Financial Literacy, Unobserved Heterogeneity and Investment Behavior in Japan

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Abstract

This research employs data from the Financial Literacy Survey (2016 and 2019) to study the relationship between financial literacy levels and financial literacy education at home, and the participation of Japanese persons on financial markets. It accounts for unobserved heterogeneity in investment behavior by employing a Finite Mixture Model with two classes, where membership to each class is a function of socio-demographic characteristics of the person and the household. Financial literacy levels are measured employing Item Response Theory on questions regarding financial knowledge and skills. Investment experience, given class membership, is shown to significantly be associated with financial literacy levels, financial literacy education at home and attitudes towards investment, where the effect of financial literacy levels and education is significantly larger among women, younger individuals with lower education, income and asset possession. These results can contribute to improving the structure of financial literacy programs in Japan.

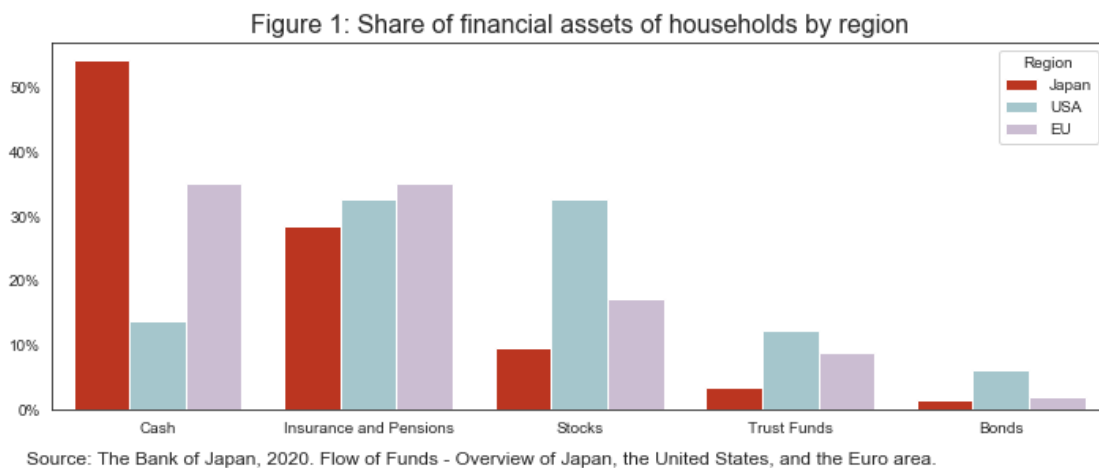[*] Research Center for Financial Gerontology, Keio University, Japan. E-mail: hiroco.araki@keio.jp

1. Introduction and Literature Review

In recent years, rapid demographic changes have led to reforms of social security and pension systems, and liberalization of markets all around the world. In consequence, the burden of assets management has rapidly shifted from governments and employers to the individuals. In Japan, changes to the public pension benefit levels through adjustments in the benefit multiplier and the so-called macroeconomic slide mechanism are under consideration in order to compensate for the growing pressure that population aging and lower fertility rates put on public finances.

As the life expectancy of the generation born during the 21th century is expected to reach 100 years, countries put more importance not only on labor policies such as increases in the retirement age, but also on strengthening private pension systems and increasing the participation in financial markets of individuals. Ironically, although Japan has been the most affected country by population ageing, its investment level remains low compared to the West.

Figure 1 shows that, compared to America and Europe, the adoption of investment in risky assets among Japanese households is quite low. Nakagawa and Katagiri (1999) employ data from the Family Saving Survey (Ministry of Internal Affairs and Communications) and from the Public Opinion Survey on savings and consumption (Central Council for Savings Information) to analyze the determinants of risk aversion among Japanese households. They show that Japanese households put a stronger emphasis on security and liquidity over profitability when compared to Americans. [1]

Figure 1: Share of financial assets of households by region

Source: The Bank of Japan, 2020. Flow of Funds - Overview of Japan, the United States, and the Euro area.

