

Financial Literacy and Retirement Planning in Japan^{*}

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Abstract

Using micro data on Japanese households, I provide an overview of the level of financial literacy in Japan, analyze the determinants of financial literacy and link financial literacy to retirement planning. Overall, the level of financial literacy is low in Japan. Surprisingly, many Japanese responded that they did not know the answer in at least one question. In addition, I found that females, the young, and individuals with lower incomes and lower education levels are financially illiterate. Moreover, as expected, I found that financial literacy increases the probability of having a savings plan for retirement.

Keywords: Financial literacy, Retirement planning, Wealth accumulation, Financial education, Children's banks, Savings promotion campaign in Japan

JEL Classification: D12, D91, H31, I21

1 Introduction

Financial literacy has become increasingly important for individuals. The reasons for this are manifold. One important aspect is the vulnerability of pay-as-you-go pension systems because of the declining birthrate and aging population. According to the "Survey on an International Comparison of the Life and Consciousness of the Elderly",¹ the proportion of households that rely mainly on public pensions to finance their living expenses is 73.9% in Japan, which is the second highest among five countries² (this proportion is 76.9% in Germany, 54.7% in the US, 49.3% in France, and 4.5% in Korea).³ However, it will be increasingly difficult for Japan to fund retirements through public pensions as long as pension benefits continue to be financed by a pay-as-you-go system, because of the rapidly aging population. The National Institute of Population and Social Security Research reported the aged dependency ratio⁴ for 1950, 2010, and 2050.⁵ In 1950, the aged dependency ratio was 8.3%, a relatively low percentage compared with other countries. However, with increases in the incidence of late marriage and non-marriage, a declining birthrate, and growth in average life expectancy, the age of Japan's population has increased rapidly. The aged dependency ratio was 35% in 2010, and it is estimated to be 74% in 2050. Before the 2004 revision of the public pension system, pension benefits were fixed by law. Thus, pension contributions have been increasing with the aging population. In order to reduce the burden on working people, the 2004 revision decided first to fix the contribution rates and then to adjust the benefit level, which implies that pension benefits will decrease as the population continues to age. Thus, individuals must take more responsibility for their own financial well-being after retirement. According to the International Retirement survey in nine countries,⁶ conducted by the Hartford Financial Services group in 2008, the proportion of individuals who are not confident at all that they have enough money for retirement is the highest in Japan among the nine countries at

¹ In Japanese, *Koreisha no Seikatsu to Ishiki Dai Rokkai Kokusai Hikaku Chosa*. This survey was conducted by the Cabinet Office of Japan in 2005.

² The respondents to this survey are males and females aged 60 years and older in Japan, the United States, Korea, Germany and France.

³ According to the same survey, the percentage of households that rely mainly on public pensions in Japan was only 34.9% in 1980, and this has increased consistently since then. In addition, according to the 2009 Comprehensive Survey of Living Conditions of the People on Health and Welfare, for the elderly, the average public pension benefit per household comprises 71% of average total income per household.

⁴ The ratio of the population aged 65 and older to the population aged 15-64.

⁵ For details, see http://www.ipss.go.jp/syoushika/tohkei/Popular/P_Detail2010.asp?fname=T02-16.htm&title1=%87U%81D%94N%97%EE%95%CA%90I%8C%FB&title2=%95%5C%82Q%81%7C16+%8E%E5%97v%8D%91%82%CC%8F%5D%91%AE%90I%8C%FB%8Ew%90%94%81F1950%2C2010%2C2050%94N.

⁶ The respondents to this survey are males and females aged 45 and older in Japan, the United States, the United Kingdom, Germany, Spain, Italy, Korea, Taiwan, and Australia.

35%.⁷ Nevertheless, the percentage of individuals who have no plans for retirement is also the highest in Japan at 82%.⁸ One of the reasons why few people in Japan develop a plan for retirement might be the lack of financial knowledge. The proportion of individuals who are not confident in their knowledge and ability with financial planning at all is extremely high in Japan (28%), followed by 7–11% in the other countries. Therefore, enhancing the level of financial literacy is an urgent issue in Japan to finance living expenses after retirement.⁹

The second reason for the public discussion about financial knowledge in Japan is the rapid development of financial markets with complex products. Since the financial liberalization in the mid 1990s, for example, it has become possible for banks and insurance companies to sell mutual funds and for securities firms to decide brokerage commission rates, which has expanded access to risky assets and lowered the transaction costs of stocks. Moreover, defined-contribution pension plans were introduced in 2001, which is also expected to increase the exposure of individuals to risky assets. The problem is that many individuals purchase risky assets they do not understand adequately. A survey on the defined-contribution pension in 2007,¹⁰ conducted by the Pension Fund Association of Japan, showed that 44% of employees participating in defined-contribution pension plans did not know how their contributions were allocated among various types of assets, and this trend is pronounced especially among the young and females. It is expected that such participants do not have sufficient information and knowledge about investment techniques, have left their asset composition as it was set initially, and fail to monitor their investment. Therefore, they might be more likely to suffer wealth loss than people who are well equipped with knowledge about risky assets. This situation is also a reason why financial literacy must be enhanced in Japan.

The third reason why financial literacy has become increasingly important is related to the financial crisis associated with Lehman's bankruptcy. In the beginning of this financial crisis, its impact on Japan's economy was not considered to be serious. However, the global recession has decreased Japan's export and led Japan's economy to a serious recession. It is undeniable that a lack of financial literacy is one of reasons of this financial crisis. In recent

⁷ The rates in the other countries are 6% in Spain, around 10% in Italy, Korea, Taiwan, Germany, and the United States, and around 20% in the United Kingdom and Australia.

⁸ The figures are around 60% in Germany and Italy, around 50% in Spain, Australia, and the United Kingdom, 40% in the United States and Taiwan, and 32% in Korea.

⁹ An additional characteristic in Japan is that the percentage of individuals who do not know whom they should rely on for credible financial planning advice is high at 54%. Of these individuals, 31% rely on information from news media, 17% rely on friends, and less than 5% rely on financial institutions such as banks, securities firms and financial planners.

¹⁰ For details, see http://www.pfa.or.jp/jigyotokei/files/dc_chosa_2.pdf

years, the importance of financial education has become widely recognized all over the world, and the improvement of financial literacy of individuals is a global task. In Japan, Financial Services Agency urged Ministry of Education, Culture, Sports, Science and Technology, which set Japan's school curricula, to strengthen a financial education in schools, and the school curricula for elementary school and lower secondary school and that for upper secondary school were revised on March 2008 and on March 2009, respectively, enhancing the statements regarding economics and finance.

The objective of my study is threefold. First, I use the Survey of Living Preferences and Satisfaction¹¹ (hereafter, the SLPS) to provide an overview of the level of financial literacy in Japan as measured by three questions on financial literacy that have been used in surveys around the world. Using identical questions to measure the level of financial literacy enables me to compare the level of financial literacy in Japan with that in many other countries. Second, I consider which groups have low financial literacy. Third, I link financial literacy to retirement planning.

There are at least two contributions of my paper. First, I focus on the effect of savings promotion activities in schools (we call it as "Children's banks") on financial literacy and retirement planning. Although children's banks are considered to be the first financial education in Japan, as far as I know, the analysis on children's banks has never been done. Children's banks allow students to deposit and withdraw money to/from financial institutions through schools, and the interest income on the money deposited through children's banks is tax exempt. The system of children's banks might improve the level of financial literacy because saving regularly might induce children's interest in calculating interest rates and considering the value of money. In addition, because students attending schools that have a children's bank are encouraged to bring some money to school regularly (for example, once two months), it is expected that students will begin to save habitually and that this habit will help them develop a savings plan when they become adults. Thus, in this paper, I consider whether individuals whose school had a children's bank are more likely to have a higher level of financial literacy and have a savings plan for retirement compared with those whose school had no children's bank.

Second, I contribute to the literature by addressing the problem of causality between financial literacy and retirement planning. I take an instrumental variable approach that uses individual Japanese skills and average regional Japanese skills because individuals with a high

¹¹ In Japanese, "*Kurashi no Konomi to Manzokudo Chosa.*"

level of knowledge of the meaning of words and a high level of sentence comprehension are likely to have a high degree of financial literacy and because when individuals live in the same prefectures as people with high Japanese skills, it is expected that individual Japanese skills become higher and the level of financial literacy also becomes higher.

My main findings are as follows. Overall, the level of financial literacy is low in Japan. Only 49% of Japanese households were able to answer two simple questions on interest and inflation. To the question on risk diversification, 60% of Japanese households were not able to provide a correct answer. Surprisingly, 62% of Japanese households said that they did not know the answer in at least one question even though possible answers were suggested to them. This result might reflect the fact that Japanese households are very cautious. With respect to the determinants of the level of financial literacy, I found that females, the young, and individuals with lower incomes and lower education levels are less likely to give correct answers to the questions on financial literacy, which is consistent with previous studies. With respect to the relationship between financial literacy and retirement planning, as expected I found that financial literacy increases the probability of having a savings plan for retirement. Moreover, I found that if people save regularly when they are children, they are more likely to develop a plan for retirement when they become adults.

