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PII: S0165-1765(25)00519-1
DOI: <https://doi.org/10.1016/j.econlet.2025.112682>
Reference: ECOLET 112682



To appear in: *Economics Letters*

Received date: 4 June 2025
Revised date: 29 September 2025
Accepted date: 18 October 2025

Please cite this article as: Kenneth De Beckker , Bart Frijns , Frank Hubers , Sjuul Derkx , The long-term impact of financial literacy on wealth: Evidence from longitudinal data, *Economics Letters* (2025), doi: <https://doi.org/10.1016/j.econlet.2025.112682>

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Highlights

- We study the long-term effects of financial literacy on household wealth in the Netherlands.
- Uses longitudinal data (2011 – 2019) data from 475 Dutch households.
- Higher literacy in 2011 predicts more income and savings in 2019.
- Effects vary by age: income gains for young, more savings for older individuals.
- Financial literacy affects men's wealth, but not women's.

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The long-term impact of financial literacy on wealth: Evidence from longitudinal data

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Abstract

This paper investigates the long-term impact of financial literacy on wealth accumulation using unique longitudinal data on Dutch households, thereby resolving important endogeneity issues that plague cross-sectional analyses. We find that financial literacy significantly influences income and savings, driving wealth accumulation over time. The effects vary by age: younger individuals with higher financial literacy tend to earn more, whereas older individuals prioritize savings. Additionally, we identify a notable gender disparity, where financial literacy significantly influences wealth accumulation for men, but has no significant impact for women.

Keywords: Financial Literacy, Financial Education, Wealth, Income, Savings

JEL Codes: A20, D14, G53, I20, J26

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1. Introduction

Financial literacy is a fundamental skill that shapes individuals' financial well-being, equipping them to make informed decisions, manage money effectively, and secure their financial future (Lusardi and Mitchell, 2014). As financial responsibility shifts from institutions to individuals, the ability to navigate complex financial choices is more critical than ever. This growing responsibility has profound implications for household wealth. While extensive research connects financial literacy to key financial behaviors, such as debt management (Disney and Gathergood, 2013; Lusardi and Tufano, 2015), fraud detection (Engels et al., 2020), savings (Babiarz and Robb, 2014; Brounen et al., 2016; Deuflhard et al., 2019), investment decisions (van Rooij et al., 2011; Arrondel et al., 2015; Von Gaudecker, 2015), risk-taking (Hermansson and Jonsson, 2021), retirement planning (Lusardi and Mitchell, 2011; Cupák et al., 2019), and inequality (Lo Prete, 2013, 2018) the direct link between financial literacy and long-term wealth accumulation remains unclear.

Prior studies identify a positive relationship between financial literacy and wealth accumulation (e.g., Behrman et al., 2012; van Rooij et al., 2012; Stolper and Walter, 2017; Bannier and Schwartz, 2018; Hastings and Mitchell, 2020; Sekita et al., 2022) but often rely on instrumental variable (IV) analysis to address endogeneity, as wealth accumulation could influence financial literacy (Monticone, 2010). However, IV estimation hinges on strong assumptions about instrument exogeneity. This paper takes a different approach, examining how financial literacy affects two key components of wealth—income and savings—using longitudinal data from Dutch households, with literacy measured in 2011 and outcomes observed in 2019. Since income or savings in 2019 cannot affect financial literacy in 2011, this temporal separation helps address concerns of potential endogeneity (Alessie et al., 2011; Angrisani et al., 2023). Analyzing 475 Dutch households, we find that individuals with higher

financial literacy in 2011 earned significantly more income and accumulated greater savings by 2019. After controlling for socioeconomic factors, a one-unit increase in financial literacy corresponds to an increase of €4,644 in income and €12,540 in savings. The effects vary by age: younger individuals primarily leverage financial literacy to increase their income, whereas older individuals experience a stronger effect on savings. Financial literacy significantly enhances income and savings for men but not for women.