Attitudes towards risk and investment are not homogeneous. Bruhin et al. (2010) show that within several nationalities there exists considerable heterogeneity with respect to risk taking behavior. Conte

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[1] It is also pointed out that low involvement in investment is not only related to cultural characteristics, but also other structural factors such as the lack of information, high transaction fees that discourage small investments, and the taxation system. Some of these structural factors have become less of a barrier in recent decades. However, there is no evidence that these recent changes have had any positive impact on attitudes toward investment in Japan.

et al. (2011) show with experimental data that heterogeneity may exist not only between individuals but also within individuals.

Furthermore, lack of understanding of economics and finance can also increase the aversion towards risky investments. Rooij, Lusardi & Alessie (2011) show that, for the Netherlands, one of the reasons why many households refrain from participating in the stock market is lack of knowledge on financial markets, and that financial literacy is limited for a majority of households. Gerhard, Gladstone & Hoffman (2018) explores with a sample of UK households the role of financial literacy on savings behavior, accounting for latent heterogeneity by employing a Finite Mixture Model. Group membership is explained as a function of socio-demographic characteristics of the household, while savings amount given group membership is a function of psychological characteristics of the head of household and a measure of financial literacy. They conclude that the data is best explained by a model with two latent groups: "striving" (larger families with children and young/female heads of household) and "established" households, and find that financial literacy has a significantly larger effect on savings for those in the "striving" group.

As for Japan, the Central Council for Financial Services Information of the Bank of Japan (hereinafter referred to as CCFSI) released Financial Literacy Map [2], defined as the minimum level of financial literacy required for daily living, which serves as a guideline for all the organizations that support the advancement of consumer education on finance [3]. Whether financial literacy effectively affects investment behavior, and which groups of the population are more likely to benefit from it, is an important question subject to empirical analysis.

This research employs data from the Financial Literacy Survey, made public by the CCFSI, and studies the relationship between financial literacy and investment in the stock market among Japanese households. It accounts for unobserved heterogeneity by employing a Finite Mixture Model. It contributes to the government and financial institutions' effort to promote private investment by bringing light into the effect of financial literacy on investment for each population group. The next section provides a brief description of the data and methodology employed.

2. Data

The Financial Literacy Survey（FLS）is an online survey conducted by the CCFSI in 2016 and 2019,

with the aim of understanding the current state of financial literacy of Japanese persons aged 18 to 79 years old, employing representative samples of 25,000 individuals on each round. The survey contains questions regarding socio-demographic characteristics, 53 standard questions on financial literacy, true/false questions on financial knowledge and skills, and questions on behavioral and attitudinal

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[2] Compiled based on a report of the Study Group on Financial Education (Secretariat: Financial Services Agency of Japan),
[3] https://www.shiruporuto.jp/public/document/container/literacy/

characteristics related to the eight categories of the Financial Literacy Map.

This research employs pooled cross-section data from both surveys. It measures financial literacy through an ability index (θ) obtained from a two-parameter logistic model (2PL) from Item Response Theory [4]. Table 1 shows the mean of several socio-demographic characteristics by quartile of the financial literacy index θ. Table 1 shows that individuals with higher financial literacy levels tend to be older, male, have more years of education, higher household income and financial assets. [5]

Table 1:Socio demographic characteristics by financial literacy level

Financial Literacy Score Quartile	Mean				
	Age	Female	Years of Education	Household Annual Income	Household Financial Assets
1	42.7590	0.5393	13.6341	4.0960	3.9302
2	47.6072	0.5766	13.8904	4.6505	5.7053
3	51.8902	0.5296	14.2208	5.2383	8.4889
4	54.0962	0.3788	14.8211	6.1589	12.0648

*Age, Annual Income and Financial Assets are categorical values representing ranges.
For the purposes of this research the middle point of each range is taken as the representative value.

