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FINANCIAL LITERACY IN JAPAN: DETERMINANTS AND IMPACTS

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Abstract

Financial literacy is gaining increasing importance as a policy objective in many countries. However, internationally comparable information on financial literacy is still scarce. Recently, the Bank of Japan conducted a major survey of financial literacy and financial behavior covering 25,000 individuals from ages 18 to 79. Our paper uses this database to analyze the determinants of financial literacy and the effects of financial literacy on other behaviors. Generally our study corroborates the findings of studies of other countries, but uncovers some differences as well. main determinants of financial literacy are found to be educational level, income, age, and occupational status. Both financial literacy and general education levels are found to be positively and significantly related to savings behavior and financial inclusion.

JEL codes: D14, G11, J26

Keywords: financial literacy, financial behavior, financial inclusion, household saving, Japan

1. Introduction

In the literature, there are several widely used definitions of financial literacy. In their review article, Lusardi and Mitchell (2014:6) define financial literacy as "…peoples' ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions." OECD/INFE (2016:47) defines financial literacy as "… [a] combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing." Thus, this concept of financial literacy is multi-dimensional, reflecting not only knowledge but also skills, attitudes and actual behavior.

Financial literacy has gained an important position in the policy agenda of many countries and the importance of collecting informative, reliable data on the levels of financial literacy across the adult population has been widely recognized (OECD/INFE 2015). At their Summit in Los Cabos in 2012, G20 Leaders endorsed the High-Level Principles on National Strategies for Financial Education developed by the Organization for Economic Cooperation and Development International Network on Financial Education (OECD/INFE), thereby acknowledging the importance of co-ordinated policy approaches to financial education (G20 2012)). At the same time, surveys consistently show that the level of financial literacy is relatively low even in advanced economies (OECD/INFE 2016). Given the increasing need for individuals to manage their own retirement savings and pensions, resulting mainly from the trend of switching to defined-contribution from defined-benefit pension plans, this indicates that the need for high levels of financial literacy is rising.

Data on financial literacy provides information on the need for financial education or other supportive policies, and indicates which groups have the greatest needs. Preferably, the survey should be repeated to identify where improvements have been made and what more needs to be done. Use of a standardized survey instrument provides the additional benefit of being able to make cross-country comparisons on key measures of financial literacy and related variables to help identify those countries with successful financial education policies and their applicability to other countries.

In order to obtain data about the state of financial literacy in Japan, the Central Council for Financial Services Information, an advisory group associated with the Bank of Japan, conducted an online survey of 25,000 individuals between ages 18 and 79 who were sampled in proportion to Japan's demographic structure. The survey contained questions regarding three related aspects: financial knowledge; financial behavior; and financial attitudes.

Financial knowledge helps individuals to compare financial products and services and make appropriate, well-informed financial decisions. A basic knowledge of financial concepts, and the ability to apply numeracy skills in a financial context, ensures that consumers can manage their financial affairs independently and respond appropriately to news and events that may have implications for their financial well-being. Financial literacy can be measured both objectively (through survey questions) and subjectively, i.e., by asking respondents to rate their own literacy compared with that of their peers.

Financial behavior (or financial "savvy") means taking (or not taking) financial actions. Some types of behavior, such as putting off bill payments, failing to plan future expenditures or choosing financial products without shopping around, may have an adverse effect on an individual's financial situation and well-being. Financial behavior may thus differ from financial literacy, and it is important to identify their relationship.

Attitudes regarding longer-term financial planning include aspects such as individuals' time preference and willingness to make planned savings. For example, one question asks about preferences for the short term

through 'living for today' and spending money. Such preferences are likely to hinder behaviors that could lead to improved financial resilience and well-being.

This paper is organized as follows. Section 2 briefly discusses the literature on determinants of financial literacy and its effects. The data description is presented in Section 3. Section 4 presents the econometric models and empirical results, followed by conclusions and policy implications in Section 6.

2. Literature survey

The literature on financial literacy focuses on two main areas: (i) the determinants of financial literacy, including age, gender, level of education, occupation; and (ii) the effects of financial literacy on financial behavior, including saving, use of credit, and preparation for retirement.

There is already a long history of efforts to develop quantifiable measures of financial literacy based on surveys that can be subjected to empirical testing. One of the earliest examples was that of the Jump$tart Coalition for Personal Financial Literacy program for high school and college students in the US in 1997 described in Mandell (2009). Lusardi & Mitchell (2006) added a set of financial literacy questions to the 2004 Health and Retirement Study (HRS), a survey of US households ages 50 and older, which have served as a model for later surveys. The three core questions in the original survey were designed to assess understanding of some key financial concepts: compound interest, real rates of return, and risk diversification. Later surveys, including the OECD/INFE survey, have built on this base, but also added questions about financial attitudes, financial behavior and financial experience. The methodology for calculating scores from the survey responses is described below in section III.2.

Lusardi and Mitchell (2014) provide an extensive review of the literature on factors related to financial literacy. Financial literacy tends to follow a hump-shaped pattern with respect to age, first rising and then declining in old age. Interestingly, elderly persons' confidence in their financial literacy shows no similar decline. Women generally score lower than men in financial literacy, and the reasons for this are still debated. However, women tend to be more willing to admit that they don't know an answer than men are. Higher levels of education and higher levels of parents' education are positively correlated with financial literacy. These findings were generally confirmed in the analysis of the results of the OECD/INFE survey in the above-mentioned sample of 30 countries in OECD/INFE (2016).

A key question is whether financial education programs can improve financial literacy. A large number of studies have been conducted, but the results are inconclusive, and are affected by many specific aspects of the programs studied, including course content, knowledge of the teachers, etc. Fernandes, Lynch and Netemeyer (2014) perform a meta-analysis of 188 studies and find that financial education has a significant but very small effect of only 0.1% on downstream economic behaviors. Lusardi and Mitchell (2014) cite one study by Walstad, Rebeck, and MacDonald (2010) as an example of a careful piece of research that found significant impacts of a study program on financial literacy. However, they recognize that much further research is needed in this area. Hastings, Madrian and Skimmyhorn (2013:359) argue that the evidence on the effectiveness of financial education programs on financial literacy, not to mention their cost-effectiveness, is "…at best contradictory." They suggest other kinds of interventions such as designing pension plan or savings plan default enrolment options to address observed behavioral biases; strict regulation; simplified disclosure about product fees, terms, or characteristics; and incentives to take action.

There is a well-developed literature trying to link measures of financial literacy with other economic and financial behaviors, going back to Bernheim (1995, 1998) in the US, in response to the increasing shift toward defined-contribution pension plans. This area of research got a further boost after the global financial crisis of 2008-2009, which drew attention to numerous scams inflected on individual borrowers and investors in the US and other countries. Hilgert, Hogarth, and Beverly (2003) found a strong correlation between financial literacy and daily financial management skills, while other studies found that

the more numerate and financially literate are more likely to participate in financial markets and invest in stocks and make precautionary savings (Christelis, Jappelli, and Padula 2010; van Rooij, Lusardi, and Alessie 2011; and de Bassa Scheresberg 2013). The more financially savvy are also more likely to undertake retirement planning, and those who plan also accumulate more wealth (Lusardi and Mitchell 2011). These results have been corroborated in a number of countries. Mahdzan and Tabiani (2013) is an example of this kind of research in Malaysia.

