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ARTICLE

Financial literacy and its determinants and consequences: New survey evidence from Finland

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Abstract

We examine financial literacy in Finland and its connection with various financial outcomes using novel survey data collected in 2023. While the overall Finnish financial literacy level is about average among the OECD countries, there is significant heterogeneity within the population. Women have lower financial literacy than men. The young and the old have lower financial literacy than respondents in their prime working age, and entrepreneurs have higher financial literacy than other groups. Financial literacy is also correlated with higher educational levels. We further study the relationship between financial literacy and a number of economic outcome variables. We find financial literacy to be negatively related to coping with a major expense, facing an income shock, and with perceived over-indebtedness. However, we do not find a statistically significant relationship between financial literacy and retirement planning in Finland.

Keywords: financial literacy; financial fragility; over-indebtedness; retirement planning; Finland

JEL Codes: G51; G53

1. Introduction

This paper studies the determinants and consequences of financial literacy in Finland. We apply the "Big Three" methodology developed by Lusardi and Mitchell (2011). This methodology was originally developed to analyze the causes of financial vulnerability and retirement planning (Lusardi and Mitchell, 2023). In this paper, the three questions are used to gauge respondents' financial literacy, and the responses are related to various economic outcomes. Using this standard methodology provides the opportunity to use the results of this study to conduct international comparisons to assess the level of financial literacy around the world.

It can be argued that high financial literacy can help individuals make good choices regarding their personal finances, which would result in better decisions for financing their retirement days, as well as assisting in steering clear of financial trouble. Perhaps due to the state's role in the Finnish pension system, we do not find a statistically significant link between financial literacy and retirement planning. However, we do find a significant relation with financial literacy and three adverse economic outcomes. This suggests that financial literacy matters in particular when it comes to avoiding financially risky circumstances.

Finland is a Nordic country with extensive social support structures, and it also provides basic services, such as education or health care, either free of charge or at very

low prices. The tax system is heavily redistributive. The Finnish statutory occupational pension scheme is a defined benefit and wage earners cannot really influence their statutory pension by their own actions. Among other things, this might reduce the incentives for citizens to invest in financial literacy (Jappelli, 2010).

Finland's school system has promoted financial literacy in recent years, and the number of hours related to financial and economic literacy has increased substantially during the past ten years. The high-quality schooling, as evidenced by the good performance of Finnish pupils in subsequent PISA tests, can contribute to a higher level of financial literacy in the youngest population.

Earlier work has found financial literacy in Finland to be relatively high (Kalmi and Ruuskanen, 2018; Klapper and Lusardi, 2020). In the OECD adult financial literacy study 2016, Finland was in the second place out of 30 countries (OECD, 2016).

In the past decade, the visibility of financial literacy has increased considerably in the country. For instance, banks had very few financial literacy programs as recently as the early 2010s, but lately they have become more active. Practically, all large financial institutions now have financial literacy programs. Sometimes, they operate their own programs and sometimes collaborate with other providers (Kalmi and Ruuskanen, 2022). At the same time, the central bank (Bank of Finland) has taken an active role in promoting financial literacy. Recently (in January 2022), it opened a Financial Literacy Center.

The task of promoting financial literacy has become more structured among the public sector organizations in recent years. The Bank of Finland led the planning phase of the national strategy for financial literacy and released the report on the national strategy in January 2021 (BoF, 2021). Since the beginning of 2022, the Ministry of Justice has directed the strategy work. In this strategy work, an ambitious target has been set for Finland to be the world leader in financial literacy by 2030 (BoF, 2021).

In Finnish schools, financial literacy is not a discipline in itself. Instead, the topics related to financial literacy (and economics) are taught in several disciplines, including social studies, mathematics, home economics, study guidance, and even languages. Moreover, the high level of mathematics and languages in Finnish schools contributes positively to the formation of financial literacy. Recent evidence shows that Finnish pupils are also relatively financially literate: In the 2018 PISA financial literacy tests, Finnish kids came second, only after Finland's southern neighbor Estonia (OECD, 2020).

Although there have been considerable efforts in the advancement of financial literacy in Finland in recent years, the efforts have been concentrated on schools as described above. The analysis in this study on the other hand focuses on the adult population. Therefore, these efforts will hopefully result in better outcomes for the young adults in future cohorts, when the generation attending school in the recent years becomes of age.

Consumer indebtedness has been an increasing trend in Finland. In 2022, the value of loans among Finnish households was 131 percent of income (Stat.fi, 2023). The growing indebtedness and especially the growth in consumer loans have led to increased arrears payment delinquencies: 8.5 percent of the adult population in Finland have registered arrears (Asiakastieto.fi, 2022). In addition, the long period of low-interest rates fueled a rise in asset prices, especially housing prices. This gave rise to macro stability concerns from the Bank of Finland (BOF,2023)

Rising inflation spreads from the U.S. to Europe in the aftermath of COVID-19. The increase in inflation was accelerated further by Russia's attack on Ukraine, which led to steeply rising energy and food prices. However, the inflation rate in Finland has been slightly below the Euro area's average. The year-to-year change in inflation peaked at around 9 percent when the sample for this study was collected.

Against this backdrop, we investigate the associations of financial literacy with a number of outcomes related to personal finance. In previous work, higher financial literacy has been found to be associated with lower financial fragility (Lusardi, Schneider, and

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Tufano, 2011; Hasler, Lusardi, and Oggero, 2018; Clark, Lusardi, and Mitchell, 2021). In these studies, financial fragility refers to whether the individual is able to face an emergency expense. Financial literacy has also been related to over-indebtedness and higher cost of credit (Disney and Gathergood, 2013; Lusardi and Tufano, 2015). Finally, financial literacy is also related to a higher likelihood of pension planning (Lusardi and Mitchell, 2011).

Financial literacy in Finland has been studied before in Kalmi and Ruuskanen (2018). They found that financial literacy in Finland is lower among the young and the old, less educated, and females. They also found evidence that financial literacy has a positive association with pension planning, though this association is significant only for females.

In this study, we revisit financial literacy in Finland. Compared to Kalmi and Ruuskanen (2018), we include a broader set of dependent variables. Alongside pension planning, we include over-indebtedness and financial fragility. We study financial literacy with a new data set collected in January-February 2023.

The paper is structured as follows. Section 2 presents the data, and in section 3, we look at the level of financial literacy in Finland. Section 4 links financial literacy to economic outcome variables, while in section 5 we present the regression results and discuss them. Finally, section 6 concludes.

2. Data

The survey used to collect the data was designed to be consistent with the OECD survey of 2022 (OECD, 2022). The funding for the research work came partly from the Ministry of Justice and the DigiConsumers research project. The research findings will be used in the execution of the Finnish national strategy for financial literacy. The decision to follow the OECD survey influenced some decisions concerning the variables, especially the Big Three questions. However, the research team also included questions outside the OECD survey.

The data were collected by online survey. The prior Finnish 2014 survey data in Kalmi and Ruuskanen (2018) were collected using face-to-face interviews. Online surveys are a more common data collection method in financial literacy surveys, making the new Finnish survey more comparable to the other international surveys. However, the two Finnish surveys are not strictly comparable due to the differences in data collection methods.

The data were collected between January 25th and February 6th, 2023. The data were sent to a panel of survey respondents through a professional survey provider Innolink. Respondents are rewarded for participating in the surveys by collecting credits based on the length of each survey they respond to. After they have collected enough credits, these can be transformed into electronic gift cards for specified service providers.

The data collection period was quite unique: the war in Ukraine had been going on for almost a year at the time data were collected, food inflation was in double-digit figures, and the energy prices had risen quite considerably. Finland was also preparing for the national parliamentary elections in April 2023.

After the data collection was completed, the respondents' response times were evaluated by this study's authors. Very fast respondents were eliminated using a procedure described in Greszki, Meyer, and Schoen (2015). This procedure eliminates those who responded shorter than a fraction of the median response time. We chose the threshold to be 50 percent of the median response time. This resulted in the removal of approximately 10 percent of the respondents. A detailed description of the differences between the removed and the non-removed samples is given in the Appendix Table A1.

To make the sample representative, after the elimination of the fast respondents, the weights were calculated using the population shares of (i) education attainment by each gender for each age group and region, (ii) gender composition for each age group and in each region, as well as (iii) age groups in each region. We similarly calculated the sample shares of these demographic characteristics. We divided the population share of

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demographic characteristics by their sample shares to get compensating weights for each demographic factor. We then multiplied compensating weights to obtain the sample weights for each respondent.

Summary statistics and frequency tables of the demographics and the variables on retirement planning and adverse economic outcomes are found in the Online Appendix, in Tables A1–A11.