Our paper makes three key contributions. First, it moves beyond cross-sectional analyses by examining the long-term impact of financial literacy on wealth, demonstrating its enduring effects on financial well-being. Second, it makes a methodological advancement by leveraging longitudinal data to address reverse causality. Unlike IV-based studies (e.g., Behrman et al., 2012; van Rooij et al., 2012; Bannier and Swartz, 2018; Sekita et al., 2022) that depend on exogeneity assumptions, our approach is more transparent and robust for causal inference. Third, it reveals substantial variation in the impact of financial literacy across groups (age and gender). By highlighting these disparities, our study deepens the understanding of financial literacy's role in wealth accumulation.

2. Data and Method

We use data from two waves of the LISS household panel, a nationally representative longitudinal survey of Dutch households, conducted by Centerdata. In 2011, respondents answered financial literacy questions, which we link to their income and savings in 2019. The final sample includes 475 individuals with complete data for both years.

2.1. Financial Literacy

The 2011 survey included four financial literacy questions covering compound interest (Q1), inflation (Q2), diversification (Q3), and the link between interest rates and bond prices (Q4),

based on Lusardi and Mitchell (2014). Table 1 presents the questions and response patterns. Most respondents are familiar with compound interest (Q1) and inflation (Q2) but are less familiar with diversification (Q3) and the impact of interest rates on bond prices (Q4).

INSERT TABLE 1 AROUND HERE

We calculate the financial literacy score by summing the correct answers to the financial literacy questions, with scores ranging from 0 to 4. Figure 1 plots the distribution of these scores. Panel A of Table 2 shows that the average financial literacy score in 2011 is 2.83.

INSERT FIGURE 1 AROUND HERE

2.2. *Wealth*

We measure wealth using self-reported annual gross income and savings. Income includes all taxable sources, as captured by a survey question mirroring Dutch tax forms: 'What is your total taxable income in the three boxes?', referring to wages (Box 1), business profits (Box 2), and income from investments and savings (Box 3). Gross income thus encompasses salary- and investment-derived income from the previous tax year. Savings are based on the reported total balance of all bank accounts (current, savings, term deposits, bonds, certificates, and savings schemes) as of December 31 of the previous year. To reduce the influence of outliers, we winsorize both income and savings at the 5% level.

Panel B of Table 2 presents descriptive statistics for income and savings. Average income in 2019 is €38,929, but the high standard deviation (€21,786) reveals considerable variation in income levels. Average savings are €49,415. The large standard deviation (€59,617) underscores significant disparities in savings.

2.3. Control variables

As control variables, we include age, gender, marital status, and educational attainment. All variables reflect the respondent's situation in 2011. *Age* is treated as a continuous variable, *Female* is a dummy equal to 1 if the respondent identifies as female, *Married* is a dummy equal to 1 if the respondent is married, and *Tertiary Education* is a dummy equal to 1 if the respondent has completed tertiary education.

Panel C of Table 2 provides descriptive statistics for these control variables. The average age is 55.94 years, with a standard deviation of 12.37 years, indicating a relatively older sample population with a broad age range (21 to 80 years). Gender distribution is uneven, with women representing 33% of the sample. Most respondents (66%) are married, and 46% have pursued tertiary education.

INSERT TABLE 2 AROUND HERE

2.4. Model

We estimate the relationship between financial literacy and wealth using OLS regressions:

$$Income_{i2019} = \beta_0 + \beta_1 FinLit_{i2011} + \beta_2 X_{i2011} + \epsilon_{it} \quad (1)$$

and

$$Savings_{i2019} = \gamma_0 + \gamma_1 FinLit_{i2011} + \gamma_2 X_{i2011} + \epsilon_{it}, \quad (2)$$

where $Income_{i2019}$ and $Savings_{i2019}$ are the annual income and savings of respondent i in 2019, $FinLit_{i2011}$ is the financial literacy score in 2011, and X_{i2011} is the vector of control variables: age, gender, marital status, and educational attainment. β_1 and γ_1 capture the impact of financial literacy on income and savings in 2019, respectively.