The remainder of this paper is structured as follows. Section 2 describes the SLPS data. Section 3 presents the empirical results and attempts to answer the following questions. How are individuals financially literate in Japan (3.1)? Who knows the least (3.2)? Does financial literacy matter (3.3)? Section 4 provides concluding remarks.

2 SLPS

SLPS is a panel survey of Japanese households designed to clarify whether or not individuals' preferences and satisfaction as assumed in economics are consistent with reality. This survey has been conducted annually since 2003 by the Osaka University 21st Century Center of Excellence (COE) program "Behavioral Macrodynamics based on Surveys and Experiments" and since 2009 by the Osaka University Global COE program "Human Behavior and Socioeconomic Dynamics." The Osaka University COE program has subcontracted the actual administration of the survey to Chuo Chosa-sha, probably the largest and most reputable private survey company in Japan. The sample is a nation-wide representative sample of males and females aged 20–69 selected by a two-stage stratified random sampling from household registers. Individuals completing the questionnaire are not necessarily the

household head or the person who knows the most about the financial situation of the household. The questionnaire is in a paper and pencil format, and individuals who participated in the survey received gift certificates for 1,500 yen (18 US dollars, 14 euro¹²). This paper employs data from the January-February 2010 wave (the eighth wave of the survey) because it is the first to include the questions that enable me to measure respondents' level of financial literacy. There are 5,386 households in SLPS 2010, and the response rate was 88%.¹³ See Section 3 in order to know how I selected sample in the empirical analysis.

As shown in Appendix, the average age of respondents to this survey is 50. Fifty-one percent of respondents are female. Eighty-two percent of respondents are married. Eight percent of respondents have education less than upper secondary school, 49% of respondents completed upper secondary school education, and 43% of respondents have higher education degrees. Eighty-six percent of respondents own their homes. According to the Population Census conducted in 2005, the average age of Japanese aged 15 or older is 49, 52% of Japanese aged 15 or older are female, 61% of Japanese aged 15 or older are married, and 61% of households own their homes. In addition, according to the Employment Status Survey conducted in 2007, 20% of Japanese aged 15 or older have education less than upper secondary school, 52% completed upper secondary school education, and 26% have higher education degrees. Thus, the average age and the percentage of females in the SLPS are consistent with those in macro data, but unfortunately, marriage rate, educational level, and homeownership rate are higher in the SLPS than those in macro data.¹⁴

3 Empirical Evidence

3.1 How are individuals financially literate in Japan?

3.1.1 Measuring financial literacy

I use the three questions on financial literacy that were first developed by Lusardi and Mitchell (2006) for the Health and Retirement Study in 2004. The first question measures the understanding of compound interest and involves simple calculations. The second question examines the understanding of the joint effects of interest and inflation. The third question deals with risk and diversification. The wording of these three questions is as follows.

¹² I converted Japanese yen to US dollars and euros at the exchange rate for December 11, 2010.

¹³ The Osaka University Global COE program sends questionnaires to individuals who responded to the survey in the previous year. This might be the reason why the response rate is so high.

¹⁴ I do not have weights to make my sample representative of the Japanese population. Thus, I would like to construct weights and use the weighted data in my future work.

1. *Understanding of interest rate (numeracy)*

"Suppose you had 10,000 yen¹⁵ in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?"

- (i) More than 10,200 yen; (ii) Exactly 10,200 yen; (iii) Less than 10,200 yen;
- (iv) Do not know; (v) Refuse to answer.

2. *Understanding of inflation*

"Suppose that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy with the money in this account?"

- (i) More than today; (ii) Exactly the same; (iii) Less than today;
- (iv) Do not know; (v) Refuse to answer.

3. *Understanding of risk and diversification*

"Do you think that the following statement is true? Buying a single company stock usually provides a safer return than a stock mutual fund."

- (i) True; (ii) False; (iii) Do not know; (iv) Refuse to answer.

3.1.2 Results

In this subsection, I present respondents' answers to the *Interest*, the *Inflation*, and the *Risk* questions in Table 1a–Table 1c and show overall performance in Table 1d. I drop observations for which one or more of the answers to the financial literacy task are missing. The percentage of nonresponses is between 1.4% and 1.7% of the total sample for each of the three questions. Moreover, for the international comparison on the level of financial literacy, I present not only the results obtained from "Whole sample," which indicates that I use all observations for which respondents gave answers to all financial literacy questions but also those obtained from "Age 25-65," which indicates that I keep observations if respondents are aged 25-65 because there are an age limit for respondents in some countries.

[Table 1 about here]

¹⁵ Using the exchange rate for December 11, 2010, 10,000 yen is 119 US dollars and 90 euro.

The results of the first question (*Interest*) are displayed in Table 1a. Around 71% of all respondents answered correctly that there would be more than 10,200 yen in the account. Around 15% gave incorrect answers, and many of these individuals expected a smaller amount rather than the exact same amount. About 13% said that they did not know the answer, and about 2% refused to answer. As the first question is very basic, it is simple to answer for most of the Japanese population. Looking at Japan's school curricula, the concept of geometric progression has been required to be taught in upper secondary school since 1951. Thus, people should be familiar with it if they completed upper secondary school education. In fact, in our sample, about 90% of all respondents completed upper secondary school education.

The results of the second question (*Inflation*) are shown in Table 1b. Only 59% of respondents responded correctly that the purchasing power of their savings will decrease because of inflation. Around 11% did not answer this question correctly. The percentage of respondents who responded that the purchasing power of their savings will increase was about 6%, and that of those who responded that it will be exactly the same was 5%. The proportion of respondents who did not know the answer to this question was about 29%, more than twice the proportion of respondents who did not know the answer to the *Interest* question (14%).

Considering trends over time in the consumption price index, Japanese has not experienced inflation since the second oil shock in 1979. The inflation rate has had a downward trend since 1981, and it is widely known that Japan has experienced deflation during the 2000s. This might be the reason why many Japanese do not know inflation. Furthermore, looking at the relationship between age and the correct answers to the *Inflation* question, the old are much more likely to know inflation than the young. For example, while only 48% of individuals in their 20s answer correctly in the *Inflation* question, around 60% of individuals in their 70s answer correctly in the same question, which might reflect the fact that the most recent experience of Japanese is deflation and that inflation is the past phenomenon in Japan. In addition, looking at Japan's school curricula, the terms such as "deflation," "inflation," and "price fluctuations" have not appeared. This might be also one of the reasons why about 41% of all respondents were unable to answer the *Inflation* question correctly.

Table 1c presents the results for the third question on risk diversification. Only about 40% of respondents answered this question correctly. About 3% answered incorrectly that the statement is correct. More than half of the respondents responded that they did not know the answer.

Learning risk diversification is not a part of Japan's school curricula. Thus, individuals either have to have some economic or financial education or experience of stock investments in order to understand risk diversification. According to the Survey of Future Life,¹⁶ the proportion of respondents who have learned about the investment strategy is only 2.4% of the total sample.¹⁷ Moreover, it is widely known that Japanese households tend to avoid risky assets. In fact, according to SLPS 2010, the proportion of Japanese households who hold stocks is only 19%,¹⁸ which means that the majority of Japanese households have had no experience with stock investments. On the other hand, the majority of households hold their assets in the form of bank deposits and insurance contracts. It seems that this conservative investment behavior is reflected by the answers to the third question.

The overall performance of the respondents is summarized in Table 1d. The *Interest* and the *Inflation* questions were answered correctly by only half of the households (49%). Slightly more than a quarter of households (27%) were able to give correct answers to all three questions. Moreover, Table 1d reveals that about 18% of respondents could not give correct answers to any of the questions. The proportion of respondents who responded "do not know" to at least one question is very high (62%). Furthermore, about 10% of respondents responded that they did not know the answer in all three questions.

In summary, the level of financial literacy in Japan is low. Although the majority of respondents were able to give correct answers to the *Interest* question, more than a half of respondents were not able to give correct answers to the *Risk* question. The remarkable feature of Japanese households is that many Japanese did not give answers, responding that they did not know the answer. Specifically, 13%, 29%, and 56% of Japanese said that they did not know the answer in the *Interest*, the *Inflation*, and the *Risk* questions, respectively. Looking at the proportions in the US and Netherland, they are about 2%, 4%, and 25% in the US and about 4%, 9%, and 27% in Netherland.¹⁹ These results might indicate that Japanese are much more cautious than people in the other countries so that they tend not to answer unless they are confident of their answer.

