

ARTICLE

The importance of pension and financial knowledge for pension plan participation in Italy

Elisa Castagno^{1,2}, Alessandra Caretta³, Elisabetta Giacomel³ and Mariacristina Rossi^{1,2,3}

¹University of Turin, Torino, Italy; ²Collegio Carlo Alberto, Torino, Italy and ³COVIP, Rome, Italy

Corresponding author: Elisa Castagno; Email: elisa.castagno@unito.it

(Received 12 September 2023; revised 19 June 2024; accepted 28 October 2024)

Abstract

Due to the implementation of several pension reforms, Italian individuals have to take more complex financial decisions and have more responsibilities on their retirement well-being which also includes the choice of whether to participate in pension funds. Relying on novel survey data, we empirically investigate the effect of pension and financial knowledge on the probability of pension plan participation in Italy. Despite documenting the already well-known trends about disparities in the level of such knowledge, we are able to establish that only pension literacy has a positive and causal effect on the probability to participate in a private pension fund.

Keywords: financial literacy; pension literacy; retirement planning

JEL Codes: D14; D91; J32; I22

1. Introduction

Due to the threat of financial and demographic crises, many European countries, including Italy, have started a process of fiscal consolidation by radically reforming their pension systems. These reforms have introduced or extended the (notional) defined contribution (DC) method to compute public pension benefits for the purpose of guaranteeing the sustainability of the system by reestablishing actuarial fairness between contributions paid and benefits received given the remaining life expectancy. Consequently, the reforms have reduced the generosity of the defined benefit (DB) system under which the size of public benefits was not strictly linked to contributions paid. This shift towards a strict one-to-one rule linking pension received to contributions paid as well as to life expectancy has put a higher burden on individuals who are now more responsible for being prepared for their retirement well-being with an adequate pension income. One important result of these changes and of the increasing level of complexity of today's financial market is the higher level of basic financial and retirement knowledge that individuals need to have if they do not want to reach retirement with too low of a level of financial wealth.

While previous research streams have primarily explored the effects of financial literacy on retirement investment decisions, this paper focuses on the role of both pension and financial knowledge as key factors in retirement savings decisions and as determinants for – current or future – pension fund participation. Following a less-developed strand of literature, our study assesses what matters the most in terms of pension and financial literacy in shaping retirement planning decisions. We investigate how the demand for retirement savings through pension plans is related to the basic

knowledge of important aspects of the pension system (pension literacy) as well as to the ability to understand and effectively use financial skills (financial literacy). To do so, we draw on the third and fourth waves of the survey designed by the Italian Committee for Financial Education (hereafter EDUFIN Committee), which collects detailed data on a representative sample of household heads in the Italian population.

Our results are threefold. First, we observe an overall low level of financial literacy and an even lower level of pension knowledge. Vast differences exist in the level of sophistication among individuals: women, lower educated people, respondents living in the Southern regions and those with lower income and wealth have the worst performance on both pension and financial literacy measures. Second, we assess the existence of a positive link between more knowledgeable individuals and the probability of holding a private pension plan after controlling for a set of socioeconomic variables (that include income and education). Third, we show that pension literacy has a positive and causal effect on current pension plan participation. We rely on two approaches to address the endogeneity concerns: the standard instrumental variable (IV) specification using as instruments information on peers' level of literacy and the presence of a pensioner in the household and the Lewbel method that exploits the heteroscedasticity of the data to generate internal instruments.

The rest of the paper is structured as follows. Section 2 summarises the related literature. Section 3 explains how the Italian pension system works. Section 4 describes the dataset. Section 5 defines the variables used to measure pension plan participation and pension and financial literacy and presents descriptive evidence of the levels and patterns among the Italian population. Section 6 describes the methodology and the outcome of the multivariate analysis, and section 7 shows the results of a sensitivity analysis to strengthen the robustness of this investigation. Finally, section 8 concludes.

2. Literature review

Financial literacy is commonly defined as the ability to understand and effectively use basic financial concepts connected with budgeting, saving, and investing activities (OECD, 2019). Since the seminal paper by Lusardi and Mitchell (2011a), financial literacy has been measured using questions that assess numeracy abilities as well as knowledge of basic financial notions such as interest compounding, risk diversification, and inflation. A large strand of literature shows that having a high level of financial literacy can help individuals make informed financial decisions, effectively manage their money, achieve their financial goals and cope with financial challenges, such as unexpected expenses or changes in income (Lusardi and Mitchell, 2007, 2011b; Bucher-Koenen and Lusardi, 2011).

Financial literacy can also be seen as an investment in human capital. Theoretical frameworks have been developed to show the optimal financial literacy level in a life-cycle context in which financial literacy is optimally chosen and, in turn, is a determinant of higher returns on financial investments due to better portfolio composition (Jappelli and Padula, 2013; Lusardi *et al.*, 2017). Our paper is related to this literature in the sense that financial literacy helps to make optimal choices. However, in relation to pension plan membership rather than portfolio returns, financial literacy acts as a precondition to have a well-diversified portfolio in terms of duration and not only as higher potential returns or lower costs of information related to riskier and complex plans (Corsini and Spataro, 2015; Spataro and Corsini, 2017). Our paper is hence related to pension fund enrolment, which is a precondition to have a well-balanced portfolio in terms of duration (Atkinson *et al.*, 2015).

There are several empirical contributions that examine the relationships between financial literacy and retirement planning behaviour in various countries, and they point out that a higher level of financial sophistication is generally associated with a higher planning attitude (e.g., Bucher-Koenen and Lusardi, 2011; Van Rooij *et al.*, 2011; Lusardi and Mitchell, 2011a).

In contrast to financial literacy, pension literacy relates to both the general understanding of the workings of the comprehensive retirement system, which is made of different pillars, and to how different types of pension plans – DB and DC plans – operate. It refers to individuals' knowledge of

basic pension concepts and their ability to make informed decisions about pension-related matters. Thus, it measures workers' awareness of the benefits and risks of each type of plan and their ability to adequately plan and save for retirement.

The literature on pension literacy is less developed than is that on financial literacy. Although some attention has been devoted to understanding the role of information on an individual's specific pension situation in the individual's retirement planning behaviour, the effect of knowing how the pension system works has not yet been fully investigated. Mastrobuoni (2011) looks at the consequences of the introduction of the annual Social Security Statement in the United States and finds that this leads to more precise estimates about personal retirement benefits but does not improve individuals' retirement saving behaviour. Landerretche and Martínez (2013) find that Chileans have limited knowledge of how the pension system works and that those with greater knowledge are also those with higher chances to hold a private pension plan. In a more recent contribution, Debets *et al.* (2022) analyse how government pension communication affects pension knowledge and pension decision making in the Netherlands. They show the existence of a positive nexus of causality going from pension knowledge to active pension decision making.

In the Italian context, Fornero and Monticone (2011) investigate whether financial literacy is a key factor in explaining pension fund enrolment and find that financial literacy has a causal effect on pension fund participation. Baldini *et al.* (2019) compare subjective expectations and statutory values of eligibility age and replacement rates to assess the level of pension knowledge in Italy. They find that a large proportion of the population has poor knowledge and that this limited knowledge is unevenly distributed across the population. Similarly, Cappelletti and Guazzarotti (2010) use data from the 2008 Survey on Household Income and Wealth (SHIW) and document that Italian workers enrolled in a pension plan have a low level of knowledge of pension fund rules and are unaware of their personal pension situations. Ceccarelli and Rinaldi (2011) look at the correlation between financial and pension literacy and pension plan participation and find a positive, although not causal, relationship between them. More recently, Jappelli *et al.* (2021) use SHIW data to examine the relationship between individual-level measures of social security risk and the demand for pension saving and find that people who expect lower and less secure social security benefits participate more in private pension plans. Figari *et al.* (2023) estimate the relationship between basic financial literacy, pension knowledge, and consensus on the need for pension reform and adequacy in Italy. They find that those with higher levels of financial literacy and pension knowledge are more likely to accept pension reforms.

3. The institutional background of the Italian pension system

After several reforms during the nineties and in the first decade of the millennium, the Italian pension system has shifted towards a multi-pillar system, which includes

1. the large and quasi-universal public pension system¹;
2. the funded voluntary occupational pension system (for public and private employees who meet the conditions set out by the referent collective agreement)²;
3. the funded voluntary personal pension system (open to all individuals regardless of their employment status).

The public pension is the most important source of pension income for most retirees in Italy, and it is largely financed through a high contribution rate of 33 percent for public and private employees

¹For a more detailed description of the Italian public pension system, see Franco and Tommasino (2020), Andriele *et al.* (2020) and Fornero (2020).

²For a more comprehensive illustration of the Italian private pension system, see COVIP (2023) and Rinaldi (2011).

that varies across categories of workers, with about one-third paid by the employee and two-thirds paid by the employer.

Following the 2011 reform (known as the ‘Fornero reform’), the public pension system has remained a pay-as-you-go system (PAYGO), but (i) it has extended the notional defined contribution (NDC) rules for benefit computation to all workers; (ii) it has introduced, starting from 2012, automatic benefit adjustments for mortality developments; and (iii) it has introduced periodic increases in all eligibility requirements for retirement in line with life expectancy changes. The reform process has also introduced incentives for the development of the supplementary pension system with the idea that a shift to a multi-pillar system would help maintain adequate replacement rates and provide a more solid pension system suitable for coping with various possible future developments in the economic and demographic fields.

The supplementary pension system is constituted by two pillars: occupational pension funds (second pillar) and personal pension plans (third pillar). The second pillar mainly consists of contractual pension funds (set up by social partners); membership in these funds is only open to employees or self-employed workers fulfilling the conditions set out in the collective agreements establishing the pension fund. The third pillar is implemented through individual membership in an open pension fund or a personal pension plan realised through life insurance contracts (so-called PIP).³ Since the mid-1990s, new, supplementary pension schemes can only be offered as DC plans, thus establishing a clear linkage between pension contributions, investment performance, and pension benefits.

Membership in all forms of the pension funds is voluntary and irreversible, but since 2007, a form of automatic enrolment has been applied to all new private sector employees, allowing them to transfer the future flows of their *Trattamento di Fine Rapporto* (TFR) (severance pay provision) to pension funds, which can also occur by tacit agreement. In all cases, employees have six months to decide whether they wish to reject this arrangement and retain their rights to the TFR as before or whether they wish to transfer future TFR flows to pension funds and be automatically enrolled in the pension funds. In the event of no explicit decision on the destination of the TFR at the end of the six-month period, employees are automatically enrolled in a default pension fund. A similar mechanism has also been introduced in the public sector, first by *Perseo Sirio* (the pension fund that covers public sector employees other than those in public schools) in 2021, and more recently by *Espero* (the pension fund for public school employees) in 2023, thus covering almost all public sector employees. Civil servants covered by these agreements have to choose between transferring their TFRs to the aforementioned pension fund (explicitly or implicitly) or maintaining their TFR rights as in the past. For civil servants, membership in a pension fund implies the payment of all contributions to the fund (future flows of TFR, employee, and employer contributions).

Another form of membership for private sector, individuals, the so-called contractual enrollment, was introduced starting in 2015. It derives from a provision included in the collective agreement that introduces a contribution paid by the employer alone to the supplementary pension fund identified in the contract for all employees in the economic sector concerned (14 occupational pension funds are involved with this type of enrolment).⁴

By aggregating all the forms of membership to occupational pension funds and personal pension plans, 9.2 million workers (36.2% of the workforce) were enrolled in supplementary schemes as of the end of 2022. Pension fund assets were equal to 10.8 percent of GDP or 4 percent of Italian households’ financial wealth. Enrolment rates are gradually rising but are still limited among the self-employed, women, employees of small firms, young people, and people in Southern Italy. These differences reflect structural disparities related to the Italian economy, its labour markets and its education system. The very large size of the Italian PAYGO scheme along with other structural

³Open pension plans may host both collective and individual enrollment.

⁴Due to data limitations, we are unable to control for this particular type of enrolment in our empirical analysis.

factors can explain the limited dimension of the supplementary pension system from an international perspective (COVIP, 2023).