We further investigate how the relationship between financial literacy and wealth accumulation varies by age and gender. As financial strategies evolve over life (Lusardi et al., 2017), financial literacy may boost income among younger adults by supporting better career choices, while it may become more important for retirement planning and savings later in life.

We also examine gender differences: women tend to score lower on financial literacy (Cupák et al., 2018) and often have less control over household finances (Fonseca et al., 2012), which may reduce the returns of financial literacy on wealth accumulation.

3. Results

3.1. Main results

Table 3 reports average income and savings by financial literacy. Individuals scoring below two are classified as low literacy; those answering at least three questions correctly form the high literacy group. The last column reports significant (1% level) mean differences: in 2019, high-literacy individuals earned €12,900 more and held €20,892 more in savings than their low-literacy counterparts.

INSERT TABLE 3 AROUND HERE

Table 4 presents the regression results, confirming a strong positive relationship between financial literacy and wealth accumulation. In both univariate and multivariate models, financial literacy has a significant (1% level) effect: each additional correct answer is associated with €4,644 higher income and €12,540 more in savings.

Among the control variables, age is negatively associated with income, likely reflecting retirement or transitions to lower-paying roles in this older sample, while positively associated with savings, indicating greater financial stability and retirement preparation. Gender

disparities are evident in income but not in savings. Marital status positively affects both income and savings. Finally, tertiary education emerges as a strong predictor of wealth outcomes.

INSERT TABLE 4 AROUND HERE

As a robustness check, we re-estimate the regression reported in the last column of Table 4, adding 2009 income and savings as control variables. The results, presented in Appendix A, show that financial literacy continues to exert a persistent positive effect on both income and savings, confirming the robustness of our main findings.

3.2. Age

Table 5 presents regression results examining the relationship between financial literacy and income across three age groups (20–40, 40–65, 65–80). In all cohorts, financial literacy is significantly and positively associated with income, though effect sizes differ. The strongest effect is observed among those aged 20–40, likely reflecting the role of financial literacy in career planning and access to higher-paying jobs. The effect is smaller for the 40–65 group, consistent with career stability. Among those aged 65–80, the effect re-emerges, suggesting that financial literacy remains important for managing retirement income through pensions, savings, and supplemental earnings.

For savings, we observe an increasing trend of financial literacy's effect as individuals age. This suggests that financial literacy is key in enhancing savings for older individuals, possibly due to more informed decision-making regarding long-term financial planning, retirement preparation, and investment strategies. The effect of financial literacy on savings in the 20–40 age group is insignificant. This could reflect the relatively early stage of their financial lives, where other factors, such as income growth, debt management, and immediate financial

needs, may play a more dominant role in shaping savings behavior than financial literacy alone.

Overall, our results align with a life cycle income model, where income often peaks around age 50 while asset accumulation grows over time (Lusardi et al., 2017).

INSERT TABLE 5 AROUND HERE

3.3. Gender

Table 6 reports the effects of financial literacy on income and savings, separately for men (Columns 1 and 3) and women (Columns 2 and 4), revealing notable gender differences. For men, financial literacy is positively and significantly associated with both income and savings, with effect sizes exceeding those in the full sample. For women, the coefficients are smaller and statistically insignificant, suggesting a weaker or less clear link between financial literacy and wealth accumulation.

INSERT TABLE 6 AROUND HERE

Prior literature has emphasized the importance of improving women's financial literacy (e.g., Bucher-Koenen et al., 2024). Our finding of an insignificant impact of financial literacy on wealth for women could stem from several factors. First, women may face barriers limiting financial literacy's influence on wealth accumulation. For instance, women often experience wage disparities, have shorter career trajectories due to caregiving responsibilities, and may take career breaks that impact their earnings and long-term savings. These factors can diminish the effectiveness of financial literacy in improving wealth outcomes, as financial education might not fully counteract the broader societal and economic constraints women face. Second, women may prioritize different financial goals. For example, women may focus

more on financial stability, debt management, or ensuring adequate savings for future family needs, rather than wealth accumulation. In this context, financial literacy might play a less direct role in increasing wealth for women, particularly compared to men who may have more opportunities for income growth and wealth-building strategies.