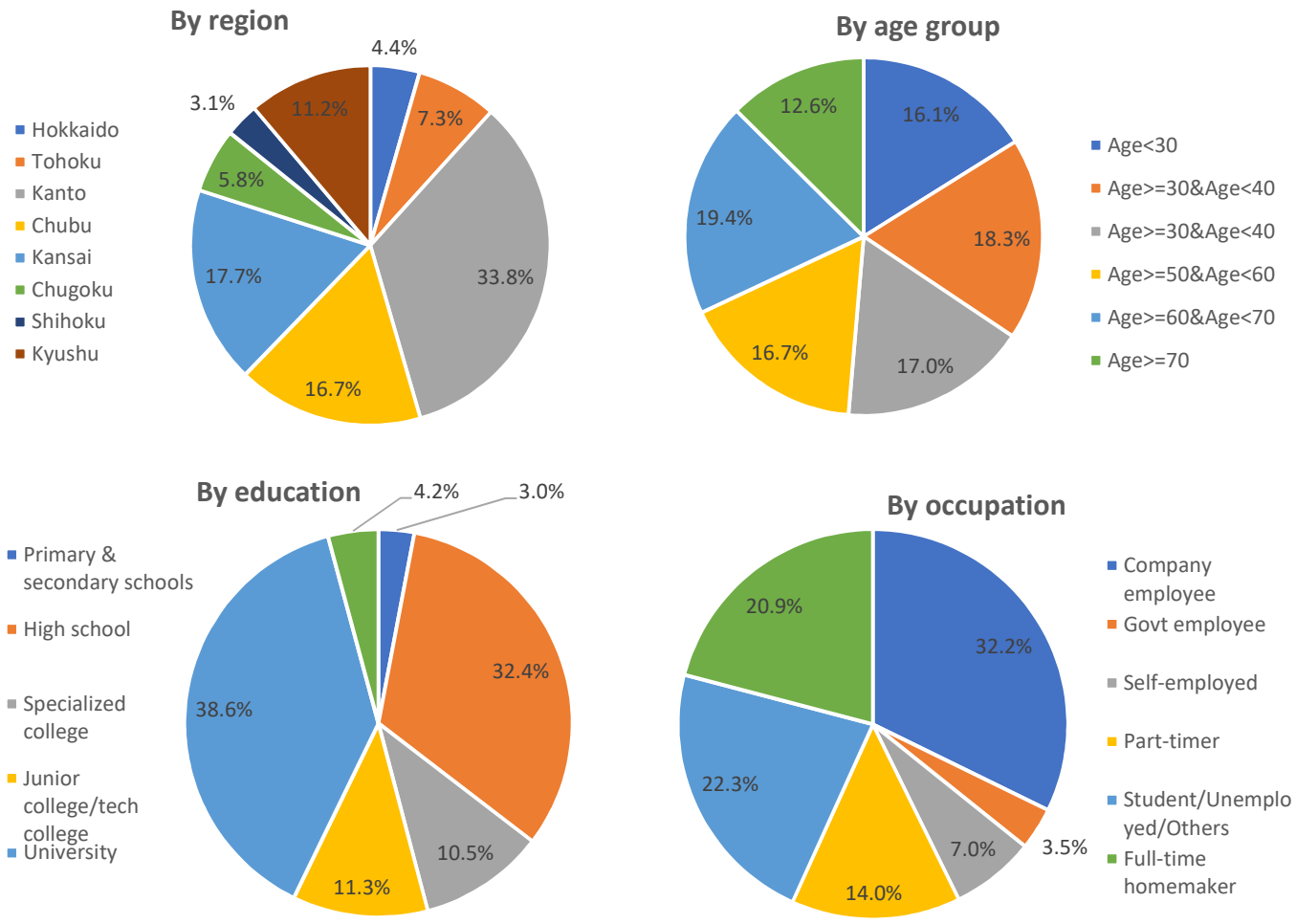
On the liability side of the household balance sheet, Moore (2003) found that the least financially literate are more likely to have more expensive mortgages. Campbell (2006) showed that those with lower income and less education were less likely to refinance their mortgages during periods of falling interest rates. Stango and Zinman (2009) found that those unable to correctly calculate interest rates generally borrowed more and accumulated less wealth.

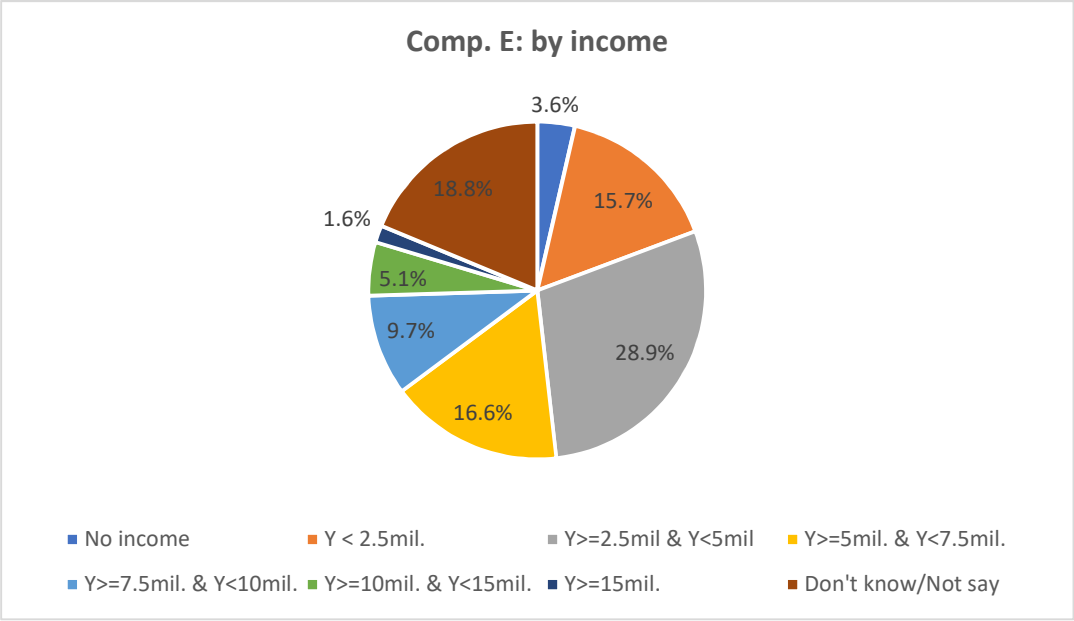
3. Data description: Financial literacy, sample groups and purchases of financial products

Sample description

An online survey was conducted on 25,000 individuals aged 18 to 79 who were chosen in proportion to Japan's demographic and economic structure (Central Council for Financial Service Information 2016). Figure 1 presents the distribution of respondents by Japanese region (component A), age (component B), education (component C), occupation (component D) and income group (component E).

Figure 1. Sample distribution (percent)





Note: In component E: Y stands for annual income
Source: Authors' calculation

Descriptive analyses

The survey contains 25 true/false questions, including 18 questions on financial knowledge and 7 on financial decision-making skills. It all contains data on respondents' age, gender, level of general education and financial education, income, occupation and the frequency of reading financial and economic news. Financial knowledge questions tested basic knowledge about interest rates, compound interest rate, inflation etc., and the financial decision making skills questions identified respondents' behavior relating to family budget management and personal expense management to avoid financial trouble. The financial literacy score is calculated based on the number of correct answers, thus each respondent could attain a maximum financial literacy score of 25.The average financial literacy score is 13.9 (standard deviation: 7.0), i.e., each On average, one fifth of respondents could answer at least 21 financial literacy questions correctly (Table 1), which is judged to be the minimum desirable level. However, there is a large gap between men and women. While 26.5% of male respondents could answer at least 21 questions correctly, the figure for female respondents is only 15.5%. Also, the proportion of older people able to answer at least 21 questions correctly is higher than that of younger people. For example, only 10.1% of people aged less than 30 could answer at least 21 question correctly, this figure is nearly three times higher among those aged from 60 to 70. This same pattern is also observed for male and female respondents.

Table 1: Proportion of respondents with high financial literacy score (at least 21 out of 25)

	All	Male	Female
All	20.9%	26.5%	15.5%
Age<30	10.1%	12.9%	7.2%
Age>=30&Age<40	16.6%	22.7%	10.3%
Age>=30&Age<40	20.7%	26.6%	14.8%
Age>=50&Age<60	25.8%	30.8%	20.9%
Age>=60&Age<70	28.1%	35.1%	21.9%
Age>=70	23.9%	31.8%	16.8%

Source: Authors' calculation

The proportion of respondents who received financial education either at school or the workplace in Japan is rather low in compared with US counterparts (6.6% vs. 21%) (Table 2). Even among students, only 14.4% received financial education, although this figure is much higher than that of those aged from 60 to 79 and from 30 to 59.