4. Data

To investigate the role played by pension and financial literacy in pension plan participation in Italy, we use data drawn from a survey designed by the EDUFIN Committee, which has as its aim to plan and promote awareness-raising campaigns as well as financial education initiatives.⁵

The Committee, established by law, aims at encouraging and coordinating financial education initiatives to improve the basic financial, insurance, and pension-related skills of the Italian population. To do so, it lays down the National Strategy for Financial Education through which it promotes large scale initiatives by fostering and organising education programmes among both stakeholders and institutions.

Since 2020, the EDUFIN Committee has conducted a yearly survey on a nationally representative sample of individuals aged 18 and older who are responsible for managing the household economy and/or are more informed about the family's economic/financial matters.⁶ The survey gathers information on socioeconomic context, financial, insurance and pension knowledge and behaviour and attitudes of the survey respondents. The aim of the survey is twofold: first, it collects useful elements to guide the National Strategy for Financial Education; and second, it uses disaggregated data on families and their economic status to identify the most vulnerable segments of the population, namely those with below-average levels of financial skills.

Over 5,000 online interviews are conducted every year as part of the survey, but we select only the third and fourth editions for the empirical work of this paper (around 80% of those interviewed took part in the previous editions) because the 2022 edition includes, for the first time, a more extensive set of questions on household pension literacy and behaviour. Table B1 in Appendix B contains descriptive statistics for the sample.⁷

Compared to the data collected by the Bank of Italy in the context of the SHIW, our sample is slightly younger. In both datasets, most respondents (about 45%) are between 45 and 64 years old, an age group in which people are expected to make some of their most important financial decisions, including those related to retirement savings. However, in the SHIW, about 20 percent of the remaining sample is made up of people younger than 45, while in our data, this group represents more than 30 percent. Looking at the gender composition, women are underrepresented in both samples (38% and 42% in the EDUFIN and SHIW, respectively), but this is not surprising as the questionnaires are addressed to the person responsible for making financial decisions in the household, a role traditionally held in Italy by men rather than women. There is quite a lot of heterogeneity in education with more than 40 percent of our respondents holding at least a bachelor's degree (the sample is biased towards more educated people since ISTAT reports that the share of Italian people holding a degree is around 20%) and approximately 23 percent having at most a middle school diploma. As far as occupation, around 40 percent of the people in the sample are employed in the private sector, the proportion who are unemployed is very small (7%) and retired respondents make up 23 percent of our sample (a little lower than in the SHIW data, in which around 30% of respondents are retired). Finally, in terms of home ownership, the EDUFIN and SHIW data are very similar in that the former shows that

⁵The EDUFIN Committee, is currently chaired by Donato Masciandaro (Annamaria Lusardi until August 2023) and formed by components nominated by Government departments, financial Authorities (Bank of Italy, Consob, Ivass and COVIP), the Supervisory body for financial consultants and their register (OCF) and the National Council of Consumers and Users (CNCU).

⁶The individuals to be interviewed are drawn from a proprietary panel of BVA Doxa, which comprises approximately 120,000 members. Those invited to participate in the survey are selected according to quotas of gender, age, geographic area, and size of the municipality.

⁷Micro-data along with the 2022 and 2023 reports are openly available at the following page.

more than 80 percent of households own the dwelling in which their family lives, while the latter shows a rate of 77 percent.

5. Empirical evidence

5.1. Measurement

Given the lack of standardised questions used to assess the level of pension literacy, we measure it relying on a set of five questions developed by the EDUFIN Committee specifically for this survey. All questions aim to test some elements of objective knowledge on a wide range of pension issues, independent of self-assessment and beliefs. The first question assesses the respondents' ability to correctly apply the concept of longevity risk to future pension benefits, while the other questions are aimed at verifying whether the respondents have a general retirement culture and are aware of the basic features of the Italian pension system (namely, the method for calculating NDC public pension benefits for young employees, the mechanism for revaluing NDC contributions based on GDP growth and the use of contributions paid to the INPS under the pay-as-you-go system, and the general functioning of the supplementary pension schemes). The final question, which is in line with the OECD's work on measuring financial literacy in several dimensions, considers financial behaviour, in particular, the urgency of planning for retirement. This question on financial behaviour attempts to provide insight into the procrastination bias in saving decisions, which can have a negative impact on retirement savings. The questions used to measure financial literacy are instead the standard 'Big Five' questions developed by Lusardi and Mitchell. These questions cover basic economic and financial concepts and aim to assess respondents' knowledge of interest rates (simple and compound), inflation, risk diversification, and how mortgages work.

All questions are multiple choice questions. The option of 'Don't Know' is always included among the possible answers to avoid obliging respondents to pick an answer and, hence, to minimise their guessing behaviour. The exact wording of the questions is reported in [Appendix A](#).

To define the level of pension and financial knowledge, we rely on two different measures: first, we use an index ranging from 0 to 5 to count the number of correct answers given to the two set of questions; and second, we use a dummy variable taking the value 1 if the number of correct answers given by each respondent is equal to or greater than the number of correct answers given by the best 10 percent of the respondent population. Thus, our pension literacy dummy variable takes the value 1 when at least four out of five questions are answered correctly and zero otherwise, while the financial literacy dummy takes the value 1 if all five questions are answered correctly and zero otherwise.

Looking at the pension and financial indices, we detect an overall low level of financial knowledge and an even lower level of pension knowledge ([Table 1](#)). Only about one-fourth of the respondents were able to correctly answer all the financial sophistication questions, while this percentage drops to 5.5 percent for pension literacy. Moreover, as shown in panel A, about 13 percent of our respondents gave no correct answers to the questions on pension knowledge, approximately 5 percent of them reply 'Don't Know' to all the questions and more than half reported not knowing the answer to at least one question. Panel B reports the same statistics as panel A, but it focuses on financial literacy. From this, we observe that about 9 percent of the respondents incorrectly answered all five financial literacy questions, less than 5 percent reported not knowing all the answers and more than 40 percent did not know the answer to at least one of the questions.

As reported in [Table 2](#), by breaking down the entire metric of the two indices (from no correct answers [0] to five correct answers [5]) across the common socio-demographic indicators (e.g., age, gender, and education groups), we observe that both pension and financial knowledge are lower for some groups of the Italian population, such as the younger generation, the female population and those with lower education.

As captured by many economic and social indicators (e.g., employment rates, per capita income, average education), Italy is characterised by sharp disparities between its regions and its macro

Table 1. Overall performance of pension and financial literacy index (percent)

| | Full sample | Age ∈ [18–64] |
|-------------------------------------|--------------|---------------|
| <i>Panel A – Pension literacy</i> | | |
| All answers correct | 5.50 | 5.82 |
| No answers correct | 12.93 | 13.89 |
| All answers ‘Don’t Know’ | 5.14 | 5.01 |
| At least one ‘Don’t Know’ | 56.88 | 57.63 |
| <i>Panel B – Financial literacy</i> | | |
| All answers correct | 27.00 | 24.87 |
| No answers correct | 8.81 | 8.38 |
| All answers ‘Don’t Know’ | 4.59 | 4.17 |
| At least one ‘Don’t Know’ | 40.35 | 41.73 |
| Number of observations | 10,002 | 8,812 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

Table 2. Pension and financial literacy index by socio-demographic characteristics (percent)

| | 0 | 1 | 2 | 3 | 4 | 5 |
|-------------------------------------|-------|-------|-------|-------|-------|-------|
| <i>Panel A – Pension literacy</i> | | | | | | |
| <i>Age</i> | | | | | | |
| 18–44 | 17.75 | 22.07 | 18.80 | 22.70 | 13.68 | 5.01 |
| 45–64 | 11.19 | 14.50 | 24.83 | 26.50 | 16.58 | 6.39 |
| 65+ | 10.05 | 9.95 | 24.37 | 25.90 | 25.18 | 4.54 |
| <i>Gender</i> | | | | | | |
| Male | 11.71 | 13.02 | 21.81 | 26.48 | 19.89 | 7.10 |
| Female | 14.96 | 20.16 | 24.60 | 23.00 | 14.46 | 2.82 |
| <i>Education</i> | | | | | | |
| Primary | 17.04 | 15.89 | 18.27 | 27.00 | 16.90 | 4.91 |
| Secondary | 11.12 | 15.27 | 26.29 | 24.40 | 17.48 | 5.44 |
| Tertiary | 12.15 | 15.91 | 22.61 | 24.82 | 18.65 | 5.86 |
| <i>Panel B – Financial literacy</i> | | | | | | |
| <i>Age</i> | | | | | | |
| 18–44 | 9.03 | 13.86 | 15.17 | 17.98 | 21.36 | 22.60 |
| 45–64 | 7.92 | 9.10 | 13.75 | 19.36 | 23.42 | 26.45 |
| 65+ | 10.11 | 7.21 | 8.17 | 16.16 | 25.02 | 33.34 |
| <i>Gender</i> | | | | | | |
| Male | 6.91 | 8.09 | 11.49 | 17.63 | 24.44 | 31.44 |
| Female | 11.99 | 13.44 | 14.95 | 18.96 | 21.08 | 19.57 |
| <i>Education</i> | | | | | | |
| Primary | 12.91 | 14.48 | 13.25 | 17.62 | 19.85 | 21.89 |
| Secondary | 9.58 | 9.36 | 12.16 | 19.31 | 23.79 | 25.80 |
| Tertiary | 6.01 | 8.33 | 13.02 | 17.48 | 24.49 | 30.67 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

regions. We checked if these inequalities also exist for financial and pension literacy by comparing the average level of these indicators by region.

Figure 1 depicts the distribution of pension literacy (left figure) and financial literacy (right figure) across regions for the indicators measuring the number of correct answers to pension and financial literacy questions. The main difference we notice is the one between the Central–Northern regions and the Southern ones. However, at a closer look, we also find substantial variation across regions that goes beyond the macro-area divide. Our results appear to be consistent with the image depicted by Fornero and Monticone (2011).

5.2. Pension literacy

Table 3 shows the distribution of the answers to the set of questions assessing the extent of pension literacy among the Italian population (first column) and among household heads between 18 and 64 years old (second column). Based on the comparisons of the answers to the pension questions,

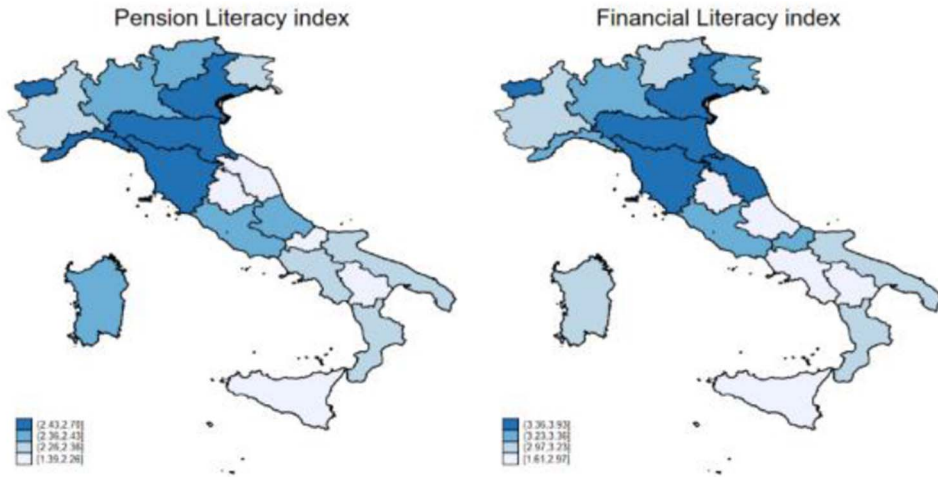


Figure 1. Pension and financial literacy index at the regional level.
 Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

Table 3. Answers to the pension literacy questions (percent)

| | Full sample | Age ∈ [18–64] |
|--|--------------|---------------|
| <i>Panel A – Longevity risk</i> | | |
| Life expectancy increases, pension amount decreases | 21.94 | 23.91 |
| Life expectancy increases, pension amount increases | 8.94 | 10.06 |
| No relation between life expectancy and pension amount | 50.41 | 46.20 |
| Don't Know | 18.71 | 19.84 |
| <i>Panel B – Public pension for young</i> | | |
| Defined contribution method | 48.67 | 45.61 |
| Defined benefit method | 15.40 | 17.00 |
| Mixed method | 10.82 | 11.55 |
| Don't Know | 25.11 | 25.85 |
| <i>Panel C – Public pension contribution revaluation</i> | | |
| Italian economic growth | 41.81 | 39.20 |
| Financial market performance | 14.22 | 16.28 |
| Don't Know | 43.98 | 44.52 |
| <i>Panel D – Saving for supplementary pension</i> | | |
| As soon as possible | 71.36 | 69.49 |
| After having worked at least 10 years | 8.76 | 10.13 |
| After being aged 50 | 3.83 | 4.65 |
| Don't Know | 16.05 | 15.73 |
| <i>Panel E – Supplementary pension [only asked in the 2022 wave]</i> | | |
| Compulsory system under INPS | 8.80 | 8.82 |
| Compulsory system under Professional Funds | 11.38 | 13.58 |
| Scheme collecting private savings and providing suppl. pension | 63.53 | 61.36 |
| Don't Know | 16.28 | 16.24 |
| <i>Panel F – Contribution paid to the INPS [only asked in the 2023 wave]</i> | | |
| Used to pay pensions to those who are already retired | 40.59 | 37.76 |
| Are invested in the financial markets | 9.05 | 10.97 |
| Are partly used to pay pensions and partly invested | 32.30 | 31.21 |
| Don't Know | 18.06 | 20.05 |
| Number of observations | 10,002 | 8,812 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

Italians seem to struggle more with the concept of longevity risk. In fact, only 21.94 percent of our respondents give the right answer to this question; the percentage slightly increases when we restrict the sample to those between 18 and 64 years old but remains quite low for this group as well (panel A).

