FINANCIAL LITERACY BIAS: A COMPARISON BETWEEN STUDENTS AND NON-STUDENTS

Abstract: This paper uses Portuguese survey data to examine financial literacy and literacy bias, overconfidence, and under-confidence. The results show that literacy is higher in individuals of the male gender, older, with higher incomes, living in metropolitan areas, highly educated, especially if their field of study is related to finance, and have high self-perceived literacy. Younger people are more overconfident. Unconditionally, women are less overconfident than men. However, women overestimate their financial knowledge after controlling for other variables. People who hold securities and whose field of study is related to finance, albeit exhibiting higher literacy, also are more overconfident. The gender effect observed in the full sample is mainly driven by students, while the impact of a field of study close to finance and of holding securities on overconfidence decreases and increases, respectively when the individual is a student. These results highlight the importance of financial education.

1. Introduction

Financial literacy reflects the degree to which the individual can understand financial issues and has the skill and willingness to act on that knowledge (Balasubramnian and Sargent, 2020), i.e., to make informed decisions regarding financial planning, wealth accumulation, debt, and pensions (Lusardi and Mitchell, 2014). It can be defined as the "ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being" (Knoll and Houts, 2012, p. 383). Financial literacy is associated with positive outcomes for individuals and households; for example, previous empirical research found evidence of its effect on household finances (Feng *et al.*, 2019). The positive relationships of financial literacy with desirable financial behavior and financial well-being were further supported by a recent meta-analysis (Hwang and Park, 2023). The increased complexity of financial concepts further emphasizes the importance of studying financial literacy and its effects.

Recently, the literature started paying attention to overconfidence in financial knowledge (e.g., Pikulina *et al.*, 2017). The term overconfidence refers to the "overestimation of one's actual ability, performance, level of control, or chance of success" (Moore and Healy, 2008, p. 502). Thus, the positive difference between objective and subjective financial knowledge corresponds to financial literacy overconfidence (Xia *et al.*, 2014). It is important to distinguish objective (actual) financial literacy from subjective (self-perceived) financial literacy because a cognitive bias might happen and influence actual behavior. Subjective knowledge is likely to have a stronger relationship with financial behavior and financial well-being than objective knowledge (Hwang and Park, 2023). Subjective financial literacy is associated with actual trading behavior (Bellofatto *et al.*, 2018) and inflated perceptions of financial literacy might influence decision-making, yielding negative outcomes for individuals and households (Balasubramnian and Sargent, 2020).

Overconfidence in financial knowledge can be more important in predicting financial health and subjective well-being than actual financial knowledge (e.g., Anderson *et al.*, 2017; Hadar *et al.*, 2013). However, there is also evidence that financial literacy overconfidence might have negative effects (e.g., Pak and Chatterjee, 2016; Pikulina *et al.*, 2017; Xia *et al.*, 2014). Theoretically, bounded rationality supports the claim that cognitive bias influences actual behavior by assuming that individuals have a limited capacity to process and incorporate relevant information (Robb *et al.*, 2015).

Financial knowledge "miscalibration", i.e., "the absolute difference between subjective and objective knowledge" (Alba and Hutchinson, 2000, p. 123), is termed "literacy bias" in the present study.

Past research analyzed the relationship between objective and subjective financial literacy (Nejad and Javid, 2018). However, the individual characteristics that lead to financial literacy bias remain unclear. Thus, the main objective of this study is to shed light on this issue by identifying the individual characteristics that are associated with financial literacy overconfidence and under-confidence, which in turn might help explain individuals' financial decisions. The study focuses on two groups, students and non-students, and considers several characteristics that are usually employed in this stream of research (for a systematic review of financial literacy see Goyal and Kumar, 2020). In particular, this research considers demographic and socio-economic factors (gender, age, education, income, occupation), structural factors (the percentage of total wealth invested in securities), and environmental factors (whether the individual lives in a metropolitan area or not) to explain differences in subjective and objective financial literacy.

This study contributes to financial literacy literature, in particular to the stream of research that focuses on psychological biases, by shedding light on the factors associated

with both individual overconfidence and under-confidence. Differentiating between students and non-students provides additional insights, which might guide policymakers on how to structure financial education to enhance individual financial behavior. This is especially important in a country such as Portugal which has the lowest objective financial literacy in the Eurozone (Gardt *et al.*, 2021).

We formalize the following research questions: (1) What are the main individual features associated with objective literacy and literacy bias? (2) What are the main differences between overconfidence and under-confidence? (3) And most originally, what are the main differences between students and non-students in these issues?

Notice that, although we are interested in studying the differences between students and non-students, we choose not to put forward hypotheses regarding those differences. The existing literature has not explored the differences in financial literacy, overconfidence, and under-confidence between these two groups. Thus, we choose to view this as an exploratory study in this regard.

Following this introduction, this paper is organized as follows. Section 2 presents the formulation of hypotheses duly contextualized within the existing literature, Section 3 presents the data, Section 4 highlights the main methodological tools, Section 5 shows the results, and Section 6 concludes the paper.

2. Literature Review and Hypothesis Development

Among the antecedents of financial literacy, it is worth highlighting the role of gender because few studies investigated overconfidence taking this perspective (Kim *et al.*, 2021). A recent systematic review also emphasizes the need to further study gender differences in financial self-efficacy (Furrebøe and Nyhus, 2022). The related literature reports a gender gap in financial behavior, for instance, regarding stock market participation. High financial literacy is likely to increase stock market participation (Yamori and Ueyama, 2022) and women are considered to be less financially literate than men (e.g., Bucher-Koenen *et al.*, 2017; Lusardi and Mitchell, 2014; Van Rooij *et al.*, 2012). Furthermore, men tend to be more overconfident than women (Barber and Odean, 2001). A recent study shows that men with narcissistic tendencies are more likely to overestimate their financial knowledge than women with similar tendencies (Hamurcu and Hamurcu, 2021). Differences in overconfidence might also justify differences in stock market participation since overconfident individuals are more likely to be involved in activities that are considered riskier (Camerer and Lovallo, 1999). Thus, the association of financial risk-taking with objective and self-perceived financial literacy is likely to be different for men and women. Bannier and Neubert (2016) note that, differently from men, only actual financial literacy is associated with standard investments for women, although women's self-perceived financial literacy is more strongly related to sophisticated investment than men's self-perceived literacy. Therefore, gender might help explain the gap between objective and perceived financial literacy, and more particularly financial overconfidence or under-confidence. Based on the results of previous studies, we put forward the following hypotheses regarding the relationship between gender and financial literacy:

> H1a: Individuals of the male gender tend to present a higher level of objective financial literacy than individuals of the female gender.
> H1b: Individuals of the male gender tend to be more overconfident and less under-confident about their level of financial literacy than individuals of the female gender.

Past research also reports a positive relationship between age and financial literacy (e.g., Frijns *et al.*, 2014; Xiao *et al.*, 2015). Young adults are more likely to lack financial

literacy (Lusardi *et al.*, 2010). Kim *et al.* (2021) argue that this relationship might occur because individuals accumulate knowledge through experience. These authors examined gender differences in financial literacy among older adults and found that older women are more likely to have lower objective financial literacy than older men. This suggests that gender differences in financial literacy remain the same irrespective of the age group. Regarding the relation between age and financial literacy, we consider the following hypotheses:

H2a: Younger individuals tend to present a lower level of objective financial literacy than older individuals.