As a robustness check, we replicate the analyses presented in Tables 4, 5, and 6 using bootstrapped standard errors. The results, available in Appendix B, show minimal changes in coefficient size or statistical significance. This confirms the stability of our main findings.

4. Conclusions

Our study highlights the long-term impact of financial literacy on income and savings. We find that individuals with higher financial literacy accumulate more wealth. The influence of financial literacy differs across age groups: younger individuals primarily leverage financial knowledge to enhance income potential, while older individuals focus on building savings. Moreover, financial literacy continues to pay off into retirement, where financially literate retirees experience higher levels of income and savings, emphasizing the importance of financial education throughout one's life. An important finding of our study is the gender disparity in the relationship between financial literacy and wealth. While previous research suggests that women tend to have lower financial literacy than men (Bucher-Koenen et al., 2017), many policymakers advocate for increasing financial literacy among women. Our results suggest that improving financial literacy may not yield the same wealth-enhancing benefits for women as for men. One possible explanation for the absence of significant effects for women is that they may be less frequently responsible for financial decision-making within households, particularly in long-term investment or savings matters (Bucher-Koenen et al., 2024). As a result, improvements in financial literacy may not immediately translate into observable changes in wealth accumulation for this group.

Our findings align with existing models on the impact of financial literacy and wealth accumulation (e.g., Lusardi et al., 2017), and support studies by van Rooij et al. (2012) and Stolper and Walter (2017), which demonstrate that financial literacy leads to better financial outcomes. Our study underscores the critical role of financial education in preventing societal divisions and promoting economic equity and prosperity. For policymakers, prioritizing financial literacy is essential. Investment in financial education can significantly improve well-being and reduce disparities, offering substantial long-term benefits to society.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT to enhance the clarity and fluency of the English language. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Data availability

Data are available upon request.

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Appendix A: Falsification test

To further mitigate concerns about potential endogeneity between financial literacy, income, and savings - and to establish that financial literacy has a persistent positive effect on both outcomes - we re-estimate the regression reported in the last column of Table 4, this time incorporating individuals' 2009 income and savings as additional control variables.

The results, presented in Table A1, reinforce our main conclusion: financial literacy exerts a sustained positive influence on income and savings over the long run. By conditioning on pre-2011 income and savings, we demonstrate the robustness of our findings and confirm that the effect of financial literacy persists even after accounting for prior levels of the outcome variables.

INSERT TABLE A1 AROUND HERE

Appendix B: Robustness check with bootstrapped standard errors.

To assess the robustness of our findings given the relatively small sample size, we re-estimated the regressions presented in Tables 4, 5, and 6 using bootstrapped standard errors. Bootstrapping is a non-parametric resampling technique that provides more reliable inference when sample sizes are limited or when assumptions about the error distribution may be violated. We performed 1,000 bootstrap replications using Stata's bootstrap command, resampling at the individual level. Table B1, B2 and B3 below report the same models as Table 4, 5 and 6, respectively, but now with bootstrapped standard errors.

The results are highly consistent with our main findings. Coefficients remain nearly identical, and significance levels show no meaningful changes. These robustness checks confirm that our conclusions are not sensitive to distributional assumptions or sample size limitations.

INSERT TABLE B1 AROUND HERE

INSERT TABLE B2 AROUND HERE

INSERT TABLE B3 AROUND HERE

TABLES

Table 1
Financial literacy questions.

