Pension Expectations and Household Portfolio Choice of the Elderly in Japan

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Abstract

Using the Japanese Study of Aging and Retirement (JSTAR), we examine the determinants of household portfolio choice by the elderly in Japan. Only one-fifth of Japanese elderly hold stocks among their financial assets. Japanese elderly who are more educated, have better mental functions, have higher income, and subjectively expect a greater probability of living until at least age 80 are more likely to hold stocks. Among those who plan to receive public pension benefits in the future, those who expect a greater decline in future public pension benefits have a smaller share of stocks and a larger share of bonds in their portfolio of financial assets, but both are in small quantities. The most important factors affecting the relatively low investment in stocks by Japanese elderly are educational and income differences, rather than their low expectations about their future pension benefits.

1 Introduction

Japan has the oldest population in the world, as the population aged 65 and above constitutes twenty-nine percent of the total population (World Bank, 2020).[1] Because in Japan the public pension benefit and contribution schemes are required by law to be reviewed at least every five years from the viewpoint of their financial balances and sustainability, Japanese may fear that the outlook for the public pension scheme may worsen in the future. This may affect individuals' subjective expectations about their future public pension arrangements and, consequently, alter their savings and furthermore their household's portfolio of financial assets.

Recently researchers have been collecting data on households' portfolio selection of financial assets (e.g., savings, bonds, and stocks) and individuals' subjective expectations of future pension benefits because of the growing importance of understanding the impact of public pension benefits on households' financial decision making in a range of countries. For example, Delavande and Rohwedder (2011) estimate the relationship between individuals' uncertainty about Social Security policy and their portfolio composition of risky assets in the U.S. They find that respondents with higher levels of uncertainty about future benefits hold a smaller share of their wealth in stocks. Additionally, Bottazzi et al. (2011) estimate the effect of Italian pension reforms on individuals' portfolio choices, and find that Italian households have responded to cuts in pension benefits mostly by investing more in real assets and in safer financial assets.[2] However, in Japan specifically, an absence of data on subjective expectations of future public pension benefits has had the result that few empirical studies in

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[1] World Bank World Development Indicators (2020 estimates).

[2] Some studies show that expectations about reductions in public pension benefits increases savings. Horioka et al. (2000) and Horioka et al. (2007) find that the high savings rate in Japan is in part due to individuals' perceptions that public pensions could become more unreliable in the future. Okumura and Usui (2014) find evidence that anxiety about the public pension programme's future in Japan increases private savings. Attanasio and Brugiavini (2003) find that the reduction in pension wealth induced by the 1992 Italian pension reform increased savings rates. Attanasio and Rohwedder (2003) obtain similar results from the UK.

Japan have examined the relationships between individuals' subjective expectations of future public pension benefits and their portfolio of financial assets. Therefore, in this paper we investigate these relationships by utilizing the Japanese Study of Aging and Retirement (JSTAR), a Japanese panel survey that collects information on the financial, social, and health conditions of people age 50 or older and that also asks the respondents about their subjective probabilistic expectations of future public pension benefits.

We first examine the determinants of household portfolio choices by the elderly in Japan. Only one-fifth of Japanese elderly hold stocks among their financial assets. We find that the Japanese elderly who are more likely to hold stocks are those who are more educated, have better math skills, have higher income, and expect a greater probability of living until at least age 80. We then examine whether subjective expectations about the future of public pension benefits affect the household portfolio choices of the elderly. Among those who plan to receive public pension benefits in the future, those who expect a greater decline in future public pension benefits are more likely to reduce their share of stocks and increase their share of bonds in their financial portfolio; however, this effect is small in magnitude. We therefore conclude that the most important factors affecting the low investment in stocks by Japanese elderly are educational and income differences, rather than their low expectations about their future pension benefits.

In Section 2, we describe the JSTAR data, focusing in particular on how the respondents are asked about their financial assets. Section 3 presents the distribution of financial assets conditional on the age of respondents. Section 4 estimates the effect of personal characteristics on household portfolio choices. Section 5 estimates the effects of public pension expectations on household portfolio choices. Section 6 concludes the paper.

2   Data

The data used in this study are from the JSTAR, a survey designed and conducted jointly by the Research Institute of Economy, Trade, and Industry (RIETI), Hitotsubashi University, and the University of Tokyo. The JSTAR is Japan's first panel-data survey of the elderly that is comparable to similar surveys in other countries. Its design is similar to that of the Health and Retirement Study (HRS) in the U.S., the Survey of Health, Ageing and Retirement in Europe (SHARE), and the English Longitudinal Study of Ageing (ELSA). The JSTAR covers a wide range of information, including the economic, social, and health conditions of middle-aged and older adults. A detailed description of the survey's design and sample methodology can be found in Ichimura, Hashimoto, and Shimizutani (2009).

The individuals in the baseline JSTAR sample were between ages 50 and 75. The baseline sample was surveyed in 2007 from among people who lived in the following five municipalities in Japan: (1) Takikawa City in Hokkaido, (2) Sendai City in Miyagi Prefecture, (3) Adachi Ward in the Tokyo metropolis, (4) Kanazawa City in Ishikawa Prefecture, and (5) Shirakawa Town in Gifu Prefecture. The JSTAR expanded the sample to five more cities between 2008 and 2011, bringing the total to ten.[3] The response rate in the baseline sample was near 60 percent, and the sample comprised a total of 7,723 participants. We used data from the first to the fifth waves, through 2015.