H2b: Younger individuals tend to be more overconfident about their level of financial literacy than older individuals.

The levels of education and income might also play a role in explaining differences in subjective and objective financial literacy. Chen *et al.* (2018) notice that in the Chinese peer-to-peer lending market, women's loans have lower performance and are more likely to default than those of men. However, gender differences tend to be smaller within high levels of education or income. It is also worth noting that financial education is associated with the holding of risky financial assets (Zhu and Xiao, 2022). Higher levels of education or income are usually associated with more financially literate individuals (e.g., Zhou *et al.* 2023). However, a high income can also lead to financial knowledge overconfidence, as reported by Ansari *et al.* (2023). Previous studies found differences in the level of financial literacy across countries that were interpreted as a result of differences in countries' educational policies (Cannistrà *et al.*, 2022), which suggests that the education level could be a predictor of their financial literacy. Chen *et al.* (2018) also suggest that, when investors work in finance or information technology industries, there are more similarities between female and male investors. Hence, the "field of study" can also be a predictor of literacy bias. Thus, regarding the relationship between the level of education and financial literacy, and between the field of study and financial literacy, we propose the following hypotheses:

H3a: Individuals with a higher level of education tend to present a higher level of objective financial literacy than individuals with a lower level of education.

H3b: Individuals with a higher level of education tend to be less overconfident about their level of financial literacy than individuals with a lower level of education.

H4a: Individuals closer to the financial field of study tend to present a higher level of objective financial literacy than individuals further from it.

H4b: Individuals closer to the financial field of study tend to be less overconfident about their level of financial literacy than individuals further from it.

It is also plausible that individuals' financial literacy might be improved through stock market participation; this reverse causality was tested by Yamori and Ueyama (2022). Xia *et al.* (2014) found that financial literacy overconfidence is positively related to stock market participation, while under-confidence is negatively related to this outcome. Hence,

H5a: Individuals with higher stock market participation tend to present a higher level of objective financial literacy than individuals with lower stock market participation.

H5b: Individuals with higher stock market participation tend to be more overconfident and less under-confident about their level of financial literacy than those with lower stock market participation.

Local financial habits might also explain differences in financial literacy. A recent study conducted in China also suggests that financial literacy amongst women is likely to

be higher in urban areas, such as Shanghai or Beijing, given the fact that gender culture is less strict (Preston *et al.*, 2023). Thus, it is possible to argue that individuals living in metropolitan areas, in which there is more financial sophistication, are more likely to have higher financial literacy compared to those living in other areas. Regarding the relationship between residence in metropolitan areas and financial literacy, we propose the following hypotheses:

> H6a: Individuals living in metropolitan areas tend to present a higher level of objective financial literacy than individuals living in non-metropolitan areas.

> H6b: Individuals living in metropolitan areas tend to be less overconfident about their level of financial literacy than individuals living in non-metropolitan areas.

One must emphasize that not all the joint hypotheses about objective and subjective literacy, and hence cognitive bias, regarding a particular feature comply with what became known in Psychology as the Dunning-Kruger effect, according to which the main corollary is that "(…) Rather, it is exactly low information individuals - that is, the incompetent - who supply much of the overestimation. (…) Because poor performers make what they believe are the most reasonable choices available, they think they are doing just fine when their actual performance is anything but." (Schlösser *et al.*, 2013, Ap. 86).

3. Data

Data is based on a survey conducted by a partnership between the Portuguese Securities Market Commission (*Comissão de Mercado de Valores Mobiliários* - CMVM) and a consortium of Portuguese universities aiming to acquire a better knowledge of potential and actual investors. The survey was based on a questionnaire made available online by the CMVM in November 2020. The link to the questionnaire was previously disseminated through e-mail databases of the CMVM (retail investors) and Portuguese Universities (students and staff). Due to the way that information on the survey was transmitted, there is no guarantee that the sample is representative of the Portuguese general population, or, for that matter, representative of the typical Portuguese retail investor or household. Also, there is no guarantee that the same individual did not answer the questionnaire more than once, although this is highly improbable. In total, there were 2,897 respondents, with 52.33% of them self-identified as students. This high percentage of students can be explained by the involvement of universities in the survey.

The study uses 19 questions out of a total of 35 that were included in the survey questionnaire (the original Q17 was split into 3 questions, 17.a) 17.b) and 17.c), hence the study uses 21 questions). The questionnaire was based on an initial structure proposed by the CMVM, and it incorporated contributions from economics and finance professors from Portuguese universities that are recognized in these fields. The questions used in the present study, translated from Portuguese to English by the authors, are presented in Appendix A. Unreasonable, unclassifiable, or missing answers to Q1 through Q11 were discarded, and the respondent was removed from the database. A different procedure was used to filter the questions used to assess objective financial literacy (Q13 through Q23), where unreasonable, unclassifiable, or missing answers were considered wrong answers. After filtering the raw data, we ended up with 1,720 usable responses (individuals), from which the percentage of students dropped to 45.58%.

Q4 was employed to partition the overall sample (hereafter called the Full sample) into two subsamples. One is composed only of individuals that report themselves as being students (hereafter called Students) and the other one is composed of individuals that report any other labor and occupational situation (hereafter called Non-students).

Section 1 and Section 2 of the questionnaire were used to characterize the individuals in the sample. Self-perceived literacy was measured by Q11: "How would you assess your knowledge about financial products and markets?", answered using a 5-point Likert scale. Table 1 shows the distribution of this variable. More than two-thirds of the respondents report a low or moderate level of financial literacy. A higher percentage of non-students reported a high or very high degree of self-perceived literacy than is the case for students.

Objective financial literacy was assessed by resorting to 12 practical questions (Q13 through Q23) on the following issues: interest rate calculation, the impact of interest rate on the final amount of a savings account (two questions), the joint impact of inflation and interest rate in the real final value of an investment, the relationship between risk and return, the relationship between diversification and risk, structured financial instruments, financial instruments with guaranteed capital, the impact of interest rates on the price of fixed-interest bonds, potential losses in an investment partly financed by debt, the concept of Euribor, and the concept of credit spread. This information was then used to compute a financial literacy score by dividing the number of correct answers by the total number of questions.[1]

[Table 1 around here]

Self-perceived literacy presents an average of 1.71, a median of 2, and a standard deviation of 0.967; whilst the objective financial literacy score (expressed as the percentage of correct answers) has an average of 71.2%, a median of 75.5%, and a standard deviation of 16.3%. Notice that these percentages may not be comparable to those of other surveys, since they depend on the difficulty of the questions.

For Students, self-perceived literacy shows an average of 1.62, a mean of 2, and a standard deviation of 0.87, while the objective financial literacy score has an average of 67.5%, a median of 66.7%, and a standard deviation of 15.5%. For Non-students, self-perceived literacy shows an average of 1.72, a mean of 2, and a standard deviation of 1.03, while the objective financial literacy score has an average of 74.3%, a median of 75.0%, and a standard deviation of 16.3%. So, Non-students show a slightly higher average self-perceived literacy and also a slightly higher average objective literacy. Figure 1 shows the distribution of objective financial literacy scores.