3. Level of financial literacy in Finland

We examine financial literacy using variants of the Big Three financial literacy questions. Following Lusardi and Mitchell (2011), the following questions were asked in the survey to measure the level of financial literacy of the respondents:

Understanding of Interest Rate

Suppose you put 100€ in a savings account with a guaranteed interest rate of 2 percent per year. You do not make any further payments into this account, and you do not withdraw any money out of this account. How much money will you have in five years after the interest payment has been made? Assume that you do not have to pay taxes on capital income and that there are no other fees related to the account.

i) Over 110€
ii) Exactly 110€
iii) Less than 110€
iv) It is impossible to know given the information provided
v) Don't know
vi) Refused

Understanding of Inflation

Suppose you put 1000€ into a savings account with a guaranteed interest rate of 2 percent annually. The annual inflation rate is 4 percent, and you do not make more payments into or take out withdrawals from the account. In one year, you can buy:

i) More than today
ii) Less than today
iii) Don't know
iv) Refused

Understanding of Risk and Diversification

Is the following statement true or false? "It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares rather than investing in one share only."

i) True
ii) False
iii) Don't know
iv) Refused

Although somewhat different, the questions are related to the canonical Big Three questions used by Lusardi and Mitchell (2011). The reason for these differences was the decision to follow the OECD (2022) survey as closely as possible.

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Table 1. Summary statistics for the Big 3 financial literacy questions

	Full sample (%)	Age 25–65 (%)
Interest question		
>110€*	49.0	52.6
=110€	19.8	19.2
<110€	6.3	5.1
Impossible to say	8.1	5.9
DK	16.8	17.2
Inflation question		
More	5.9	6.8
Exactly the same	9.8	7.4
Less*	64.5	66.5
DK	19.8	19.3
Risk question		
Correct*	73.5	76.0
Incorrect	4.8	4.4
DK	21.7	19.6
Cross-question consistency		
Interest and Inflation correct	39.2	42.2
All correct	36.3	39.1
None correct (All DK included)	16.9	15.4
At least 1 DK	32.4	31.4
All DK	6.3	6.7
Observations	1,806	1,324

Note: DK refers to Don't know. The asterisk* marks the correct answer to the question. All figures are weighted.

The differences between the approaches are as follows: In the interest rate question, the numerical value is 110€ instead of 102€. This makes the question more difficult, as the respondent needs not only to understand the concept of interest rate but also the concept of compound interest rate. Also, consistent with the OECD questionnaire, there is an additional option, "It is impossible to know given the information provided." This additional option is likely to reduce the proportion of correct answers. We have also added the condition of no taxes and fees for clarity. The differences in the inflation question are that our wording gives a monetary value (which is irrelevant to the task) and the rate paid to the savings and inflation rate are double that compared to the original Big Three. In the risk diversification question, the comparison is otherwise similar, but the statement is constructed to be true and not false, as in Big Three. This was again to keep the results comparable to the OECD formulation.

Summary statistics for these questions are provided in Table 1. It reports the share of respondents who answered each of the given alternatives to the three financial literacy questions. These are given for the full sample and just for those 25 to 65 years old.

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Table 2a. Summary statistics by age, gender, education level, and employment status

	Interest		Inflation		Risk		Overall	
	C	DK	C	DK	C	DK	All C	DK ≥ 1
Age								
18–35	40.3	18.0	49.3	28.8	60.4	29.2	22.5	42.5
36–50	55.0	16.6	65.1	19.7	78.2	18.0	41.1	30.6
51–65	54.5	15.5	76.6	13.3	80.2	16.0	44.2	26.6
> 65	47.8	16.7	69.6	15.6	77.2	22.2	40.8	29.2
Sex								
Male	57.4	11.5	76.7	12.4	78.7	14.4	47.5	24.0
Female	40.9	21.8	53.0	26.7	68.5	28.6	26.3	40.7
Education								
< High school	35.4	19.3	41.2	39.5	56.9	36.4	23.6	49.2
High school grad	43.5	22.5	58.4	22.9	70.0	25.8	27.5	41.3
Some university	49.7	9.7	79.1	4.7	74.8	11.0	33.2	15.9
University graduate	58.1	13.1	77.1	10.4	82.8	13.7	47.7	21.9
Postgraduate	62.4	9.0	84.7	8.8	91.2	8.8	61.3	8.8
Employment status								
Self-employed	60.9	6.7	67.0	6.7	85.8	4.7	44.1	12.0
Not employed	44.6	21.1	57.3	24.0	68.8	22.2	28.1	37.2
Working	52.0	14.1	65.2	20.1	74.6	20.9	39.2	31.6
Retired	48.5	16.9	70.7	16.3	76.0	22.5	40.4	31.0

Note: C refers to "correct," DK to "don't know." All figures are weighted.

From Table 1, we can see that the question on risk diversification has the highest share of correct answers. The lowest share of correct answers is found for the interest rate question. The share of respondents who answered correctly to each individual question is slightly smaller in the overall sample than it is among those aged 25 to 65, indicating that the youngest and the oldest respondents have somewhat lower levels of financial literacy. The share of respondents who reported that they do not know the answer is roughly the same in both groups. 36.3 percent of respondents in the full sample answered all three questions correctly. The sample of respondents in previous assessments of adult financial literacy in Finland had a similar performance regarding answering all three questions correctly (OECD, 2016; Kalmi and Ruuskanen, 2018). This leaves room for improving the level of adult financial literacy in Finland.

Compared to the previous work by Kalmi and Ruuskanen (2018) based on face-to-face interviews, the share of correct responses to interest rate and inflation questions is lower in the new sample, but correct responses risk diversification is quite a bit higher in the new sample. One reason for this might be that the last time the risk diversification question was posited in the way that the correct answer was false. The share of all three correct is almost the same as in the face-to-face interviews, and the share of "do not know" is much higher in the new sample. Due to the differences in data collection, the results are not strictly comparable.

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Table 2b. Simple OLS regression of answering inflation correctly on the demographic variables

	(1) Inflation correct
Age	0.012*
	(0.007)
Age sq.	−0.000
	(0.000)
Female	−0.268***
	(0.032)
Education (Ref. < High school)	
High school grad	0.186***
	(0.058)
Some college	0.323***
	(0.076)
College grad	0.363***
	(0.057)
Postgraduate	0.435***
	(0.129)
Employment (Ref. Working)	
Self-employed	−0.015
	(0.067)
Not working	0.034
	(0.033)
Constant	0.162
	(0.165)
Observations	1714
R^2	0.199

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

At the time of the writing (May 2023), we do not yet know how the Finnish results will compare to the results of the OECD data collection round of 2022/2023, as the results will be released only in November 2023. However, compared with the 2018 survey results (OECD, 2020), it seems that the results will place Finland in the middle category among OECD countries – neither to the top nor to the bottom. This may be a reasonable position, as the data collection methods this time were more similar to those used in other countries than the ones used in 2014 and reported in Kalmi and Ruuskanen (2018).

Financial literacy is known to be quite unevenly distributed among the population. Next, we look at the heterogeneity in financial literacy. Tables 2a and 2b present the shares of respondents who answered either correctly or that they did not know in response to the three financial literacy questions. The answers are categorized by age, gender, education level, and employment status.

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The group of working-age adults from 36 to 50 had the highest proportion of correct answers (55%) to the interest rate question. This share was lower, at 40.3 percent, for those younger than 35. Interest knowledge decreases for the oldest age group, thus forming an inverted U-shape with regard to age. Decreasing knowledge for the oldest respondents could reflect decreasing cognitive capabilities with old age. Both the young and the old have lower levels of financial literacy than those in their working age, although the share of having all three correct is much larger for the oldest age group than it is for the youngest.

These findings therefore show that the young have the weakest level of financial literacy. This could be due to lack of experience in financial decisions. It can be argued that people develop financial literacy through experience, and therefore, the young would have lower financial literacy simply because they have less experience. However, the understanding of central financial concepts as the Big Three is important when faced with large financial decisions such as taking a mortgage, highlighting the need for financial skills in making good choices in terms of choosing the right type of interest rate offered for the mortgage. Thus, it is concerning to find low levels of financial literacy for the young, since they will be faced with the consequences of making financial decisions without sound knowledge.

Another possible explanation for the lower level of financial literacy for the young could be cohort-specific effects. However, it is not possible to distinguish between cohort-specific and age-specific effects in this context. Yet, other studies, such as Lusardi and Mitchell (2011), have also found that the young and the old tend to have lower financial literacy than those in their prime working age.

Women have a lower share of correct answers to all financial literacy questions than men. The share of women who got all three questions correct is 26.3 percent, whereas for men it is almost 50 percent. The share of do not know answers is also higher for women than they are for men. These findings align with prior findings on gender differences in financial knowledge. It has been found in the literature that the lower levels of financial literacy of women could be due to a lack of self-confidence, as shown in Bucher-Koenen et al. (2021).

Financial knowledge increases strongly with education. For instance, the share of correct answers is 23.6 percent for those with less than high school level education, and it is over 60 percent for postgraduates. This finding makes sense, since higher education can be intuitively understood to correlate with higher financial literacy measured by the Big Three.