Approximately 50 percent of respondents correctly answer the question on how the public pension for young people works, and such percentage is even lower among those between 18 and 64 years old (panel B). Panel C highlights that approximately 40 percent of respondents know how past public pension contributions are revaluated. The fourth question, which asks when it is better to start saving for a supplementary pension, appears to have given respondents the less difficulty; around 70 percent of our sample answer this question correctly (panel D). The question reported in panel E was only asked in the 2022 wave, while the one in panel F was only asked in the 2023 wave. Almost two-thirds of respondents correctly answer the question on the definition of supplementary pension plan (panel E), but only about 40 percent of them are able to correctly answer the question related to the use of the contributions paid to the INPS (panel F).

Looking at the rate of 'Don't Know' answers, we see that it ranges between 15 and 26 percent in all questions except for the question about the mechanism for revaluing NDC contributions, in which case, the share of people that could not provide an answer is almost 45 percent.

Turning to socio-demographic groups, we find some specific patterns of vulnerability, as indicated in Table 4. We notice that an increase in age is associated with an increase in the level of information for four out of five questions asked. Younger people show lower knowledge across all questions except for the longevity risk question. For the gender dimension, we find that women not only perform significantly worse than men but they also state 'Don't Know' more often. Pension literacy is also positively correlated with educational attainment; in fact, the percentage of correct answers is higher among those holding a degree than among their counterparts for all but one question. In addition, less educated people select the 'Don't Know' answer at an increased rate. With the only exception of the question on longevity risk, retired individuals display a higher level of pension knowledge than those who are still working or are unemployed. However, in these last two categories, we find some differences for those without employment, as they show the lowest absolute level of knowledge. Wealth, measured as home ownership, and income are associated with a higher level of pension knowledge. In fact, the rate of correct answers increases and the percentage of people who report not knowing the answers declines as the levels of both income and household wealth increase.

5.3. Financial literacy

Table 5 shows the answers to each of the five questions measuring the level of financial literacy for the total sample and for the households whose head is more than 18 and less than 65 years old. Overall, the differences between the whole sample and the subsample are negligible. Panel A shows the answers to the interest compounding question. Approximately 70 percent of respondents are able to give the correct answer, whereas less than 10 percent report not knowing the answer. Among those who gave the wrong answer, the majority (around 15%) select 'Exactly 102 euro', which can be seen as a less serious mistake than the answer 'Less than 102 euro'. Panel B reports summary statistics for responses to the inflation question. Around two-thirds of the respondents give the correct answer. Comparing the results of these two questions with those documented by Fornero and Monticone (2011), we observe a substantial increase in the ability to respond correctly to the question related to interest rate calculation (40.02% in 2008 versus 71.20% today), while the fraction of those able to correctly answer the inflation-related question did not increase much (59.30% in 2008 versus 68.30% today). Results from the answers to the third question on risk diversification, reported in panel C, show that more than 60 percent of the people give the correct answer; however, almost one-fourth of them report not knowing the answer to this question. The fourth and fifth questions on mortgage and interest rate compounding, respectively, appear to have given respondents the most difficulty: only slightly above half of respondents got them right (59.06% panel D and 55.43% panel E), while around one-fourth could not provide an answer (19.89% panel D and 23.63% panel E).

In Table 6, we display the rate of correct and 'Don't Know' answers to each of the five financial literacy questions by socio-demographic characteristics of the respondents. With the only

Table 4. Pension literacy by socio-demographic characteristics (percent)

| | Longevity risk | | Pension for young | | Pension revaluation | | Saving for suppl. pens. | | Supplementary pension | | Use of INPS contrib. | |
|-------------|----------------|-------|-------------------|-------|---------------------|-------|-------------------------|-------|-----------------------|-------|----------------------|-------|
| | Correct | DK | Correct | DK | Correct | DK | Correct | DK | Correct | DK | Correct | DK |
| 18-44 | 26.52 | 19.87 | 39.07 | 26.03 | 35.90 | 41.13 | 62.24 | 16.25 | 54.13 | 18.14 | 33.42 | 20.23 |
| 45-64 | 22.08 | 19.81 | 50.18 | 25.72 | 41.50 | 46.90 | 74.57 | 15.36 | 66.41 | 14.92 | 40.80 | 19.93 |
| 65+ | 16.07 | 15.38 | 57.78 | 22.92 | 49.58 | 42.34 | 76.93 | 16.99 | 70.02 | 16.40 | 48.99 | 12.13 |
| Male | 23.94 | 16.77 | 53.73 | 21.91 | 45.58 | 40.61 | 73.14 | 14.31 | 66.12 | 14.55 | 43.36 | 14.05 |
| Female | 18.58 | 21.97 | 40.21 | 30.47 | 35.50 | 49.60 | 68.40 | 18.95 | 59.22 | 19.17 | 35.94 | 24.76 |
| Primary | 19.87 | 17.43 | 44.67 | 29.27 | 38.89 | 48.00 | 63.73 | 23.97 | 58.55 | 19.33 | 53.06 | 35.60 |
| Secondary | 17.29 | 18.68 | 47.26 | 27.14 | 41.01 | 46.77 | 74.82 | 15.21 | 66.93 | 14.86 | 47.11 | 19.65 |
| Tertiary | 26.70 | 19.43 | 51.91 | 21.29 | 44.00 | 39.63 | 72.72 | 12.47 | 68.84 | 11.74 | 37.34 | 17.00 |
| Employed | 24.60 | 18.99 | 46.64 | 24.54 | 41.04 | 42.37 | 70.58 | 14.13 | 61.60 | 14.32 | 38.14 | 18.78 |
| Unemployed | 17.71 | 26.67 | 39.82 | 37.94 | 32.53 | 54.88 | 56.90 | 31.74 | 56.20 | 31.56 | 38.86 | 23.02 |
| Retired | 15.08 | 15.40 | 57.65 | 22.88 | 47.03 | 45.54 | 78.26 | 17.05 | 71.20 | 17.83 | 49.11 | 13.99 |
| Own | 22.59 | 17.35 | 50.26 | 23.44 | 43.32 | 42.36 | 73.32 | 14.30 | 65.21 | 13.54 | 41.55 | 17.02 |
| Rent | 17.02 | 26.20 | 41.41 | 30.55 | 34.36 | 50.24 | 60.75 | 24.34 | 54.19 | 28.48 | 38.66 | 22.15 |
| Other | 27.46 | 20.29 | 40.11 | 44.23 | 36.26 | 57.96 | 68.78 | 23.87 | 62.02 | 31.17 | 32.21 | 27.78 |
| <539 | 17.55 | 25.68 | 28.94 | 46.42 | 28.07 | 55.95 | 53.06 | 32.35 | 44.67 | 29.06 | 43.42 | 26.38 |
| 540-954 | 14.06 | 17.13 | 31.60 | 31.68 | 37.48 | 38.35 | 52.44 | 26.66 | 60.37 | 17.45 | 33.36 | 22.31 |
| 955-1,549 | 17.18 | 24.60 | 40.59 | 30.49 | 36.67 | 48.87 | 63.78 | 21.07 | 53.33 | 24.60 | 39.96 | 22.01 |
| 1,550-1,939 | 21.48 | 21.87 | 50.17 | 26.53 | 38.44 | 48.11 | 73.69 | 15.89 | 65.91 | 17.05 | 38.89 | 19.66 |
| 1,940-2,454 | 24.31 | 12.23 | 55.32 | 20.54 | 47.12 | 39.07 | 80.12 | 9.19 | 67.78 | 10.53 | 41.30 | 12.85 |
| > 2,455 | 30.66 | 13.02 | 62.28 | 16.02 | 49.93 | 39.25 | 82.85 | 8.84 | 76.25 | 6.60 | 44.56 | 12.99 |

Note: EDUFIN 2022-2023 surveys--all individuals, weighted data. DK, do not know.

Table 5. Answers to the financial literacy questions (percent)

| | Full sample | Age ∈ [18–64] |
|--|--------------|---------------|
| <i>Panel A – Interest rate</i> | | |
| More than 102 euro | 71.20 | 69.53 |
| Exactly 102 euro | 14.72 | 16.73 |
| Less than 102 euro | 4.88 | 5.78 |
| Don't Know | 9.20 | 7.95 |
| <i>Panel B – Inflation</i> | | |
| More than today | 5.56 | 6.14 |
| Exactly the same | 12.60 | 14.28 |
| Less than today | 68.30 | 65.87 |
| Don't Know | 13.54 | 13.70 |
| <i>Panel C – Risk Diversification</i> | | |
| True | 12.14 | 12.38 |
| False | 63.79 | 62.92 |
| Don't Know | 24.07 | 24.70 |
| <i>Panel D – Mortgage</i> | | |
| True | 59.06 | 60.10 |
| False | 21.06 | 20.27 |
| Don't Know | 19.89 | 19.63 |
| <i>Panel E – Compounding interest rate</i> | | |
| Higher amount the second year | 55.43 | 52.29 |
| Same amount in both years | 20.94 | 23.00 |
| Don't Know | 23.63 | 24.71 |
| Number of observations | 10,002 | 8,812 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