[Figure 1 here]

The variables (personal characteristics) used to explain objective financial literacy, literacy bias, overconfidence, and under-confidence were codified as follows:

- **Gender** (Q1), codified as 0 for males and 1 for females.
- **College degree** (Q2), codified as 1 if the respondent has a university degree and 0 if the respondent just has secondary education or was attending university but did not yet have a degree.
- **Field of study** (Q3), codified as 1, 2, and 3 according to the proximity to the financial field (e.g., biology, humanities, medicine were classified as 1; engineering, computer science, mathematics were classified as 2; finance, economics, management were classified as 3).
- **Employment status** (Q4), codified as 1 if the respondent is employed and 0 otherwise. Students are codified as 0 except in those cases in which they explicitly reported they were also working (which only happened in one case).

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[1] The reader should keep in mind that self-perceived literacy and objective literacy scores have different scales and hence are not directly comparable.

- **Income** (Q5), assessed using eight classes of the net monthly income: ≤500€ (class 1),]500€, 1,000€],]1,000€, 1,500€],]1,500€, 2,000€],]2,000€, 2,500€],]2,500€, 3,500€],]3,500€, 5,000€], and >5,000€ (class 8).
- **Securities** (Q8), assessed using five classes according to the percentage of the total wealth invested in securities: 0% (class 0),]0%, 25%],]25%, 50%],]50%, 75%], and >75% (class 4). Securities were defined in the survey as shares, bonds, treasury bills, mutual funds, futures, options, CFD/contracts for differences, other derivatives, complex financial products, and other similar assets.
- **Metropolitan** (Q10), codified as 1 if the respondent lives in one of the two Portuguese metropolitan areas (Lisbon and Oporto) and 0 otherwise.
- **Age** (Q9), equal to the age of the respondent in years.

Table 2 shows the descriptive statistics for these variables, for the Full sample, Students and Non-students. The surveyed sample is well-balanced in terms of gender and employment status. Most of the respondents have a college degree and live outside the Portuguese metropolitan areas of Lisbon and Oporto. More than half of the respondents (56.9%) have a field of study close to finance, economics, or management. Most of the respondents have low income levels, which translates into low participation in the security market. The sample is rather young, with a median and average ages of 26 and 31.88 years, respectively, although the age ranges from 17 to 99 years old. These features are mostly the result of a high percentage of students in the sample, as can be seen in the descriptive statistics of the subsamples.

[Table 2 around here]

Figure 2 shows the frequency distribution of the categorical variables. There is a slight predominance of women in the Students sample and men in the Non-students one. Most non-students hold a college degree, while less than one-third of students completed a bachelor's degree. Regarding the field of study, about two-thirds of the students are enrolled in economics or management. As expected, almost all students have no job, while most non-students are employed. The income of the latter group is also higher. However, even in this group, the net monthly income falls short of 2,000€ for 72% of the respondents. In both samples, most individuals hold no securities, but non-students show a higher propensity to invest in these assets.

[Figure 2 around here]

4. Methodology

This paper has a threefold aim. First, it studies the main individual features associated with objective financial literacy. Second, it analyses the relationship between those variables and the bias between self-perceived and objective literacy, distinguishing overconfidence and under-confidence. Third, this framework is also used to examine the differences between students and non-students.

Those aims are pursued using cross-sectional OLS regressions, except the study of the literacy bias for which we use an ordered probit. The stochastic linear equation used to assess objective financial literacy is the following:

$$ol_i = a + \mathbf{b}'\mathbf{X}_i + \epsilon_i, \tag{1}$$

where i refers to the i-th individual in the sample (Full sample, Students and Non-students), ol_i is the dependent variable, the objective financial literacy, a is the intercept,

b is a column vector of the coefficients associated with the space vector of independent variables, $\mathbf{X}_i$, describing individual i, and ϵ_i is the error term, assumed to be *i.i.d.* normal. The space vector $\mathbf{X}_i$ contains the eight individual features presented in Table 2 (Gender, College degree, Field of study, Employment status, Income, Securities, Metropolitan, and Age), and includes the self-perceived literacy, as it may help explain objective literacy (see, for instance, Nejad and Javid, 2018).

For the second task, literacy bias was computed as the difference between standardized self-perceived literacy and objective literacy. This metric is then clustered into 5 classes. Then an ordered probit model with fixed thresholds was applied to this metric. The classification procedure and the probit model enable proper handling of measurement errors, as the "true" literacy bias is not known. The specification of the model is the following:

$$lb_i^* = \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i + \varepsilon_i, \tag{2}$$

where lb_i^* is the latent and continuous measure of literacy bias of individual i, $\boldsymbol{\beta}$ is the vector of parameters to be estimated (there is no intercept), $\widetilde{\mathbf{X}}_i$ is the vector of variables describing individual i, which is similar to the previous $\mathbf{X}_i$, except it does not contain the self-perceived literacy, and ε_i is the error term, assumed to be *i.i.d.* normal. The observed and coded literacy bias, lb_i, takes on the integer values 0 through 4 according to the following scheme:

$$lb_i = \begin{cases} 0 \ if -\infty < lb_i^* < -1.5 \\ 1 \ if -1.5 \le lb_i^* < -0.5 \\ 2 \ if -0.5 \le lb_i^* < 0.5 \\ 3 \ if \ 0.5 \le lb_i^* < 1.5 \\ 4 \ if \ 1.5 \le lb_i^* < +\infty \end{cases} \tag{3}$$

Considering Equation (2) and Equation (3), the probabilities associated with the coded responses are as follows:

$$\begin{cases} \Pr(lb_i = 0) = \Pr(-\infty < lb_i^* < -1.5) = \phi(-1.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i), \\ \Pr(lb_i = 1) = \Pr(-1.5 \le lb_i^* < -0.5) = \phi(-0.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i) - \phi(-1.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i), \\ \Pr(lb_i = 2) = \Pr(-0.5 \le lb_i^* < 0.5) = \phi(0.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i) - \phi(-0.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i), \\ \Pr(lb_i = 3) = \Pr(0.5 \le lb_i^* < 1.5) = \phi(1.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i) - \phi(0.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i), \ and \\ \Pr(lb_i = 4) = \Pr(1.5 \le lb_i^* < +\infty) = 1 - \phi(1.5 - \boldsymbol{\beta}'\widetilde{\mathbf{X}}_i). \end{cases} \tag{4}$$

In Equation (4) $\phi(.)$ is the standard normal cumulative distribution function. The model is estimated by maximum log-likelihood.

Unlike in the case of OLS, $\boldsymbol{\beta}$ in the ordered probit cannot be interpreted as the impact of a small change of the space vector $\widetilde{\mathbf{X}}_i$ on the outcome variable lb_i. The marginal effect of an increase in regressor x_k on the probability of selecting a particular class $j = 0, 1, 2, 3, 4$ of literacy bias is given by the corresponding derivative of Equation (4) multiplied by β_k, the coefficient of x_k.

After the study of literacy bias, we refined our analysis by looking specifically at overconfidence and under-confidence, assuming that there are no measurement errors in the variable lb_i^*. Overconfidence is proxied by the following variable:

$$over_i \ = max(lb_i^*, 0). \tag{5}$$

Hence, individual i is overconfident if has a positive financial literacy bias and its degree is measured by lb_i^*. Similarly, under-confidence is proxied by:

$$under_i \ = abs\left(min(lb_i^*, 0)\right). \tag{6}$$

An individual is under-confident if has a negative financial literacy bias, and its degree is measured by the absolute value of lb_i^*. The overconfidence and under-confidence are then

examined using OLS regressions, similar to Equation (2), with the exception that the space vector does not include the perceived literacy. That is

$$over_i = a_o + \boldsymbol{b'_o}\widetilde{\mathbf{X}}_i + \epsilon_{oi}, \text{ and} \tag{7}$$

$$under_i = a_u + \boldsymbol{b'_u}\widetilde{\mathbf{X}}_i + \epsilon_{ui}, \tag{8}$$

respectively. The use of absolute values ensures the coherence between the results for under and overconfidence. If the coefficient estimate is positive (negative) that means a positive (negative) marginal effect both to overconfidence and under-confidence.[2]

5. Results

In this section, the associations between the individuals' characteristics and their objective literacy scores are assessed. Then, the relationship between those characteristics and the financial literacy bias is analyzed. Finally, the relationships between the individual features and financial literacy overconfidence and under-confidence are reported. These analyses are performed for the Full sample, Students and Non-students samples.