Question	Correct (%)	Incorrect (%)	Don't know (%)
Q1 Suppose you have 100 euros in a savings account with an annual interest rate of 2%. How much do you think you would have in the savings account after five years, assuming you leave all the money in this account? (a) More than 102 euros, (b) exactly 102 euros, (c) less than 102 euros)	451 (94.95%)	22 (4.63%)	2 (0.42%)
Q2 Suppose the interest rate on your savings account is 1% per year, and the inflation rate is 2% per year. After one year, do you think you would be able to (a) buy more, (b) exactly the same, or (c) less than today with the money in the account?	445 (93.68%)	22 (4.63%)	8 (1.63%)
Q3 A company's stock generally provides a more certain return than a mutual fund that invests only in stocks. (True/ False)	305 (64.21%)	76 (16.00%)	94 (19.79%)
Q4 If interest rates rise, what should happen to bond prices? (a) should rise, (b) should fall, (c) should remain the same	143 (30.11%)	219 (46.11%)	113 (23.79%)

Note: This table reports the fraction of correct, incorrect, and “don't know” answers to the four financial literacy questions.

Table 2
Descriptive statistics.

Variable	Definition	Mean	Std. dev.	Min	Max
Panel A: Financial literacy					
FinLit	Total score on financial literacy (range of 0 – 4)	2.83	0.84	0	4
Panel B: Wealth variables					
Income 2019	Total taxable household income in 2019 (in euro), winsorized	38,929	21,786	7,307	89,991
Savings 2019	Total balance of current accounts, savings accounts, term deposits and all other assets on 31 December 2019, winsorized	49,415	59,617	600	220,677
Panel C: Socio-economic variables					
Age	Age in years	55.94	12.37	21	80
Female	A dummy variable equal to 1 if respondent is female.	0.33	0.47	0	1
Married	A dummy variable equal to 1 if respondent is married.	0.66	0.48	0	1
Tertiary Education	A dummy variable equal to 1 if the respondent has pursued tertiary education.	0.46	0.50	0	1

Note: This table reports descriptive statistics for the variables used in our analysis. Panel A presents the financial literacy scores, while Panel B summarizes the wealth variables, including income and savings for 2011 and 2019 (winsorized at 5% to mitigate the influence of outliers). Panel C provides socio-economic characteristics of the sample, including age, gender, marital status, and educational attainment, with all variables reflecting respondents' situations in 2011.

Table 3

Income and savings gap by financial literacy level.

	Low Financial Literacy (Score 0 – 2)	High Financial Literacy (Score 3 – 4)	Difference High - Low
Income 2019	30,456	43,355	12,900***
Savings 2019	35,693	56,585	20,892***
<i>N</i>	163	312	

Note: This table presents the average income and savings for 2019 among respondents with low (0–2) and high (3–4) financial literacy as measured in 2011. It also includes the estimated gap between the two groups. The significance of the gap in income and savings levels between respondents with high and low scores is assessed using a *t*-test. Standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

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Table 4

The effect of financial literacy on income and savings.

	Income 2019	Income 2019	Savings 2019	Savings 2019
Financial Literacy	7,785*** (1,140)	4,644*** (1,063)	14,737*** (3,199)	12,540*** (3,336)
Age		-331.5*** (71.24)		566.1** (223.6)
Female		-10,787*** (1,894)		-4,374 (5,944)
Married		3,153* (1,859)		12,161** (5,835)
Tertiary Education		14,994*** (1,706)		10,615** (5,352)
<i>N</i>	475	475	475	475
R-squared	0.090	0.301	0.043	0.081

Note: This table reports the OLS results analyzing the effect of financial literacy on savings and income, controlling for a set of socio-economic factors (age, gender, marital status, and tertiary education). All explanatory variables are measured in 2011, while the dependent variable is measured in 2019. Standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level respectively.

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Table 5

The effect of financial literacy on income and savings by age.