Furthermore, the self-employed get the largest share of correct answers in the employment categories, a common finding in the field. The self-employed need to know more about financial matters, because they have to take care of their taxes and other things much more independently than the average wage earner in the Finnish setting needs to. Not only do the self-employed have the highest share of correct answers but also they say they do not know much less frequently than the other employment groups. This could indicate that they are more confident in financial matters, perhaps due to more experience they have acquired through their business knowledge.

We next investigate the relationship between inflation knowledge and its determinants in more detail. In the recent decades, inflation has remained low, but has recently reappeared in high rates in many developed economies. First, in order to investigate the importance of inflation knowledge in day-to-day financial decisions, we look at the development of the inflation rate in Finland. Figure 1 shows the development of the Finnish inflation rate over time starting from the 1960s up to 2023. From this figure, we can see that high inflation has not been a concern in the economy for about 30 years, leaving the young more vulnerable to not understanding its effects on personal finance due to the lack of experience on inflation.

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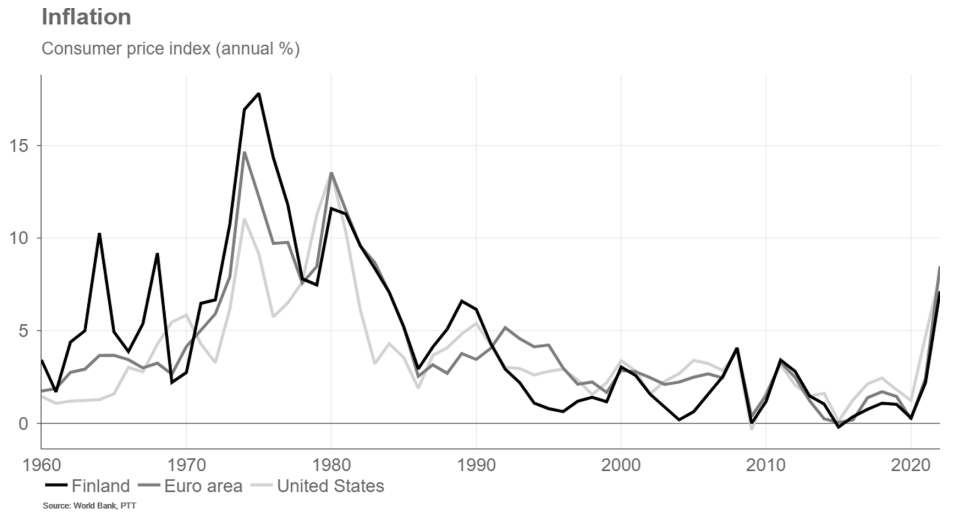

Figure 1. Inflation rate in Finland, the Euro area, and the United States (CPI, annual %).
Source: World Bank (2023)

Figure 1 shows that the inflation rate in Finland has remained, until recently, below 5 percent since the early 1990s. Before that, in the 1960s, Finland's inflation rate varied between 2 and 10 percent, while it rose close to 20 percent during the oil crisis in the 1970s. Inflation remained quite high during the 1980s as well, declining from over 10 percent down to about 3 percent throughout the decade. In the late 1980s, inflation increased beyond 5 percent and started to decline again during the Finnish banking crisis of the early 1990s.

After joining the Euro area during its inception in 1999, Finland's inflation has mostly closely mirrored the Euro area. The annual inflation rate has since been well below 5 percent and in 2013–2021 very low, occasionally dipping into the deflation zone. However, as in the rest of the Eurozone countries and the United States, the inflation rate in Finland started to rise in the aftermath of the COVID-19 pandemic. The inflation rate in Finland rose above the European Central Bank's target of 2 percent in late 2021 and has quite steadily increased close to 10 percent in late 2022.

With this background of the inflation environment of the past decades in mind, we turn back to the inflation knowledge figures in Tables 2a and 2b. From it, we observe that inflation knowledge indeed increases with age, although there is a small drop in knowledge for the oldest individuals. Older individuals had more experience with inflation during their lifetime in the 1970s and 1980s, which could be reflected in their higher inflation knowledge. The share of correct answers is almost 70 percent for those older than 65, who would have been in their twenties during the oil crisis in the mid-70s. In contrast, the share of those younger than 35 who answered the inflation question correctly is much lower, at 49.3 percent. These individuals have not really had experience with inflation, as those 35 today have been small children in the late 1980s to the early 1990s when Finland last went through a spell of high inflation.

Next, we look at how inflation knowledge correlates with the demographic variables. Table 2b reports the results of this simple OLS regression of getting the inflation question correct on age, gender, education, and employment, which are the demographic variables considered in Table 2a.

The results show that age and education are positively and significantly related to correctly answering the inflation question. The positive coefficient for age shows that the

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older the individual, the higher the score on inflation knowledge. Surprisingly though, the coefficient for age is only weakly significant. This suggests that the correlation between inflation knowledge and age is not very strong.

On the other hand, the higher the education level is, the greater the coefficient, suggesting that higher education predicts better inflation understanding. Unlike the coefficient for age, the coefficients on education are highly statistically significant. The negative and significant coefficient for the female dummy indicates that females have lower inflation knowledge than men even after accounting for other demographic variables.

There is a long-standing historical division between the North-Eastern part and South-Western parts of Finland. This divide dates back to the division of Finland between Sweden and Russia in a peace treaty in the 14th century. However, it has been suggested that this geographic divide was in existence for centuries, even millennia before that time, where the North-East constituted of mainly hunting-oriented societies, and the South-West focusing on agriculture (Palo, 2020). Therefore, as indicated in Palo (2020), even the gene pool of individuals on different sides of this historic divide is different. These differences are still apparent today, where for instance, health outcomes are on average poorer in the East and then in the North of the country, and there are worse socio-economic outcomes in general such as higher unemployment levels. The population is mostly concentrated in the South and the West, where the East and the North of Finland are much more sparsely populated. The country's major cities are found in the South and the West. Here, we look at summary statistics for the Big Three financial literacy questions for different regions in Finland, which are presented in Tables 3a and 3b.

Inflation knowledge is highest in North Finland, where 69.9 percent of the respondents answered the inflation question correctly. By contrast, 63 percent of the respondents answered this question correctly in South Finland, which was the lowest. West Finland scored the highest for the interest rate question, while it was lowest in North Finland. The understanding of risk, on the other hand, is highest in East Finland.

It may look like there is a financial literacy gap between the North (North Finland Province) and the rest of Finland (i.e., South, West, and East Finland provinces). We have tested this by checking the financial literacy of those respondents who live in the North and those who live in the rest of Finland. In the former group, the (weighted) average Big 3 score is 1,899 (*std. dev.* = 1.180), while it was 1.827 (*std. dev.* = 1.079) in the latter group. The difference in the (weighted) Big 3 scores between these two groups was not statistically significant according to an adjusted Wald test ($p = 0.490$).[1] The same conclusion can be reached if we only compare the Big 3 scores between North Finland and South Finland provinces ($p = 0.534$ according to an adjusted Wald test).

Taken together, these region-specific measures of financial literacy do not reveal any large differences between the regions. This can be seen as reassuring, as even though the population of Finland is mainly concentrated in the South and to the West, and there are other differences between the regions, the levels of financial literacy have not fallen behind in the less populated North and East.

The survey further asked about how the respondents would rank themselves on their financial knowledge. The survey question was formulated as follows:

[1] Since we use probability weights for the survey data in our analysis, we cannot conduct a t-test. Some statistical softwares provide packages for frequency-weighted t-test. We did not opt for a frequency-weighted *t*-test in our analysis primarily because this type of weighting does not match with the one we use in this study. Instead, we use the Wald test, which is equivalent to testing the significance of the coefficient estimate in the linear regression of the Big 3 test score on the region indicator.

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Table 3a. Summary statistics for South, West, East, and North Finland

	Interest		Inflation		Risk		Overall	
Region	C	DK	C	DK	C	DK	All C	DK ≥ 1
South Finland	49.0	16.1	64.3	20.4	72.8	21.4	37.5	32.4
West Finland	51.7	18.6	63.0	20.8	70.1	25.5	36.1	35.9
East Finland	46.1	14.4	64.5	20.6	80.9	17.8	35.7	32.9
North Finland	44.5	17.5	69.9	12.5	78.7	17.7	33.5	25.3

Note: C refers to "correct" and DK to "don't know." All figures are weighted.