¹⁶ In Japanese, "*Kongo no Seikatsu ni kansuru Anketo.*" This survey was conducted by the Institute of Life Design in 2001. The respondents to this survey are males and females aged 18–69 selected by a two-stage stratified random sampling from throughout Japan.

¹⁷ Respondents answered that they learned about investment strategies mainly from magazines and books (40%), seminars offered by financial institutions (32%), and TV programs (29%).

¹⁸ The share of Japanese households who hold mutual funds is 27%.

¹⁹ The results for the US and Netherland are obtained from Lusardi and Mitchell (2009, Table 1A and 2A) and Van Rooij, Lusardi, and Alessie (2007, Table 1A and 2A), respectively.

3.2 Who knows the least?

In this section, I concentrate on households that display lower levels of financial literacy. In Section 3.2.1, I show the relationship between financial literacy and some demographics that previous studies considered as factors that affect the level of financial literacy. In Section 3.2.2, I consider how the level of financial literacy varies across two factors specific to Japan.

3.2.1 Financial literacy, age, gender, education, and work

Previous studies of financial literacy find low levels of literacy among respondents with low income and low education, and among females and minorities. Table 2 shows the answers to the financial literacy questions across different socioeconomic characteristics. I kept observations for which respondents gave answers to three financial literacy questions and the questions on the relevant demographics.

[Table 2 about here]

Age.²⁰ Correct answers to the *Interest* and *Inflation* questions show a hump-shaped pattern over age. The percentages of respondents with correct answers to the two questions increase with age but decrease in the oldest age group (individuals aged over 65).²¹ However, the patterns of correct answers to the *Risk* question reveal a different picture from that to the *Interest* and *Inflation* questions. The percentage of respondents with correct answers to the *Risk* question continues to increase with age until "Age 51-65," but there is no statistically significant difference between "Age 51-65" and "Older than 65."²² The result for the *Risk* question is reflected in the pattern of the percentage of respondents who answered all three questions correctly. The percentage of respondents with three correct answers continues to increase with age until "Age 51-65," but there is no statistically significant difference between

²⁰ I use cross-section data for my analysis. Thus, I cannot differentiate between age and cohort effects. The level of financial literacy seems to reflect both age and cohort effects.

²¹ I performed two-sided t-tests to evaluate the differences in the answers to financial literacy questions among various age groups. Although the differences in the percentage of respondents with correct answers to the *Interest* question are not statistically significant between "Younger than 36" and "Older than 65" and between "Age 36-50" and "Age 51-65," all other differences in the percentage of correct answers to the *Interest* question are significant. The differences in the percentage of respondents with correct answers to the *Inflation* question are significant among all age groups.

²² Although there is no statistically significant difference in the percentage of respondents with correct answer to the *Risk* question between "Age 51-65" and "Older than 65," all other differences in the percentage of correct answers to the *Risk* question are statistically significant.

"Age 51-65" and "Older than 65."²³ Even in the oldest age group, the percentage of respondents with three correct answers is only about 32%. The pattern of "DK" answers is opposite to that of correct answers. For example, while the percentages of respondents with correct answers to the *Interest* and the *Inflation* questions show a hump-shaped pattern over age, those of respondents with "DK" answers to the two questions show a reverse hump-shaped pattern over age.

Gender. Females perform significantly worse than males²⁴. The percentage of females with correct answers is lower than that of males in all individual questions. Moreover, the percentage of females who select "DK" answers is higher than that of males in all individual questions. The difference in the percentage of respondents with three correct answers (At least 1 DK) is more than 10 percent point (15 percent point) between males and females.

Education. Financial literacy is highly correlated with education, and the gradient is rather steep. As the level of education is higher, the percentage of individuals with correct answers to individual questions and with three correct answers is higher²⁵. For example, while only 14% of individuals who completed education less than upper secondary school answered all questions correctly, 62% of individuals who have master degree or higher ("University, graduate school" in Table 2) answered all questions correctly. However, surprisingly, more than 30% of individuals who have master degree or higher (that is, individuals with the highest educational degrees) said that they did not know the answer to at least one question.

Self-employed, non-employed, workers, and retirees. Looking at the answers to the *Interest* question, the percentage of "Workers" with correct answers is the highest, and that of "Non-employed" with correct answers is the lowest (the difference between the two is statistically significant at the 5% level). However, all other differences in correct answers to the *Interest* question are not significantly different from zero among four work-related groups. With respect to correct answers to the *Inflation* question, "Non-employed" performs significantly worse than "Self-employed," "Workers," and "Retirees," and those three groups

²³ Although the differences in the percentages of respondents with three correct answers are not statistically significant between "Age 51-65" and "Older than 65," all other differences are significantly different from zero.

²⁴ All differences in the percentage of correct answers and "DK" answers are significantly different from zero between males and females.

²⁵ Although there is no statistically significant difference in the level financial literacy between upper secondary school graduates ("Upper secondary school" in Table 2) and junior college graduates ("Junior college" in Table 2), all other differences among various education degrees are significantly from zero.

perform equivalently²⁶. With respect to correct answers to the *Risk* question, "Non-employed" perform worse than "Workers" and "Retirees" again. However, there is no statistically significant difference in correct answers to the *Risk* question between "Non-employed" and "Self-employed." With respect to three correct answers, "Retirees" performs significantly better than other three groups ("Workers," "Self-employed," and "Non-employed"), and those three groups perform equivalently. Finally, looking at "DK" answers, I find that "Non-employed" are most likely to say that they did not know the answer. However, note that there is no statistically significant difference in the percentage of "DK" answers between "Non-employed" and "Self-employed" in most cases.

In summary, women and individuals with low educational degrees reveal a low level of financial literacy, consistent with previous studies. The pattern over age varies by the financial literacy questions. While the correct answers to the *Interest* and the *Inflation* questions show a hump-shaped pattern over age, the percentage of respondents with correct answers to the *Risk* question continues to increase with age until "Age 51-65," but there is no statistically significant difference between "Age 51-65" and "Older than 65." With respect to the differences in financial literacy among work-related groups, non-employed groups perform worst and retirees perform best in most cases²⁷.

3.2.2 Financial literacy, self-assessed financial knowledge and children's banks

Self-assessed literacy

In Section 3.1.2, it is found that only one-fourth of Japanese were able to give correct answers to all three questions and that nearly two-thirds of Japanese said that they did not know the answer to at least one financial literacy question, which imply that the level of financial literacy in Japan is low and they are not confident of their financial knowledge. In

²⁶ There is no statistically significant difference in the percentage of correct answers to the *Inflation* question among "Self-employed," "Workers," and "Retirees."

²⁷ Most of results found in the bivariate analysis do not change in a multivariate context: women and individuals with lower educational degrees are less likely to give three correct answers, and there is no statistically significant difference in the percentage of three correct answers between workers and the self-employed and between workers and the non-employed. However, contrary to the results found in the bivariate analysis, age does not have a significant effect on the percentage of three correct answers in a multivariate analysis even though it does have a significant and positive effect on that of the number of correct answers.

this subsection, first, I check how Japanese assess their level of financial literacy and consider the relationship between self-assessed financial literacy and observed financial literacy.

In the survey I used, respondents are asked whether they think that they know a lot about finance and gave the answer on a 1–5 scale.²⁸ For example, the answer "1" ("5") indicates that respondents think that the level of their financial literacy is very low (very high). Looking first at the distribution of self-assessment of financial literacy in Table 3, while the proportion of respondents who think that their level of financial knowledge is very low or just low is more than 70% of total observations, the proportion of respondents who chose "very high" or "high" is only 6%. Thus, so many Japanese are not confident of their financial literacy.²⁹

Next, I compare the objective measures of financial literacy with the self-assessment of financial literacy, ignoring individuals assessing that their financial knowledge is very high because the number of such observations is so few (only 0.7% of total sample) that sampling error may exist. The results show that as the self-assessment of financial literacy increases, the percentage of individuals with correct answers to all three questions also increases, as expected³⁰. The difference in the percentages of individuals with correct answers among different self-assessment categories is the largest for the *Risk* question. While only 28% of respondents, who assessed that the level of their financial literacy is very low, gave correct answers to the *Risk* question, 64% of respondents, who assessed that the level of their financial literacy is high, gave correct answers to the *Risk* question.

[Table 3 about here]

Children's banks.

As mentioned in Section 1, children's banks are savings promotion activities in schools. Children's banks allow students to deposit and withdraw money to/from financial institutions

²⁸ Because the question about self-assessment of financial knowledge appears prior to the *Interest*, *Inflation*, and *Risk* questions, it seems that the answer to self-assessment of financial knowledge is not affected by the *Interest*, *Inflation*, and *Risk* questions.