Table 3 exhibits the OLS estimates and the robust standard errors for the objective financial literacy regression. The table also reports the R^2, which presents values between 22.36% for Students and 32.02% for Non-students. These values show that the nine descriptive variables used in the regressions are well-suited to explain a fair part of the variability in objective literacy.

[Table 3 around here]

In the Full sample, women and young people show worse objective literacy scores than men and older individuals. These results are consistent with previous literature (e.g., Bucher-Koenen *et al.*, 2017, Lusardi and Mitchell, 2014 and Van Rooij *et al.*, 2012 for gender; Frijns *et al.*, 2014 and Xiao *et al.* 2015 for age). As expected, highly educated individuals have higher objective literacy, especially if their field of study is related to finance. The relation between education and financial literacy has also been found by other authors – for example, Herd *et al.* (2012), conclude that early-life cognition and schooling experiences are associated with late-life financial knowledge. Participation in security markets is also a positive indicator of financial knowledge, as is self-perceived literacy. People who live in metropolitan areas and have high incomes tend to exhibit higher objective literacy, probably due to their easier access to financial information. This is in line with previous studies that find that neighborhood characteristics impact financial literacy (e.g., Lachance, 2014). The employment status is not significantly related to objective financial literacy.

The results for Students are coherent with those of the Full sample. However, the coefficient of age is not statistically significant for this group. This is not surprising given

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[2] We have examined the robustness of the results presented in the next section to the model and variable specifications. We have tested if the fact that the variables in OLS regressions are left- and/or right-censored has a non-trivial impact on the estimates of the coefficients. If that is the case, then the estimates tend to be biased and inconsistent. For that purpose, we have applied, alternatively to those models, tobit type I left- and/or right-censoring models with normal errors. We also analyse if different coding schemes of literacy bias (or any at all, using an OLS regression on lb_i^*) would produce different results. More specifically, we used three alternative class partitions: First, < -1 (class 0), [-1, -1/3[, [-1/3, 1/3],]1/3, 1], and >1 (class 4), second, <-0.75 (class 0), [-0.75, -0.25[, [-0.25, 0.25],]0.25, 0.75], and >0.75 (class 4), and third <-0.5 (class 0), [-0.5, 0.5[, and >0.5 (class 2). We only find minor changes in the coefficients, and the signals and significance of the coefficients remain the same. All these results can be obtained from the authors on request.

that students' ages are homogeneous: nearly 90% of students are between 17 and 26 years old. Income is not significant either, as almost all students have no labor income. The estimates for Non-students agree with the Full sample ones, both in sign and significance, except for Securities which are not statistically significant for this group.

Table 4 shows the ordered probit estimates of the individual features on literacy bias (the marginal effects of these variables are reported in Appendix B). In the Full sample, and after controlling for other variables, women show a higher tendency to overestimate their financial knowledge than men. This result is at odds with previous studies, which show that men tend to show a higher level of overconfidence in their financial literacy than women (e.g., Barber and Odean, 2001). Additionally, Gender is the variable with the highest marginal effects in absolute terms in every class. Being a woman increases the probability of having a positive literacy bias and decreases the probability of having a negative literacy bias. Most notably, the marginal effect of -0.173 for class 0 (the maximum marginal effect in absolute terms), indicates that women have a lower probability of being severely under-confident.

Young individuals also show a higher literacy bias than older individuals in the Full sample. This bias is significant at the 1% significance level, showing that it is a relevant effect. However, this effect only occurs in Non-students – in the Student subsample, it is not significantly different from zero. It is worth noticing that although the marginal effects of Age are lower than most other variables, that is mainly due to the finer scale and not to the relative importance of this variable.

People who hold securities show a higher literacy bias than people who do not, with the effect being significant at the 1% level. This is consistent with the results of Xia *et al*. (2014), who relate stock market participation to higher overconfidence and lower under-confidence. However, for this variable, we cannot draw a definitive conclusion about the causality – does market participation induce a literacy bias, or is it a result of this bias?

People whose field of study is related to finance believe they have higher financial knowledge than they truly do. So, studying areas closer to finance may have the negative effect of inducing overconfidence.

Finally, we also notice that people who do not live in metropolitan areas also tend to show a higher literacy bias. However, this effect is weaker (only significant at the 10% level for the Full sample), and it is not significant, even at the 10% level, in any of the subsamples. The remaining variables show no significant association with the literacy bias.

The estimates for Students are broadly consistent with the estimates for the Full sample. Age is not significantly related to the literacy bias, as this variable has a low variability within this group. Curiously, Gender does not influence the literacy bias in Non-students, which suggests that literacy bias is more acute in younger generations (Students). These results are also supported by the marginal effects reported in Appendix B. For Students, Gender is the variable with higher absolute marginal effects. However, this is different for Non-students. In this subsample, although the signals of the marginal effects remain majority the same, the Field of study is the variable with higher absolute marginal effects for all classes. So, for Non-students, in terms of literacy bias, it does not matter so much about being a woman or a man, but instead if the Field of study is more or less close to finance.

[Table 4 around here]

Table 5 reports separately the OLS results on overconfidence and under-confidence. The number of non-null observations is fairly distributed across the samples,

although there are more observations for overconfidence in the Full sample (55.58%). Students are relatively more under-confident (54.85%), while Non-students are relatively more overconfident (51.07%). The coefficients of determination are low, achieving a maximum of around 6.3% for under-confidence in Non-students, and the Wald test fails to reject the null hypothesis of no joint significance at the 1% level for the overconfidence and under-confidence in Students. However, there are no remarkable differences between the determination coefficients in the overconfidence and under-confidence regressions.

[Table 5 around here]

The overconfidence estimates for the Full sample agree with the ones from those of literacy bias ordered probit. Younger people and women exhibit higher overconfidence than older people and men, and people whose field of study is related to finance tend to overestimate their financial literacy. Stock market participation also leads to overconfidence – as explained before, this result is consistent with Xia *et al.* (2014). For Students, Gender, the Field of study, and Securities remain positively associated with overconfidence, but the latter variable is now only significant at the 10% level. For Non-students, the Field of study bears a positive association with overconfidence and Age a negative one, as they did in the ordered probit. In contrast to the literacy bias ordered probit, it's important to note that Securities are not an indicator of overconfidence.

Notice that for under-confidence the signs of the coefficients are expected to be the opposite of the ones estimated for the literacy bias, i.e., lower literacy bias corresponds to a higher under-confidence. The results for the Full sample are almost entirely consistent with the ones from the financial bias ordered probit. Men, people whose field of study is far from finance, those who do not hold securities, and older individuals underestimate their financial literacy. For Students, only Gender, the Field of study, and Securities are associated with under-confidence. The signs of the coefficients of these variables are all negative as expected, given the literacy bias estimates (see Table 4). In the Non-students, the Field of study, Securities, and Age are associated with under-confidence and have the expected sign. Individuals who live in metropolitan areas are more under-confident, which was not observable in the literacy bias estimates.