Table 3b. Distribution of answers to self-reported financial literacy by age, gender, education level, and employment status

	1–3	4	5	6	7	Average score
Full sample	19.1	39.6	19.5	14.7	7.2	4.4
Age						
25–65	18.6	41.1	19.1	15.1	6.1	4.3
18–35	29.1	33.9	22.8	8.2	6.0	4.1
36–50	20.1	39.1	19.2	15.8	5.8	4.4
51–65	12.8	46.9	16.9	17.3	6.1	4.5
>65	12.7	39.5	18.4	18.4	11.0	4.7
Sex						
Male	18.8	34.7	20.2	15.7	10.6	4.6
Female	19.4	44.2	18.8	13.6	4.0	4.2
Education						
Lower secondary	37.0	30.3	20.5	5.1	7.0	3.8
High school or vocational	22.4	45.3	16.5	11.8	3.9	4.2
Specialist vocational	17.1	31.4	22.9	18.8	9.7	4.6
University or polytechnic	9.2	41.6	20.5	20.1	8.7	4.7
Doctorate	6.5	26.2	11.7	32.2	23.4	5.3
Employment status						
Self-employed	8.8	43.1	21.4	17.4	9.3	4.7
Not employed	26.4	38.9	23.3	7.4	4.0	4.1
Working	18.9	39.3	18.3	16.7	6.8	4.4
Retired	13.5	40.6	18.2	17.7	9.9	4.6

Note: All figures are weighted. Self-reported financial literacy score varies from 1 (Very bad) to 7 (Very good).

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On a scale of 1 to 7, where 1 means very bad and 7 means very good, how would you assess your own financial knowledge in relation to other Finns?

The responses included the options "don't know" and "I don't want to answer." The distribution of this measure is reported by demographic groups in Table 3b.

We can see that the most commonly reported level of self-reported financial literacy for the full sample is at the value 4, indicating neither bad nor good knowledge. The average score for the whole sample is slightly above this at 4.4. The level of self-reported financial knowledge rises with age and education, which is in line with the actual knowledge measures found in Tables 2a and 2b. The fact that self-reported financial knowledge increases with age possibly indicates more confidence in one's knowledge with more life experience.

Women have a slightly lower level of self-reported financial knowledge than men. Less than 18 percent of women assess their financial knowledge to be good or very good (values 6 and 7), whereas this figure is over 26 percent for men. Women also self-assess their financial knowledge to be average more often than men do. The self-employed and the retired have clearly larger shares of top assessments than those who are not employed. The self-employed may be more confident in the knowledge gained from their experience as an entrepreneur, whereas the retired may feel confident due to accumulated life experience in general. These findings also reflect the figures obtained from the knowledge questions.

4. Financial literacy and economic outcomes

In this section, we link financial literacy to selected economic outcomes. The outcomes we investigate are retirement planning and three measures of adverse economic outcomes. These include subjective over-indebtedness, coping with a major expense and facing an income shock, of which the latter two can be seen as measures of financial fragility. In prior literature, Clark, Lusardi and Mitchell (2021) use facing an emergency expense as a measure of financial fragility. The outcome that most closely aligns with theirs is the variable measuring coping with a major expense, here the size of the respondents' monthly income. In addition, we include another measure of financial fragility in the form of losing one's main source of income. This variable is of interest since many people lost their main source of income during the pandemic. Although Finland has extensive government support for unemployment, it is nevertheless of interest to investigate how this variable plays out in relation with financial literacy. We next present these economic outcome measures in more detail. Their summary statistics regarding financial literacy are presented in Table 4.

Retirement planning

We start by examining the link between financial literacy and retirement planning. The retirement planning question used in this context is the same as in several previous studies, including Lusardi and Mitchell (2011) and Kalmi and Ruuskanen (2018). It is

Have you ever tried to figure out, how much you should save for retirement?

i) Yes
ii) No
iii) Don't know
iv) Refused

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Table 4. Financial literacy and measures of retirement planning and adverse economic outcome variables

			Adverse economic outcomes					
	Retirement planning		Too much debt		Major expense		Income shock	
	Yes	No	Yes	No	Not fragile	Fragile	Not fragile	Fragile
Financial literacy								
Interest correct	54.3	50.3	44.0	51.2	54.9	41.1	58.7	38.6
Interest incorrect	35.5	32.4	35.3	33.8	33.4	36.0	31.2	42.4
Interest DK	10.1	17.7	20.7	15.0	11.7	22.9	10.1	19.0
Inflation correct	74.9	63.4	60.2	66.3	70.7	56.5	73.8	54.0
Inflation incorrect	16.1	16.2	17.0	15.2	15.6	16.3	16.1	16.6
Inflation DK	8.0	20.4	22.9	18.3	13.9	27.2	10.1	29.4
Risk correct	81.1	73.7	67.3	76.1	81.6	63.1	84.5	58.0
Risk incorrect	8.2	5.1	7.4	3.7	4.6	4.9	3.7	7.8
Risk DK	10.8	21.2	25.3	20.2	13.8	32.0	11.8	34.2
Total	19.0	81.0	30.3	69.7	57.0	43.0	67.6	32.4

Note: All figures are weighted.

This particular question was not in the OECD questionnaire, but we decided to include it because of its prominence in the literature. This question was coded into an indicator variable, which takes the value one when one had planned for retirement and zero otherwise. The responses "Don't know" or "Refused" were recoded as missing.

Altogether, only 19 percent of the respondents say they have planned for retirement. For those individuals who had planned for their retirement, the shares of correct and incorrect answers are close to each other concerning the interest question, but in the risk question and especially in the inflation question, there is a larger difference in the share of correct answers. The share of do not know answers was higher for those who had not planned for retirement, indicating somewhat stronger financial literacy for those who had.

Adverse economic outcomes

In this section, we present the three measures of adverse economic outcomes: perceived over-indebtedness, major expense, and facing a large income shock.

Having too much debt can lead to having less flexibility in the household budget, therefore highlighting the need to investigate the relation of this measure with financial literacy. This particular question is also included in the OECD questionnaire.

Perceived over-indebtedness

The respondents are asked to evaluate how much they agree or disagree with the following statement:

- I have too much debt right now

They evaluated this statement on a 1–5 scale, where 1 indicated a complete disagreement with the statement and 5 a complete agreement. The respondents also had

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the possibility to answer Don't know or refuse to answer the question, which were again coded as missing. The variable too much debt takes the value of 1 if the respondents chose the value 4 or 5.

In total, slightly over 30 percent say that they have too much debt. The share of correct answers to the financial literacy questions is higher for those who do not perceive to have too much debt, whereas the share of incorrect answers is slightly higher for those who state they have too much debt. Indebted respondents are also more likely to indicate that they do not know the answer. These findings thus point to the direction that individuals with higher financial literacy accumulate less debt that they perceive excessive.

Facing a major expense

If you, personally, faced a major expense today – equivalent to your own monthly income – would you be able to pay it without borrowing the money or asking family and friends for help?

i) I certainly would be able to pay
ii) I probably would be able to pay
iii) I probably would not be able to pay
iv) I certainly would not be able to pay
v) The question does not apply to me, I have no personal income
vi) Don't know
viii) Refused

This variable takes on the value 1 when the individual states that they could not pay an unexpected bill that is equal in size to their monthly net income without asking for help from family or friends or without borrowing money to pay the bill. The individuals who answered that they probably or definitively could not pay were coded as 1, and those who answered that they probably or definitively could were coded as 0. Individuals, who refused to answer or did not know or said the question did not apply to them because they have no income, were coded as missing.

43.9 percent of the respondents would not be able to pay for a major expense. We find that financial literacy is higher among those who stated they would be able to pay for a major expense. Those who stated that they could not <>had a slightly higher share of incorrect answers. On the other hand, the share of "do not know" answers was higher for those who could not pay a major expense.

Income shock

If you lost your main source of income, how long could you continue to cover living expenses, without borrowing any money or moving into another apartment?

i) Less than a week
ii) At least a week, but not one month
iii) At least one month, but not three months
iv) At least three months, but not six months
v) More than six months
vi) Don't know
vii) Refused

This variable measures how long the individual could cope with losing their main source of income. It can therefore be seen as another measure of financial fragility. It takes the value 1 when the respondent states that if they lost their main source of income, they could

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Table 5. OLS estimates of retirement planning on financial literacy

	(1)	(2)	(3)
	Pension planning	Pension planning	Pension planning
All correct	−0.042		
	(0.028)		
No. of correct		0.009	
		(0.021)	
Interest correct			−0.052*
			(0.029)
Inflation correct			0.020
			(0.032)
Risk correct			0.018
			(0.037)
Age	0.007	0.007	0.006
	(0.005)	(0.005)	(0.005)
Female	−0.034	−0.023	−0.027
	(0.027)	(0.028)	(0.029)
Education (Ref. <High school)			
High school grad	0.013	0.010	0.009
	(0.042)	(0.040)	(0.041)
Some university	0.175**	0.176**	0.174*
	(0.088)	(0.088)	(0.091)
University grad	0.085**	0.071*	0.074*
	(0.043)	(0.041)	(0.043)
Postgraduate	0.072	0.046	0.053
	(0.144)	(0.144)	(0.143)
Married/Cohabitation	−0.023	−0.022	−0.027
	(0.028)	(0.029)	(0.029)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	−0.014	−0.014	−0.012
	(0.050)	(0.050)	(0.052)
30 000€–49 999€	0.048	0.050	0.051
	(0.065)	(0.065)	(0.069)
50 000€+	0.125*	0.123*	0.120
	(0.075)	(0.074)	(0.077)
Employment (Ref: Working)			
Self-employed	0.114	0.111	0.121*
	(0.070)	(0.070)	(0.072)