Table 6. Financial literacy by socio-demographic characteristics (percent)

| | Interest rate | | Inflation | | Risk Diversification | | Mortgage | | Comp. interest rate | |
|------------------------------------|---------------|-------|-----------|-------|----------------------|-------|----------|-------|---------------------|-------|
| | Correct | DK | Correct | DK | Correct | DK | Correct | DK | Correct | DK |
| <i>Panel A – Age (years)</i> | | | | | | | | | | |
| 18–44 | 64.99 | 9.06 | 58.88 | 15.64 | 63.42 | 24.54 | 59.68 | 21.75 | 49.62 | 24.91 |
| 45–64 | 72.71 | 7.18 | 70.77 | 12.34 | 62.57 | 24.82 | 60.39 | 18.15 | 54.15 | 24.57 |
| 65+ | 76.16 | 12.90 | 75.51 | 13.08 | 66.40 | 22.17 | 55.95 | 20.64 | 64.78 | 20.41 |
| <i>Panel B – Gender</i> | | | | | | | | | | |
| Male | 74.73 | 7.22 | 73.45 | 9.67 | 67.46 | 19.02 | 62.65 | 16.22 | 60.65 | 19.80 |
| Female | 65.30 | 12.51 | 59.69 | 20.02 | 57.67 | 32.51 | 53.06 | 26.01 | 46.71 | 30.03 |
| <i>Panel C – Education</i> | | | | | | | | | | |
| Primary | 64.69 | 13.77 | 61.73 | 18.25 | 55.30 | 31.43 | 52.14 | 30.09 | 48.84 | 28.93 |
| Secondary | 71.85 | 9.81 | 69.85 | 14.89 | 64.05 | 24.87 | 55.72 | 20.48 | 54.31 | 24.11 |
| Tertiary | 74.17 | 6.27 | 70.59 | 10.05 | 68.13 | 19.50 | 65.38 | 13.96 | 59.83 | 20.41 |
| <i>Panel D – Employment status</i> | | | | | | | | | | |
| Employed | 71.19 | 7.21 | 66.31 | 12.63 | 64.02 | 23.03 | 62.57 | 17.63 | 54.31 | 23.10 |
| Unemployed | 60.14 | 13.99 | 61.97 | 19.04 | 53.28 | 38.54 | 38.25 | 33.84 | 40.54 | 29.89 |
| Retired | 74.65 | 13.81 | 76.39 | 14.64 | 66.36 | 22.77 | 54.71 | 22.47 | 63.50 | 23.29 |
| <i>Panel E – Housing tenure</i> | | | | | | | | | | |
| Own | 73.09 | 8.42 | 69.82 | 12.44 | 65.19 | 22.13 | 60.55 | 18.16 | 58.19 | 21.94 |
| Rent | 60.55 | 13.99 | 57.38 | 20.57 | 55.26 | 34.28 | 49.29 | 28.57 | 39.03 | 32.85 |
| Other | 70.34 | 7.51 | 78.60 | 10.42 | 66.31 | 28.23 | 64.66 | 25.29 | 58.31 | 25.57 |
| <i>Panel F – Income (euro)</i> | | | | | | | | | | |
| <539 | 49.31 | 20.30 | 60.65 | 20.35 | 44.43 | 38.93 | 46.72 | 30.01 | 36.63 | 41.96 |
| 540–954 | 50.89 | 14.09 | 56.38 | 14.41 | 51.21 | 34.61 | 41.44 | 30.24 | 37.99 | 26.63 |
| 955–1,549 | 63.71 | 13.44 | 59.59 | 19.47 | 55.49 | 32.13 | 51.52 | 24.84 | 48.07 | 29.49 |
| 1,550–1,939 | 71.81 | 8.86 | 70.23 | 14.33 | 63.06 | 26.08 | 59.59 | 22.06 | 51.01 | 27.58 |
| 1,940–2,454 | 79.78 | 4.52 | 75.47 | 9.11 | 73.29 | 16.37 | 65.49 | 15.23 | 65.33 | 16.83 |
| >2,455 | 84.41 | 4.11 | 79.62 | 6.86 | 75.35 | 11.81 | 72.40 | 10.24 | 69.31 | 15.38 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

exception of age, we observe the same pattern of financial illiteracy across socioeconomic groups as previous studies conducted in Italy (Fornero and Monticone, 2011; Lusardi and Mitchell, 2011b;

Table 7. Joint distribution of pension and financial literacy index (percent)

| Pension literacy | Financial literacy | | | | | | Total |
|------------------|--------------------|-------|-------|-------|-------|-------|--------|
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| 0 | 4.31 | 3.41 | 2.67 | 1.40 | 0.77 | 0.37 | 12.93 |
| 1 | 2.05 | 2.81 | 3.07 | 3.47 | 2.63 | 1.67 | 15.69 |
| 2 | 1.67 | 1.35 | 3.55 | 5.12 | 5.69 | 5.48 | 22.86 |
| 3 | 0.42 | 1.44 | 2.49 | 5.10 | 7.44 | 8.27 | 25.18 |
| 4 | 0.37 | 0.90 | 0.85 | 2.60 | 5.11 | 8.03 | 17.85 |
| 5 | 0.00 | 0.17 | 0.16 | 0.43 | 1.55 | 3.19 | 5.50 |
| Total | 8.81 | 10.09 | 12.78 | 18.13 | 23.18 | 27.00 | 100.00 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

Bottazzi and Lusardi, 2016). We did not find the traditional financial literacy hump-shaped age profile (with the exception of the question on mortgage). From our sample, we observe that knowledge increases almost monotonically with age without experiencing any decline once people reach retirement age. As in the case of pension literacy, men appear to have a higher level of knowledge related to financial literacy. Indeed, the rate of correct answers is higher for men than for women across all questions. Men also chose the ‘Don’t Know’ answer with lower frequency than women. Table 6 also shows that financial literacy is positively correlated with educational attainment, income, and employment status. This means that those with a higher level of education, those with higher income and those who are currently working or were working in the past have an average score that is better than their counterparts on all questions. Housing tenure also has a positive relationship with financial literacy. Homeowners display better ability to correctly answer the questions related to financial literacy than people who are renting their dwelling.

5.4. Joint distribution

Table 7 shows the joint distribution of measured pension and financial literacy. We see that the correlation between the two indices is positive but well below one, with only one-fourth of respondents able to correctly answer the same number of pension and financial questions. Moreover, basically no respondent who incorrectly answered all the questions on pension (financial) literacy is able to correctly answer all five questions on financial (pension) literacy. Overall, the percentage of people who scores 10 is very low (3.19%), as is the percentage of people who scores 0 (4.31%).

From Table 7, we can see that if we look at the median respondent who has a total literacy score of 6, the most likely combination behind this score is given by four correct answers in financial literacy and two correct answers in pension literacy, representing 5.69 percent of the total cases. Table 8 shows the percentage of correct and incorrect answers to each question on pension and financial literacy conditional on having given six correct answers (two related to pension literacy and four related to financial literacy). In this case, the financial literacy question that was most likely to be incorrectly answered by the median respondent is the question about mortgage functioning, while for the set of questions on pension literacy, those most likely to be correctly answered are the question that assesses when it is better to start saving for a supplementary pension and the one that assesses knowledge of what is a supplementary pension plan/the use of contributions paid to the INPS.

5.5. Pension plan participation

To measure pension plan participation, we use two questions asking respondents whether they currently hold or will consider holding a private pension plan in the future. The question about current participation was asked of all respondents, while the one on future participation was only asked of those reporting a negative answer to the first question. We then defined two binary variables on current and future private pension plan participation taking value 1 if people report having a plan (or

Table 8. Answers to the pension and financial literacy questions (percent) given two pension literacy and four financial literacy correct answers

| | Percentage of answers | |
|-------------------------------------|-----------------------|-------|
| | Correct | Wrong |
| <i>Panel A – Pension literacy</i> | | |
| Saving for suppl. pension | 80.46 | 19.54 |
| Suppl. pens./INPS contr. | 48.18 | 51.82 |
| Public pension for young | 33.89 | 66.11 |
| Public pension revaluation | 26.92 | 73.08 |
| Longevity risk | 10.55 | 89.45 |
| <i>Panel B – Financial literacy</i> | | |
| Interest rate | 90.53 | 9.47 |
| Inflation | 88.72 | 11.28 |
| Risk diversification | 80.52 | 19.48 |
| Interest rate comp. | 71.85 | 28.15 |
| Mortgage | 68.39 | 31.61 |

Note: EDUFIN 2022–2023 surveys – all individuals, weighted data.

Table 9. Private pension plan participation (percent)

| | Current participation | | Future participation | |
|--------------------------------------|-----------------------|-------|----------------------|-------|
| | Yes | No | Yes | No |
| <i>Panel A – Total participation</i> | | | | |
| Total | 15.66 | 84.34 | 13.86 | 86.14 |
| <i>Panel B – Gender</i> | | | | |
| Male | 64.27 | 62.26 | 61.23 | 62.42 |
| Female | 35.73 | 37.74 | 38.77 | 37.58 |
| <i>Panel C – Age (years)</i> | | | | |
| 18–44 | 35.08 | 30.02 | 38.63 | 29.63 |
| 45–64 | 54.83 | 42.03 | 49.24 | 40.87 |
| 65+ | 10.09 | 27.96 | 12.13 | 30.50 |
| <i>Panel D – Employment status</i> | | | | |
| Private sector employee | 56.72 | 35.72 | 47.04 | 33.90 |
| Public sector employee | 16.16 | 16.53 | 17.43 | 16.38 |
| Self-employed | 16.74 | 14.24 | 19.00 | 13.47 |
| Other | 10.38 | 32.51 | 16.53 | 36.25 |
| <i>Panel E – Area of residence</i> | | | | |
| North | 52.00 | 44.92 | 42.65 | 45.29 |
| Centre | 20.51 | 19.93 | 20.81 | 19.78 |
| South | 27.49 | 35.15 | 36.54 | 34.93 |
| <i>Panel F – Saving behaviour</i> | | | | |
| Saver | 57.08 | 37.68 | 37.82 | 37.65 |
| Not saver | 42.92 | 62.32 | 62.18 | 62.35 |

Note: EFUFIN 2022–2023 surveys – all individuals, weighted data.

will consider having 1) and 0 otherwise. As shown in panel A of [Table 9](#), about 16 percent of the sample report having a private pension fund; among those who do not have such a fund, around 14 percent said they are thinking of having one in the future.

The sample participation rate in the supplementary pension system is lower than the actual figure, for example, it is 15 percent in the 2022 wave, while according to the COVIP (2022) Annual Report, the percentage of people who currently have a private pension plan is 36.2 percent. However, the survey rate is calculated based only on household heads whereas the actual rate is constructed by considering the entire workforce. In addition, the real participation data include in the numerator individuals over 15 years old (which are almost 140,000 people and represent about 1.5% of the members), while the EDUFIN survey is only carried out among people aged 18 and over. Another explanation for the difference between the sample and the real participation rate is the contractual membership. According to the COVIP (2022) Annual Report, more than a third of contractual

adherents do not pay any contribution. Thus, it can be assumed that this subgroup, which is characterised by compulsory membership and no contributions, lacks awareness of being enrolled in the supplementary pension scheme.

The COVIP (2022) Annual Report also shows that the lack of contribution has taken a structural nature in the Italian supplementary pension system as approximately 14 percent of the total number of members have suspended contributions in the last five years and the percentage of those not contributing has reached about 28 percent of the total membership in 2022. Therefore, it is a general issue to assess the active participation in the supplementary pension system by means of sample surveys because of the possible underreporting.

Notwithstanding the underestimation of the sample participation rate in the supplementary pension system (compared to the actual figures), the differences in the socio-demographic distributions of the sample and the total population (as reported by the 2022 and 2023 COVIP Annual Report) are minimal. Among those participating in private pension plans, more than 60 percent are men (panel B). The age profile is hump-shaped with a peak of participation among those between 45 and 64 years old (panel C). Around 60 percent of those holding a private pension plan work in the private sector, while public sector employees and self-employed each represent around 16 percent of the participants (panel D). The participation rate is higher in the Northern regions where the number of people with a private pension fund is double compared to its counterparts in the Centre and in the South (panel E). We also believe that there is a correlation between the ability to be correctly prepared for retirement and some current attitudes, such as the ability to save part of current income. This hypothesis is confirmed by panel F of Table 9, from which we see that in our sample, around 57 percent of those holding a private pension fund also report being able to save some of their current income, while the proportion of savers among those who do not have a private pension fund is much lower (37.68%). Regarding future participation, we observe that more than 60 percent of those expressing the willingness to participate in the private pension system in the future are not able to save today, which means that the lack of saving today could at least partially explain why these people do not hold a private pension fund.

6. Multivariate analysis of retirement planning

To understand if pension and financial literacy play a role in pension plan participation, we restrict our analysis to the subsample of those younger than 65 that were interviewed in the third and fourth waves of the EDUFIN survey and reported not being retired.⁸ This leaves us with a sample of 8,520 individuals answering the question on current participation in a pension plan and a sample of 6,537 individuals answering the question about future intention to participate. In our final sample, only 1,353 individuals (15.88% of the total sample) were interviewed in only one wave, while the remaining took part in both 2022 and 2023 interviews.

To check the correlation between our measures of pension and financial literacy and participation (future intention to participate) in supplementary pension plans, we perform a multivariate analysis by estimating the following ordinary least square (OLS) regression:

$$pens_plan = \beta_0 + \beta_1 pen_lit + \beta_2 fin_lit + \beta_3 X + \varepsilon_1 \quad (1)$$

where *pens_plan* can either be current private pension plan participation or future intention to participate; *pen_lit* and *fin_lit* are the main explanatory variables; *X* is a vector individual control variable; and ε_1 is the error term.