3. Methodology and Results

I follow the methodology in Gerhard, Gladstone & Hoffman (2018) and employ a two-classes Finite Mixture Model. Class membership probability is explained through a Probit model including as controls socio-demographic characteristics such as age, gender, years of schooling, household annual income and the value of household financial assets. The explained variable is the binary variable that takes the value of 1 if the person has ever made investments in stocks, foreign currency or trust funds, and 0 otherwise, and is also modeled employing a Probit model. Controls include the financial literacy index, having received financial education at home by parents, the frequency the person receives financial and economic information, and controls that capture attitudes towards finances (preference to pay bills on time, basing purchase behaviors on the opinions of others, making long-term savings and expenditures plans, preference to live by the day, tolerance to losses on investment and deposits, and financial myopia).

The Probit estimation results for the membership probability are shown in Table 2a, where class 1 is the baseline. Results show that class 2 is characterized by older persons, especially male, with higher income and financial assets possession. This classification is similar to the one in Gerhard, Gladstone & Hoffman (2018), where "striving" and "established" household groups were obtained. Table 2b shows the expected share of persons with previous investment experience for each group, with class 2 exhibiting the largest share.

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[4] 2PL models the interaction between the individual's performance and the features (discrimination and difficulty) of the questions.

[5] Please refer to the full paper for a detailed explanation of each variable employed in the full analysis and the corresponding summary statistics.

Table2a：Probability of Class Membership (FMM)

	Probability of Belonging to Class2 Relative to Class1
Age	0.0314**
	[0.0020]
Female	-0.6036**
	[0.0584]
Years of Education	0.1313**
	[0.0147]
Annual Hosehold Income	0.0430**
	[0.0101]
Household Financial Assets	0.2803**
	[0.0238]

Standard errors in brackets   * p<0.05   ** p<0.05   *** p<0.01

Table2b：Share of Persons with Having Previous Investment Experience

	Latent class marginal probabilities	Having Previous Investment Experience
Class1	0.386	0.137
Class2	0.614	0.643

Table3 : Probit Analysis of Person's investment experience (N=32,723)

	(1)	(2)	(3)
	Class 1	Class 2	Chi-Squre Statistics for the Difference between Coefficients in (1) vs (2)
Financial Literacy Score	0.4491**	0.3520**	3.86**
	[0.0438]	[0.0177]	
Experience of home education by parents	0.2793**	0.1128**	3.41*
	[0.0787]	[0.0270]	
Frequency of contact with financial information	0.3665**	0.2663**	5.74**
	[0.0400]	[0.0092]	
Pays bills on time	0.0177	-0.0569**	2.68
	[0.0387]	[0.0167]	
Herd behavior	0.1398**	0.0751**	2.61
	[0.0347]	[0.0126]	
Makes long term plans	0.2298**	0.0456**	19.23***
	[0.0364]	[0.0134]	
Lives for today	0.1138**	-0.0083	9.40***
	[0.0331]	[0.0134]	
Losing money is natural when investing/saving	0.3965**	0.3544**	1.11
	[0.0368]	[0.0111]	
Myopic behavior	-0.0137	-0.0088	0.04
	[0.0217]	[0.0083]	
Constant	-5.7556**	-1.6402**	
	[0.3531]	[0.1193]	

Standard errors in brackets   * p<0.05   ** p<0.05   *** p<0.01

Table 3 shows the effect of different covariates on the probability of having previous investment experience by group. The financial literacy index has a positive effect for both groups, although its impact is larger for class 1. The difference across both groups for this coefficient is significant to the 5%

level. Similarly, the impact of financial education at home by parents is also positive and significant for both groups, and is larger for group 1 (the difference across groups is significant to the 10% level). This pattern is similar for most covariates. The constant term is large and negative for group 1 individuals, compared to group 2 persons. This suggests that persons in group 2 are naturally more likely to have investment experience holding everything else constant. On the contrary, group 1 is less likely to invest and more reactive to financial education and changes in their attitudes toward finances.

4. Conclusions

The results above confirm the findings in previous research. Accounting for unobserved heterogeneity uncovers important differences in the effect of financial literacy and education on investment behavior. I show that financial literacy has a positive impact in general on investment behavior, and that some individuals, especially women and younger, less educated and less wealthy persons, are more responsive to financial education programs. The government and financial institutions may increase participation in financial markets by prioritizing the education of persons in more responsive groups.

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