	Income 2019			Savings 2019		
	(1) Age 20 – 40	(2) Age 40 - 65	(3) Age 65 - 80	(4) Age 20 - 40	(5) Age 40 - 65	(6) Age 65 - 80
Financial Literacy	5,847** (2,887)	3,945*** (1,425)	5,441*** (1,719)	3,775 (5,557)	11,854*** (4,450)	17,939** (7,057)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	61	314	100	61	314	100
R-squared	0.371	0.285	0.284	0.121	0.064	0.073

Note: This table presents the OLS results of analyzing the effect of financial literacy on savings and income across different age groups, controlling for socio-economic factors (gender, marital status, and tertiary education). All explanatory variables are measured in 2011, and the dependent variable is measured in 2019. Standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6

The effect of financial literacy on income and savings by gender

	Income 2019		Savings 2019	
	Male	Female	Male	Female
Financial Literacy	6,162*** (1,320)	2,172 (1,699)	17,021*** (4,393)	4,214 (4,888)
Controls	Yes	Yes	Yes	Yes
<i>N</i>	320	155	320	155
R-squared	0.283	0.209	0.080	0.064

Note: This table reports the OLS results of analyzing the effect of financial literacy on savings and income by gender, controlling for socio-economic factors (age, marital status, and tertiary education). Explanatory variables are measured in 2011, while the dependent variable is measured in 2019. Standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table A1

The effect of financial literacy on income and savings (falsification test)

	Income 2019	Savings 2019
Financial Literacy	3,522*** (1,007)	10,524*** (3,220)
Age	-315.4*** (66.88)	440.6** (215.6)
Female	-7,486*** (1,824)	-4,306 (5,709)
Married	2,648 (1,746)	11,038** (5,607)
Tertiary Education	12,466*** (1,631)	11,445** (5,142)
Income 2009	0.268*** (0.033)	
Savings 2009		0.281*** (0.044)
<i>N</i>	475	475
R-squared	0.386	0.154

Note: This table reports the OLS results analyzing the effect of financial literacy on savings and income, controlling for a set of socio-economic factors (age, gender, marital status, and tertiary education) and prior levels of the outcome variables. All explanatory variables are measured in 2011, except for income and savings, which are measured in 2009; the dependent variable is measured in 2019. Standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Table B1

The effect of financial literacy on income and savings (bootstrapped SE)

	Income 2019	Income 2019	Savings 2019	Savings 2019
Financial Literacy	7,785*** (1,226)	4,644*** (1,171)	14,737*** (3,295)	12,540*** (3,336)
Age		-331.5*** (67.88)		566.1*** (192.4)
Female		-10,787*** (1,851)		-4,374 (5,140)
Married		3,153* (1,842)		12,161** (5,529)
Tertiary Education		14,994*** (1,798)		10,615* (5,529)
<i>N</i>	475	475	475	475
R-squared	0.090	0.301	0.043	0.081

Note: This table reports the OLS results analyzing the effect of financial literacy on savings and income, controlling for a set of socio-economic factors (age, gender, marital status, and tertiary education). All explanatory variables are measured in 2011, while the dependent variable is measured in 2019. Standard errors are in parentheses. Bootstrapped standard errors based on 1,000 replications. Estimates obtained using Stata's nonparametric bootstrap with resampling of observations. Reproducibility ensured by setting random seed to 1234. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Table B2

The effect of financial literacy on income and savings by age (bootstrapped SE)

	Income 2019			Savings 2019		
	(1) Age 20 - 40	(2) Age 40 - 65	(3) Age 65 - 80	(4) Age 20 - 40	(5) Age 40 - 65	(6) Age 65 - 80
Financial Literacy	5,847** (2,927)	3,945** (1,580)	5,441*** (1,898)	3,775 (3,563)	11,854*** (4,355)	17,939** (7,312)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	61	314	100	61	314	100
R-squared	0.371	0.285	0.284	0.121	0.064	0.073

Note: This table presents the OLS results of analyzing the effect of financial literacy on savings and income across different age groups, controlling for socio-economic factors (gender, marital status, and tertiary education). All explanatory variables are measured in 2011, and the dependent variable is measured in 2019. Standard errors are in parentheses. Bootstrapped standard errors based on 1,000 replications. Estimates obtained using Stata's nonparametric bootstrap with resampling of observations. Reproducibility ensured by setting random seed to 1234. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level respectively.