²⁹ US and Dutch households' responses to similar questions are given in previous studies (Lusardi and Mitchell (2009) and Van Rooij et al. (2007)). They use the following question as a measure of self-assessment: "On a scale from 1 to 7, where 1 means very low and 7 means very high, how would you assess your understanding of economics?" Their results show that 50% (60%) of US households (Dutch households) assess their understanding of economics to be higher than average.

³⁰ There is no statistically significant difference in the percentage of respondents with all correct answers between respondents who assess that their financial literacy is "high" and those who assess that their financial literacy is "very high." However, all other differences in the percentage of respondents with all correct answers are significantly different from zero among different self-assessment categories.

through schools, and the interest income on the money deposited through children's banks is tax exempt regardless of the amount on deposit. Japan's school curricula, announced in 1951, recommended to introduce the savings promotion activities in schools as one of student body activities. Although there has been no statement about children's banks in school curricula since 1958, the number of children's banks increased in the 1950s all over Japan. For example, the number of children's banks was only 9,709 in July 1949, which accounts for 22% of elementary schools, lower secondary schools and upper secondary schools. However, in July 1957, the number of children's banks rose to 23,649, which accounts for 53% of elementary schools, lower secondary schools and upper secondary schools in Japan.

The system of children's banks might improve the level of financial literacy because saving regularly might induce children's interest in calculating interest rates and considering the value of money. Thus, I consider whether individuals whose school had a children's bank are more likely to have a higher level of financial literacy than those whose school had no children's bank. The question about children's banks is as follows:

"When you were elementary school students, was there a children's bank in your school?"

(i) Yes; (ii) No; (iii) Do not know

Table 3 shows that 15% of respondents attended schools with a children's bank, 72% attended schools without a children's bank, and 13% do not know whether there was a children's bank in their school. The results of Table 3 show that children's banks do not have clear impacts on financial literacy. More specifically, the percentage of respondents with correct answers are not significantly different between individuals who attended schools with a children's bank and those who attended schools without a children's bank in any question except for the *Inflation* question. For example, the differences in the percentages of respondents with correct answers between the two groups are only 0.9 percent point ($=72.4 - 71.5$), 4.4 percent point ($=63.6 - 59.2$), and -0.1 percent point ($=40.8 - 40.9$) for the *Interest*, the *Inflation*, and the *Risk* questions, respectively. In addition, the percentage of respondents with three correct answers is only 0.8 percent point higher ($=28.7 - 27.9$) for respondents who attended schools with a children's bank than those who attended schools without a children's bank. Although there are statistically significant differences in the percentage of correct answers between respondents who attended schools with a children bank and those who do not know whether there was a children's bank in their school, this difference in the percentage of correct answers between the two groups seems to reflect a difference in memory rather than a

difference in the level of financial knowledge. Therefore, it seems that children's banks do not have impact on the level of financial literacy. This result might not be surprising because although children's banks are considered to be the first financial education in Japan, the objects of children's banks are mainly to recommend students not to waste money, to use money in a planned manner, and to save regularly, and learning concepts of economics and finance was not emphasized so much.

3.3 Does financial literacy matter?

3.3.1 Retirement planning

In this section, I turn to the question of whether financial literacy matters for retirement planning. Previous studies (for example, Ameriks, Caplin, and Leahy (2003); Lusardi and Mitchell (2007); and Lusardi (2003)) have shown that people who develop a plan accumulate more wealth than those who do not develop a plan. According to Lusardi (2003), planning is costly for individuals because they have to gather and process information in the course of planning. Thus, the difference in search costs can explain the difference in the level of accumulation. It seems that the difference in search costs can be explained by the level of financial literacy. In other words, individuals equipped with a high level of financial literacy face lower planning costs than those with a low level of financial literacy and thus end up with greater wealth. In this paper, I am not interested in the effect of financial literacy on the level of wealth but rather in whether individuals with a high level of financial literacy are more likely to develop a plan for retirement than those with a low level of financial literacy. I measure retirement planning using the following question.

"Do you have a savings plan for after the household head retires? (If the household head has already retired, do you have a savings plan for the future?)"

(i) I have a specific plan. (5%)

(ii) I have a rough plan. (35%)

(iii) I do not have a plan now, but I am going to make a plan in the future. (47%)

(iv) I do not have a plan now, and I am not going to make a plan in the future. (14%)

As you can see above, while 40% of respondents have a plan, more than half of respondents do not have a plan for their retirement or the future. Moreover, 14% of respondents are not going to make a plan even in the future. Table 4 compares the level of financial literacy between planners (respondents who chose (i) or (ii)) and non-planners (respondents who chose (iii) or (iv)). The differences between planners and non-planners are statistically significant at the 1% level in all cases in Table 4. More specifically, the percentage of respondents with correct answers (DK) is higher (lower) for planners than for non-planners in each individual question. In addition, overall, the percentage of respondents with correct answers to both the *Interest* and the *Inflation* questions, the percentage of respondents with all correct answers, and the number of correct answers are higher for planners than for non-planners.

[Table 4 about here]

3.3.2 Retirement planning and financial literacy (OLS results)In order to examine the relationship among having a savings plan, financial literacy, and socioeconomic characteristics simultaneously, I conduct multivariate analysis. First I estimate a simple linear regression (OLS). As in Tables 4, I use *Planners* as dependent variables, which is a dummy variable that equals one if respondents have a savings plan for their retirement or future. Financial literacy is measured in two different ways. The first measure is a dummy variable that equals one if respondents were able to answer all three financial literacy questions correctly. The second measure is the number of correct answers; i.e., the variable can take values between 0 and 3. In addition, I control for children's bank, age, gender, educational level, household income, marital status, the number of children, self-employed, non-employed, income shock, homeownership, and seven area dummies. With respect to sample selection, I dropped observations that had missing values for the variables included in the regression. Moreover, I restricted the empirical analysis to the non-retired respondents who are aged 25-65 because developing a savings plan is more important for non-retirees than for retirees and because restricting the sample to age 25-65 makes it possible for us to do an international comparison on the empirical results.

[Table 5 about here]

The OLS results are displayed in models 1 and 4 of Table 5. As expected, financial literacy has a positive effect on retirement planning, and the coefficients are significant at the 1% level in both specifications. More specifically, the ability to answer three questions correctly increases the probability of having a savings plan for retirement by about 7%, and an increase in the number of correct answers increases the probability of having a savings plan by about 4%.³¹

Children's banks also have a positive effect on retirement planning even if I control for socioeconomic variables. Individuals who attended schools with a children's bank have a higher probability of planning by 7% compared with those who attended schools without a children's bank or those who do not know whether there was a children's bank in their school. However, one concern is that introducing children's banks to schools is not an obligation for schools and students, parents, and/or teachers decide if they introduce a children's bank or not. That is, regional factors might contribute to this result (for example, in some regions, but not in other regions, there might be many parents who do not want their children to deal with money and who oppose the introduction of children's banks to schools). In order to take account of regional factors, I used dummy variables for the prefectures in which respondents lived when they were third-grade lower secondary school students as proxy variables for the prefectures in which respondents lived when they were elementary school students. The main result is not changed. For example, the coefficient of children's bank in model 1 of Table 5 becomes 0.0735 (significant at the 1% level), which is very similar to that obtained when the prefectures in which respondents lived when they were third-grade lower secondary school students are not controlled. Moreover, whether children's banks are introduced into schools or not might depend on the respondents' cohorts. Although a savings promotion campaign by the Japanese government had been very active in the past, as the Japanese economy grew, the campaign became less active, and thus the number of children's banks may have decreased. Although the data I use cannot differentiate between age and cohort effects, I added seven age dummies for five-year intervals beginning at 30 years of age in order to capture the pure effect of

³¹ I also conduct robustness checks with more detailed measures of financial literacy. First, I include the correct answers to the *Interest*, the *Inflation*, and the *Risk* questions separately. I find that the ability to answer the *Interest*, the *Inflation*, and the *Risk* questions correctly increases the probability of developing a savings plan for retirement by 4.8%, 3.7%, and 7.2%, respectively (the coefficients are significant at 5%). Thus, understanding the risk diversification has the largest effect on developing a savings plan among three concepts. Second, I include a dummy variable that equals one if respondents answer both the *Interest* and the *Inflation* questions. I find that the ability to answer the two questions correctly increases the probability of developing a savings plan by 5.1% (the coefficient is significant at the 1% level). Third, I include the number of "do not know" responses. I find that an increase in the number of "do not know" responses decreases the probability of developing a savings plan by 4.7%.

children's banks as precisely as possible. The main result is not changed. For example, when I add seven age dummies for five-year intervals instead of age and age-squared, the coefficient of children's banks became 0.0734 and significant at the 1% level. Therefore, my finding that children's banks have a positive effect on planning seems to be robust.