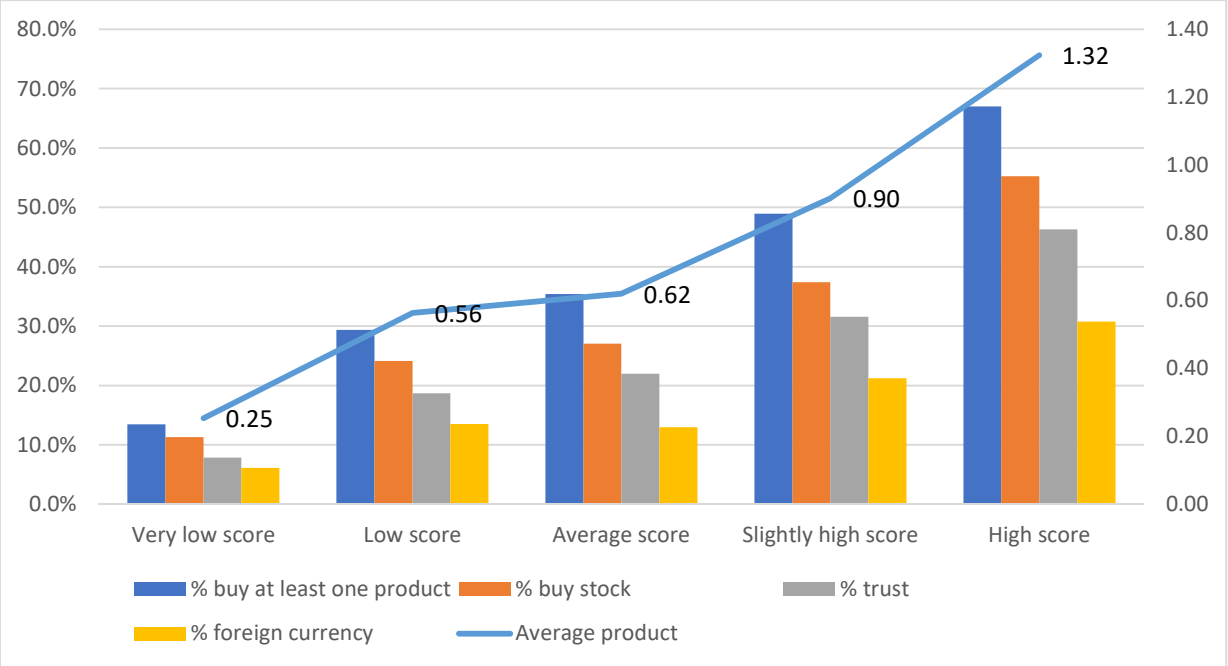
Table 2: Financial education in Japan and the US

	% with financial education
Japan	6.6%
Age 18-29	10.7%
Student (Age 18-24)	14.4%
Age 30-59	6.0%
Age 60-79	5.5%
USA	21.0%

Source: Authors' calculation (for Japanese data) and Central Council for Financial Service Information (2016) (for US data)

Figure 2 shows the correlation between the financial literacy score and the likelihood of owning various financial products. We divided the respondents into five groups based on their financial literacy score: very low score (less than 7 correct answers); low score (7 to 12 correct answers); average score 13 to 16 correct answers); slightly high score (17 to 20 correct answers) and high score (more than 20 correct answers). The figure shows that, of financial products, stocks are the most widely held, while foreign currency is the least held, regardless of financial literacy score. Moreover, there is a big difference in the likelihood of owning at least one financial product across the financial literacy score groups. Only 13.5% respondents in the very low score groups have at least one financial product. This figure increase to 35.4% and 67%, respectively, among respondents in the average score and high score groups. The pattern is also observed for each of the three financial products.

Figure 2: Purchase of financial products and financial literacy score (by group)



Note: The average number of financial products purchased by each group of financial literacy is presented using the right hand side scale.
Source: Authors' calculation

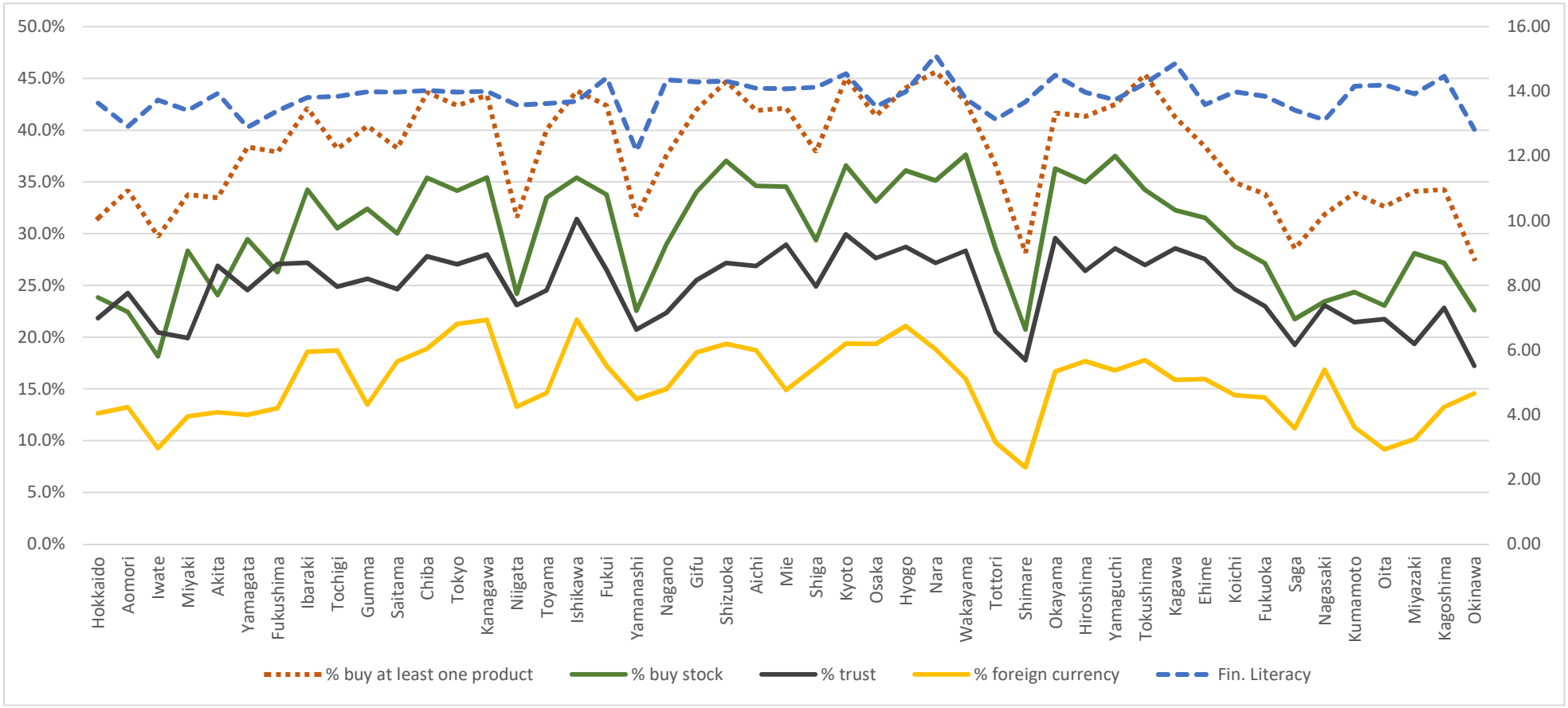
Respondents in Nara, Kagawa, Kyoto, Okayama and Kagoshima prefectures had the highest proportion of correct answers (Table 3 and Figure 3). The average number of correct answers made by respondents in Nara prefecture is about 15, highest among the 47 prefectures. On average, respondents in Nagasaki, Tottori, Aomori, Yamagata and Okinawa and Yamanashi prefectures had the lowest average number of correct answers (about 12-13 questions). Respondents in prefectures with the highest number of correct answers tend to underestimate their financial knowledge, while those in prefectures with the lowest proportion of correct answers tend to overestimate their financial literacy.