[Table 6 around here]

For high (low) levels of objective literacy, both men and women present under-confidence (overconfidence). However, broadly speaking, the degree of under-confidence is higher, while the degree of overconfidence is lower for women. The only exception is the case of low objective literacy for Students, but it is not statistically significant. After controlling for other variables, namely the Field of Study and Securities, which have a positive (negative) association with overconfidence (under-confidence), and assume lower values for women, the remaining effect of Gender on overconfidence (under-confidence) is still positive (negative).

6. Conclusions

This paper aims to assess the individual features associated with objective financial literacy and with the bias between self-perceived and objective financial literacy, distinguishing students and non-students. Although there are several papers on the determinants of financial literacy, objective and subjective, a lower amount of research has focused on the gap between the two types of literacy. And even less on the differences between people who reported being students and those who reported being non-students.

The study is conducted on survey data of Portuguese actual and potential investors, collected online by the Portuguese Securities Market Commission (*Comissão de Mercado de Valores Mobiliários* - CMVM) and a consortium of Portuguese universities. The filtered sample is formed by 1,720 respondents, from which 784 respondents (45.58%) identify themselves as students. Most students can be seen as potential investors, as only 20.54% of them have positions in the financial market.

The results corroborate the notion that objective literacy is higher in individuals of the male gender, older, with higher incomes, living in metropolitan areas, and highly educated, especially if their field of study is related to finance. Therefore, hypotheses H1a, H2a, H3a, H4a and H6a are all supported. The positive feedback from market participation and self-perceived literacy on objective literacy, already documented in the literature, is also verified in this study, supporting H5a. Individuals with higher market participation tend to exhibit higher objective literacy, probably due to their close contact with financial information and learning-by-doing processes.

The results of literacy bias are quite interesting. As expected, younger people are more overconfident and less under-confident, supporting H2b. However, the results on gender are at odds with the literature. Although the objective literacy of women is lower than that of men, they show a higher (lower) tendency to overestimate (under-estimate) their financial knowledge, contradicting H1b. This apparently contrasts the idea that men are more overconfident than women (Barber and Odean, 2001). However, that is a conditional effect after controlling for other variables. Unconditionally, women tend to be less overconfident and more under-confident than men.

People whose field of study is related to finance and who hold securities, albeit exhibiting higher objective literacy, are more overconfident (and less under-confident) on average, contradicting H4b and supporting H5b. This means that some of them believe they have higher financial knowledge than they truly do. Broadly speaking, the variables that are associated with under-confidence are the same ones that are associated with overconfidence. However, lower under-confidence means a more realistic self-assessment of their true knowledge and hence should increase the perception of how financial markets work and the risk involved in different financial decision choices, whilst higher overconfidence may have undesirable consequences. In this case, it is as if their contact with finance, through their academic curricula and/or participation in real financial markets, has increased their self-assurance, inflated their perceptions, and turned them into potential or actual overconfident investors. Arguably, this overconfidence may influence financial decision-making by increasing the tolerance to risk and the demand for less diversified, shorter-term, and hence riskier investment alternatives, which may result in considerable losses in the presence of turbulent markets and even more so in face of a sudden negative extreme event.

The level of education and residence in metropolitan areas seem to have a negative effect on overconfidence about financial literacy. However, the effects are not statistically significant at the 10% level, so it is not possible to conclusively support or contradict H3b and H6b. Table 7 summarizes the results regarding the formulated hypotheses.

[Table 7 around here]

The partition of the sample into a subsample formed only by students and a subsample formed by people with other labor or occupational status allowed the disentanglement of some interesting insights. Firstly, the gender effect observed in the full sample is mainly driven by students, as women students are more overconfident and less under-confident than men. This pattern is only marginally observable for the overconfidence of non-students. Secondly, the impact of a field of study close to finance on overconfidence and under-confidence decreases, while the impact of holding securities on overconfidence and under-confidence increases, when the individual is a student. A possible interpretation of these results is that financial academic education increases young people's self-awareness of their knowledge of financial issues, while experience, which probably resulted in good financial outcomes in some investments, inflates their perceptions about their real financial knowledge. This is consistent with the results of a recent meta-analysis that emphasized the importance of subjective financial knowledge on desirable financial behavior, thereby recommending an educational approach to improve people's confidence in their financial knowledge (Hwang and Park, 2023). Thirdly, living in metropolitan areas only affects the overconfidence and especially under-confidence of non-students. This seems quite plausible as most students from non-metropolitan areas live in renting rooms in cities where universities are located. In a nutshell, the aforementioned conclusions highlight what any academic knows: financial education is more effective than learning through experience.

Still, it is worth noticing that these conclusions cannot be generalized for the Portuguese population, nor even for Portuguese retail investors. The link to the online questionnaire was only transmitted within e-mail databases owned by the CMVM and Portuguese universities, so we cannot guarantee its unbiasedness.

The National Plan for Financial Education (the acronym in Portuguese is PNFF) was created in 2011, under the aegis of the National Council of Financial Supervisors, which included representatives of three financial regulators, the Central Bank of Portugal, CMVM, and Insurance and Pension Funds Supervisory Authority (see its website: https://www.todoscontam.pt/). Its mission is "(…) to contribute to increase the level of financial knowledge of the population and to promote the adoption of appropriate financial behaviours, through an integrated vision of financial education projects and the combination of the efforts of the stakeholders (…)" (Conselho Nacional de Supervisores Financeiros, 2011, p. 3). The PNFF embodies the awareness of the need for financial education in Portugal at a national level. Our results may help the PNFF fine-tune the required actions towards different target groups, and most importantly, highlight that different groups may require different approaches aiming to narrow the gap between objective and perceived literacy. The first step should be creating procedures to provide feedback on the objective and perceived literacy of those who enroll in the financial formation programs.

CMVM and the consortium of Portuguese universities continue this project of gathering information on actual and potential investors. By now, there is already data from four semiannual surveys. This gives us a unique opportunity to study financial literacy not only cross-sectionally but also in the time domain and to assess what has been effectiveness of the National Plan for Financial Education in the different segments of the target population. The outcomes of this study could then be compared with those of similar literacy programs in European Union countries.