We use different specifications to measure pension and financial literacy: the number of correct answers to each set of questions (column 1); the dummy indicating whether the respondent belongs

⁸Given that one of the five pension literacy questions changed between the two waves Table C3 in Appendix C reports results obtained using data from the 2023 wave only.

to the most knowledgeable 10 percent of the respondent population (column 2) and the interaction between them (column 3); a vector of dummies for each of the questions the respondent answered correctly (column 4); a pension literacy index based on only four questions, the dummy for the question on when it is better to start saving for a supplementary pension and the financial literacy index constructed using all the related questions (column 5). The motivation for this fifth specification lies in the fact that the variable *Saving for supplementary pension* does not measure a direct feature of the Italian pension system.

Our vector of covariates includes a set of standard socio-demographic variables, such as age group, gender, a dummy for having minor children in the household, a dummy for holding a degree, occupational status (self-employed, private sector employee,⁹ public sector employee, and other occupational status), income group, wealth (proxied by home ownership status), year of the interview, and region of residence. We also control for whether or not the individual is part of the longitudinal sample because it is possible that individuals asked to answer pension and financial literacy questions in different waves eventually learn the correct answers.

Table 10 reports the OLS estimation results omitting the demographic variables.¹⁰ Our results indicate that both pension and financial literacy have an independent and statistically significant effect on pension plan participation. Column 1 shows that one additional correct answer to the pension literacy questions increases the probability of current participation in a private pension plan by 3.7 percentage points, while the effect of one additional correct answer to the financial literacy questions increases such probability by 1.9 percentage points.¹¹ As for the second specification (column 2), we observe that the effect of the two dummy variables is bigger than the effect of the indices. The ability to correctly answer at least four questions related to pension knowledge and all questions related to financial literacy increases the likelihood of currently holding a private pension plan by 9.8 and 7.7 percentage points, respectively. Column 3 shows that pension and financial literacy do not have a joint effect on the probability of holding a private pension plan as the interaction between these two variables is not statistically significant.

The fourth column shows that the effect of the aggregate measures is mainly driven by the ability to correctly answer the pension literacy questions. Three out of five of these questions show a positive and statistically significant effect, while among the financial literacy questions, the only two that are statistically significant are those related to risk diversification and interest compounding. More specifically, people who understand the concept of longevity risk are 5.5 percentage points more likely to be enrolled in a private pension fund. This result is not surprising, as those who understand longevity risk are aware that private pension funds allow them to reduce the risk of outliving their savings. Looking at the three dummies aimed at verifying whether respondents are generally aware of how the Italian pension system works, the only one that is statistically significant is the one related to knowledge of the method used to calculate the NDC public pension benefits for young workers. This positive relationship indicates that those who understand the method used to calculate NDC public pension benefits are better able to understand the potential income shortfalls in retirement and, in turn, are more inclined to secure their financial future by supplementing public pensions with private savings. Finally, the understanding that it is better to start saving for retirement as early as possible

⁹Due to data limitations, we are not able to control for company size, which could be a relevant characteristic since in Italy, the membership rate of pension funds in the private sector is higher in larger companies.

¹⁰The complete set of result as well as the regression related to future intention of having a pension plan are reported in Table C1 of Appendix C. Results obtained using the OLS model are confirmed when the same regressions are estimated using a Probit model to take into account the dichotomous nature of the dependent variable. In this case we still find a very statistically significant effect of pension and financial literacy on pension plan participation and the magnitude of such effect is substantially higher than in the OLS model. Results are not reported but are available upon request.

¹¹This positive and significant effect of financial literacy on pension fund participation is consistent with the effect found by both Fornero and Monticone (2011) and Jappelli *et al.* (2021), who find that one additional correct answer to the financial literacy questions increases the probability of pension fund participation by 2 and 5 percentage points, respectively.

Table 10. OLS estimates

| | Current participation | | | | |
|-----------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Pen. Lit. – Index | 0.037*** (0.004) | | | | 0.029*** (0.004) |
| Fin. Lit. – Index | 0.019*** (0.003) | | | | 0.017*** (0.003) |
| Pen. Lit. – Dummy | | 0.098*** (0.012) | 0.095*** (0.015) | | |
| Fin. Lit. – Dummy | | 0.077*** (0.011) | 0.075*** (0.013) | | |
| Pen. Lit. – Dummy# | | | 0.009 | | |
| Fin. Lit. – Dummy | | | (0.024) | | |
| Long. Risk | | | | 0.055*** (0.011) | |
| Pension for young | | | | 0.049*** (0.010) | |
| Pension revaluation | | | | 0.011 (0.010) | |
| Sup. Pen./INPS contr. | | | | 0.008 (0.010) | |
| Sav. for supp. Pen. | | | | 0.071*** (0.010) | 0.069*** (0.010) |
| Interest rate | | | | 0.008 (0.010) | |
| Inflation | | | | 0.007 (0.010) | |
| Risk div. | | | | 0.029*** (0.010) | |
| Mortgage | | | | 0.004 (0.010) | |
| Comp. int. rate | | | | 0.032*** (0.010) | |
| Observations | 8,520 | 8,520 | 8,520 | 8,520 | 8,520 |
| R-squared | 0.101 | 0.095 | 0.104 | 0.095 | 0.036 |
| Socio-dem. ctr. | Yes | Yes | Yes | Yes | Yes |
| Region dum. | Yes | Yes | Yes | Yes | Yes |

Note: EDUFIN 2022–2023 surveys – people in the labour market aged 18–65 years. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable takes value 1 if the respondent is currently holding a private pension plan and 0 otherwise. Pension and financial literacy are assessed in five different ways: the number of correct answers given (column 1); the dummy indicating whether the respondent gave a higher number of correct answers than the median (column 2); the interaction between these two dummies (column 3); a dummy for each question asked (column 4); and the pension literacy index constructed using only four questions excluding the dummy for the question on when it is better to start saving for a supplementary pension and the financial literacy index constructed using all the related questions (column 5). The full set of results are in [Table C1 of Appendix C](#).

is also positively and significantly related to the probability of being enrolled in a private pension fund. We believe that this positive and significant relationship can be explained by the fact that those who start saving early are more capable of understanding that this behaviour allows them to regularly contribute smaller amounts over a longer time, thus reducing their financial burden.

Column 5 reports the results obtained by running a specification aimed at singling out the role of the variable *Saving for supplementary pension* since it does not measure a direct feature of the Italian pension system unlike the other four questions related to pension literacy. The results are in line with those obtained in the previous specifications. Similar results are found when looking at the effect of pension and financial literacy on future intention to hold a private pension plan reported in [Table C1 of Appendix C](#).

All in all, we observe that the effect of the pension literacy index is stronger than the effect of the financial literacy index for current pension plan participation, even once we control for educational attainment. This suggests that despite the positive correlation between education and pension and

financial knowledge, education alone does not capture the effect of knowledge. If we interact the two literacy variables with educational level, we do not find any statistically significant joint effect.¹² Moreover, the coefficient associated with gender is not significant nor is the one capturing the effect of having minor children in the household. Income and wealth have a positive impact on the probability of having a pension plan, with individuals at the top of the income distribution and homeowners more likely to hold a plan. Private sector employees are significantly more likely to hold a private pension plan compared to public sector employees, while the effect of being self-employed is negative but not significant.

To check whether our models are affected by multicollinearity problems, we run the variance inflation factor (VIF) test, which is a commonly used tool for detecting the degree of multicollinearity between independent variables. Both our VIF test results for each variable and the overall mean VIF test for each specification show values well below the cut-off point of 10, which is usually taken as the threshold for determining if there is multicollinearity (Belsley *et al.*, 1980).¹³

As has been documented in the literature (Bucher-Koenen and Lusardi, 2011; Fornero and Monticone, 2011; Van Rooij *et al.*, 2011), literacy can be endogenously determined, and this could cause the OLS estimates to be biased for several reasons. First, pension and financial literacy could be the result of experience, meaning that holding and managing savings in a private pension plan could affect the level of financial and retirement knowledge and, hence, the estimates could suffer from reverse causality bias. Second, the difficulty in assessing people's financial and pension sophistication levels might lead to errors in the measurement of these variables. Consequently, the OLS estimates could be biased towards zero. In addition, respondents' sensitivity to the way questions are asked also raises the threat of recording distorted knowledge scores due to guessing behaviour (Lusardi and Mitchell, 2011a). Finally, there might be problems of omitted variable bias determined by the lack of information on innate ability or motivation.

We applied two strategies to address the identified endogeneity concerns and establish the existence of a causal effect between pension and financial literacy and plan participation. First, we rely on a standard IV approach; second, we use the alternative identification approach proposed by Lewbel (2012), which generates instruments by using the heteroscedasticity of the error structure of the first-stage regression.

In our first approach, we use a standard IV model with two endogenous variables relying on the following first (equations 2 and 3) and second-stage specifications (equation 4):

$$pen_lit = \delta_0 + \delta_1 Z + \delta_2 X + \varepsilon_2 \quad (2)$$

$$fin_lit = \gamma_0 + \gamma_1 Z + \gamma_2 X + \varepsilon_3 \quad (3)$$

$$pens_plan = \beta_0 + \beta_1 \widehat{pen_lit} + \beta_2 \widehat{fin_lit} + \beta_3 X + \varepsilon_1 \quad (4)$$

where Z is a vector of instruments; X is the vector of the mentioned control variable; and ε_1 , and ε_3 are the error terms.

We use exposure to knowledge of peers and the presence of a person aged 70 or more in the household as instruments for pension and financial literacy. To define peers' level of knowledge, we compute the average level of pension and financial literacy of a set of subgroups of our sample. We define these subgroups based on the year in which they took part in the survey, the gender, the macro-area of residence (North-West, North-East, Centre, South, and Islands), the educational level (primary,

¹²Results of this specification are not reported but are available upon request.

¹³Results for the VIF tests are not reported but are available upon request while Table B2 in Appendix B reports the Pearson correlation matrix for our set of independent variables.

Table 11. IV estimates

| | Current participation | | | Future participation | | |
|-------------------|-----------------------|---------------------|---------------------|----------------------|---------------------|--------------------|
| | Ext.instr. (1) | Lewbelinstr. (2) | Comb.instr (3) | Ext.instr. (4) | Lewbelinstr. (5) | Comb.instr. (6) |
| Pen. Lit. – Index | 0.069** (0.027) | 0.135*** (0.040) | 0.093*** (0.022) | 0.020 (0.030) | 0.031 (0.041) | 0.023 (0.024) |
| Fin. Lit. – Index | -0.019 (0.023) | -0.018 (0.031) | -0.016 (0.019) | 0.031 (0.025) | -0.033 (0.039) | 0.014 (0.021) |

Note: EDUFIN 2022–2023 surveys – people in the labour market aged 18–65 years. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1–3 report results for respondents that are currently holding ($\text{pens_plan} = 1$) or not holding ($\text{pens_plan} = 0$) a private pension plan; columns 4–6 report results for respondents that are not currently holding a private pension but that are planning to hold one in the future ($\text{pens_plan} = 1$) or that are not currently holding a private pension and that are not planning to hold one in the future ($\text{pens_plan} = 0$). The reference group in the pension literacy and financial literacy instrument set consists of, respectively, respondents who do not have a pensioner living in the household and of respondents who do not have a college degree. The full set of results are in Table C2 of Appendix C.

secondary, and tertiary), and the occupational status (employed and unemployed) of each respondent. The choice of the first two instruments, namely average peers' level of pension and financial knowledge, is driven by the assumption that a higher exposure to more knowledgeable people has a positive effect on the level of knowledge of the individual without giving him or her the chance to directly influence it. The third instrument, presence of a person aged ≥ 70 years in the household, was chosen following Landerretche and Martínez (2013), whose identification assumption is that having a person aged 70 or more in the household (that means having a pensioner in the household) can directly impact pension literacy (if the person shares his or her knowledge about the rules and the functioning of the system) or indirectly affect it (by having somebody in the household with a higher level of knowledge) without affecting pension plan participation in any other way.