Age also has a significant effect on retirement planning. According to the result in model 1 of Table 5, increase in age decreases the probability of developing a plan until age 36 ($=0.0356/0.0005*2$) but increases it since then. With respect to gender, females have a higher probability of planning by 4% compared with males. I do not find significant differences in planning among educational levels. The results are unchanged even if I change the omitted category from less than upper secondary school to any other education levels. Income has a significantly positive effect on the probability of having a savings plan. Moreover, respondents who did not answer their household income also are more likely to develop a savings plan than those whose household income is less than 4 million yen. With respect to marital status, while single respondents are less likely to develop a plan than married respondents, divorced and widowed respondents develop a savings plan equally to married respondents. With respect to the number of children, there is no significant difference in planning behavior among respondents with no child, those with one child and those with two children, but the respondents with three children (four or more children) are less likely to develop a plan by 7% (11%) than respondents with no child. While the self-employed is more likely to develop a savings plan than workers by 4%, the non-employed develops a savings plan equally to workers. An income shock (decrease in income) decreases the probability of developing a saving plan, and respondents who own their homes are more likely to develop a plan than non-home owners.

3.3.3 Retirement planning and financial literacy (GMM results)

There is a potential problem in relying on OLS estimates because of the fact that households may learn and improve their knowledge via developing a savings plan. In order to take account of the endogeneity problem between financial literacy and retirement planning, I estimate an IV regression. Ameriks et al. (2003) use respondents' mathematical skills as an instrumental variable for the propensity to plan in order to identify the effect of planning on wealth because financial planning calls for specific skills in the area of numeracy. I use the level of Japanese skills as instruments for financial literacy because respondents have to know the meaning of words in the financial literacy questions and to comprehend the sentences in the

financial literacy questions that might be unfamiliar to ordinary people. Moreover, it is unlikely that individuals with higher Japanese skills are more likely to develop a savings plan than those with lower Japanese skills³². Specifically, I use two types of instruments. My first hypothesis is that individuals with higher Japanese skills will have a higher level of financial literacy than those with lower Japanese skills. Respondents' Japanese skills are measured by the following question.

"When you were 15 years old, where did your grades in Japanese rank among others in your grade?"

(i) in lower rank; (ii) in rather lower rank; (iii) in the middle; (iv) in rather higher rank; (v) in higher rank.

I define two dummy variables that equal one if respondents chose (iv) and (v), respectively.

The second instrument for financial literacy is the average Japanese skills in each prefecture where the respondents live. The hypothesis for this instrument is that if respondents are surrounded by people with high Japanese skills, respondents are more likely to learn from them and to become more financially literate as well. The Ministry of Education, Science and Technology have conducted the "Nationwide Academic Achievement Exams" annually since 2007, and the data on average Japanese score by prefecture are available.³³ Because the SLPS collects information on the prefectures where the survey respondents live, I am able to match observations from the SLPS data with the average Japanese score in each prefecture. The targets of the "Nationwide Academic Achievement Exams" are third-grade lower secondary school students, but it is expected that students' Japanese skills are influenced strongly by their parents' Japanese skills and that their Japanese skills give the positive effect on the respondents' Japanese skills and financial literacy.

[Table 6 about here]

³² One could argue that the individual Japanese skill might be a proxy for intelligent and ability and it might also have an effect on developing a savings plan. However, I used this variable as an instrument variable for financial literacy because 1) the impact of the individual Japanese skill on the level of financial literacy is very strong (i.e., the weak-instrument problem does not occur) and 2) the results of the Hansen's J-test do not show the rejection of the over-identifying restrictions.

³³ More specifically, I used the Nationwide Academic Achievement Exams 2010, which were conducted in April, 2010, the closest to when the SLPS 2010 was conducted.

The results for the first stage are reported in Table 6. The dependent variables in models 7 and 8 (All three correct) are a dummy variable that equals 1 if all three financial literacy questions are answered correctly and those in models 9 and 10 (No. of correct answers) are the number of correct answers to the three financial literacy questions. With respect to models 7 and 9 of Table 6, instrument variables are a dummy variable that equals one if respondents' grades in Japanese rank in "rather higher rank" in their grade and a dummy variable that equals one if respondents' grades in Japanese rank in "higher rank" in their grade. With respect to models 8 and 10, instrument variables are the two dummy variables used in models 7 and 9 and the average Japanese score by prefecture.

Looking at the results in models 7 and 9 of Table 6, the coefficients of the two instrument variables are strongly significant at the 1% level, and as expected, respondents' Japanese skills increase the level of financial literacy. Moreover, looking at the results in models 8 and 10, not only the coefficients of respondents' Japanese skills but also those of the average Japanese score by prefecture are statistically significant. Thus, as expected, if respondents are surrounded by people with high Japanese skills, respondents are more likely to learn from them and to become more financially literate as well. With respect to the effect of the other variables on the level of financial literacy, while age does not have a significant effect on the ability to answer three financial literacy questions correctly, it does have a significant and positive effect on the number of correct answers. Moreover, consistent with the results obtained in previous studies, female and individuals with lower education degrees and with less income are less likely to be financially literate than counterparts. In addition, increase in the number of children also decreases the level of financial literacy. The GMM results are reported in models 2, 3, 5, and 6 of Table 5³⁴. I found that financial literacy has a positive and significant effect on planning for retirement, which is consistent with the OLS results. Moreover, the coefficients of financial literacy in the GMM results are larger in value than the coefficients of the OLS results. For example, the ability to answer three questions correctly increases the probability of having a savings plan for retirement by 47% (model 2 of Table 5) and an increase in the number of correct answers increases the probability of having a savings plan by 16% (model 5 of Table 5). With respect to the other explanatory variables, the OLS and GMM results are not different in most cases.³⁵

³⁴ The results of the first stage regression in models 2 and 5 are shown in models 7 and 9 of Table 6, and those of the first stage regression in models 3 and 6 are shown in models 8 and 10 of Table 6.

³⁵ The F-values of the excluded instruments are always more than 10 in models 2, 3, 5, and 6 of Table 5. Stock, Wright, and Yogo (2002) suggest that the F statistic should exceed 10 for inference based on t

3.3.4 Robustness checks and extensions

In this subsection, I assess the robustness of my findings obtained so far by using different sample. Moreover, I extend my analysis by controlling for the other important variables that seem to affect financial literacy. The estimation results are not shown in tables but are available from the author on request.

All non-retirees

So far, I have conducted estimations restricting non-retirees who are aged 25-65. However, Japanese tend to work longer than people in the other countries. According to the Society at a Glance 2009: OECD Social Indicators,³⁶ while the average retirement age is 63.5 for males and 62.3 for females on average in OECD countries, Japanese males (females) work until age 69.5 (66.5) on average. Thus, restricting samples to non-retirees who are aged 25-65 might indicate dropping respondents who are very close to their retirement and who are very important for the analysis on retirement planning. Therefore, I use all observations for which respondents are non-retirees.³⁷ I found that the effect of financial literacy on retirement planning became larger. For example, the coefficient of "All three correct" in model 1 of Table 5 changed from 0.0722 to 0.0741 and that in model 2 of the same table changed from 0.4695 to 0.5500.

Decision makers

Next, I restrict the sample to decision makers regarding savings and investments because the effect of financial literacy on retirement planning is expected to be larger for decision makers than for non-decision makers. As expected, I found that the coefficient of "All three correct" in model 1 of Table 5 changed from 0.0722 to 0.0769 and that in model 2 of the same table changed from 0.4695 to 0.4922.

Parents' educational degrees

Third, I take account of the effect of respondents' family characteristics because financial knowledge may be affected by the interaction with family. For example, Lusardi, Mitchell, and Curto (2009) found that respondents whose mother has a higher education degree are more

the 2SLS estimator to be reliable when there is one endogenous regressor. Thus, my instruments meet this rule. Moreover, the results of the Hansen's J-test do not show the rejection of the over-identifying restrictions, which indicate that my instruments are valid. In addition, I tested for the exogeneity of financial literacy, and the null hypothesis that financial literacy is exogenous was rejected at the 1% significance level in all models, which mean that OLS estimates are inconsistent and GMM estimates are preferable.