Table B3

The effect of financial literacy on income and savings by gender (bootstrapped SE)

	Income 2019		Savings 2019	
	Male	Female	Male	Female
Financial Literacy	6,162*** (1,429)	2,172 (1,912)	17,021*** (4,063)	4,214 (5,376)
Controls	Yes	Yes	Yes	Yes
<i>N</i>	320	155	320	155
R-squared	0.283	0.209	0.080	0.064

Note: This table reports the OLS results of analyzing the effect of financial literacy on savings and income by gender, controlling for socio-economic factors (age, marital status, and tertiary education). Explanatory variables are measured in 2011, while the dependent variable is measured in 2019. Standard errors are in parentheses. Bootstrapped standard errors based on 1,000 replications. Estimates obtained using Stata's nonparametric bootstrap with resampling of observations. Reproducibility ensured by setting random seed to 1234. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level respectively.

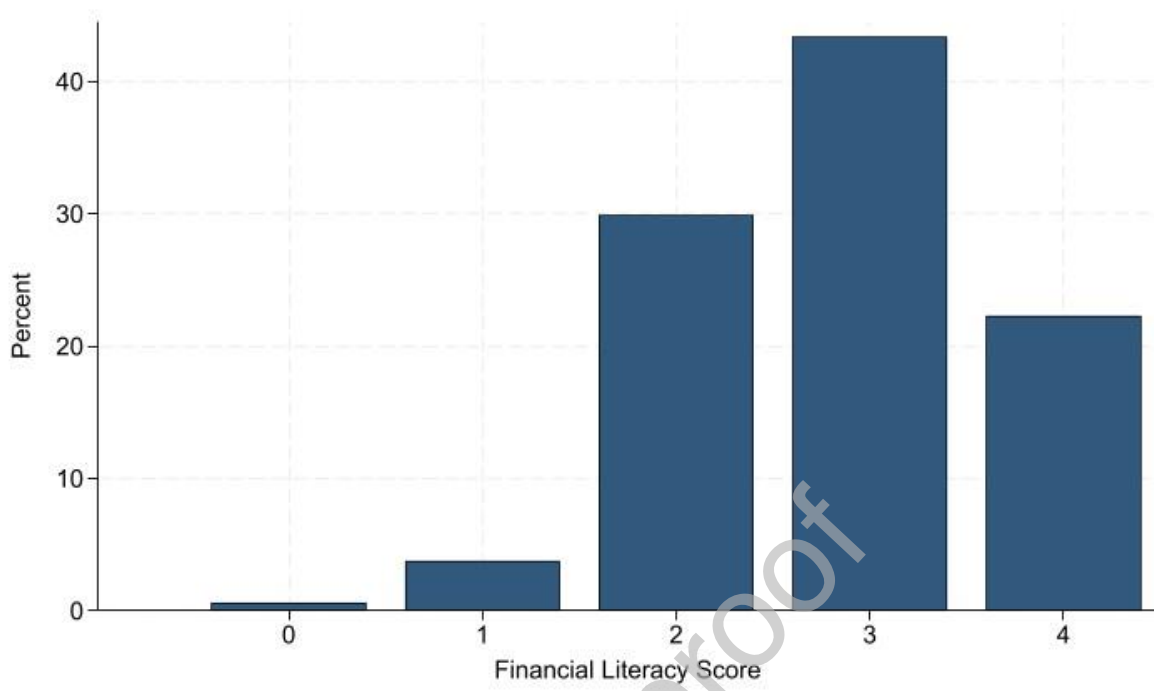
FIGURES

Fig. 1. Distribution of financial literacy scores