Our second strategy use the approach proposed by Lewbel (2012) that exploits variation on higher moment conditions of the error distribution obtained from the first-stage regression of the endogenous variables on (a set of) other covariates included in the model, meaning that this approach exploits heteroscedasticity in the first-stage regression instead of relying on the exclusion restrictions to achieve identification. The Lewbel method allows the generation of a set of instruments Z , defined as $[Z - E(Z)]\varepsilon_2$ and $[Z - E(Z)]\varepsilon_3$, to be used as instruments for the endogenous variables. The vector Z can be equal to the set of the exogenous variables X included in equation 1 or just be a subset of it. Good candidates for the set of instruments are predetermined variables relative to the outcomes. For our estimates, we use gender, presence of minor kids in the household and possession of a degree. Such instruments can then be used to identify if the two assumptions hold. First, the presence of heteroscedasticity in the errors obtained from the first-stage regression is required. This assumption can be tested using the Breusch–Pagan test for heteroscedasticity and is supported in our data. Second, $\text{Cov}(Z, \varepsilon_1\varepsilon_2\varepsilon_3) = 0$ must be satisfied. This approach also allows combining generated instruments with external ones, if these exist.

Table 11 reports the results of the IV estimations with the omission of the demographic variables.¹⁴ We instrument the pension and financial literacy indexes and look at two different outcomes: current pension plan participation (columns 1–3) and future intention to participate (columns 4–6). Columns 1 and 4 present results obtained by using only the three external instruments; columns 2 and 5 present results obtained by using the generated instruments from the Lewbel method; and columns 3 and 6 present the results obtained by combining the external instruments with the generated ones.

Our estimates show that pension literacy has a positive and strong effect on current pension plan participation, while financial literacy does not seem to affect such probability. The coefficient of pension literacy obtained with the use of only external instruments is 6.9 and is significant at the

¹⁴The complete set of results is reported in Table C2 of Appendix C.

5 percent level. The coefficient of pension literacy estimated using the Lewbel approach is higher (13.5) and significant at the 1 percent level, while the coefficient obtained from the estimation that combines external and generated instruments is almost 10 and is significant at the 1 percent level. Results related to the effect of pension and financial literacy on the probability of future intention to hold a private pension plan are not significant. The discussion of the quality of the instruments and the table reporting the full set of results are presented in [Appendix C](#).

7. Sensitivity analysis

The results of our multivariate regression estimates show that pension literacy increases the probability of holding private pension plans. To support the robustness of our results, we follow Van Rooij *et al.* (2011) and extend our analysis by including measures for risk aversion and planning attitude among our covariates. This choice was made because previous works (Dohmen *et al.*, 2010; Benjamin *et al.*, 2013) have shown a link between cognitive abilities and risk and planning preferences.

For risk attitude, it could be that those who are more risk averse decide to invest more in both preparedness for retirement and pension and financial education. Hence, not controlling for this aspect could affect our estimates by creating a spurious correlation between our dependent and main explanatory variables due to an omitted variable bias. Regarding planning attitude, it is possible that individuals who are concerned about their future have a higher interest in investing in pension and financial education.

Thus, as a sensitivity analysis to consider the possible effects of risk aversion and of the degree of interest towards the future on the probability of participating in private pension schemes, we re-estimate our models with the inclusion of self-assessed measures of time preferences and of risk attitudes. As shown by Donkers and Van Soest (1999) and Kapteyn and Teppa (2011), subjective variables are more informative than proxies relying on direct cognitive abilities (e.g., lottery or gambling participation). Therefore, we employ a categorical variable, *risk_attitude*, which ranges from one to ten (where one means that you are risk averse and ten means that you are a risk seeker) to control for time preferences. This variable contains the answers to the question assessing the self-reported degree of risk aversion related to financial decisions as well as a dummy variable, *planning_attitude*, that takes a value of 1 if the respondent states that he or she has medium/long-term goals, and 0 otherwise.

[Table 12](#) reports results from the regressions containing these additional control variables. As we expected, the relation between planning attitude and private pension plan participation is positive and statistically significant, while not being risk averse is positively and significantly associated with having a private pension. All in all, the magnitude of these two additional control variables is small and their inclusion has little effect on the relationship between pension and financial literacy and participation in private pension funds, confirming our previous results.

8. Conclusion

Due to the continuous threats posed by the ageing process of the Italian population, the sustainability of the public pension system will be challenged by an always higher dependency ratio, which is projected to rise from 36 percent in 2021 to 61 percent in 2050. Under these circumstances, the role of the private pension system is going to gain more and more importance by allowing people to save more to avoid adjusting their standard of living once they retire. Hence, individuals, particularly the young ones, will have to face an increasing number of choices and will have to handle a more complex set of financial decisions regarding their future, including those related to saving for retirement. Therefore, a higher level of both basic pension and financial knowledge is now required.

Table 12. Sensitivity checks: including risk and time preferences

| | Current participation | | | Future participation | | |
|----------------------------|-----------------------|---------------------|---------------------|----------------------|----------------------|--------------------|
| | OLS (1) | OLS (2) | IV (3) | OLS (4) | OLS (5) | IV (6) |
| Pen. Lit. – Index | 0.035*** (0.004) | | 0.069** (0.027) | 0.019*** (0.004) | | 0.022 (0.030) |
| Fin. Lit. – Index | 0.021*** (0.003) | | -0.025 (0.025) | 0.020*** (0.004) | | 0.027 (0.025) |
| Pen. Lit. – Dummy | | 0.090*** (0.012) | | | 0.047*** (0.013) | |
| Fin. Lit. – Dummy | | 0.079*** (0.011) | | | 0.073*** (0.013) | |
| Risk attitude | 0.015*** (0.002) | 0.014*** (0.002) | 0.014*** (0.002) | -0.004** (0.003) | -0.006*** (0.002) | -0.004* (0.002) |
| Planning attitude | 0.023** (0.011) | 0.027** (0.011) | 0.019 (0.012) | 0.033*** (0.012) | 0.036*** (0.012) | 0.032** (0.013) |
| Observations | 8,252 | 8,252 | 8,252 | 6,306 | 6,306 | 6,306 |
| R-squared | 0.107 | 0.100 | 0.087 | 0.037 | 0.034 | 0.037 |
| Socio-demographic controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Region dummies | Yes | Yes | Yes | Yes | Yes | Yes |

Note: EDUFIN 2022–2023 surveys – people in the labour market aged 18–65 years. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1–3 report results for respondents that are currently holding (pens_plan = 1) or not (pens_plan = 0) a private pension plan; columns 4–6 report results for respondents that are not currently holding a private pension but that are planning to hold one in the future (pens_plan = 1) or that are not currently holding a private pension and that are not planning to hold one in the future (pens_plan = 0). The reference group in the pension literacy and financial literacy instrument set consists of, respectively, respondents who do not have a pensioner living in the household and of respondents who do not have a college degree.

This paper uses a novel survey designed by the EDUFIN Committee to assess pension and financial literacy in Italy and to investigate the impact of such knowledge on the probability of participating in a pension plan today and on the willingness to participate in the future.

First, from a descriptive analysis, we document an overall low level of financial literacy and an even lower level of pension literacy. In particular, we observe a lack of knowledge on basic pension and financial concepts among the more vulnerable groups of people, namely the female population, the younger generations, low-income workers, and those with a lower level of education.

In a second step, by running a set of OLS estimates, we document a significantly positive and economically meaningful association between pension and financial sophistication and the propensity to hold, now or in the future, a pension plan. From this initial analysis, it appears that the effect of pension literacy is stronger than the effect of financial literacy. After controlling for a large set of socioeconomic characteristics, including education and income, results from our OLS regressions show that the effect of one additional correct answer to the pension literacy questions increases the probability of currently holding a private pension fund by 3.7 percentage points, while the effect of one additional correct answer to the financial literacy questions only increases such probability by 1.9 percentage points.

Finally, by re-estimating our models based on two strategies, namely the standard IV approach and the Lewbel method, we try to address the causal impact of pension and financial literacy on the probability to hold a private pension fund. Using only external instruments (information on the average level of sophistication of peers and the presence of pensioners in the household), we find a causal effect of pension knowledge on current pension plan participation, and this result is confirmed by the other two models: the one only using generated instruments from the Lewbel method and the one that uses external and generated instruments together.

Our study strengthens previous recommendations (e.g., OECD, 2022) about the need to invest more in specific education, such as pension education, to improve people's ability to correctly plan for retirement savings. We stress that since pension and financial knowledge are not equally spread

among the Italian population, it is important that public interventions target the most vulnerable groups to avoid a further widening of disparities.

Acknowledgements. We would like to thank the Editor and two anonymous referees for all their precious suggestions. We also feel thankful for the valuable advice and helpful comments of the participants at the *19th International Conference on Pensions, Insurance and Savings* in Tokyo, *XXVth Applied Economics Meeting* in Toledo, *International Pension Workshop 2023* in Leiden, *PhD Researchers' Forum* of Collegio Carlo Alberto, the *Previdenza complementare e scelte individuali seminar* at COVIP.

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Appendices

Appendix A. Questions related to pension and financial knowledge

In the 2022 and 2023 waves of the survey, the following questions related to financial and pension knowledge were included. Starting from them we construct our pension and financial literacy indexes by counting the number of correct answers given by each respondent.

Pension literacy

1. Which of the following statement is true?
 - As life expectancy increases the monthly amount of pension decreases
 - As life expectancy increases the monthly amount of pension increases
 - The monthly amount of pension and life expectancy are not related
 - Don't know
2. Do you know how, in accordance with current legislation, is the public pension of a newly hired young employee calculated?
 - Yes, it is determined according to the defined contribution method, meaning that it depends on how much it has been contributed during one's entire working career
 - Yes, it is determined according to the defined benefit method, meaning that it depends on one's average late-career earnings
 - Yes, it is determined according to a mixed method, meaning that it partly depends on the defined contribution scheme and partly depends on the defined benefit scheme
 - Don't know
3. In accordance with current legislation, the revaluation of the pension contributions paid to INPS follows:
 - The Italian economic growth
 - The performance of the financial market
 - Don't know
4. In your opinion what is the best thing to do to have a high capital to supplement the public pension?
 - Start to save even small amounts as soon as possible
 - Start to save only after having worked for at least 10 years
 - Start to save after you are 50, meaning during the period in which you are assumed to have the highest earnings
 - Don't know
5. [Only asked in the 2022 wave] The supplementary pensions schemes is:
 - The compulsory public pension system run by INPS
 - The compulsory public pension system run by Professional Funds and directed toward self-employed professionals
 - The system of pension schemes collecting private savings and providing a supplementary pension in addition to INPS pension provisions
 - Don't know
6. [Only asked in the 2023 wave] According to current legislation, the contributions that workers pay to the INPS today:
 - Are used to pay pensions to those who are already retired
 - Are set aside on workers' social security accounts and invested in the financial markets

- Are partly used to pay pensions to those who are already retired and partly set aside on workers' social security accounts and invested in the financial markets
- Don't know

Financial literacy

1. Suppose you had 100 euro in a savings account and the interest rate was 2 percent per year. After 5 years, how much do you think you would have in the account if you left the money to grow?
 - More than 102 euro
 - Exactly 102 euro
 - Less than 102 euro
 - Don't know
2. Imagine leaving 1,000 euro in a current account that pays 1 percent interest per year and has no charges. Imagine that inflation is running at 2 percent. After 1 year, how much would you be able to buy with the money in this account?
 - More than today
 - Exactly the same
 - Less than today
 - Don't know
3. Do you think that the following statement 'Investing 1,000 euro by buying a single company's stock is usually less risky than investing 1,000 euro by buying stocks from 10 different companies' is true or false?
 - True
 - False
 - Don't know
4. A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.
 - True
 - False
 - Don't know
5. Suppose to deposit money in your bank current account for 2 years. Suppose that the interest rate is 5 percent per year and that your account has no charges. The bank will then
 - Give you a higher amount of money the second year than the first one
 - Give you the same amount of money in both years
 - Don't know