Table 3: Number of correct answers by prefecture

		Objective assessment			
	Prefecture	% Correct answers given to questions	National average=100	Self-assessment (national average=100)	Gap (actual score - self-assessment)
Highest	Nara	60.5	108.8	102	6.8
2nd highest	Kagawa	59.4	106.8	106.7	0.1
3rd highest	Kyoto	58.2	104.7	99.8	4.9
4th highest	Okayama	58	104.3	101	3.3
5th highest	Kagoshima	57.9	104.1	99.8	4.3
National average		55.6	100	100	0
5th lowest	Nagasaki	52.5	94.4	96.5	-2.1
5th lowest	Tottori	52.5	94.4	104	-9.6
4th lowest	Aomori	51.7	93	103	-10
3rd lowest	Yamagata	51.6	92.8	103	-10.2
2nd lowest	Okinawa	51.3	92.3	92.5	-0.2
Lowest	Yamanashi	48.7	87.6	94	-6.4

Source: Central Council for Financial Service Information (2016)

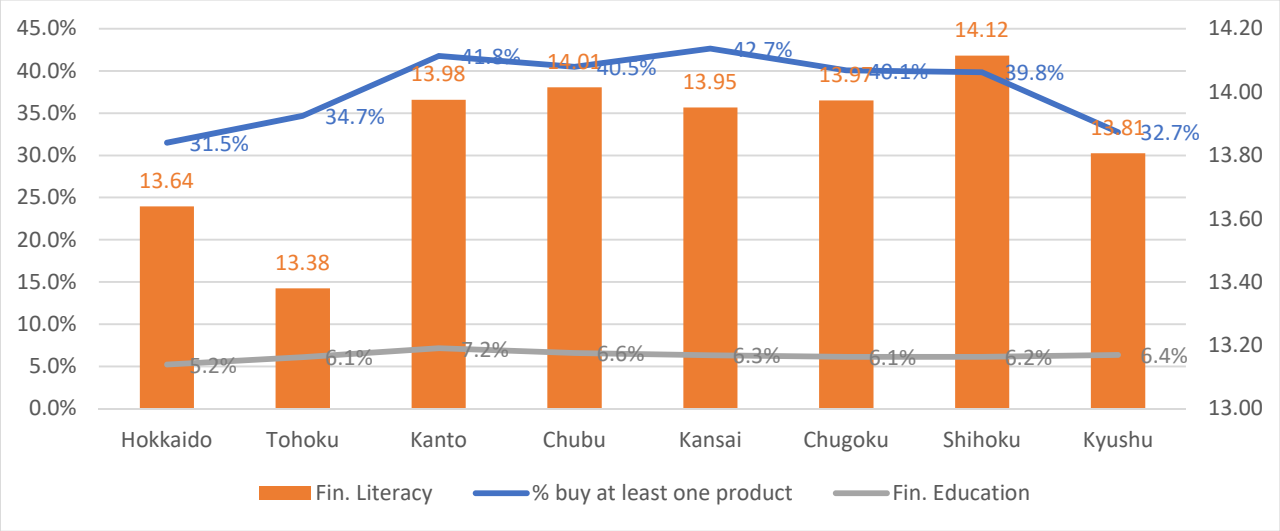
Figure 3: Purchase of financial products and financial literacy score, by prefecture



Note: The right hand side scale is used for the financial literacy score
Source: Authors' calculation

Overall, the differences in financial literacy scores among regions are negligible except for Hokkaido, Tohoku and Kyushu, which are relatively low (Figure 4). The proportion of respondents who buy financial products in these three regions are also lower than that in other regions. Except for Hokkaido, the proportion of respondents who received financial education is rather similar across the regions.

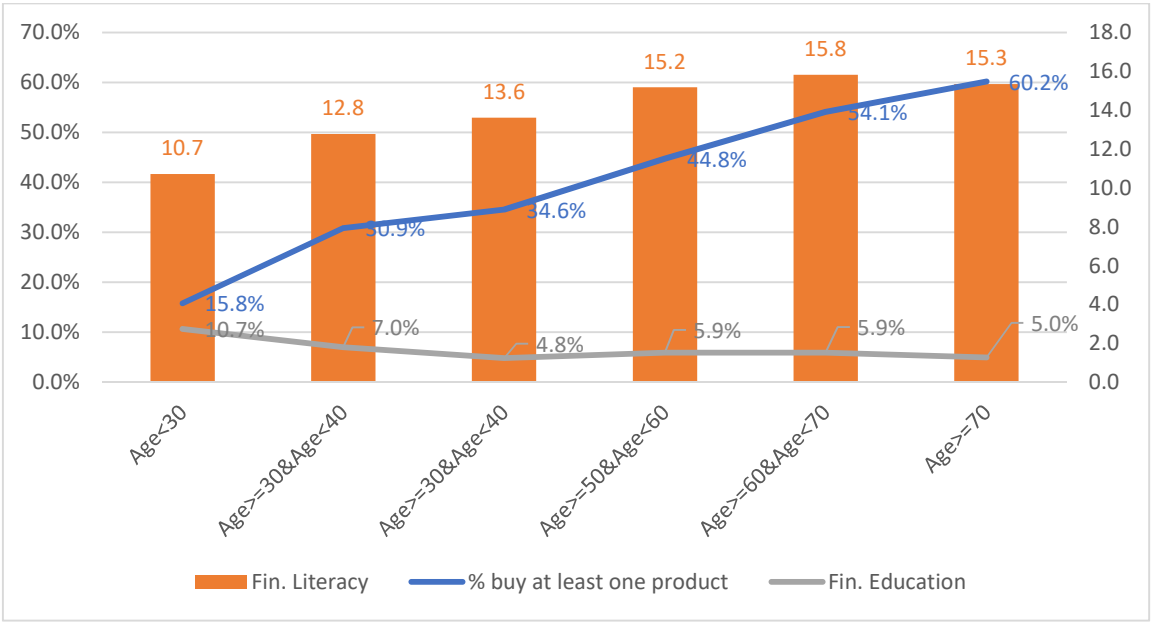
Figure 4: Financial education, financial literacy and purchase of financial products, by regions



Note: Financial literacy score on right-hand scale.
Source: Authors' calculation

The financial literacy increases with respondents' age up to age 70, and slightly declines among those aged from 70 to 79 (Figure 5). The proportion of those who buy financial products also increases with age. Only 15.8% respondents aged under 30 have a financial product. This figure is much lower than that of respondents aged over 60).

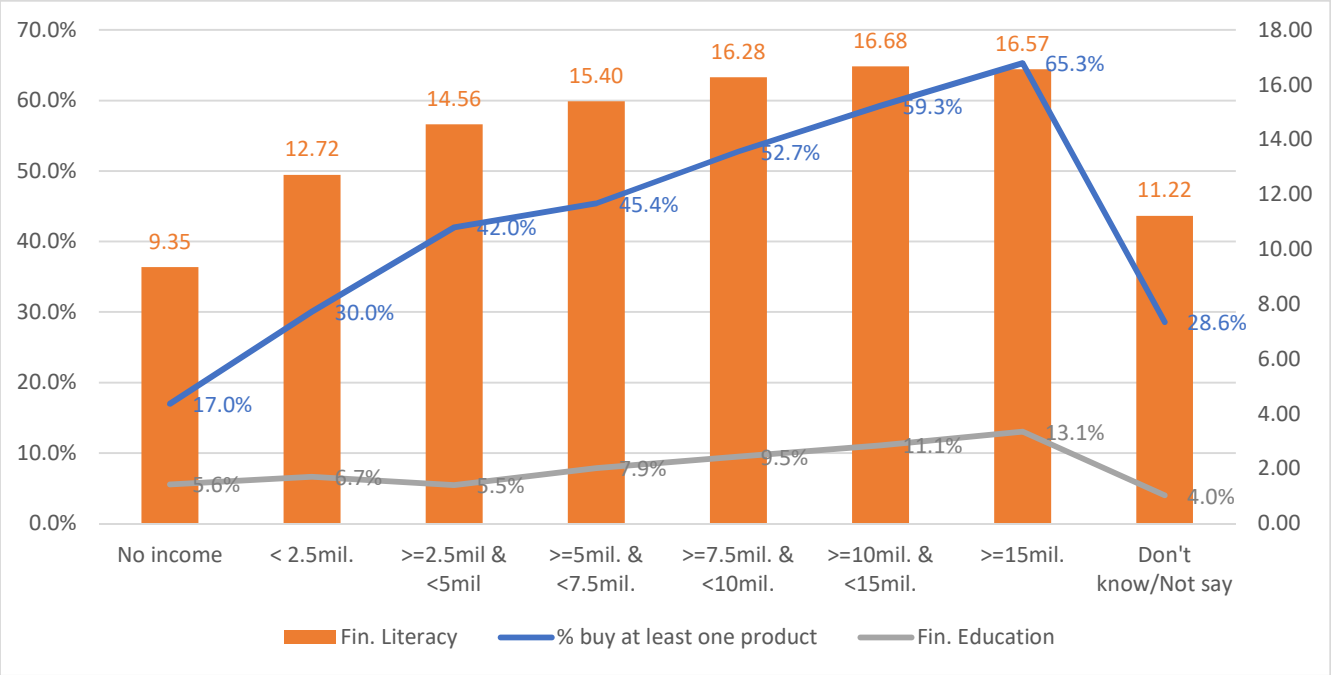
Figure 5: Financial education, financial literacy score and purchase of financial products, by age group



Note: Financial literacy score on right-hand scale.
Source: Authors' calculation

Figure 6 shows that those with higher income tend to have higher financial literacy scores. For example, while those with annual income less than JPY 2.5 million had an average financial literacy score of 12.7, while those with income of at least JPY 15 million have an average financial score of 16.6. The proportion of respondents possessing at least one financial product also increases as their income increases. However, the correlation between financial education, financial literacy and financial product purchases is weak, especially among those have annual income less than JPY 5 million.