(*Continued*)

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Table 5. (*Continued*)

	(1)	(2)	(3)
	Pension planning	Pension planning	Pension planning
Not working	−0.066	−0.063	−0.066
	(0.043)	(0.043)	(0.045)
Constant	0.011	−0.001	0.023
	(0.127)	(0.134)	(0.140)
Observations	1182	1185	1134
R^2	0.097	0.094	0.096

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating planning for retirement. 19% of respondents stated that they had tried to find out how much to save for their retirement. Those who did not know, were already retired, or refused to answer were coded as missing. All regressions include controls for age squared, the number of children, and regional controls for North, East, South, and West Finland.

cover their expenses without having to move or borrow money for less than one month. If the individual could cover their expenses for more than a month without having to move or borrow money, it takes the value 0. The responses stating refused and don't know have been coded as missing observations.

Considering the income shock, 32.4 percent of respondents were classified as financially fragile. Financial literacy among the fragile is lower than for those not fragile. Considering the interest rate question, only 38.6 percent of those financially fragile responded correctly, whereas that share is 58.7 percent of the ones not considered fragile. The share of incorrect answers was larger for the fragile, especially concerning the interest rate question. The share of incorrect answers for the inflation and risk questions was only slightly larger for the fragile, and the share of do not know answers was larger for the financially fragile.

In conclusion, the summary statistics in Table 5 indicate that financial literacy is somewhat higher among those who can better deal with the economic outcomes investigated in this study. Taken together, we thus expect financial literacy to play an important role in relation to adverse economic outcomes. We go on to explore this relationship further in the regression framework.

5. Regressions and discussion

In this section, we study the link between financial literacy and retirement planning, over-indebtedness, and financial fragility. Following Lusardi and Mitchell (2011), the main explanatory variables include first a variable that indicates whether the individuals got all the big three financial literacy questions correct, second, a continuous variable of the number of big three questions correct, and finally, each of the big three questions on their own to measure the contribution of each question. Other controls include the respondents' age and its quadratic, gender, education level indicators, and regional dummies.

Further controls include a dummy variable cohabitation/married, which takes the value one when the respondent reports they live with a spouse and zero otherwise. Therefore, this variable includes married couples and those couples who are cohabiting and are not necessarily married, which is common in Finland.

We also control for the number of children, which affects household expenses. The number of children is added as their own categorical variables, with the reference group

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Table 6. OLS estimates of having too much debt

	(1)	(2)	(3)
	Too much debt	Too much debt	Too much debt
All correct	−0.105***		
	(0.029)		
No. of correct		−0.042***	
		(0.015)	
Interest correct			−0.044
			(0.030)
Inflation correct			−0.047
			(0.037)
Risk correct			−0.061
			(0.041)
Age	0.027***	0.027***	0.029***
	(0.006)	(0.006)	(0.006)
Female	−0.000	0.002	0.000
	(0.029)	(0.029)	(0.030)
Education (Ref. <High school)			
High school grad	−0.022	−0.014	−0.018
	(0.050)	(0.049)	(0.051)
Some university	0.031	0.048	0.026
	(0.068)	(0.067)	(0.068)
University grad	−0.056	−0.050	−0.041
	(0.049)	(0.048)	(0.049)
Postgraduate	−0.154	−0.148	−0.140
	(0.112)	(0.117)	(0.118)
Married/Cohabitation	0.029	0.030	0.026
	(0.029)	(0.029)	(0.029)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	0.153***	0.152***	0.154***
	(0.055)	(0.055)	(0.057)
30 000€–49 999€	0.095	0.097	0.098
	(0.064)	(0.064)	(0.067)
50 000€+	0.154**	0.155**	0.152**
	(0.070)	(0.071)	(0.073)
Employment (Ref: Working)			
Self-employed	−0.131**	−0.125**	−0.113**
	(0.056)	(0.056)	(0.057)

(*Continued*)

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Table 6. (*Continued*)

	(1)	(2)	(3)
	Too much debt	Too much debt	Too much debt
Not working	0.026	0.032	0.045
	(0.037)	(0.038)	(0.039)
Constant	−0.190	−0.164	−0.189
	(0.121)	(0.124)	(0.128)
Observations	1542	1542	1484
R^2	0.129	0.127	0.127

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent has too much debt. 31.3% of respondents stated that they completely agree or somewhat agree with the statement "I have too much debt." All regressions include controls for age squared, the number of children, and regional controls for North, East, South, and West Finland.

being no children. The categories included are one, two, three, four, or more children. The maximum number of children in the sample was six children. The child in this definition refers to only children younger than 18 years of age.

We further added controls for income and wealth. The personal income of the respondent was added in four categories as up to 10 000€ per year, 10 to 29 999€ per year, 30 to 49 999€ per year, and 50 000€ or more per year.[2] The survey asked the respondents to place themselves into given income categories. Using this, we constructed the categories above based on the most evenly distributed observations for each group. The lowest income group, those earning less than 10 000€ per year, was used as the reference group. We used home ownership as a measure of wealth. The indicator variable for home ownership includes those individuals who stated that they own their home, including both the ones who own their home debt-free and those with a mortgage.

Finally, measures of the individual's employment status were included in the regressions. The self-employed are entered as their own category. The category not working includes those who are retired, looking for a job, are on parental leave, are unable to work, are studying, or are not working or looking for a job. Those working include both full-time and part-time workers, and it is used as the reference category.

Table 5[3] reports the OLS estimates for retirement planning. The results do not give evidence for a strong link between retirement planning and financial literacy. Only interest knowledge is weakly significantly related to retirement planning, and this estimate is negative. This suggests that being more knowledgeable on interest rates, one would be less likely to have done retirement planning.

The empirical analysis thus did not find a strong link between retirement planning and financial literacy. This was similar to prior results in Kalmi and Ruuskanen (2018). The lack of a statistically significant relationship may be due to the nature of the Finnish pension

[2] See Online Appendix Table A7 for the frequency table of income.

[3] The number of observations in the regression tables varies in each specification, because of the way that the financial literacy controls were constructed. For instance, there are fewer observations where the Big Three measures are added individually in column (3) than when they are added together in column (1), because when one of the Big Three is missing in column (3) it results in a missing observation for the whole regression. In contrast, at least one answered question along with at least one unanswered question still produces a Big 3 score for the respondent. This increases the number of observations in columns (1) and (2). The same is true for all of the OLS regression tables presented in this context.

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Table 7. OLS estimates of facing a major expense

	(1)	(2)	(3)
	Major Expense	Major Expense	Major Expense
All correct	−0.115***		
	(0.044)		
No. of correct		−0.066***	
		(0.021)	
Interest correct			−0.045
			(0.038)
Inflation correct			−0.037
			(0.047)
Risk correct			−0.135***
			(0.049)
Age	0.037***	0.038***	0.039***
	(0.008)	(0.008)	(0.008)
Female	0.043	0.032	0.029
	(0.039)	(0.040)	(0.042)
Education (Ref. <High school)			
High school grad	0.034	0.051	0.034
	(0.060)	(0.060)	(0.061)
Some university	−0.127	−0.101	−0.118
	(0.082)	(0.084)	(0.086)
University grad	−0.114*	−0.091	−0.098
	(0.068)	(0.069)	(0.070)
Postgraduate	−0.194	−0.166	−0.165
	(0.169)	(0.167)	(0.168)
Married/Cohabitation	−0.070*	−0.069*	−0.071*
	(0.039)	(0.039)	(0.039)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	−0.007	0.003	0.009
	(0.071)	(0.069)	(0.069)
30 000€–49 999€	−0.098	−0.088	−0.089
	(0.077)	(0.077)	(0.080)
50 000€+	−0.095	−0.083	−0.095
	(0.083)	(0.082)	(0.084)
Employment (Ref: Working)			
Self-employed	−0.061	−0.051	−0.050
	(0.065)	(0.066)	(0.069)

(*Continued*)

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Table 7. (*Continued*)

	(1)	(2)	(3)
	Major Expense	Major Expense	Major Expense
Not working	0.079*	0.089**	0.079*
	(0.044)	(0.045)	(0.048)
Constant	−0.196	−0.173	−0.159
	(0.171)	(0.174)	(0.185)
Observations	1528	1528	1472
R^2	0.219	0.225	0.232

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent could not pay an unexpected expense. 43.9% of respondents stated that they probably or for sure could not come up with a sum equivalent to their monthly net income to pay for an unexpected expense. All regressions include controls for age squared, the number of children, and regional controls for North, East, South, and West Finland.

system, which is of defined benefit type. Finnish citizens have limited means to influence their statutory pension earning, so there are few incentives to take action.