Appendix B. Summary statistics

Table B1. Summary statistics

| | Obs. | Mean | Std. Dev. | Min | Max |
|--|--------|-------|-----------|-----|-----|
| Age: 18–44 years | 10,002 | .308 | .462 | 0 | 1 |
| Age: 45–64 years | 10,002 | .440 | .496 | 0 | 1 |
| Age: 65+ years | 10,002 | .252 | .434 | 0 | 1 |
| Female | 10,002 | .374 | .484 | 0 | 1 |
| Minor children in household | 10,002 | .289 | .453 | 0 | 1 |
| Tertiary education | 10,002 | .431 | .495 | 0 | 1 |
| Secondary education | 10,002 | .339 | .473 | 0 | 1 |
| Primary education | 10,002 | .230 | .421 | 0 | 1 |
| Self-employed | 10,002 | .146 | .353 | 0 | 1 |
| Public sector employee | 10,002 | .265 | .371 | 0 | 1 |
| Private sector employee | 10,002 | .390 | .488 | 0 | 1 |
| Not employed | 10,002 | .071 | .256 | 0 | 1 |
| Retired | 10,002 | .228 | .420 | 0 | 1 |
| Income: < 539 euro | 10,002 | .013 | .180 | 0 | 1 |
| Income: 540–954 euro | 10,002 | .088 | .283 | 0 | 1 |
| Income: 955–1,549 euro | 10,002 | .348 | .476 | 0 | 1 |
| Income: 1,550–1,939 euro | 10,002 | .143 | .350 | 0 | 1 |
| Income: 1,940–2,454 euro | 10,002 | .170 | .376 | 0 | 1 |
| Income: > 2,455 euro | 10,002 | .237 | .425 | 0 | 1 |
| Home: own | 10,002 | .825 | .380 | 0 | 1 |
| Home: rent | 10,002 | .144 | .351 | 0 | 1 |
| Home: other | 10,002 | .031 | .173 | 0 | 1 |
| Pension literacy index | 10,002 | 2.358 | 1.416 | 0 | 5 |
| Pension literacy – dummy | 10,002 | .234 | .423 | 0 | 1 |
| Average pension literacy knowledge | 10,002 | 2.367 | .397 | 0 | 4 |
| Financial literacy index | 10,002 | 3.178 | 1.614 | 0 | 5 |
| Financial literacy – dummy | 10,002 | .270 | .444 | 0 | 1 |
| Average financial literacy knowledge | 10,002 | 3.214 | .560 | 0 | 5 |
| Pension fund holder | 10,002 | .157 | .363 | 0 | 1 |
| Intention to hold pension fund | 7,819 | .139 | .346 | 0 | 1 |
| Risk attitude | 10,002 | 3.980 | 2.482 | 1 | 10 |
| Planning attitude | 9,701 | .730 | .444 | 0 | 1 |
| Presence of a pensioner in the household | 10,002 | .102 | .303 | 0 | 1 |
| Panel participant | 10,002 | .850 | .357 | 0 | 1 |

Note: EFUFIN 2022–2023 surveys – all individuals, weighted data.

Table B2. Pearson correlations matrix

| | Pen. Lit. | Fin. Lit. | Educ. | Age cat. | Female | Minor kids in hh. | Occ. Stat. | Housing ten. | Income cat. | Risk av. | Planning att. |
|-------------------|-----------|-----------|--------|----------|--------|-------------------|------------|--------------|-------------|----------|---------------|
| Pen. Lit. | 1.000 | | | | | | | | | | |
| Fin. Lit. | 0.520 | 1.000 | | | | | | | | | |
| Educ. | 0.035 | 0.132 | 1.000 | | | | | | | | |
| Age cat. | 0.140 | 0.098 | -0.207 | 1.000 | | | | | | | |
| Female | -0.140 | -0.170 | 0.054 | -0.154 | 1.000 | | | | | | |
| Minor kids in hh. | -0.045 | -0.011 | 0.066 | -0.308 | 0.004 | 1.000 | | | | | |
| Occ. stat. | 0.028 | -0.009 | -0.215 | 0.523 | -0.024 | -0.286 | 1.000 | | | | |
| Housing ten. | -0.092 | -0.089 | -0.018 | -0.081 | 0.037 | -0.011 | -0.044 | 1.000 | | | |
| Income | 0.259 | 0.303 | 0.177 | 0.045 | -0.135 | 0.068 | -0.037 | -0.159 | 1.000 | | |
| Risk av. | 0.058 | 0.098 | 0.145 | -0.180 | -0.103 | 0.215 | -0.196 | -0.075 | 0.141 | 1.000 | |
| Planning att. | 0.040 | 0.047 | 0.107 | -0.236 | 0.025 | 0.170 | -0.242 | -0.022 | 0.081 | 0.197 | 1.000 |

Note: EFUFIN 2022–2023 surveys – all individuals, weighted data.

Appendix C Estimation results

OLS Estimation

Table C1. OLS estimates

| | Current participation | | | | | Future participation | | | | |
|-----------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Pen. Lit. – Index | 0.037*** (0.004) | | | | 0.029*** (0.004) | 0.019*** (0.004) | | | | 0.005 (0.023) |
| Fin. Lit. – Index | 0.019*** (0.003) | | | | 0.017*** (0.003) | 0.020*** (0.003) | | | | 0.066*** (0.013) |
| Pen. Lit. – Dummy | | 0.098*** (0.012) | 0.095*** (0.015) | | | | 0.049*** (0.013) | 0.040** (0.016) | | |
| Fin. Lit. – Dummy | | 0.077*** (0.011) | 0.075*** (0.013) | | | | 0.075*** (0.013) | 0.068*** (0.015) | | |
| Pen. Lit. – Dummy# | | | 0.009 (0.024) | | | | | 0.026 (0.027) | | |
| Fin. Lit. – Dummy | | | | | | | | | | |
| Long. Risk | | | | 0.055*** (0.011) | | | | | 0.010 (0.012) | |
| Pension for young | | | | 0.049*** (0.010) | | | | | 0.016 (0.011) | |
| Pension revaluation | | | | 0.011 (0.010) | | | | | 0.009 (0.011) | |
| Sup. Pen./INPS contr. | | | | 0.008 (0.010) | | | | | 0.015 (0.011) | |
| Sav. for supp. Pen. | | | | 0.071*** (0.010) | 0.069*** (0.010) | | | | 0.049*** (0.011) | 0.070*** (0.010) |
| Interest rate | | | | 0.008 (0.010) | | | | | 0.021* (0.011) | |
| Inflation | | | | 0.007 (0.010) | | | | | – (0.012) | |
| Risk div. | | | | 0.029*** (0.010) | | | | | 0.005 (0.010) | |
| Mortgage | | | | 0.004 (0.010) | | | | | 0.030*** (0.011) | |
| Comp. int. rate | | | | 0.032*** (0.010) | | | | | 0.028*** (0.010) | |
| Age: 45–64 | 0.025*** (0.009) | 0.034*** (0.009) | 0.035*** (0.009) | 0.026*** (0.009) | 0.027*** (0.009) | 0.002 (0.010) | 0.008 (0.010) | 0.008 (0.010) | 0.002 (0.010) | 0.002 (0.010) |

(Continued)

Table C1. (Continued.)

| | Current participation | | | | | Future participation | | | | |
|--------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Female | -0.012 (0.009) | -0.012 (0.009) | -0.012 (0.009) | -0.013 (0.009) | -0.019** (0.009) | 0.018* (0.010) | 0.016 (0.010) | 0.016 (0.010) | 0.014 (0.010) | 0.011 (0.010) |
| Minor kids | 0.006 (0.009) | 0.001 (0.009) | 0.001 (0.009) | 0.007 (0.009) | 0.008 (0.009) | 0.011 (0.010) | 0.008 (0.010) | 0.008 (0.010) | 0.012 (0.010) | 0.012 (0.010) |
| Degree | 0.029** (0.011) | 0.033** (0.011) | 0.033** (0.011) | 0.029** (0.011) | 0.034** (0.011) | 0.015 (0.013) | 0.019 (0.013) | 0.019 (0.013) | 0.017 (0.013) | 0.020 (0.013) |
| Self-employed | -0.012 (0.014) | -0.009 (0.014) | -0.009 (0.014) | -0.013 (0.014) | -0.015 (0.014) | -0.005 (0.015) | -0.001 (0.015) | -0.001 (0.015) | -0.005 (0.015) | -0.005 (0.015) |
| Private sector empl. | 0.057*** (0.011) | 0.059*** (0.011) | 0.059*** (0.011) | 0.058*** (0.011) | 0.056*** (0.011) | 0.011 (0.012) | 0.012 (0.012) | 0.012 (0.012) | 0.011 (0.012) | 0.011 (0.012) |
| Unemployed | -0.047*** (0.016) | -0.050*** (0.016) | -0.050*** (0.016) | -0.048*** (0.016) | -0.053*** (0.016) | 0.006 (0.022) | 0.004 (0.022) | 0.004 (0.022) | 0.007 (0.022) | 0.001 (0.022) |
| Income: 540–954 euro | 0.008 (0.022) | 0.015 (0.022) | 0.015 (0.022) | 0.008 (0.022) | 0.008 (0.022) | 0.004 (0.028) | 0.010 (0.028) | 0.010 (0.028) | 0.004 (0.028) | 0.007 (0.028) |
| Income: 955–1,549 euro | -0.001 (0.019) | 0.012 (0.019) | 0.012 (0.019) | -0.001 (0.019) | 0.001 (0.019) | -0.004 (0.024) | 0.006 (0.024) | 0.006 (0.024) | -0.006 (0.024) | -0.001 (0.024) |
| Income: 1,550–1,939 euro | 0.021 (0.021) | 0.043** (0.021) | 0.044** (0.021) | 0.022 (0.021) | 0.026 (0.021) | 0.014 (0.026) | 0.030 (0.026) | 0.030 (0.026) | 0.011 (0.026) | 0.019 (0.026) |
| Income: 1,940–2,454 euro | 0.033 (0.021) | 0.057*** (0.021) | 0.058*** (0.021) | 0.032 (0.021) | 0.040* (0.021) | 0.014 (0.026) | 0.032 (0.026) | 0.033 (0.026) | 0.012 (0.026) | 0.021 (0.026) |
| Income: > 2,455 euro | 0.126*** (0.020) | 0.150*** (0.020) | 0.151*** (0.020) | 0.125*** (0.021) | 0.134*** (0.021) | 0.032 (0.025) | 0.049* (0.025) | 0.050* (0.025) | 0.030 (0.025) | 0.039 (0.025) |
| Home: rent | -0.054*** (0.011) | -0.058*** (0.011) | -0.058*** (0.011) | -0.054*** (0.011) | -0.056*** (0.011) | 0.003 (0.013) | 0.001 (0.013) | 0.001 (0.013) | 0.004 (0.013) | 0.002 (0.013) |
| Home: other | -0.008 (0.022) | -0.003 (0.022) | -0.003 (0.022) | -0.011 (0.022) | -0.009 (0.022) | -0.026 (0.024) | -0.025 (0.024) | -0.025 (0.024) | -0.025 (0.024) | -0.027 (0.024) |
| Panel respondent | -0.010 (0.012) | -0.011 (0.012) | -0.011 (0.012) | -0.010 (0.012) | -0.009 (0.012) | 0.010 (0.013) | 0.009 (0.013) | 0.010 (0.013) | 0.010 (0.013) | 0.010 (0.013) |
| Year dummy | 0.019* (0.010) | 0.015 (0.010) | 0.015 (0.010) | 0.011 (0.010) | 0.010 (0.010) | -0.082*** (0.012) | -0.085*** (0.012) | -0.085*** (0.012) | -0.084*** (0.012) | -0.087*** (0.012) |
| Constant | -0.003 (0.034) | 0.070** (0.034) | 0.070** (0.034) | 0.001 (0.034) | 0.046 (0.034) | 0.094*** (0.039) | 0.150*** (0.039) | 0.151*** (0.039) | 0.093*** (0.039) | 0.134*** (0.039) |
| Observations | 8,520 | 8,520 | 8,520 | 8,520 | 8,520 | 6,537 | 6,537 | 6,537 | 6,537 | 6,537 |

(Continued)

Table C1. (Continued.)

| | Current participation | | | | | Future participation | | | | |
|-------------|-----------------------|-------|-------|-------|-------|----------------------|-------|-------|-------|-------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| R-squared | 0.101 | 0.095 | 0.095 | 0.104 | 0.102 | 0.036 | 0.032 | 0.038 | 0.032 | 0.036 |
| Region dum. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Note: EDUFIN 2022–2023 surveys – people in the labour market aged 18–65 years. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1–4 report results for respondents that are currently holding a private pension plan (pens_plan = 1) or not (pens_plan = 0); columns 5–8 report results for respondents that are not currently holding a private pension but that are planning to hold one in the future (pens_plan = 1) or that are not currently holding a private pension and that are not planning to hold one in the future (pens_plan = 0). Pension and financial literacy are assessed in five different ways: the number of correct answers given (column 1); the dummy indicating whether the respondent gave a higher number of correct answers than the median (column 2); the inter-action between these two dummies (column 3); a dummy for each question asked (column 4); and the pension literacy index constructed using only four questions excluding the dummy for the question on when it is better to start saving for a supplementary pension and the financial literacy index constructed using all the related questions (column 5).