³⁶ See for the details: <http://www.oecd-ilibrary.org/docserver/download/fulltext/8109011ec014.pdf?expires=1296034181&id=0000&accname=guest&checksum=D82D8CB4D4CEB67009FBE6F0C1581C79>

³⁷ 244 observations were added by not setting age limits.

likely to answer financial literacy questions correctly than those whose mother has a lower education degree. Thus, I test whether respondents whose parents have higher education degrees are more likely to have higher levels of financial literacy. As expected, the results show that the respondent whose mother completed upper secondary school education have more correct answers in financial literacy questions than those whose mother completed education lower than upper secondary school education³⁸. However, the effect of father's education is different from that of mother's. I found that the respondent whose father completed upper secondary school education is less likely to answer correctly in all financial literacy questions than those whose father completed education lower than upper secondary school education.³⁹ Parents' educational levels also affect respondents' retirement planning. In all OLS and GMM results, I found that the respondent whose mother completed education higher than upper secondary school education is less likely to develop a savings plan than that whose mother completed education lower than upper secondary school education. On the other hand, the respondent whose father completed education higher than upper secondary school education is more likely to develop a savings plan than that whose father completed education lower than upper secondary school education⁴⁰. Finally, the effect of financial literacy on retirement planning are not different from those obtained in the estimation that does not include parents' educational degrees.

Talking about finance with parents

Houtenville and Conway (2008) found that if parents have more time for discussions with their children, the school achievements of their children, such as math and reading scores, are higher. Thus, I test whether individuals who had more time for discussions with parents have higher levels of financial literacy. In order to proxy "discussion with parents," I use the following statement.

"When I was a child, my parents often talked to me about finance."

Respondents answer on the 1–5 scale from "It is particularly true for you" to "It doesn't hold true at all for you." I define a dummy variable that equals 1 if respondents chose 1, 2, or 3 and

³⁸ However, there is no significant difference in the number of correct answers between the respondent whose mother completed education higher than upper secondary school education and that whose mother completed education less than upper secondary school education.

³⁹ However, there is no significant difference in all correct answers between the respondent whose father completed education higher than upper secondary school education and that whose father completed education less than upper secondary school education.

⁴⁰ In my future work, I would like to consider the mechanism of the different impact of parents' educational degrees on financial literacy and retirement planning.

a dummy variable that equals 1 if they chose 4, with 5 being the excluded category. Thus, it is expected that the coefficients of the two variables will be positive. The results show that the fact that parents talked to respondents about finance have no significant impact on respondents' financial literacy. This result might not be surprising because the content of finance parents talked to respondents about when respondents were children must be very simple. On the other hand, the fact that parents talked to the respondents about finance increases the probability of developing a savings plan for retirement in all OLS and GMM estimations (the coefficients are significant at 1% level). These results might indicate that although talking about finance with parents did not improve respondents' financial literacy, it contributed positively to the tendency to think about future. Finally, the effects of financial literacy on retirement planning are not different in signs and magnitude from those obtained in the estimation that does not include the variable that indicates talking about finance with parents.

4 Conclusions and discussion

4.1 Conclusions

In this paper, I provided an overview of the level of financial literacy in Japan using micro data on Japanese households, analyzed the determinants of financial literacy and linked financial literacy to retirement planning.

Overall, the level of financial literacy is low in Japan. Only 49% of Japanese households were able to answer two simple questions on interest and inflation. To the question on risk diversification, 60% of Japanese households were not able to provide a correct answer. Surprisingly, 62% of Japanese households responded that they did not know the answer in at least one question even though possible answers were suggested to them. This result might reflect the fact that Japanese households are very cautious. With respect to the determinants of the level of financial literacy, I found that females, the young, and individuals with lower incomes and lower education levels are less likely to give correct answers to the questions on financial literacy, which is consistent with previous studies. With respect to the relationship between financial literacy and retirement planning, as expected I found that financial literacy increases the probability of having a savings plan for retirement. Finally, I found that if people save regularly when they are children, they are more likely to develop a plan for retirement when they become adults.

4.2 Discussion

As mentioned in Introduction, it will be increasingly difficult for Japan to fund retirements through public pensions, and individuals must take more responsibility for their own financial well-being after retirement. Although Japanese households tend to allocate their financial assets mainly to safe assets, the interest rate of bank deposits is less than 0.1% on average (on January 2011), and thus it seems to be hard to lead a comfortable life after retirement only by depending on such a conservative way of saving. However, my finding shows that only about 40% of Japanese understand the concept of risk diversification, which is a basic and minimum knowledge required to invest risky assets. If individuals do not have an adequate financial literacy but invest risky assets, they may be more likely to suffer wealth loss than those with an adequate financial literacy.

I would like to provide some suggestions, taking defined-contribution pension plans (hereafter, DC pension plans) in Japan as an example. There are two types of DC pension plans in Japan: the employer-sponsored type and the individual type. Of the participants in the DC pension plans, 96% have the employer-sponsored type. Even though employers pay all contributions to the pension plan for their employees (no matching contributions), participants in DC employer-sponsored pension plans can decide how to allocate pension contributions among various types of financial assets. Before and after participants decide the asset allocation of pension contributions, their companies are obligated to offer the education about the system of DC pension plans, retirement benefit systems, and asset allocation. However, according to a survey on the defined-contribution pension in 2007, conducted by the Pension Fund Association of Japan, about half of participants in DC pension plans answered that they did not understand the contents of DC pension plans and that they did not know how their contributions were allocated among various types of assets. These results imply that the offered education in the workplace did not improve the level of financial literacy of participants in DC pension plans. I would like to suggest 1) to test the level of financial literacy of participants in DC pension plans after providing an education in the workplace, 2) to prohibit DC pension participants from investing risky assets if their level of financial literacy is low, and 3) to continue to offer an education to the participants with a low level of financial literacy until their financial literacy reach a certain level. Since conducting a financial literacy test and offering a continued education is very hard for companies because of time and budget constraints, public sectors such as Financial Services Agency have to support them further.

My second suggestion is related to Kitamura and Nakashima (2009). They gave the financial education to participants in DC pension plans through seminars and compared the

level of financial literacy and the share of stocks between the participants in the seminar and non-participants.⁴¹ Their findings are that seminar participants are more likely to have a higher level of financial literacy and to increase the share of stocks in their pension contributions in the future than non-participants in the seminar.⁴² The important thing of their research is that even though the seminar, organized by Kitamura and Nakashima (2009), taught only a basic and minimum financial knowledge required for investing risky assets, it could improve the financial literacy of participants in DC pension plans. It must be too difficult for individuals with low level of financial literacy such as Japanese households to understand the complicated financial concepts. Offering simplified guidelines for asset allocation might be effective to enhance the level of financial literacy.

⁴¹ Unfortunately, Kitamura and Nakashima (2009) do not compare the share of stocks in pension contributions between the low and high level of financial literacy.

⁴² This result might be overestimated because the survey respondents can decide whether they participate in the seminar or not.

Table 1: Answers to the Financial Literacy Questions

Table 1a–Table 1c contain the proportion of respondents selecting each possible answer to the *Interest*, the *Inflation* and the *Risk* questions. Table 1d displays the proportion of respondents 1) who were able to give correct answers to both the *Interest* and the *Inflation* questions, 2) who were able to give correct answers to all three questions, 3) who were unable to give correct answers to any of the questions, 4) who gave at least one "do not know" response, and 5) who gave "do not know" response in all three questions. "Whole sample" indicates that I use all observations for which respondents gave answers to all financial literacy questions. "Age 25-65" indicates that I keep observations if respondents are aged 25-65.

Table 1a: Interest question		
	Whole sample in percent	Age 25-65 in percent
More than 10,200 yen	70.5	71.3
Exactly 10,200 yen	6.0	6.0
Less than 10,200 yen	9.4	9.6
Do not know	12.5	11.6
Refuse to answer	1.6	1.5
Number of observation	5,268	4,382

Table 1b: Inflation question		
	Whole sample in percent	Age 25-65 in percent
More	5.8	5.5
Exactly the same	5.0	5.1
Less	58.8	58.8
Do not know	28.6	28.8
Refuse to answer	1.8	1.8
Number of observation	5,268	4,382

Table 1c: Risk question		
	Whole sample in percent	Age 25-65 in percent
Correct "False"	39.5	39.4
Incorrect "True"	2.8	2.5
Do not know	56.1	56.5
Refuse to answer	1.7	1.6
Number of observation	5,268	4,382

Table 1d: Answers across questions		
	Whole sample in percent	Age 25-65 in percent
Interest & Inflation	49.2	49.2
All correct	27.0	26.9
No correct	17.6	16.8
At least 1 DK	61.5	61.9
All DKs	9.7	9.0
Number of observation	5,268	4,382

Note: Author's calculation on the basis of the SLPS 2010. Data are unweighted.

Table 2: Financial Literacy and Socioeconomic Variables

This table shows financial literacy across different socioeconomic variables. The left six columns show the percentage of correct answers (Correct) and the percentage of "do not know" answers (DK) to each financial literacy question (*Interest*, *Inflation*, and *Risk*). The last two columns display the percentage of respondents with three correct answers and the percentage of respondents with at least one "do not know." I used all observations for which respondents gave answers to all three financial literacy questions and the questions on the relevant demographics. The number of observations is 5268 for Age and Gender, 5175 for Education, and 5018 for Self-employed, non-employed, workers, and retirees.