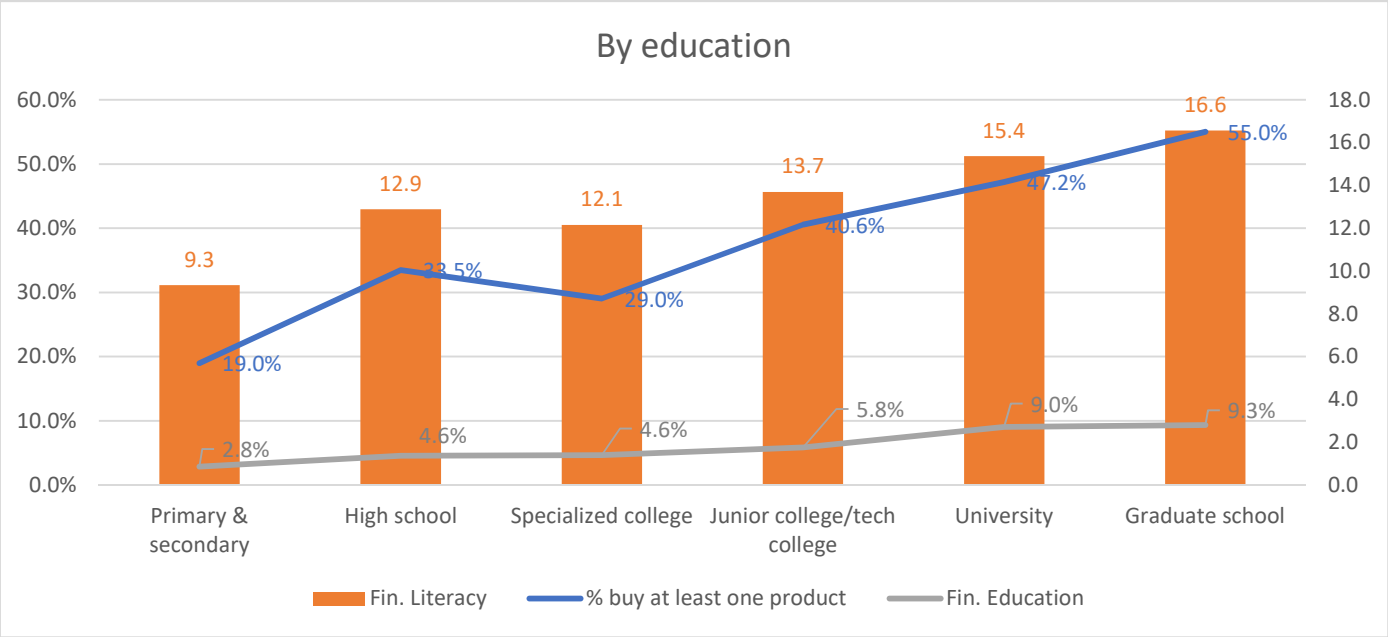
Figure 6: Financial education, financial literacy score and purchase of financial products, by income group



Note: Financial literacy score on right-hand scale.
Source: Authors' calculation

Educational level also has a positive correlation with financial literacy score, the likelihood of owning a financial product as well as the likelihood of receiving financial education (Figure 7). Those with primary and secondary education have an average financial literacy score of only 9.3 while those with a graduate degree have an average financial literacy score of 16.6. Similarly, while only 19% of respondents with primary and secondary education buy a financial product, the figures for those with university and graduate school education are 47.2% and 55.5%, respectively. The likelihood that a person took financial education rises from 2.8% to 9.3% as their education level increases from primary and secondary education to graduate school.

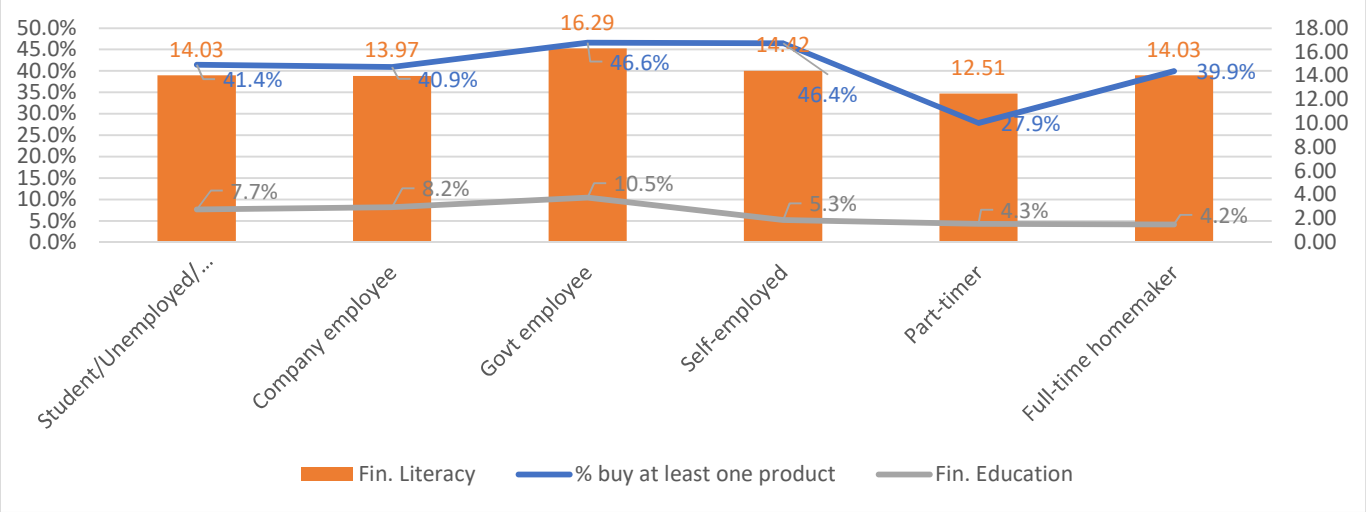
Figure 7: Financial education, financial literacy and possess of financial products, by education level



Note: Financial literacy score on right-hand scale.
Source: Authors' calculation

Figure 8 shows that the average financial literacy score of respondents in all occupational groups is about 14, except for government employees (16.3) and part-timers (12.5). About 46% of government employees and self-employed purchased a financial product, slightly higher than other occupational groups of respondents, especially the part-timers (only 27.9). The figure also indicates that students, company employees and government employees are three groups of respondents with highest proportion to take a financial education.

Figure 8: Financial education, financial literacy score and purchase of financial products, by occupation



Note: The right hand side scale is used for the financial literacy score
Source: Authors' calculation

4. Regression analysis of Determinants of and Impacts of Financial Literacy

Estimation methods

To quantify the effect of financial literacy on saving behavior, the following equation is estimated:

$$FP_i = \beta_0 + \beta_1 FL_i + \beta_2 X_i + \eta_i \quad (1)$$

Where the dependent variable FP_i indicates whether individual i holds a financial product or not. We estimate four alternative values of FP_i: (i) FP_1 takes the value of one if the individual i holds at least one financial product (including stocks, investment trusts and foreign currency) and zero otherwise; (ii) FP_2 takes the value of one if the individual i buys stocks and zero otherwise; (iii) FP_3 takes value of one if the individual i buys an investment trust and zero otherwise; and (iv) FP_4 takes value of one if the individual i holds foreign currency and zero otherwise. The variable FL_i indicate individual i's financial literacy score. For robustness check, in some specifications, we use the financial knowledge score instead of the financial literacy score. We expect that a person with a higher financial literacy score will be more likely to own a financial product.