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Figure 1. Distribution of objective financial literacy scores (defined as the percentage of correct answers), for the Full sample and the Students and Non-students subsamples.
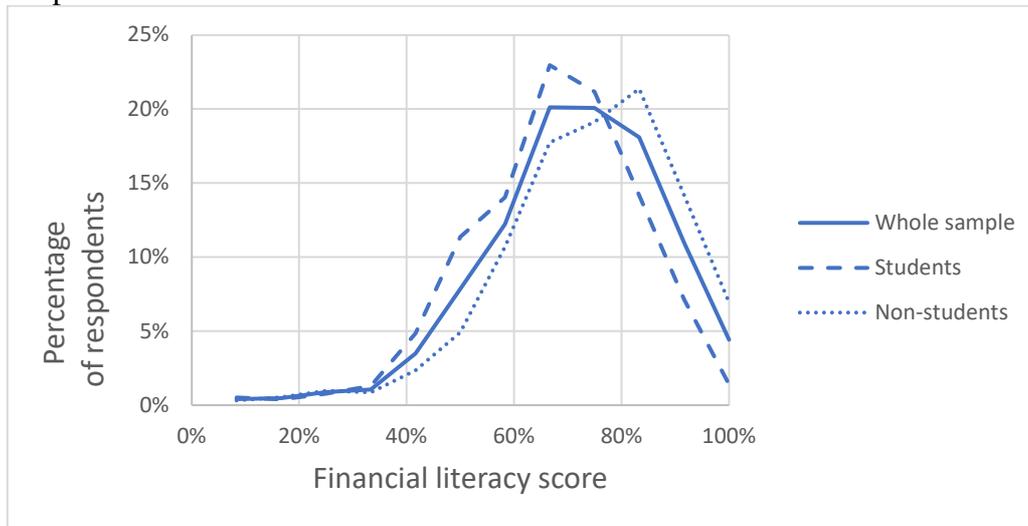
Figure 2. Frequency distribution of the categorical variables for the Full sample and the Students and Non-students subsamples.
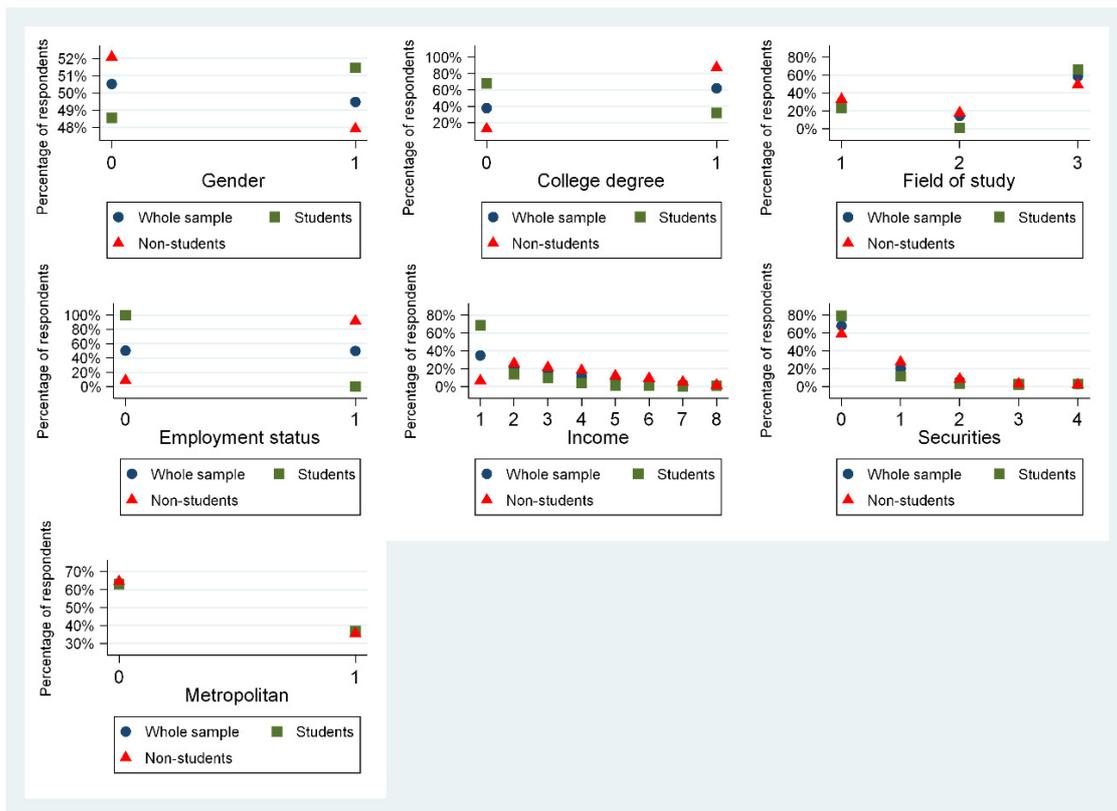
Table 1
Self-perceived literacy

Level	Qualitative	Number of respondents		
(0: minimum)	scale	Full sample	Students	Non-students
0	Very Low	152 (8.8%)	62 (7,9%)	90 (9,6%)
1	Low	600 (34.9%)	303 (38,6%)	297 (31,7%)
2	Moderate	633 (36.8%)	304 (38,8%)	329 (35,1%)
3	High	265 (15.4%)	100 (12,8%)	165 (17,6%)
4	Very High	70 (4.1%)	15 (1,9%)	55 (5,9%)

Notes: This table shows the absolute and relative frequencies of self-perceived literacy scores. These frequencies are shown for the full sample, a subsample composed only of students, and a subsample composed of all the individuals that reported different labor or occupational situation. Self-perceived literacy was measured by Question 11: "How would you assess your knowledge about financial products and markets?", answered using a 5-point Likert scale.

Table 2

Descriptive statistics of the explaining variables

Full sample (1720 respondents)				
Variable	Median	Average	Std. deviation	Minimum	Maximum
---	---	---	---	---	---
Gender	0	0.49	0.50	0	1
College degree	1	0.62	0.49	0	1
Field of study	3	2.28	0.88	1	3
Employment status	0	0.50	0.50	0	1
Income	2	2.71	1.80	1	8
Securities	0	0.52	0.93	0	4
Metropolitan	0	0.36	0.48	0	1
Age	26	31.88	13.75	17	99

Students (784 respondents)				
Variable	Median	Average	Std. deviation	Minimum	Maximum
---	---	---	---	---	---
Gender	1	0.51	0.50	0	1
College degree	0	0.32	0.47	0	1
Field of study	3	2.42	0.85	1	3
Employment status	0	0.00	0.04	0	1
Income	1	1.66	1.25	1	8
Securities	0	0.38	0.91	0	4
Metropolitan	0	0.37	0.48	0	1
Age	21	21.81	4.97	17	64

Non-students (936 respondents)				
Variable	Median	Average	Std. deviation	Minimum	Maximum
---	---	---	---	---	---
Gender	0	0.48	0.50	0	1
College degree	1	0.87	0.33	0	1
Field of study	2	2.17	0.89	1	3
Employment status	1	0.91	0.28	0	1
Income	3	3.60	1.70	1	8
Securities	0	0.63	0.93	0	4
Metropolitan	0	0.35	0.48	0	1
Age	40	40.31	13.06	18	99

Notes: This table shows some summary statistics of the described variables. The statistics are presented for the Full sample and its partition into Students and Non-students subsamples. Gender, College degree, Employment status and Metropolitan are binary variables, assuming the values {0, 1}. Field of study, Income and Securities are Likert-scaled variables, assuming the values {1, 2, 3}, {1, 2, …, 8}, and {0, 1, …,4}. Age is a discrete variable corresponding to the age in years.