	Interest		Inflation		Risk		Overall	
	Correct in percent	DK in percent	Correct in percent	DK in percent	Correct in percent	DK in percent	3 correct in percent	At least 1 DK in percent
Age								
Younger than 36	64.2	15.9	41.6	41.5	29.9	64.8	15.7	72.8
Age 36-50	72.2	12.1	56.1	31.3	38.7	57.6	25.8	63.2
Age 51-65	72.5	9.6	66.9	22.0	42.7	53.1	31.0	57.4
Older than 65	67.4	17.6	62.8	25.6	43.2	51.0	31.5	56.1
Gender								
Male	74.6	10.4	67.0	21.2	46.2	48.7	34.3	53.2
Female	66.8	14.4	51.6	35.1	33.5	62.7	20.6	68.8
Education								
Less than upper secondary school	47.0	26.7	43.7	40.7	25.7	67.6	13.5	72.7
Upper secondary school	68.9	13.4	55.5	31.1	36.2	59.6	23.4	64.9
Junior college ^{a)}	71.7	10.2	55.6	32.1	37.7	58.4	23.6	66.2
University, undergraduate ^{b)}	81.8	6.6	72.9	16.8	51.1	44.7	40.0	48.6
University, graduate school ^{c)}	95.1	1.0	86.3	7.8	66.7	31.4	61.8	32.4
Self-employed, non-employed, workers, and retirees								
Self-employed	68.8	11.8	58.7	29.9	37.5	57.6	24.1	63.6
Non-employed ^{d)}	67.8	13.8	52.8	32.8	35.2	62.1	24.4	66.4
Workers	73.0	10.6	60.5	26.8	40.9	54.8	27.7	60.3
Retirees ^{e)}	71.7	12.3	61.4	26.6	42.3	53.3	30.1	58.4

Note: Author's calculation on the basis of the SLPS 2010. Data are unweighted. a) junior college graduates; b) individuals who completed undergraduate education; c) individuals who completed graduate education; d) individuals who are not retired but non-employed; e) individuals who are completely retired.

Table 3: Financial Literacy, Self-Assessed Financial Knowledge and Children's Banks

This table shows how the level of financial literacy differs depending on the self-assessment of financial knowledge and whether or not there was a children's bank in the elementary schools that respondents had attended. "Correct" shows the percentage of respondents with correct answers in each individual question, "DK" shows the percentage of respondents who said that they did not know the answer in each individual question, "3 correct" shows the percentage of respondents who answered correctly in all three question, and "At least 1 DK" shows the percentage of respondents who said that they did not know the answer to at least one question. I used all observations for which respondents gave answers to all three financial literacy questions and the questions on the relevant demographics. The number of observations is 5260 for self-assessed financial knowledge and 5198 for children's banks.

	Interest		Inflation		Risk		Overall		
	Relative frequency in percent	Correct in percent	DK in percent	Correct in percent	DK in percent	Correct in percent	DK in percent	3 correct in percent	At least 1 DK in percent
Self-assessed financial knowledge									
1 (very low)	36.8	64.9	17.3	49.5	38.5	28.4	67.6	17.3	73.7
2 (low)	34.2	72.4	9.8	62.2	24.8	40.7	55.3	28.3	60.2
3 (medium)	23.3	74.1	10.0	64.9	22.2	49.6	45.4	35.3	50.9
4 (high)	4.9	81.1	7.3	75.3	12.0	63.7	29.3	47.9	32.8
5 (very high)	0.7	80.6	8.3	72.2	16.7	66.7	30.6	55.6	30.6
Children's banks									
Respondents' schools had children's banks	15.1	72.4	11.7	63.6	23.4	40.8	55.4	28.7	60.1
Respondents' schools had no children's banks	71.8	71.5	11.7	59.2	28.5	40.9	54.6	27.9	60.5
Respondents do not know if their schools had children's banks	13.1	64.1	17.1	52.6	34.7	30.9	64.6	21.6	67.8

Note: Author's calculation on the basis of the SLPS 2010. Data are unweighted.

Table 4: Retirement Planning and Financial Literacy

This table shows the differences in the level of financial literacy between planners and non-planners. *Planners* means that respondents have a savings plan for after the household head retires (if the household head has already retired, they have a savings plan for the future), and *Non-planners* means that respondents do not have a savings plan. "Correct" shows the percentage of respondents with correct answers in each individual question, "DK" shows the percentage of respondents who said that they did not know the answer in each individual question, and "Interest and Inflation" shows the percentage of respondents with correct answers to both the *Interest* and the *Inflation* questions. I dropped observations that had missing values for the variables included in the regression and kept the observations on non-retired respondents who are aged 25-65. The number of observation is 2855.

	Planners	Non-planners
Interest		
Correct	78.4	71.9
DK	7.1	11.6
Inflation		
Correct	65.9	58.3
DK	21.6	29.3
Risk		
Correct	48.4	38.1
DK	47.4	58.5
Overall		
Interest and Inflation	57.8	48.4
All correct	34.5	25.2
Number of correct answers	1.9	1.7

Source: Author's calculation on the basis of the SLPS 2010. Data are unweighted.

Table 5: Multivariate Analysis of Retirement Planning (OLS and GMM Results)

This table reports OLS and GMM estimates of the effect of financial literacy and several control variables on retirement planning. The dependent variable is a dummy variable that equals one if respondents have a savings plan for their retirement or future. "All three correct" is a dummy variable that equals one if respondents answered correctly in all three financial literacy questions. "Number of correct answers" means the number of correct answers in three financial literacy questions. I also included seven area dummies, but their coefficients are not shown. Standard errors are White's heteroskedasticity-robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4	5	6
	OLS	GMM	GMM	OLS	GMM	GMM
All three correct	0.0722*** (0.0211)	0.4695** (0.2142)	0.3873* (0.2016)			
Number of correct answers				0.0369*** (0.0094)	0.1645** (0.0731)	0.1427** (0.0707)
Children's banks	0.0677*** (0.0260)	0.0613** (0.0278)	0.0628** (0.0272)	0.0658** (0.0259)	0.0553** (0.0272)	0.0571** (0.0269)
Age	-0.0356*** (0.0082)	-0.0388*** (0.0089)	-0.0383*** (0.0087)	-0.0361*** (0.0082)	-0.0398*** (0.0087)	-0.0392*** (0.0086)
Age squared	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0005*** (0.0001)
Female	0.0402** (0.0195)	0.0840*** (0.0313)	0.0749** (0.0300)	0.0405** (0.0195)	0.0690*** (0.0257)	0.0644** (0.0253)
Upper secondary school	0.0403 (0.0403)	0.0001 (0.0477)	0.0094 (0.0463)	0.0348 (0.0407)	-0.0098 (0.0508)	-0.0008 (0.0496)
Junior college	0.0009 (0.0451)	-0.0570 (0.0571)	-0.0434 (0.0552)	-0.0071 (0.0456)	-0.0712 (0.0613)	-0.0583 (0.0597)
University, undergraduate	0.0503 (0.0433)	-0.0529 (0.0716)	-0.0315 (0.0686)	0.0409 (0.0438)	-0.0562 (0.0723)	-0.0387 (0.0703)
University, graduate school	0.0845 (0.0716)	-0.1078 (0.1278)	-0.0674 (0.1219)	0.0773 (0.0718)	-0.0689 (0.1108)	-0.0427 (0.1082)
Income: 4-6 million yen	0.0736*** (0.0268)	0.0587** (0.0295)	0.0621** (0.0288)	0.0690** (0.0269)	0.0433 (0.0314)	0.0478 (0.0309)
Income: 6-8 million yen	0.1106*** (0.0281)	0.0870*** (0.0328)	0.0923*** (0.0318)	0.1079*** (0.0281)	0.0837*** (0.0324)	0.0881*** (0.0319)
Income: More than 8 million yen	0.1618*** (0.0278)	0.1152*** (0.0393)	0.1259*** (0.0376)	0.1576*** (0.0279)	0.1138*** (0.0384)	0.1219*** (0.0375)
Income missed	0.0813* (0.0418)	0.0585 (0.0459)	0.0654 (0.0446)	0.0845** (0.0417)	0.0816* (0.0427)	0.0835** (0.0422)
Single	-0.0782* (0.0434)	-0.0819* (0.0461)	-0.0820* (0.0451)	-0.0762* (0.0435)	-0.0718 (0.0450)	-0.0725 (0.0445)
Divorced	-0.0104 (0.0474)	-0.0221 (0.0510)	-0.0188 (0.0498)	-0.0111 (0.0474)	-0.0210 (0.0493)	-0.0185 (0.0488)
Widowed	-0.0403 (0.0629)	-0.0701 (0.0675)	-0.0659 (0.0660)	-0.0400 (0.0621)	-0.0579 (0.0612)	-0.0562 (0.0610)
One child	-0.0529 (0.0440)	-0.0317 (0.0476)	-0.0372 (0.0464)	-0.0476 (0.0441)	-0.0159 (0.0485)	-0.0215 (0.0478)
Two children	-0.0637 (0.0404)	-0.0369 (0.0452)	-0.0438 (0.0439)	-0.0587 (0.0406)	-0.0247 (0.0458)	-0.0311 (0.0451)
Three children	-0.0734* (0.0435)	-0.0376 (0.0500)	-0.0462 (0.0485)	-0.0692 (0.0436)	-0.0324 (0.0494)	-0.0392 (0.0486)
Four or more children	-0.1090* (0.0636)	-0.0627 (0.0733)	-0.0747 (0.0710)	-0.1058* (0.0636)	-0.0659 (0.0700)	-0.0726 (0.0690)
Self-employed	0.0441* (0.0255)	0.0482* (0.0270)	0.0482* (0.0265)	0.0453* (0.0255)	0.0515** (0.0261)	0.0512** (0.0259)
Non-employed	0.0158 (0.0306)	0.0056 (0.0329)	0.0079 (0.0322)	0.0207 (0.0306)	0.0310 (0.0321)	0.0293 (0.0317)
Income shock	-0.0386** (0.0180)	-0.0453** (0.0194)	-0.0446** (0.0190)	-0.0400** (0.0180)	-0.0491** (0.0192)	-0.0477** (0.0190)
Home	0.0590** (0.0247)	0.0671** (0.0264)	0.0641** (0.0257)	0.0559** (0.0247)	0.0505** (0.0256)	0.0502** (0.0254)
Constant	0.8041*** (0.1934)	0.8728*** (0.2091)	0.8633*** (0.2044)	0.7861*** (0.1936)	0.7676*** (0.2009)	0.7703*** (0.1987)
Number of observations	2855	2855	2855	2855	2855	2855
R-squared	0.0674	-	-	0.0684	0.0078	0.0267
F-value of the excluded instruments		14.24	10.35		26.42	18.30
P-value of Hansen's OIR test		0.849	0.3534		0.7807	0.3953
P-value of exogeneity test		0.0487	0.1101		0.0706	0.1294