X_i is a vector of control variables, including individual age (in log), gender, level of general education and financial education, income, occupation and the frequency of reading financial and economic news. Financial education is a binary variable which takes value one if individual i took financial education either at school or at work, and zero otherwise. For general education, due to data availability, we use a series of dummy variables to indicate the level of general education of individual i, including primary and secondary school, high school, specialized school, junior college, university and graduate school. We use the group with primary and secondary school as the reference group (for education) in our estimation. Similarly, we also categorize income, occupation and the frequency of news reading into subgroups. The reference groups in our estimation are those without any income; student/unemployed and those who read the financial news almost every day, respectively. We also control for the individual's location. There are two approaches: (i) prefecture dummies and (ii) cluster group dummies. Prefecture are clustered in 5 groups based upon the cluster analysis presented in the previous sections. η_i is the error term. To estimate equation (1), we use linear probability regression and probit regression.

We further examine the determinants of financial literacy using the following equation:

$$FL_i = \alpha_0 + X'_i \alpha_1 + \epsilon_i \quad (2)$$

Where FL_i is the financial literacy score as in equation (1), or, alternatively, the financial knowledge score, and *X'* is the vector of control variables including individual age (in log), general education and financial education, income, occupation, frequency of reading financial and economic news, location (either prefecture or cluster group) as in equation (1) and ϵ_i is the error term. We use OLS to estimate this equation. For robustness check, we also estimate equations (1) and (2) using the generalized structure economic model (GSEM) estimator.

Estimation results

Table 4 presents our estimation results regarding the factors driving the decision to own at least one of the three financial products mentioned above. The dependent variable in this table is a binary variable, which takes value of one if an individual owns at least one type of financial products (i.e. stock, investment trust or foreign currency). We use the linear probability regression in column 1 and the probit regression in the remaining equations. We control for prefecture dummies in columns 1 and 3 and cluster dummies in column 2. The estimation results show a positive correlation between financial literacy and the likelihood of possessing at least one financial product. More specially, in all specifications, a one standard deviation increase in financial literacy increase the likelihood to hold at least one financial product by 8.4 to 8.9

percentage points. Having financial education is also positively associated with the likelihood of holding a financial product.

Table 4: Financial literacy and decisions to purchase financial products (dependent variable: purchased stocks, investment trusts or foreign currency)

	(1) OLS	(2) Probit (Marginal effects)	(3) Probit (Marginal effects)
Financial literacy	0.089***	0.084***	0.084***
	[0.003]	[0.003]	[0.003]
Financial education	0.135***	0.131***	0.131***
	[0.011]	[0.011]	[0.011]
Age (in log)	0.263***	0.280***	0.281***
	[0.008]	[0.008]	[0.008]
Being a male	0.041***	0.039***	0.039***
	[0.007]	[0.007]	[0.007]
Education			
High school	0.026*	0.040**	0.041**
	[0.014]	[0.018]	[0.018]
Specialized college	0.033**	0.054***	0.054***
	[0.015]	[0.019]	[0.019]
Junior college/tech college	0.084***	0.105***	0.103***
	[0.016]	[0.019]	[0.019]
University	0.091***	0.109***	0.105***
	[0.014]	[0.018]	[0.018]
Graduate school	0.142***	0.164***	0.159***
	[0.019]	[0.022]	[0.022]
Income			
< 2.5mil.	-0.013	0.003	0.003
	[0.014]	[0.019]	[0.019]
>=2.5mil & <5mil	0.020	0.034*	0.033*
	[0.014]	[0.019]	[0.019]
>=5mil. & <7.5mil.	0.039***	0.052***	0.051***
	[0.015]	[0.019]	[0.019]
>=7.5mil. & <10mil.	0.059***	0.064***	0.062***
	[0.016]	[0.020]	[0.020]
>=10mil. & <15mil.	0.098***	0.100***	0.097***
	[0.018]	[0.022]	[0.022]
>=15mil.	0.124***	0.125***	0.120***
	[0.025]	[0.028]	[0.028]
Don't know/Not say	-0.027**	-0.021	-0.023
	[0.014]	[0.019]	[0.019]
Occupation			
Company employee	-0.008	0.018**	0.017**
	[0.008]	[0.008]	[0.008]
Govt employee	-0.025	-0.003	0.002
	[0.017]	[0.016]	[0.016]
Self-employed	-0.008	0.012	0.011

	[0.012]	[0.012]	[0.012]
Part-timer	-0.043***	-0.026***	-0.027***
	[0.009]	[0.010]	[0.010]
Full-time homemaker	-0.014	0.004	0.003
	[0.009]	[0.009]	[0.009]
Frequency of information acquired			
About once a week	-0.114***	-0.103***	-0.102***
	[0.008]	[0.008]	[0.008]
About once a month	-0.159***	-0.137***	-0.135***
	[0.011]	[0.011]	[0.011]
Less often than a month	-0.268***	-0.251***	-0.250***
	[0.008]	[0.008]	[0.008]
Never	-0.301***	-0.323***	-0.321***
	[0.008]	[0.009]	[0.009]
Others	-0.301***	-0.291***	-0.281***
	[0.068]	[0.064]	[0.065]
Regional group dummies			
Group 2		-0.002	
		[0.013]	
Group 3		0.021**	
		[0.008]	
Group 4		0.031***	
		[0.006]	
Group 5		-0.053**	
		[0.026]	
Prefecture dummies	YES	NO	YES
Constant	-0.628***		
	[0.035]		
R-sq/Pseudo R-sq	0.278	0.238	0.241
N	25000	25000	25000

Note: Reference groups: for education, those with primary and secondary education and those who do not report their education); for income, the no income group; for occupation, students, unemployed and others; for frequency of financial information, almost every day; and for prefectures, Hokkaido.
Source: Authors' estimation

The relationships between the decision to hold a financial product and other control variables are consistent with our expectations. Individuals who received financial education either at company or school are more likely to buy all three financial products. While men are more likely to possess a financial product than women, older respondent seems to be more risk averse than younger ones.[1] More educated individuals are also more likely to hold at least one financial product. For example, those with a graduate degree are more likely to hold a financial product than those with only secondary education by 14 to 16 percentage points. We also find a positive correlation between income and possessing financial products. The results indicate that the likelihood of holding a financial product is not different between those with annual income below 5 million yen per year and the reference group (i.e. those without any income). Those with annual income between 5 million yen and 7.5 million yen are more likely to have financial product than the reference group by about 3-5 percentage points. The corresponding figures for those with annual income from 7.5 to 10 million yen, from 10 million to 15 million yen and higher than 15 million yen

[1] We, however, do not find any non-linear relationship between age and the likelihood of holding a financial product. The estimation results are upon request.

are 6 percentage points, 10 percentage points and 12 percentage points, respectively. We do not find a difference in the likelihood to hold financial product between the reference group (including students, unemployed, and those who did not report their profession) and those who work as salaried employees, government employees, self-employed or full time homemakers. But part-time workers are less likely to hold financial products than the reference groups. Those who read financial and economic news/information daily also have a higher likelihood to hold financial products.

We also examine the relationship between financial knowledge, the main subcomponent of the financial literacy score, and the decision to hold a financial product. The estimation results are presented in Table 5. The financial knowledge score is positively associated with likelihood to purchase a financial product, and this relationship is statistically significant at the 1% level. A one standard deviation increase in financial knowledge increases the likelihood of holding a financial product by about 10 percentage points. This figure is slightly higher than that for the overall financial literacy score, which suggests that financial knowledge may play a dominant role in the relationship between financial literacy and likelihood of holding a financial product. For other variables, we find that their relationships with financial knowledge are not significant altered in compared to the results presented in Table 4.