Of the other control variables, having higher education and income, as well as being self-employed give weakly significant estimates that are positively related to retirement planning. Relative to living in Southern Finland, living in the East or the North of the country is negatively and weakly significantly related to retirement planning. Gender is not significant, unlike in Kalmi and Ruuskanen (2018), where women were more likely to have been engaged in retirement planning.

Table 6 reports the OLS estimates when the dependent variable measures over-indebtedness, namely, the respondents who somewhat agree or completely agree with the statement "I have too much debt." Answering correctly to all the financial literacy questions, as well as the number of correct answers are both negatively and significantly related to the outcome variable. However, none of the individual questions are significant.

Financial literacy was thus found to have a negative relationship with perceived over-indebtedness, pointing to the direction that higher financial literacy may protect against adverse debt outcomes, as suggested by Lusardi and Tufano (2015).

Table 7 presents the OLS estimations where the dependent variable indicates whether the respondent could not pay for a major expense. Here, the first two controls for financial literacy are negatively and significantly related to the event of not being able to come up with a sum equivalent to one's monthly net income for a sudden expense. All the individual knowledge questions are also negatively related to the dependent variable, but only the risk question is statistically significant, suggesting that the understanding of risk diversification has an important link with financial fragility.

Table 8 reports the OLS estimates where the dependent variable is the other measure of financial fragility, in this case experiencing an income shock. Having all three financial literacy questions correct is again negatively and significantly related to this outcome variable, as is the number of correct answers. Of the individual financial literacy questions, the question on risk is again negatively and significantly related to the outcome variable. The other two are also negative but not significant. Financial literacy is thus found to play an important role in protecting individuals from being financially fragile.

We ran a robustness check on the measure of financial fragility in Table 9, where instead of one month, we altered the definition of fragile to cover those individuals who could cope with the loss of their main source of income for up to three months. It can be

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Table 8. OLS estimations of financial fragility (income shock)

	(1)	(2)	(3)
	Income shock	Income shock	Income shock
All correct	−0.110***		
	(0.042)		
No. of correct		−0.118***	
		(0.032)	
Interest correct			−0.053
			(0.039)
Inflation correct			−0.013
			(0.051)
Risk correct			−0.214***
			(0.057)
Age	0.010	0.011	0.014*
	(0.009)	(0.008)	(0.008)
Female	0.041	0.017	0.021
	(0.041)	(0.040)	(0.042)
Education (Ref. <High school)			
High school grad	−0.062	−0.037	−0.061
	(0.071)	(0.071)	(0.068)
Some university	−0.049	−0.016	−0.049
	(0.092)	(0.092)	(0.095)
University grad	−0.129*	−0.095	−0.107
	(0.073)	(0.074)	(0.074)
Postgraduate	−0.156	−0.100	−0.117
	(0.154)	(0.149)	(0.154)
Married/Cohabitation	−0.058	−0.054	−0.053
	(0.039)	(0.039)	(0.039)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	−0.137*	−0.125	−0.129*
	(0.083)	(0.076)	(0.073)
30 000€–49 999€	−0.263***	−0.250***	−0.262***
	(0.094)	(0.088)	(0.082)
50 000€+	−0.223**	−0.216**	−0.230***
	(0.097)	(0.090)	(0.086)
Employment (Ref: Working)			
Self-employed	−0.056	−0.046	−0.027
	(0.067)	(0.062)	(0.063)

(*Continued*)

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Table 8. (*Continued*)

	(1)	(2)	(3)
	Income shock	Income shock	Income shock
Not working	0.026	0.037	0.029
	(0.062)	(0.056)	(0.055)
Constant	0.506**	0.556**	0.544**
	(0.249)	(0.229)	(0.217)
Observations	1390	1393	1343
R^2	0.159	0.176	0.190

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent could cover their living expenses for less than one month if they lost their main source of income. 32.4% of respondents stated that they could cover their living expenses for less than one month without borrowing money or moving. All regressions include controls for age squared, the number of children, and regional controls for North, East, South, and West Finland.

argued that those individuals who could cope with the loss of their main source of income for up to three months could also be considered financially fragile. Here, the results became more significant, where now all measures of financial literacy were negatively and significantly related to the outcome variable. This suggests that financial literacy correlates even more strongly with the broader definition of financial fragility.

The regression Tables 5–8 were also run solely for the non-retired individuals aged 25–65. These results were mainly consistent with the findings presented above, although some differences were found with the restricted sample. Concerning the financial literacy controls, the results stayed the same for all four economic outcome variables in the restricted sample. The only change was for the case of facing a major expense. When we ran the major expense regressions on the population restricted to non-retired people aged 25 to 65, the results remained mostly the same, but the measure on interest was found to be negative and significant (see Table A4 in the Appendix). All of the tables on the non-retired population aged 25–65 can be found in the Appendix, in Tables A2–A5.

In conclusion, the results suggested a strong correlation between financial literacy and financial fragility. Having higher financial literacy was found to be correlated with being better able to handle major expenses and cope with income shocks.

Of the individual financial literacy measures, the understanding of risk was negatively and significantly related to both measures of financial fragility. Specifically, risk knowledge was found significant in facing major expenses and fragility to income shocks. Individuals with a better understanding of risk may be better prepared for major expenses and income losses.

We further found that the inflation question, although negative, was not significantly related to any of the economic outcome variables studied.

Moreover, higher education, living with a spouse, and home ownership can be seen as protective factors against financial fragility. These factors may provide additional resources and support, helping individuals better manage their financial situation and reduce fragility to financial shocks. Having children, on the other hand, can increase the financial burden on a family. In line with this observation, we found the number of children to be positively related to the adverse economic outcomes. Not surprisingly, our regression results also indicate that low-income earners are more likely to experience financial fragility. Also, having higher wealth, measured by home ownership, is associated

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Table 9. Robustness check for financial fragility (income shock)

	(1)	(2)	(3)
	Income Shock	Income Shock	Income Shock
All correct	−0.178***		
	(0.045)		
No. of correct		−0.101***	
		(0.022)	
Interest correct			−0.069*
			(0.041)
Inflation correct			−0.120**
			(0.050)
Risk correct			−0.159***
			(0.049)
Age	0.015*	0.016**	0.018**
	(0.008)	(0.008)	(0.008)
Female	0.014	−0.003	−0.011
	(0.039)	(0.040)	(0.040)
Education (Ref. <High school)			
High school grad	−0.057	−0.036	−0.041
	(0.060)	(0.060)	(0.061)
Some university	−0.144	−0.108	−0.098
	(0.089)	(0.090)	(0.093)
University grad	−0.166**	−0.138*	−0.129*
	(0.069)	(0.071)	(0.071)
Postgraduate	−0.356**	−0.319**	−0.301*
	(0.161)	(0.159)	(0.160)
Married/Cohabitation	−0.086**	−0.082**	−0.082**
	(0.040)	(0.040)	(0.041)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	−0.053	−0.039	−0.031
	(0.066)	(0.061)	(0.061)
30 000€–49 999€	−0.180***	−0.168***	−0.164**
	(0.068)	(0.064)	(0.065)
50 000€+	−0.193**	−0.180**	−0.188**
	(0.080)	(0.075)	(0.076)
Employment (Ref: Working)			
Self-employed	−0.140**	−0.121*	−0.121*
	(0.070)	(0.072)	(0.073)

(*Continued*)

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Table 9. (*Continued*)

	(1)	(2)	(3)
	Income Shock	Income Shock	Income Shock
Not working	−0.015	0.000	−0.000
	(0.044)	(0.041)	(0.042)
Owns home	−0.169***	−0.155***	−0.147***
	(0.039)	(0.038)	(0.038)
Constant	0.710***	0.757***	0.755***
	(0.177)	(0.165)	(0.165)
Observations	1390	1390	1343
R^2	0.220	0.232	0.240

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent could cover their living expenses for less than three months if they lost their main source of income. 55.1% of respondents stated that they could cover their living expenses for less than three months without borrowing money or moving. All regressions include controls for age squared, the number of children, and regional controls for North, East, South, and West Finland.

with lower fragility. These results are consistent with earlier studies from other countries (see Lusardi and Mitchell, 2011, 2023).

While financial literacy is studied here in the OLS framework, we acknowledge that financial literacy can be an endogenous variable, meaning that it can be correlated with the error term. A usual approach to address this concern is turning to instrumental variables estimation. Unfortunately, we do not have a reasonable instrumental variable available and therefore leave this approach out of this study. In fact, the coefficients produced by the IV method are usually larger than the OLS estimates. Thus, the OLS estimates provided in this study may even underestimate the effects of financial literacy on economic outcomes.