IV Estimation

To measure the quality of our instruments, we present the first-stage statistics of the two models in the second part of Table C2. The external instruments appear to be relevant and strong. Indeed, from the Kleibergen–Paap rk LM statistic, we see that the null hypotheses that the model is under-identified is rejected at the 1 percent level for all the specifications, meaning that they all are identified, while from the highly significant test statistics obtained from the Cragg–Donald test for weak identification we can reject the null hypotheses of weakness of our group of instruments. To validate the exclusion restriction, we look at the over-identification test. From the p -value of the Hansen's J statistic, we can then conclude that the null hypotheses of validity of our external instruments (i.e., lack of correlation between the instruments and the error term) cannot be rejected at all traditional levels of significance. Similar statistics are obtained for the two alternative specifications using heteroscedasticity based instruments only and the combined set of instruments respectively. In fact, in both cases, the under-identification tests display highly significant test statistics and both sets of instruments meet the exogeneity assumption since the Hansen's J statistic fails to reject the null hypothesis at the highest level of confidence. Finally, using the Lewbel method allows to test for the joint validity of the external instruments used for estimating the standard IV model. Such test uses the difference between the Hansen's J statistics obtained from the model that only uses generated instruments and the one obtained from the augmented model that uses both, external and generated, sets of instruments. Failure in the rejection of the null hypothesis of the C -statistic (value: 2.652 and p -value: 0.448 for the current participation model; value: 2.874 and p -value: 0.412 for the future intention to participate model) confirms the validity of our external instruments.

Table C2. IV estimates

| | Current participation | | | Future participation | | |
|--------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Ext.instr. (1) | Lewbel instr. (2) | Comb.instr (3) | Ext.instr. (4) | Lewbel instr. (5) | Comb.instr. (6) |
| Pen. Lit. – Index | 0.069** (0.027) | 0.135*** (0.040) | 0.093*** (0.022) | 0.020 (0.030) | 0.031 (0.041) | 0.023 (0.024) |
| Fin. Lit. – Index | -0.019 (0.023) | -0.018 (0.031) | -0.016 (0.019) | 0.031 (0.025) | -0.033 (0.039) | 0.014 (0.021) |
| Age: 45–64 | 0.028** (0.012) | 0.009 (0.015) | 0.020* (0.011) | -0.001 (0.013) | 0.012 (0.014) | 0.002 (0.011) |
| Female | -0.020 (0.014) | 0.004 (0.019) | -0.010 (0.013) | 0.023 (0.015) | -0.004 (0.019) | 0.016 (0.014) |
| Minor kids | 0.005 (0.010) | 0.015 (0.012) | 0.009 (0.010) | 0.013 (0.011) | 0.006 (0.012) | 0.011 (0.011) |
| Degree | 0.036** (0.014) | 0.022 (0.017) | 0.030** (0.014) | 0.011 (0.016) | 0.033* (0.019) | 0.017 (0.015) |
| Self-employed | -0.005 (0.016) | -0.014 (0.017) | -0.009 (0.015) | -0.008 (0.017) | 0.011 (0.019) | -0.003 (0.017) |
| Private sector empl. | 0.062*** (0.012) | 0.055*** (0.013) | 0.058*** (0.012) | 0.009 (0.012) | 0.019 (0.013) | 0.012 (0.012) |
| Unemployed | -0.047*** (0.017) | -0.042** (0.018) | -0.045*** (0.017) | 0.007 (0.022) | 0.003 (0.022) | 0.006 (0.022) |
| Income: 540–954 euro | 0.005 (0.022) | 0.001 (0.024) | 0.004 (0.022) | 0.004 (0.028) | 0.003 (0.028) | 0.004 (0.028) |
| Income: 955–1,549 euro | -0.001 (0.020) | -0.023 (0.024) | -0.010 (0.020) | -0.007 (0.026) | 0.004 (0.027) | -0.004 (0.025) |
| Income: 1,550–1,939 euro | 0.025 (0.026) | -0.018 (0.034) | 0.007 (0.025) | 0.008 (0.032) | 0.033 (0.035) | 0.015 (0.030) |
| Income: 1,940–2,454 euro | 0.041 (0.029) | -0.013 (0.041) | 0.018 (0.028) | 0.005 (0.036) | 0.046 (0.042) | 0.016 (0.032) |
| Income: >2,455 euro | 0.133*** (0.034) | 0.061 (0.050) | 0.104*** (0.031) | 0.021 (0.041) | 0.071 (0.049) | 0.034 (0.036) |
| Home: rent | -0.056*** (0.013) | -0.042*** (0.015) | -0.050*** (0.013) | 0.005 (0.015) | -0.005 (0.016) | 0.003 (0.014) |
| Home: other | -0.002 (0.022) | -0.009 (0.023) | -0.005 (0.022) | -0.029 (0.025) | -0.012 (0.026) | -0.024 (0.024) |
| Panel respondent | -0.010 (0.012) | -0.014 (0.013) | -0.012 (0.012) | 0.009 (0.013) | 0.012 (0.013) | 0.010 (0.013) |
| Year dummy | 0.027** (0.013) | 0.048*** (0.016) | 0.035*** (0.012) | -0.081*** (0.014) | -0.083*** (0.016) | -0.081*** (0.013) |

(Continued)

Table C2. (Continued.)

| | Current participation | | | Future participation | | |
|-------------------------------------|-----------------------|----------------------|---------------------|----------------------|----------------------|---------------------|
| | Ext.instr. (1) | Lewbel instr. (2) | Comb.instr. (3) | Ext.instr. (4) | Lewbel instr. (5) | Comb.instr. (6) |
| Constant | 0.060 (0.062) | -0.060 (0.091) | 0.009 (0.056) | 0.069 (0.072) | 0.204** (0.098) | 0.105* (0.063) |
| Test statistics | | | | | | |
| <i>Under-identification test</i> | | | | | | |
| KP rk LM stat. | 92.091 | 34.025 | 138.441 | 79.825 | 67.587 | 127.501 |
| <i>p</i> -value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| <i>Weak identification test</i> | | | | | | |
| CD Wald F stat. | 33.394 ^a | 10.603 ^b | 18.783 ^c | 28.695 ^a | 8.730 ^b | 16.115 ^c |
| <i>Overidentification test</i> | | | | | | |
| Hansen's J stat. | 0.575 | 3.583 | 6.650 | 0.071 | 4.375 | 7.511 |
| <i>p</i> -value | 0.448 | 0.465 | 0.466 | 0.790 | 0.358 | 0.378 |
| <i>Endogeneity test</i> | | | | | | |
| C-statistic | | | 2.652 | | | 2.874 |
| <i>p</i> -value | | | 0.448 | | | 0.412 |
| <i>Heteroscedasticity test</i> | | | | | | |
| Breusch-Pagan test (Pension lit.) | | 14.730 | | | 14.070 | |
| <i>p</i> -value | | 0.000 | | | 0.000 | |
| Breusch-Pagan test (Financial lit.) | | 30.440 | | | 10.550 | |
| <i>p</i> -value | | 0.000 | | | 0.001 | |

Note: EDUFIN 2022–2023 surveys – people in the labour market aged 18–65 years. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1–3 report results for respondents that are currently holding a private pension plan ($\text{pens_plan} = 1$) or not ($\text{pens_plan} = 0$); columns 4–6 report results for respondents that are not currently holding a private pension but that are planning to hold one in the future ($\text{pens_plan} = 1$) or that are not currently holding a private pension and that are not planning to hold one in the future ($\text{pens_plan} = 0$). The reference group in the pension literacy and financial literacy instrument set consists of respondents who do not have a pensioner living in the household and of respondents who do not have a college degree respectively.

^aStock-Yogo weak ID test critical values: 10% maximal IV size 13.43; 15% maximal IV size 8.18; 20% maximal IV size 6.40; 25% maximal IV size 5.45.

^bStock-Yogo weak ID test critical values: 5% maximal IV relative bias 15.72; 10% maximal IV relative bias 9.48; 20% maximal IV relative bias 6.08; 30% maximal IV relative bias 4.78; 10% maximal IV size 21.68; 15% maximal IV size 12.33; 20% maximal IV size 9.10; 25% maximal IV size 7.42.

^cStock-Yogo weak ID test critical values: 5% maximal IV relative bias 18.30; 10% maximal IV relative bias 10.43; 20% maximal IV relative bias 6.22; 30% maximal IV relative bias 4.69; 10% maximal IV size 27.51; 15% maximal IV size 15.24; 20% maximal IV size 11.03; 25% maximal IV size 8.85.

Restricted sample estimation

Table C3. 2023 Sample only

| | Current participation | | | | Future participation | | | |
|-----------------------|-----------------------|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Pen. Lit. – Index | 0.031*** (0.005) | | | | 0.010*** (0.005) | | | |
| Fin. Lit. – Index | 0.024*** (0.005) | | | | 0.024*** (0.005) | | | |
| Pen. Lit. – Dummy | | 0.092*** (0.017) | 0.086*** (0.022) | | | 0.005 (0.018) | 0.011 (0.021) | |
| Fin. Lit. – Dummy | | 0.079*** (0.016) | 0.075*** (0.018) | | | 0.078*** (0.017) | 0.083*** (0.019) | |
| Pen. Lit. – Dummy # | | | 0.014 (0.035) | | | | -0.017 (0.036) | |
| Fin. Lit. – Dummy | | | | | | | | |
| Long. Risk | | | | 0.042*** (0.015) | | | | 0.002 (0.016) |
| Pension for young | | | | 0.062*** (0.014) | | | | 0.012 (0.014) |
| Pension revaluation | | | | 0.016 (0.014) | | | | 0.016 (0.014) |
| Sup. Pen./INPS contr. | | | | -0.026* (0.014) | | | | -0.040*** (0.014) |

(Continued)

Table C3. (Continued.)

| | Current participation | | | | Future participation | | | |
|---------------------|-----------------------|-------|-------|---------------------|----------------------|-------|-------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Sav. for supp. Pen. | | | | 0.077*** (0.014) | | | | 0.067*** (0.015) |
| Interest rate | | | | 0.000 (0.015) | | | | 0.014 (0.014) |
| Inflation | | | | 0.005 (0.015) | | | | 0.014 (0.015) |
| Risk div. | | | | 0.045*** (0.014) | | | | 0.000 (0.014) |
| Mortgage | | | | 0.021 (0.014) | | | | 0.035*** (0.013) |
| Comp. int. rate | | | | 0.014*** (0.014) | | | | 0.033** (0.014) |
| Observations | 4,275 | 4,275 | 4,275 | 4,275 | 3,214 | 3,214 | 3,214 | 3,214 |
| R-squared | 0.104 | 0.099 | 0.111 | 0.099 | 0.031 | 0.025 | 0.040 | 0.025 |
| Socio-dem. ctr. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region dum. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Note: EDUFIN 2022–2023 surveys – people in the labour market aged 18–65 years. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1–4 report results for respondents that are currently holding a private pension plan ($\text{pens_plan} = 1$) or not ($\text{pens_plan} = 0$); columns 5–8 report results for respondents that are not currently holding a private pension but that are planning to hold one in the future ($\text{pens_plan} = 1$) or that are not currently holding a private pension and that are not planning to hold one in the future ($\text{pens_plan} = 0$).