Table 5: Financial knowledge and decision to purchase financial products (stocks, investment trusts or foreign currency)

	(4) OLS	(5) Probit (Marginal effects)	(6) Probit (Marginal effects)
Financial knowledge	0.102***	0.096***	0.096***
	[0.003]	[0.003]	[0.003]
Financial education	0.129***	0.125***	0.125***
	[0.011]	[0.011]	[0.011]
Age (in log)	0.248***	0.265***	0.266***
	[0.008]	[0.008]	[0.008]
Being a male	0.033***	0.031***	0.031***
	[0.007]	[0.007]	[0.007]
Education			
High school	0.023	0.036**	0.037**
	[0.014]	[0.018]	[0.018]
Specialized college	0.029*	0.050***	0.050***
	[0.015]	[0.019]	[0.019]
Junior college/tech college	0.079***	0.100***	0.099***
	[0.016]	[0.019]	[0.019]
University	0.083***	0.100***	0.097***
	[0.014]	[0.018]	[0.018]
Graduate school	0.133***	0.155***	0.150***
	[0.019]	[0.022]	[0.022]
Income			
< 2.5mil.	-0.013	0.003	0.003
	[0.014]	[0.019]	[0.019]
>=2.5mil & <5mil	0.020	0.034*	0.033*
	[0.014]	[0.019]	[0.019]
>=5mil. & <7.5mil.	0.039***	0.051***	0.050***
	[0.015]	[0.019]	[0.019]
>=7.5mil. & <10mil.	0.057***	0.063***	0.061***

	[0.016]	[0.020]	[0.020]
>=10mil. & <15mil.	0.097***	0.099***	0.095***
	[0.018]	[0.022]	[0.022]
>=15mil.	0.121***	0.121***	0.116***
	[0.025]	[0.028]	[0.028]
Don't know/Not say	-0.022	-0.016	-0.018
	[0.014]	[0.019]	[0.019]
Occupation			
Company employee	-0.008	0.017**	0.017**
	[0.008]	[0.008]	[0.008]
Govt employee	-0.027	-0.005	-0.000
	[0.017]	[0.015]	[0.015]
Self-employed	-0.007	0.013	0.012
	[0.012]	[0.011]	[0.011]
Part-timer	-0.041***	-0.024**	-0.026***
	[0.009]	[0.010]	[0.010]
Full-time homemaker	-0.013	0.005	0.004
	[0.009]	[0.009]	[0.009]
About once a week	-0.113***	-0.101***	-0.099***
	[0.008]	[0.008]	[0.008]
About once a month	-0.154***	-0.131***	-0.130***
	[0.011]	[0.011]	[0.011]
Less often than a month	-0.261***	-0.242***	-0.241***
	[0.008]	[0.008]	[0.008]
Never	-0.289***	-0.311***	-0.309***
	[0.008]	[0.009]	[0.009]
Others	-0.298***	-0.288***	-0.278***
	[0.067]	[0.063]	[0.064]
Regional group dummies			
Group 2		-0.002	
		[0.013]	
Group 3		0.019**	
		[0.008]	
Group 4		0.030***	
		[0.006]	
Group 5		-0.051**	
		[0.026]	
Prefecture	YES	NO	YES
Constant	-0.567***		
	[0.035]		
R-sq/Pseudo R-sq	0.284	0.243	0.247
N	25000	25000	25000

Source: Authors' estimation

Table 6 reports the effect of financial literacy on the likelihood of holding individual financial products. The dependent variables in this table are also binary variables, which take value of one if an individual either bought stocks (columns 7 and 8), or investment trusts (columns 9 and 10) or foreign currency (columns 11 and 12) and zero otherwise. We use the linear probability regression in columns 7, 9 and 11 and probit regressions in columns 8, 10 and 12.

The estimation results show financial literacy is positively associated with the likelihood to hold either stocks, investment trusts or foreign currency, and this relationship is statistically significant at the 1% level. The effects of financial literacy on the likelihood of holding different types of financial products are different according to the product. A one standard deviation increase in financial literacy increases the likelihood to buy stocks or investment trust by 6 percentage points, while it increases the likelihood to buy foreign currency by only 3 percentage points.

While, in general, the behavior of most of other variables in this table is not qualitatively different from that presented in Tables 4 and 5, there is some variation by product. Men are more likely to buy stocks than women while they are not different from women regarding their decisions to either buy investment trusts or foreign currency. An older person has higher likelihood to buy stocks or investment trusts than foreign currency. With regard to income level, not only do those with annual income above 5 million have a higher propensity to buy investment trusts than those with at most secondary education, but those with income from 2.5 million yen to 5 million yen also have a higher probability than those without income.

Table 6: Financial literacy and decision to buy stock; invest in investment trust or hold foreign currency

	(7)	(8)	(9)	(10)	(11)	(12)
	Buying stock=1		Buying investment trust=1		Buying foreign currency=1	
	OLS	Probit	OLS	Probit	OLS	Probit
Financial literacy	0.060***	0.057***	0.060***	0.060***	0.034***	0.034***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Financial education	0.133***	0.119***	0.129***	0.113***	0.134***	0.102***
	[0.011]	[0.010]	[0.010]	[0.009]	[0.009]	[0.008]
Age (in log)	0.212***	0.235***	0.208***	0.240***	0.101***	0.126***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.007]	[0.008]
Being a male	0.078***	0.076***	-0.003	-0.006	-0.006	-0.008
	[0.007]	[0.007]	[0.006]	[0.007]	[0.006]	[0.006]
Education						
High school	0.026	0.041**	0.006	0.020	0.004	0.019
	[0.016]	[0.017]	[0.015]	[0.016]	[0.014]	[0.014]
Specialized college	0.014	0.033*	0.009	0.025	0.021	0.041***
	[0.017]	[0.018]	[0.017]	[0.018]	[0.015]	[0.015]
Junior college/tech college	0.059***	0.080***	0.050***	0.070***	0.037**	0.058***
	[0.017]	[0.018]	[0.017]	[0.018]	[0.015]	[0.015]
University	0.076***	0.090***	0.070***	0.085***	0.053***	0.070***
	[0.016]	[0.017]	[0.015]	[0.016]	[0.014]	[0.014]
Graduate school	0.115***	0.129***	0.108***	0.125***	0.120***	0.128***
	[0.020]	[0.021]	[0.019]	[0.021]	[0.017]	[0.019]
Income						
< 2.5mil.	-0.010	0.003	-0.001	0.018	-0.015	-0.008
	[0.016]	[0.018]	[0.015]	[0.017]	[0.014]	[0.016]
>=2.5mil & <5mil	0.018	0.025	0.034**	0.048***	-0.008	-0.003
	[0.015]	[0.018]	[0.015]	[0.017]	[0.013]	[0.016]
>=5mil. & <7.5mil.	0.036**	0.042**	0.038**	0.052***	0.014	0.016
	[0.016]	[0.018]	[0.016]	[0.018]	[0.014]	[0.017]
>=7.5mil. & <10mil.	0.049***	0.048**	0.056***	0.063***	0.031**	0.025
	[0.017]	[0.019]	[0.017]	[0.019]	[0.015]	[0.017]
>=10mil. & <15mil.	0.086***	0.076***	0.095***	0.090***	0.059***	0.040**
	[0.019]	[0.021]	[0.019]	[0.020]	[0.017]	[0.019]
>=15mil.	0.126***	0.107***	0.150***	0.129***	0.099***	0.066***
	[0.025]	[0.027]	[0.025]	[0.026]	[0.022]	[0.024]

Don't know/Not say	-0.029*	-0.030*	-0.009	-0.003	-0.026*	-0.031*
	[0.016]	[0.018]	[0.015]	[0.017]	[0.014]	[0.016]
Occupation						
Company employee	-0.010	0.018**	-0.033***	0.002	0.012*	0.030***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.007]	[0.007]
Govt employee	-0.041***	-0.007	-0.027*	0.010	0.008	0.030**
	[0.015]	[0.015]	[0.015]	[0.015]	[0.013]	[0.013]
Self-employed	-0.015	0.007	-0.056***	-0.024**	0.014	0.027***
	[0.011]	[0.011]	[0.011]	[0.010]	[0.010]	[0.010]
Part-timer	-0.039***	-0.023**	-0.058***	-0.041***	-0.017**	-0.011
	[0.009]	[0.010]	[0.009]	[0.009]	[0.008]	[0.008]
Full-time homemaker	-0.013	0.010	-0.024***	-0.002	-0.011	-0.001
	[0.009]	[0.009]	[0.009]	[0.009]	[0.008]	[0.008]
Frequency of information acquired						
About once a week	-0.132***	-0.112***	-0.098***	-0.078***	-0.089***	-0.074***
	[0.007]	[0.008]	[0.007]	[0.008]	[0.006]	[0.007]
About once a month	-0.186***	-0.158***	-0.120***	-0.093***	-0.105***	-0.086***
	[0.010]	[0.011]	[0.010]	[0.010]	[0.009]	[0.009]
Less often than a month	-0.270***	-0.253***	-0.198***	-0.181***	-0.158***	-0.149***
	[0.008]	[0.008]	[0.007]	[0.007]	[0.007]	[0.006]
Never	-0.286***	-0.305***	-0.208***	-0.232***	-0.167***	-0.186***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.007]	[0.006]
Others	-0.249***	-0.221***	-0.251***	-0.225***	-0.192***	-0.181***
	[0.070]	[0.067]	[0.068]	[0.053]	[0.061]	[0.043]
Constant	-0.511***		-0.504***		-0.201***	
	[0.037]		[0.036]		[0.032]	
R-sq/Pseudo R-sq	0.237	0.217	0.185	0.1867	0.122	0.146
N	25000	25000	25000	25000	25000	25000