6. Conclusions

This article presented recent survey-based evidence on financial literacy and its relationship to retirement planning, over-indebtedness, coping with a major expense, and financial fragility in Finland. Financial literacy was measured by using variations of the Big Three financial literacy questions on interest rates, inflation, and risk diversification.

The findings indicated that financial literacy among the Finnish population is similar to most advanced countries. Most respondents answered the inflation question correctly and a significant proportion answered the interest question correctly. Likewise, most respondents had a correct answer for the risk diversification question. The results concerning the overall questions differed somewhat from the previous results of Kalmi and Ruuskanen (2018), but this can be explained by having a different data collection methodology (online survey instead of face-to-face interviews) and also by having somewhat different wording of questions (especially in the risk question).

Financial literacy of the young adults was found to be lower than that of other age groups. The importance of building financial literacy has been recognized in the recent years, where there have been considerable efforts made in the Finnish schooling system to incorporate teaching of financial literacy. However, the group of today's young adults will not benefit from these efforts, since they are already out of the school system. Thus, a

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policy implication based on these findings would be to find ways of reaching young adults for financial literacy training, for instance through higher education institutions or workplaces.

Financial knowledge on inflation increased with age, while the share of correct answers to the interest rate question peaked at the 36–50 age group and then decreased slightly with increased age. Men had a higher share of correct answers to all three questions than women. Moreover, financial literacy was higher among those with higher levels of education, and the self-employed had the highest share of getting all three questions correct. A third of the respondents answered all three questions correctly.

In conclusion, this study provides insights into the relationship between financial literacy and economic outcomes in Finland. Overall, these findings suggest that even in a Nordic country with an extensive welfare state where a high level of economic protection is coming from the state, there is room for financial literacy to mitigate adverse economic outcomes. However, when it comes to retirement planning, we did not find a significant role for financial literacy, most likely due to the state's involvement in the statutory pension system, which leaves little room for individual-level planning. Therefore, improving financial literacy is an effective strategy to reduce financial fragility and promote financial stability in society. This newly enacted national strategy for financial literacy in Finland will, in part, guide the stakeholders to address these issues.

The goal presented in the national strategy, namely for Finland to have the highest level of financial literacy in the world by 2030, can be achieved through active policies promoting financial literacy. These include targeted financial education programs, strengthening the role of financial literacy in school curriculums, and promoting access to financial advice and resources. This requires collaboration between stakeholders from the public sector, private companies (especially banks), and third-sector organizations.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/flw.2023.14

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Appendix A

Table A1. Comparison of the fast respondents with the non-removed respondents[a]

	Whole sample ($n = 2000$)			Removed ($n = 194$)			Non-removed ($n = 1806$)			
	n	Mean	SD	*n*	Mean	SD	*n*	Mean	SD	Means test
Age	1990	47.698	16.370	194	31.309	11.640	1796	49.468	15.818	$p < 0.001$[b]
Female	1988	0.521	0.500	193	0.347	0.477	1795	0.540	0.499	$p < 0.001$[c]
Income[e]	1791	2.435	0 .865	174	2.586	1.021	1617	2.419	0 .845	$p = 0.030$[d]
Education[f]	1944	2.929	1.143	166	2.807	1165	1778	2.940	1.141	$p = 0.140$[d]
Employed[g]	1950	0.461	0.499	181	0.536	0.500	1769	0.453	0.498	$p = 0.033$[c]
Big 3: Inflation	1936	0.639	0.480	178	0.399	0.491	1758	0.663	0.473	$p < 0.001$[c]
Big 3: Interest	1904	0.477	0.500	174	0.253	0.436	1730	0.500	0.500	$p < 0.001$[c]
Big 3: Investment	1932	0.729	0.444	167	0.383	0.488	1765	0.762	0.426	$p < 0.001$[c]
Big 3[h]	1978	1.797	1.075	185	0.968	0.902	1793	1.883	1.055	$p < 0.001$[d]
Duration[i]	2000	1621.652	6097.62	194	353.124	89.450	1806	1757.917	6401.935	$P = 0.002$[b]

[a]The statistics reported in this table are not weighted, as we do the weighting after removing the fast respondents.
[b]T-test.
[c]Two-sample proportions test.
[d]Wilcoxon rank-sum test.
[e]4 intervals. For the income intervals, please check the descriptions of the variables in Section X.
[f]5 categories. For categories of education attainment, please check the descriptions of the variables in Section X.
[g]Different from the "Employment" variable we use in our analysis, this is a binary variable that indicates whether the respondent is employed.
[h]The Big 3 score includes those who refused to answer one or two questions but gave an answer to at least one of the Big 3 questions. As a result, the number of respondents who answered at least one of the questions get a Big 3 score, yet they may have a missing value for individual questions.
[i]Measured in seconds.

Table A1 presents summary statistics of the removed respondents and the remaining sample. The average duration of response time for the whole sample and for the non-removed respondents were 1621.652 and 1757.917 seconds, respectively. In contrast, it was only 353.124 seconds (roughly 6 minutes) for those who were removed from our analysis, which is well below the reasonable time it would take to fill in the entire survey. The difference between the two groups is highly significant. The removed respondents are on average significantly younger and significantly higher income, higher proportion of men, and higher proportion of employed. In contrast, the fast respondents and non-removed respondents do not differ significantly in educational attainment. The share of correct answers for all Big 3 questions as well as the number of correct answers for the Big 3 questions among the removed respondents are significantly lower than that of the non-removed respondents.

We believe that 6 minutes on average was not enough time to answer all the questions in our survey in a healthy way, as the number of questions was quite high. This included a number of knowledge questions. Furthermore, many of the questions among the fast respondents were left blank. This along with the highly significant difference in the Big 3 scores and no significant educational difference between the two groups constitute evidence for poor response among those who were removed from our analysis.

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Table A2. OLS estimates on retirement planning, non-retired people aged 25 to 65

	(1)	(2)	(3)
	Pension planning	Pension planning	Pension planning
All correct	−0.033		
	(0.034)		
No. of correct		0.023	
		(0.023)	
Interest correct			−0.035
			(0.035)
Inflation correct			0.039
			(0.039)
Risk correct			0.015
			(0.043)
Age	0.000	−0.001	−0.003
	(0.012)	(0.012)	(0.013)
Age sq.	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Female	−0.043	−0.028	−0.031
	(0.034)	(0.034)	(0.035)
Education (Ref. <High school)			
High school grad	−0.013	−0.031	−0.027
	(0.066)	(0.064)	(0.064)
Some university	0.126	0.109	0.065
	(0.115)	(0.114)	(0.110)
University grad	0.058	0.027	0.035
	(0.067)	(0.065)	(0.066)
Postgraduate	0.080	0.037	0.050
	(0.151)	(0.151)	(0.150)
Married/Cohabitation	−0.039	−0.039	−0.045
	(0.035)	(0.035)	(0.036)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	−0.062	−0.063	−0.067
	(0.064)	(0.063)	(0.065)
30 000€–49 999€	−0.003	−0.005	−0.011
	(0.087)	(0.085)	(0.090)
50 000€+	0.033	0.026	0.014
	(0.091)	(0.090)	(0.092)

(*Continued*)

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Table A2. (*Continued*)

	(1)	(2)	(3)
	Pension planning	Pension planning	Pension planning
Employment (Ref: Working)			
Self-employed	0.090	0.083	0.096
	(0.072)	(0.072)	(0.075)
Not working	−0.071	−0.070	−0.071
	(0.049)	(0.049)	(0.051)
One child	0.047	0.047	0.046
	(0.055)	(0.056)	(0.058)
Two children	0.091	0.094	0.107
	(0.076)	(0.076)	(0.076)
Three children	−0.039	−0.044	−0.037
	(0.070)	(0.070)	(0.071)
Four or more children	0.155	0.146	0.146
	(0.166)	(0.164)	(0.164)
Owns home	0.058*	0.054	0.054
	(0.034)	(0.034)	(0.036)
Region (Ref: South)			
East Finland	−0.044	−0.043	−0.043
	(0.050)	(0.050)	(0.052)
West Finland	−0.030	−0.034	−0.033
	(0.035)	(0.035)	(0.035)
North Finland	−0.054	−0.044	−0.043
	(0.049)	(0.050)	(0.052)
Constant	0.209	0.213	0.268
	(0.303)	(0.302)	(0.314)
Observations	922	924	880
R^2	0.069	0.067	0.068

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating planning for retirement. 20.5% of non-retired respondents aged 25–65 stated that they had tried to find out how much to save for their retirement. Those who did not know, were already retired, or refused to answer were coded as missing. Includes only non-retired people aged 25–65.