Source: Author's calculation on the basis of the SLPS 2010. Data are unweighted.

Table 6: First-stage Regressions

This table reports the results for the first stage of GMM estimation shown in Table 5. "All three correct" is a dummy variable that equals one if respondents answered correctly in all three financial literacy questions. "Number of correct answers" means the number of correct answers in three financial literacy questions. I also included seven area dummies, but their coefficients are not shown. Standard errors are White's heteroskedasticity-robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	7	8	9	10
	All three correct	All three correct	No. of correct answers	No. of correct answers
Children's banks	0.0150 (0.0236)	0.0133 (0.0236)	0.0797 (0.0500)	0.0760 (0.0501)
Age	0.0102 (0.0073)	0.0105 (0.0073)	0.0353** (0.0159)	0.0361** (0.0159)
Age squared	-0.0000 (0.0001)	-0.0000 (0.0001)	-0.0002 (0.0002)	-0.0002 (0.0002)
Female	-0.1286*** (0.0177)	-0.1302*** (0.0178)	-0.2750*** (0.0398)	-0.2786*** (0.0399)
Upper secondary school	0.0843*** (0.0318)	0.0849*** (0.0318)	0.3018*** (0.0873)	0.3033*** (0.0872)
Junior college	0.1182*** (0.0368)	0.1194*** (0.0368)	0.4248*** (0.0965)	0.4275*** (0.0964)
University, undergraduate	0.2118*** (0.0365)	0.2122*** (0.0364)	0.6266*** (0.0931)	0.6274*** (0.0930)
University, graduate school	0.4114*** (0.0646)	0.4113*** (0.0645)	0.9389*** (0.1200)	0.9387*** (0.1199)
Income: 4-6 million yen	0.0382 (0.0239)	0.0378 (0.0239)	0.2021*** (0.0548)	0.2011*** (0.0547)
Income: 6-8 million yen	0.0568** (0.0246)	0.0561** (0.0246)	0.1833*** (0.0571)	0.1817*** (0.0570)
Income: More than 8 million yen	0.1098*** (0.0252)	0.1086*** (0.0252)	0.3220*** (0.0556)	0.3193*** (0.0557)
Income missed	0.0571 (0.0371)	0.0550 (0.0371)	0.0227 (0.0909)	0.0179 (0.0910)
Single	0.0068 (0.0408)	0.0069 (0.0408)	-0.0416 (0.0887)	-0.0413 (0.0885)
Divorced	0.0362 (0.0414)	0.0364 (0.0414)	0.0969 (0.0926)	0.0974 (0.0923)
Widowed	0.0789 (0.0599)	0.0809 (0.0597)	0.1515 (0.1314)	0.1558 (0.1310)
One child	-0.0604 (0.0407)	-0.0585 (0.0407)	-0.2688*** (0.0883)	-0.2646*** (0.0882)
Two children	-0.0683* (0.0380)	-0.0675* (0.0380)	-0.2693*** (0.0805)	-0.2675*** (0.0803)
Three children	-0.0925** (0.0404)	-0.0920** (0.0404)	-0.2956*** (0.0862)	-0.2945*** (0.0861)
Four or more children	-0.1307** (0.0561)	-0.1292** (0.0561)	-0.3520*** (0.1213)	-0.3486*** (0.1216)
Self-employed	-0.0087 (0.0220)	-0.0087 (0.0219)	-0.0460 (0.0493)	-0.0460 (0.0493)
Non-employed	0.0276 (0.0266)	0.0283 (0.0266)	-0.0766 (0.0638)	-0.0749 (0.0638)
Income shock	0.0182 (0.0165)	0.0182 (0.0165)	0.0745** (0.0359)	0.0744** (0.0359)
Home	-0.0166 (0.0227)	-0.0191 (0.0228)	0.0532 (0.0533)	0.0477 (0.0534)
Respondents' Japanese skills: rather higher	0.0700*** (0.0195)	0.0704*** (0.0195)	0.1910*** (0.0424)	0.1920*** (0.0424)
Respondents' Japanese skills: higher	0.1208*** (0.0249)	0.1209*** (0.0249)	0.3479*** (0.0497)	0.3483*** (0.0497)
Average Japanese score by prefecture		0.0099* (0.0057)		0.0224* (0.0129)
Constant	-0.2089 (0.1664)	-0.9541** (0.4524)	0.0427 (0.3722)	-1.6443 (1.0277)
Number of observations	2855	2855	2855	2855
R-squared	0.1153	0.1162	0.1552	0.1561

Note: Author's calculation on the basis of the SLPS 2010. Data are unweighted.

Appendix : Descriptive statistics

Variable	Total sample (N = 3,979)		Non-retired respondents who are aged 25-65 (N = 2,855)	
	Mean	Std. Dev.	Mean	Std. Dev.
Age	49.5893	12.6769	46.9257	10.2142
Female	0.5089	0.5000	0.4487	0.4974
Less than upper secondary school	0.0804	0.2720	0.0564	0.2307
Upper secondary school	0.4891	0.4999	0.4858	0.4999
Junior college	0.1568	0.3637	0.1625	0.3690
University, undergraduate	0.2516	0.4340	0.2701	0.4441
University, graduate school	0.0221	0.1471	0.0252	0.1568
Income: Less than 4 million yen	0.2644	0.4411	0.2189	0.4136
Income: 4-6 million yen	0.2219	0.4156	0.2242	0.4171
Income: 6-8 million yen	0.1975	0.3982	0.2179	0.4129
Income: More than 8 million yen	0.2579	0.4375	0.2799	0.4490
Income missed	0.0583	0.2344	0.0592	0.2360
Married	0.8188	0.3852	0.8168	0.3869
Single	0.1216	0.3269	0.1257	0.3316
Divorced	0.0337	0.1804	0.0385	0.1925
Widowed	0.0259	0.1588	0.0189	0.1362
Number of children	1.7959	1.0534	1.7870	1.0738
Self-employed	0.1347	0.3415	0.1608	0.3674
Non-employed	0.0824	0.2751	0.0995	0.2994
Workers	0.7004	0.4581	0.9005	0.2994
Income shock	0.4368	0.4961	0.4574	0.4983
Home	0.8570	0.3501	0.8427	0.3641
Urban	0.2521	0.4343	0.2420	0.4284
Respondents' schools had children's banks	0.1526	0.3596	0.1510	0.3581
Respondents do not know if their schools had children's banks	0.1206	0.3257	0.1226	0.3280
Respondents' schools had no children's banks	0.7268	0.4457	0.7264	0.4459

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