.057* (.033)			.35*** (.029)	.28*** (.03)	.25*** (.028)
Controls					✓					✓
Obs.	1,963	1,963	1,949	1,949	1,949	1,958	1,958	1,951	1,951	1,951
	Satisfied with saving					Worried pension				
Individual-specific pension knowledge	.043*** (.013)			.0051 (.014)	.0076 (.014)	-.072*** (.013)			-.051*** (.014)	-.045*** (.014)
Financial literacy		.07*** (.014)		.05*** (.015)	.0092 (.015)		-.051*** (.015)		-.031** (.015)	-.011 (.015)
Sufficient knowledge			.25*** (.03)	.23*** (.033)	.21*** (.034)			-.16*** (.031)	-.11*** (.033)	-.086*** (.033)
Controls					✓					✓
Obs.	1,936	1,936	1,922	1,922	1,922	1,960	1,960	1,945	1,945	1,945

Note: Robust standard errors are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level. The individual-specific pension knowledge and financial literacy indexes have been standardized to have mean of zero and standard deviation of one. The "Sufficient knowledge" variable is an indicator for whether respondents consider themselves to have sufficient knowledge to understand how their own choices affect their future pensions. All outcome variables are dummy variables (see Section 4.3 for exact definitions). Control variables are the same as those in Table 2. Sample sizes vary slightly because a few respondents have not answered all questions related to the outcome variables. All regressions are weighted with entropy balancing weights.