Table 3
OLS regressions for objective financial literacy

Variables	Full sample	Students	Non-students
Constant	0.5135[a]	0.5392[a]	0.4805[a]
	(0.0138)	(0.0304)	(0.0299)
Gender	-0.0702[a]	-0.0741[a]	-0.0645[a]
	(0.0072)	(0.0107)	(0.0097)
College degree	0.0473[a]	0.0468[a]	0.0529[a]
	(0.0088)	(0.0115)	(0.0162)
Field of study	0.0332[a]	0.0359[a]	0.0293[a]
	(0.0043)	(0.0062)	(0.0061)
Employment status	0.0082	-	0.0228
	(0.0093)	-	(0.0181)
Income	0.0088[a]	0.0005	0.0141[a]
	(0.0029)	(0.0041)	(0.0040)
Securities	0.0117[a]	0.0155[a]	0.0086
	(0.0040)	(0.0057)	(0.0054)
Metropolitan	0.0198[a]	0.0227[b]	0.0170[c]
	(0.0070)	(0.0104)	(0.0094)
Age	0.0010[a]	0.0008	0.0009[c]
	(0.0004)	(0.0011)	(0.0005)
Self-perceived literacy	0.0319[a]	0.0248[a]	0.0365[a]
	(0.0042)	(0.0061)	(0.0059)
R^2	0.3035	0.2236	0.3202
Wald test	89.22[a]	34.95[a]	45.99[a]

Notes: This table reports the coefficient estimates and corresponding White's robust standard errors (in parenthesis) of OLS regressions for objective financial literacy considering the Full sample, and its partition into Students and Non-students subsamples. Variable Employment status is excluded from the Student's regression because only one student reported having a job. "[a]", "[b]", and "[c]" denote statistical significance at the 1%, 5%, and 10% levels, respectively. The table also reports the R^2 and the Wald F-type test for joint significance.

Table 4
Ordered probit regressions for literacy bias

Variables	Full sample	Students	Non-students
Gender	0.1841[a]	0.2587[a]	0.1085
	(0.0531)	(0.0782)	(0.0729)
College degree	-0.0532	-0.0302	-0.0953
	(0.0645)	(0.0912)	(0.1087)
Field of study	0.1459[a]	0.1158[b]	0.2081[a]
	(0.0299)	(0.0455)	(0.0404)
Employment status	-0.0267	-	-0.1394
	(0.0692)	-	(0.1265)
Income	0.0065	0.0099	0.0028
	(0.0200)	(0.0307)	(0.0279)
Securities	0.1067[a]	0.0963[b]	0.1098[a]
	(0.0289)	(0.0430)	(0.0394)
Metropolitan	-0.0991[c]	-0.0518	-0.1052
	(0.0532)	(0.0782)	(0.0728)
Age	-0.0107[a]	0.0002	-0.0131[a]
	(0.0028)	(0.0090)	(0.0034)
Pseudo-R^2	0.0177	0.0080	0.0241
LR test	87.14[a]	18.90[a]	64.80[a]

Notes: This table reports the coefficient estimates and corresponding White's robust standard errors (in parenthesis) of ordered probit regression for literacy bias considering the Full sample, and its partition into Students and Non-students subsamples. Variable Employment status is excluded from the Student's regression because only one student reported having a job. "a", "b", and "c" denote statistical significance at the 1%, 5%, and 10% levels, respectively. The table also reports McFadden's pseudo-R^2 and the likelihood ratio (LR) chi-squared test for joint significance.

Table 5
OLS regressions for overconfidence and under-confidence

	Overconfidence			Under-confidence		
Variables	Full sample	Students	Non-students	Full sample	Students	Non-students
Constant	0.4065[a]	0.0637	0.7364[a]	0.5427[a]	0.5851[a]	0.4994[a]
	(0.0634)	(0.1714)	(0.1359)	(0.0656)	(0.1454)	(0.1186)
Gender	0.1179[a]	0.1890[a]	0.0716[c]	-0.0894[a]	-0.1510[a]	-0.0616
	(0.0334)	(0.0527)	(0.0434)	(0.0316)	(0.0517)	(0.0406)
College degree	-0.0386	-0.0626	-0.1132	-0.0090	0.0110	-0.0185
	(0.0429)	(0.0608)	(0.0788)	(0.0369)	(0.0578)	(0.0604)
Field of study	0.0635[a]	0.0605[b]	0.0680[a]	-0.1034[a]	-0.0578[b]	-0.1270[a]
	(0.0176)	(0.0286)	(0.0023)	(0.0176)	(0.0289)	(0.0222)
Employment status	-0.0341	-	-0.1175	0.0079	-	0.0388
	(0.0461)	-	(0.0854)	(0.0391)	-	(0.0669)
Income	0.0085	0.0170	0.0042	0.0028	0.0057	0.0102
	(0.0143)	(0.0230)	(0.0189)	(0.0112)	(0.0197)	(0.0143)
Securities	0.0447[b]	0.0606[c]	0.0309	-0.0594[a]	-0.0598[b]	-0.0552[b]
	(0.0198)	(0.0341)	(0.0238)	(0.0177)	(0.0297)	(0.0219)
Metropolitan	-0.0465	0.0048	-0.0766[c]	0.0344	0.0676	0.0867[b]
	(0.0341)	(0.0540)	(0.0443)	(0.0304)	(0.0506)	(0.0381)
Age	-0.0051[a]	0.0058	-0.0074[a]	0.0058[a]	0.0039	0.0050[a]
	(0.0018)	(0.0067)	(0.0022)	(0.0016)	(0.0058)	(0.0018)
Non-null obs.	956 (55.58%)	354 (45.15%)	478 (51.07%)	764 (44.42%)	430 (54.85%)	458 (48.93%)
R^2	0.0316	0.00247	0.0425	0.0511	0.0222	0.0629
Wald test	6.77[a]	2.40[b]	4.93[a]	9.35[a]	1.89[c]	7.03[a]

Notes: This table reports the coefficient estimates and corresponding White's robust standard errors (in parenthesis) of OLS regressions for overconfidence and under-confidence, considering the Full sample, and its partition into Students and Non-students subsamples. Variable Employment status is excluded from the Students regression because only one student reported having a job. "a", "b", and "c" denote statistical significance at the 1%, 5%, and 10% levels, respectively. The table also reports the number of non-null observations, R^2 and Wald F-type test for joint significance. The number of non-null observations for the Full sample is not equal to the sum of the non-null observations of Students and Non-students because the literacy bias in each subsample is computed considering the standardized objective and self-perceived literacy within each group. The percentages in that line refer to the relative frequency within each subsample.

Table 6
Literacy bias for women and men with different objective financial literacy levels

			Obs.	Mean	Std. dev.	Mean = 0	ΔMean = 0
Full sample	High	Women	526	-0.3920	0.9564	-9.3990[a]	-2.5040[b]
		Men	741	-0.2545	0.9671	-7.1640[a]	
	Low	Women	325	0.8119	0.9841	14.8730[a]	-2.0460[b]
		Men	128	1.0226	0.9945	11.6340[a]	
Students	High	Women	221	-0.4407	1.0041	-6.5252[a]	-0.8568
		Men	303	-0.3619	1.0658	-5.9100[a]	
	Low	Women	182	0.8188	1.0393	10.6284[a]	0.5379
		Men	78	0.7439	1.0039	6.5445[a]	
Non-Students	High	Women	305	-0.3462	0.9252	-6.5357[a]	-2.3429[b]
		Men	438	-0.1861	0.9105	-4.2770[a]	
	Low	Women	143	0.8185	0.9665	10.1277[a]	-3.6280[a]
		Men	50	1.4012	1.0089	9.8200[a]	

Notes: This table exhibits the number of individuals (Obs.), the mean literacy bias, and its standard deviation (Std. dev.) for high (> 2/3) and low (≤ 2/3) levels of objective financial literacy, respectively. The column "Mean = 0" shows the t-statistic for the null that the average bias equals zero. The column "ΔMean = 0" displays the t-statistic for the null that the average biases for women and men are equal. "[a]" and "[b]" denote statistical significance at the 1% and 5% levels, respectively.