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Table A3. OLS estimations of having too much debt, non-retired people aged 25–65

	(1)	(2)	(3)
	Too much debt	Too much debt	Too much debt
All correct	−0.118***		
	(0.039)		
No. of correct		−0.046**	
		(0.019)	
Interest correct			−0.041
			(0.041)
Inflation correct			−0.053
			(0.047)
Risk correct			−0.082
			(0.053)
Age	0.037***	0.036***	0.035**
	(0.014)	(0.014)	(0.014)
Age sq.	−0.000***	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)
Female	0.029	0.034	0.032
	(0.039)	(0.040)	(0.041)
Education (Ref. <High school)			
High school grad	−0.067	−0.054	−0.058
	(0.084)	(0.083)	(0.084)
Some university	−0.069	−0.062	−0.086
	(0.121)	(0.118)	(0.118)
University grad	−0.092	−0.082	−0.070
	(0.085)	(0.084)	(0.085)
Postgraduate	−0.172	−0.163	−0.153
	(0.138)	(0.143)	(0.143)
Married/Cohabitation	0.057	0.055	0.053
	(0.039)	(0.039)	(0.040)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	0.163**	0.161**	0.151*
	(0.074)	(0.074)	(0.077)
30 000€–49 999€	0.093	0.095	0.086
	(0.089)	(0.090)	(0.095)
50 000€+	0.149	0.149	0.134
	(0.096)	(0.097)	(0.101)

(*Continued*)

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Table A3. (*Continued*)

	(1)	(2)	(3)
	Too much debt	Too much debt	Too much debt
Employment (Ref: Working)			
Self-employed	−0.164***	−0.158***	−0.148***
	(0.055)	(0.055)	(0.056)
Not working	0.046	0.051	0.062
	(0.053)	(0.054)	(0.056)
One child	0.070	0.072	0.068
	(0.057)	(0.057)	(0.059)
Two children	0.081	0.075	0.067
	(0.067)	(0.067)	(0.070)
Three children	0.177*	0.174*	0.165
	(0.100)	(0.100)	(0.101)
Four or more children	0.229	0.250	0.247
	(0.177)	(0.177)	(0.177)
Owns home	−0.091**	−0.089**	−0.081*
	(0.041)	(0.041)	(0.042)
Region (Ref: South)			
East Finland	0.001	−0.002	0.002
	(0.057)	(0.057)	(0.059)
West Finland	0.032	0.031	0.028
	(0.041)	(0.041)	(0.042)
North Finland	−0.026	−0.021	−0.019
	(0.057)	(0.057)	(0.060)
Constant	−0.343	−0.311	−0.240
	(0.332)	(0.332)	(0.346)
Observations	981	981	937
R^2	0.091	0.088	0.090

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent has too much debt. 39.2% of non-retired respondents aged 25–65 stated that they completely agree or somewhat agree with the statement "I have too much debt." Includes only non-retired people aged 25–65.

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Table A4. OLS estimates on financial fragility (major expense), non-retired people aged 25–65

	(1)	(2)	(3)
	Major Expense	Major Expense	Major Expense
All correct	−0.201***		
	(0.039)		
No. of correct		−0.104***	
		(0.019)	
Interest correct			−0.108**
			(0.042)
Inflation correct			−0.053
			(0.047)
Risk correct			−0.154***
			(0.050)
Age	0.038***	0.038***	0.042***
	(0.015)	(0.015)	(0.015)
Age sq.	−0.000**	−0.000**	−0.000***
	(0.000)	(0.000)	(0.000)
Female	0.016	0.010	0.008
	(0.039)	(0.040)	(0.041)
Education (Ref. <High school)			
High school grad	−0.039	0.001	−0.032
	(0.086)	(0.082)	(0.083)
Some university	−0.220*	−0.193*	−0.179
	(0.114)	(0.116)	(0.118)
University grad	−0.119	−0.075	−0.099
	(0.086)	(0.082)	(0.083)
Postgraduate	−0.195	−0.147	−0.170
	(0.192)	(0.183)	(0.184)
Married/Cohabitation	−0.038	−0.044	−0.045
	(0.043)	(0.043)	(0.044)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	0.064	0.067	0.073
	(0.084)	(0.085)	(0.088)
30 000€–49 999€	−0.044	−0.028	−0.033
	(0.103)	(0.105)	(0.110)
50 000€+	−0.087	−0.070	−0.084
	(0.106)	(0.107)	(0.111)

(*Continued*)

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Table A4. (*Continued*)

	(1)	(2)	(3)
	Major Expense	Major Expense	Major Expense
Employment (Ref: Working)			
Self-employed	−0.059	−0.041	−0.039
	(0.075)	(0.077)	(0.078)
Not working	0.118**	0.129**	0.109*
	(0.057)	(0.058)	(0.061)
Children (Ref: No children)			
One child	0.146**	0.146**	0.146**
	(0.058)	(0.059)	(0.059)
Two children	0.073	0.058	0.036
	(0.079)	(0.080)	(0.082)
Three children	0.186*	0.185**	0.176*
	(0.099)	(0.093)	(0.093)
Four or more children	0.005	0.037	0.034
	(0.183)	(0.176)	(0.174)
Owns home	−0.190***	−0.184***	−0.183***
	(0.042)	(0.042)	(0.043)
Region (Ref: South)			
East Finland	−0.037	−0.040	−0.030
	(0.059)	(0.059)	(0.061)
West Finland	0.015	0.018	0.029
	(0.041)	(0.041)	(0.042)
North Finland	0.082	0.093	0.100
	(0.063)	(0.064)	(0.066)
Constant	−0.191	−0.133	−0.167
	(0.364)	(0.369)	(0.379)
Observations	968	968	927
R^2	0.203	0.211	0.215

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent could not pay an unexpected expense. 48.6% of non-retired respondents aged 25–65 stated that they probably or for sure could not come up with a sum equivalent to their monthly net income to pay for an unexpected expense. Includes only non-retired people aged 25–65.

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Table A5. OLS estimations of financial fragility (income shock), non-retired people aged 25–65

	(1)	(2)	(3)
	Income Shock	Income Shock	Income Shock
All correct	−0.113***		
	(0.037)		
No. of correct		−0.098***	
		(0.029)	
Interest correct			−0.030
			(0.040)
Inflation correct			−0.023
			(0.049)
Risk correct			−0.162***
			(0.058)
Age	0.016	0.014	0.019
	(0.014)	(0.014)	(0.014)
Age sq.	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)
Female	−0.025	−0.030	−0.039
	(0.038)	(0.039)	(0.039)
Education (Ref. <High school)			
High school grad	−0.045	−0.018	−0.053
	(0.076)	(0.079)	(0.080)
Some university	−0.006	0.011	0.020
	(0.113)	(0.121)	(0.123)
University grad	−0.047	−0.019	−0.036
	(0.076)	(0.079)	(0.081)
Postgraduate	−0.061	−0.020	−0.042
	(0.157)	(0.153)	(0.155)
Married/Cohabitation	0.025	0.026	0.022
	(0.038)	(0.037)	(0.038)
Personal income (Ref: Under 10 000€)			
10 000€–29 999€	−0.083	−0.092	−0.085
	(0.075)	(0.072)	(0.072)
30 000€–49 999€	−0.216***	−0.222***	−0.217***
	(0.081)	(0.079)	(0.080)
50 000€+	−0.212**	−0.221**	−0.220**
	(0.089)	(0.086)	(0.088)

(*Continued*)

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Table A5. (*Continued*)

	(1)	(2)	(3)
	Income Shock	Income Shock	Income Shock
Employment (Ref: Working)			
Self-employed	−0.089	−0.076	−0.062
	(0.056)	(0.055)	(0.056)
Not working	0.125**	0.122**	0.114**
	(0.051)	(0.051)	(0.052)
One child	0.158***	0.165***	0.161***
	(0.055)	(0.055)	(0.055)
Two children	0.060	0.055	0.030
	(0.054)	(0.055)	(0.057)
Three children	0.146	0.161	0.160
	(0.109)	(0.105)	(0.107)
Four or more children	0.013	0.062	0.054
	(0.171)	(0.181)	(0.181)
Owns home	−0.166***	−0.163***	−0.163***
	(0.040)	(0.041)	(0.042)
Region (Ref: South)			
East Finland	−0.060	−0.060	−0.048
	(0.054)	(0.054)	(0.054)
West Finland	−0.053	−0.055	−0.042
	(0.040)	(0.039)	(0.040)
North Finland	0.018	0.029	0.025
	(0.059)	(0.058)	(0.059)
Constant	0.238	0.338	0.270
	(0.322)	(0.315)	(0.320)
Observations	882	883	848
R^2	0.161	0.169	0.175

Notes: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Dependent variable is a dummy indicating that the respondent could cover their living expenses for less than one month if they lost their main source of income. 30.5% of non-retired respondents aged 25–65 stated that they could cover their living expenses for less than one month without borrowing money or moving. Includes only non-retired people aged 25–65.

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