Source: Authors' estimation

Table 7 reports our estimation results regarding determinants of financial literacy and financial knowledge. The dependent variable in columns 13 and 14 is financial literacy and that in column 15 is financial knowledge. In column 13 we control for prefecture dummies while cluster group dummies are controlled for in column 14. The estimation results indicate that financial education is strongly associated with both financial literacy and financial knowledge. Older persons also tend to have higher financial literacy and financial knowledge scores than younger ones. While an individual's gender does not affect their financial literacy overall, men are more likely to have higher financial knowledge than women. This suggests that women are more likely to have "savvier" financial behavior and better financial attitudes than men. Those with higher education have higher financial literacy and financial knowledge scores. We also find that higher income is linked with higher financial literacy scores. Those with annual incomes higher than 15 million yen per year have financial literacy scores and financial knowledge scores higher than those with no income by 40 percentage points. This gap is much smaller than the gap between those with income from 5 million yen per year to 15 million per year (ranging from 45 percentage points to 55 percentage points). With regards to occupation, when we control for education level as well as income level, company employees, self-employed, part-time workers and full-time homemakers have lower financial literacy and financial knowledge scores than the reference group (students and unemployed) while there is no significant difference between government employees and the reference group. Those who read financial and economic news daily tend to have higher financial literacy and financial knowledge scores than those who read news less frequently.

Table 7: Determinants of financial literacy and financial knowledge

	(13)	(14)	(15)
Dependent variable:	Financial literacy	Financial literacy	Financial knowledge
Financial education	0.214***	0.214***	0.242***
	[0.021]	[0.021]	[0.020]
Age (in log)	0.475***	0.473***	0.560***
	[0.016]	[0.016]	[0.016]
Being a male	-0.001	0.001	0.078***
	[0.014]	[0.014]	[0.014]
Education			
High school	0.281***	0.281***	0.283***
	[0.033]	[0.033]	[0.032]
Specialized college	0.263***	0.263***	0.262***
	[0.036]	[0.036]	[0.035]
Junior college/tech college	0.358***	0.358***	0.357***
	[0.036]	[0.036]	[0.035]
University	0.558***	0.557***	0.564***
	[0.033]	[0.033]	[0.033]
Graduate school	0.716***	0.713***	0.715***
	[0.043]	[0.043]	[0.042]
Income			
< 2.5mil.	0.269***	0.271***	0.234***
	[0.034]	[0.034]	[0.033]
>=2.5mil & <5mil	0.407***	0.411***	0.354***
	[0.034]	[0.034]	[0.033]
>=5mil. & <7.5mil.	0.508***	0.512***	0.451***
	[0.035]	[0.035]	[0.034]
>=7.5mil. & <10mil.	0.538***	0.541***	0.487***
	[0.037]	[0.037]	[0.036]
>=10mil. & <15mil.	0.551***	0.555***	0.496***
	[0.041]	[0.041]	[0.040]
>=15mil.	0.461***	0.464***	0.440***
	[0.055]	[0.055]	[0.054]
Don't know/Not say	0.040	0.042	-0.017
	[0.034]	[0.034]	[0.033]
Occupation			
Company employee	-0.135***	-0.135***	-0.117***
	[0.016]	[0.016]	[0.016]
Govt employee	0.036	0.035	0.051
	[0.034]	[0.034]	[0.033]
Self-employed	-0.110***	-0.111***	-0.104***
	[0.024]	[0.024]	[0.023]
Part-timer	-0.129***	-0.127***	-0.134***
	[0.019]	[0.019]	[0.019]
Full-time homemaker	-0.076***	-0.075***	-0.079***
	[0.019]	[0.019]	[0.018]
About once a week	-0.043***	-0.043***	-0.054***
	[0.015]	[0.015]	[0.015]
About once a month	-0.219***	-0.220***	-0.238***
	[0.021]	[0.021]	[0.021]
Less often than a month	-0.342***	-0.342***	-0.375***
	[0.016]	[0.016]	[0.016]
Never	-0.844***	-0.844***	-0.855***

	[0.017]	[0.017]	[0.017]
Others	-0.141	-0.139	-0.146
	[0.145]	[0.145]	[0.141]
Regional group	NO	YES	NO
Prefecture	YES	NO	YES
Constant	-2.242***	-2.257***	-2.559***
	[0.078]	[0.075]	[0.076]
R-sq/Pseudo R-sq	0.270	0.269	0.302
N	25000	25000	25000

Source: Authors' estimation

We check the robustness of our results by using a structural economic model. The results are reported in Table 8. Column 16 shows the results of the first equation: decision to hold a financial product while column 17 shows the results of the second equation: determinants of financial literacy. We find that the results are not significantly different from those in Table 4 (column 1) and in Table 7 (column 1). This confirms our previous findings about the role of financial literacy on the decision to hold financial products and the determinants of financial literacy.

Table 8: Structural equation model: 2 simultaneous equations: decision to purchase financial products; financial literacy)

	Purchase financial product	Financial literacy
	(16)	(17)
Financial literacy	0.089***	
	[0.003]	
Financial education	0.135***	0.214***
	[0.011]	[0.022]
Age (in log)	0.262***	0.473***
	[0.008]	[0.016]
Being a male	0.041***	0.001
	[0.007]	[0.014]
Education		
High school	0.025	0.281***
	[0.016]	[0.033]
Specialized college	0.032*	0.263***
	[0.017]	[0.036]
Junior college/tech college	0.084***	0.358***
	[0.017]	[0.036]
University	0.093***	0.557***
	[0.016]	[0.033]
Graduate school	0.146***	0.713***
	[0.020]	[0.042]
Income		
< 2.5mil.	-0.014	0.271***
	[0.016]	[0.033]
>=2.5mil & <5mil	0.020	0.411***

	[0.016]	[0.032]
>=5mil. & <7.5mil.	0.040**	0.512***
	[0.017]	[0.034]
>=7.5mil. & <10mil.	0.060***	0.541***
	[0.018]	[0.036]
>=10mil. & <15mil.	0.102***	0.555***
	[0.019]	[0.040]
>=15mil.	0.129***	0.464***
	[0.026]	[0.053]
Don't know/Not say	-0.026	0.042
	[0.016]	[0.033]
Occupation		
Company employee	-0.007	-0.135***
	[0.008]	[0.016]
Govt employee	-0.029*	0.035
	[0.016]	[0.032]
Self-employed	-0.007	-0.111***
	[0.012]	[0.024]
Part-timer	-0.041***	-0.127***
	[0.010]	[0.020]
Full-time homemaker	-0.013	-0.075***
	[0.009]	[0.019]
Frequency of information acquired		
About once a week	-0.115***	-0.043***
	[0.008]	[0.015]
About once a month	-0.160***	-0.220***
	[0.010]	[0.021]
Less often than a month	-0.270***	-0.342***
	[0.008]	[0.016]
Never	-0.302***	-0.844***
	[0.008]	[0.017]
Others	-0.306***	-0.139
	[0.072]	[0.147]
Regional group dummies		
Group 2	-0.003	0.023
	[0.013]	[0.027]
Group 3	0.020**	0.079***
	[0.008]	[0.017]
Group 4	0.032***	0.008
	[0.006]	[0.013]
Group 5	-0.045*	-0.020
	[0.026]	[0.054]
Constant	-0.581***	-2.257***
	[0.036]	[0.073]

Source: Authors' estimation

5. Conclusions

Based on a sample of 25,000 respondents, we have analyzed both the effects of financial literacy on the savings behavior of Japanese and the determinants of financial literacy. The results are consistent with those of other studies. Both financial literacy and financial education are found to be significantly and positively correlated with investment in the three financial products considered in this study—stocks, investment trusts and foreign currency. Purchases of these products are also positively associated with age, male gender, education and income levels.

The level of financial literacy is found to be significantly and positively correlated with having had financial education, age, education level and income. The results for gender are mixed, with males scoring significantly higher in some specifications, but not others. Correcting for possible endogeneity by estimating a combined structural model for investment in financial products and financial literacy confirms the results.

The results imply that policy measures to increase financial education can improve financial literacy, and thereby have a positive impact on savings. This suggests that programs to strengthen financial literacy can have a significant and positive macroeconomic impact.

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