Table 7

Results regarding the hypotheses developed in Section 2

H1a	H1b	H2a	H2b	H3a	H3b	H4a	H4b	H5a	H5b	H6a	H6b
+	-	+	+	+	?	+	-	+	+	+	?

Notes: "+", "-", and "?" mean hypothesis supported, hypothesis contradicted, and inconclusive results, respectively.

Appendix A – Survey questionnaire

Welcome to this CMVM survey, a tool of the utmost importance in the pursuit of our investor protection mission. CMVM guarantees the confidentiality and anonymity of your answers. Please answer in the most as rigorous and truthful as possible.
Thank you for your participation in this survey, which has an approximate duration of 15 minutes.

Section 1.

Q1. Please indicate your gender.
   ( ) Female
   ( ) Male
   ( ) Other

Q2. What is your highest completed level of education?
   ( ) Have not completed primary education
   ( ) Have completed primary education (4th year/4th grade)
   ( ) Have completed primary education (Grade 9)
   ( ) Have completed secondary education (Grade 12)
   ( ) Attending higher education
   ( ) Higher education (polytechnic or university) completed
   ( ) Have a post-graduate degree, Master's degree, MBA or Doctorate

Q3. Indicate your main field of education/studies:
   _____

Q4. In what labour or occupational situation are you?
   ( ) Self-employed
   ( ) Employee
   ( ) Unemployed
   ( ) Retired
   ( ) Student
   ( ) Other (please specify)

   _____

Q5. Please indicate your net monthly income
   ( ) Up to €500
   ( ) Between €501 and €1,000
   ( ) Between €1,001 and €1,500
   ( ) Between €1,501 and €2,000
   ( ) Between €2,001 and €2,500
   ( ) Between €2,501 and €3,500
   ( ) Between €3,501 and €5,000
   ( ) Over €5,001

Q6. […]

Q7. […]

Q8. Does your current portfolio of securities (i.e. equities, corporate bonds, government bonds, investment fund units, futures, options, CFD/contracts for differences, other

derivatives, complex financial products, among others) represent approximately what percentage of your total assets?
( ) I have no securities
( ) Between 0% and 25%
( ) Between 26% and 50%
( ) Between 51% and 75%
( ) More than 76%

Section 2.

Q9. Please indicate your age, in years.

_____

Q10. Please give the first 4 digits of the postcode of your usual residence

_____

Section 3.

Q11. How would you assess your knowledge about financial products and markets?
( ) Not at all knowledgeable
( ) Not very knowledgeable
( ) Moderately knowledgeable
( ) Knowledgeable
( ) Very knowledgeable

Q12. […]

Q13. If you lend €25 to a friend and he pays you back the €25 the next day, how much did he pay you in interest?

_____

Q14. Suppose you put €100 into a term deposit with an annual interest rate of 2%. You make no further deposits; you do not withdraw money from the account and there are no taxes or fees. How much will you have in the account after 1 year?

_____

Q15. Suppose you put £100 into a time deposit with an annual interest rate of 2%. You make no further deposits; you do not withdraw money from the account and there are no taxes or fees.
How much will you have in your account after 5 years, knowing that at the end of each year you leave the interest value to stay on that same time deposit?
( ) Less than $110
( ) Exactly $110
( ) More than $110
( ) It is impossible to answer with the information provided

Q16. Suppose you have €100 in a bank account where the interest rate is 1% per annum and inflation is 2% per annum. One year from now, what do you think you could buy with the money in that account, knowing that you make no more deposits, no withdrawals and no taxes or commissions?
( ) I could buy fewer things than I can today
( ) I could buy the same things as today

( ) I could buy more things than today

Q17. In your opinion, please indicate whether the following statements are true or false
a) An investment with a high return generally has a high risk associated with it.
　( ) True
　( ) False

b) It is generally possible to reduce the risk of investing in the capital market by buying a diversified portfolio of shares.
　( ) True
　( ) False

c) The return on a Structured Product depends, amongst other factors, on the evolution of the financial assets underlying the product.
　( ) True
　( ) False

Q18. What does it mean that a security has guaranteed capital at maturity?
　( ) I have the right to receive the money invested, at any time
　( ) At maturity I always get the money invested
　( ) At maturity I get the money invested, if the issuer of the security is financially able to pay me

Q19. You have invested in a bond that pays a fixed rate of interest. In the meantime, market interest rates have fallen. If you sell that bond after this decrease, the price of this bond should be:
　( ) Less than the price at which you bought it
　( ) Equal to the price at which you bought it
　( ) Higher than the price at which you bought it

Q21. Suppose you want to invest 10,000 EUR in a product that has a risk of capital loss. This investment will be made with 2,500 EUR of your own money and the remaining 7,500 EUR lent to you by the Bank. What is the maximum loss you can sustain on this investment?
　( ) 0 EUR
　( ) 2,500 EUR
　( ) 7,500 EUR
　( ) 10,000 EUR

Q22. For some financial products, the return is indexed to a reference rate, which is usually "Euribor". Let's say Euribor:
　( ) Is a rate set by the Portuguese government
　( ) is a rate set by the Bank of Portugal
　( ) is a rate set by the European Central Bank
　( ) It is a rate that results from loans made between a group of European banks

Q23. From the following options, please indicate the one that in your opinion best defines what the spread is
　( ) It is the total interest rate that the bank charges for loans
　( ) It is the mark-up the bank sets against a reference interest rate, which may vary from one customer to another
　( ) It is the increase that the bank establishes, in relation to a reference interest rate and that is the same for all customers
　( ) It is an interest rate that the bank sets according to the amount of the loan

[...]

Appendix B – Marginal effects of literacy bias

	Classes → Variables ↓	0	1	2	3	4
Full sample	Gender	-0.173	-0.041	-0.010	0.036	0.032
	College degree	0.005	0.012	0.003	-0.010	-0.009
	Field of study	-0.014	-0.033	0.003	0.028	0.026
	Employment status	0.003	0.006	0.001	-0.005	-0.005
	Income	-0.001	-0.001	-0.000	0.001	0.001
	Securities	-0.009	-0.022	-0.005	0.020	0.018
	Metropolitan	0.009	0.022	0.005	-0.002	-0.002
	Age	0.001	0.002	0.001	-0.002	-0.002
Students	Gender	-0.047	-0.051	0.012	0.036	0.050
	College degree	0.006	0.006	-0.001	-0.004	-0.006
	Field of study	-0.021	-0.023	0.005	0.016	0.022
	Income	-0.002	-0.002	0.000	0.001	0.002
	Securities	-0.018	-0.019	0.005	0.014	0.018
	Metropolitan	0.009	0.010	-0.002	-0.007	-0.010
	Age	-0.000	-0.000	0.000	0.000	0.000
Non-students	Gender	-0.012	-0.024	-0.002	0.021	0.017
	College degree	0.011	0.021	0.002	-0.019	-0.015
	Field of study	-0.023	-0.046	-0.004	0.041	0.032
	Employment status	0.015	0.031	0.003	-0.027	-0.022
	Income	-0.000	-0.001	-0.000	0.001	0.000
	Securities	-0.012	-0.024	-0.002	0.021	0.017
	Metropolitan	0.012	0.023	0.002	-0.021	-0.016
	Age	0.001	0.003	0.000	-0.003	-0.002

Notes: This table presents the marginal effects of the ordered probit estimated for the literacy bias. The marginal effect of variable x_k on class j (with $j = 0, 1, 2, 3, 4$) indicates the marginal impact of an increase in x_k on the probability of selecting class j.