In JSTAR, respondents are first asked whether they have any "savings," such as regular bank accounts or postal savings accounts, fixed-term or fixed-amount savings, including accounts with credit unions, agricultural cooperatives, and credit banks. Respondents are then asked whether they have any "bonds," such as investment trust funds (money management funds, medium-term government-bond funds, international investment trust funds, etc.),

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[3] The JSTAR added Naha City in Okinawa Prefecture in 2008, Tosu City in Saga Prefecture in 2009, and Chofu City in the Tokyo metropolis, Tondabayashi City in Osaka Prefecture, and Hiroshima City in Hiroshima Prefecture in 2011. The JSTAR is not a probabilistic national sampling, but within the ten cities, the researchers selected a probabilistic sample for each site.

discount bank debentures, "wide" funds, or government, corporate, or other bonds. If respondents answer "yes," then they are asked how much money they would have received if they sold all those securities. Subsequently, respondents were asked whether they have any "stocks" that can be sold through a securities firm. If they answer "yes," they are asked further how much money they would receive if they sold all those securities.

The JSTAR also asks about the value of the respondent's real estate holdings, mortgage and other debts. Regarding the value of real estate, we use (1) the value of the primary residence and (2) the value of any vacation house, land or forested property, or other real estate. The value of mortgage and other debt includes (1) outstanding primary housing debt, and (2) other debt, such as loans for the purchase of a vehicle, or durable goods or money borrowed from relatives or friends.

In the analysis below, we restrict the data to respondents between the ages of 60 and 75. Regarding the characteristics of the JSTAR samples in the first wave: 47.4 percent are women, 87.6 percent are married, and 55.2 percent are engaged in paid work. In terms of education, 21.4 percent received less than a high-school degree, 46.3 percent received a high-school degree, 13.5 percent attained a junior-college degree, and 18.8 percent earned a university degree or greater. See summary statistics by the respondents' age in appendix table 1.

3 Descriptive Statistics

This section describes the distribution of total assets (financial assets and real estate) and mortgage and other debt conditional on the respondents' age. We define *financial assets* to be the sum of savings, bonds, and stocks.[4]

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[4] For financial assets, we consider assets in personal accounts, and do not include assets in retirement accounts. Although many elderly in the US have a significant portion of their financial assets in retirement accounts (IRAs), retirement accounts became available in Japan only recently. Since 2011, the JSTAR has asked whether the respondents have retirement accounts, but these retirement accounts are classified as one of the following: corporate employee pensions (which include the employee's pension fund, defined-contribution pensions, defined-benefit pensions, tax-qualified retirement pensions, and smaller-enterprise retirement-allowance mutual-aid systems. The JSTAR questionnaire

Figure 1A shows the distribution of the amount of (1) financial assets, (2) real estate holdings, (3) total assets (the sum of financial assets and real estate), and (4) mortgage and other debts, by the respondents' age using the first wave of the baseline sample.

The value of financial assets is, on average, 11,235 thousand yen for those in their early 50s; 12,630 thousand yen for those in their late 50s; 17,501 thousand yen for those in their early 60s; 18,505 thousand yen for those in their late 60s; and 14,605 thousand yen for those in their early 70s.[5] The value of real estate is, on average, 23,192 thousand yen for those in their early 50s; 26,139 thousand yen for those in their late 50s; 35,132 thousand yen for those in their early 60s, 31,780 thousand yen for those in their late 60s, and 30,339 thousand yen for those in their early 70s. Overall, total assets are 33,279 thousand yen for those in their early 50s; 37,612 thousand yen for those in their late 50s; 51,517 thousand yen for those in their early 60s; 50,698 thousand yen for those in their late 60s; and 45,084 thousand yen for those in their early 70s. As these figures show, respondents in their early 50s have the lowest total assets (both financial assets and real estate); financial assets, taken alone, reach their highest values for the elderly in their late 60s and decline in their late 70s, while real estate takes the highest value for respondents in their early 60s, and declines thereafter.

Note that differences in the value of real estate among those in their 50s and those in their 60s are larger than the differences in the value of financial assets between these age groups. Therefore, the wealth differences between those in their 50s and those in their 60s arise because of the differences in the value of real estate they own. Real estate values differ between these groups partly because those in their 50s purchased houses during the "bubble economy" of the late 1980s and since then the value of their real estate has depreciated.

asks whether respondents are receiving (1) a corporate employee pension or (2) a civil servant's occupational addition; about 6 percent of those who are receiving some kind of pension receive either (1) or (2).

[5] The median of financial assets is 56,604 thousand yen for those in their early 50s, 94,340 thousand yen for those in their early 60s—which is the highest value—and drops to 80,241 thousand yen for those in their late 60s, and 79,444 thousand yen for those in their early 70s.

Approximately 60-70 percent of the elderly's assets consist of real estate. Since real estate is an illiquid asset, having a large share of assets in real estate may be restraining Japanese households from holding riskier assets such as stocks.[6]

Mortgage and other debt levels gradually decrease with age, from 6,282 thousand yen in the early 50s to 1,819 thousand yen in the early 70s. (After age 57, half of all respondents are holding no debt at all.)

Figure 1B shows the distribution by age of holdings of (1) savings, (2) bonds, (3) stocks, and (4) either bonds or stocks for the first wave of the baseline sample. The proportion of respondents who hold savings accounts is 92.0 percent for ages between 50 and 74. The proportion of respondents who hold bonds and stocks is far lower: 20.5 percent hold bonds, 21.3 percent hold stocks, and 29.3 percent hold either stocks or bonds; these proportions are about the same for any age between 50 and 74.[7] This pattern of Japanese households holding a much smaller proportion of their assets in stocks and bonds, compared to their holdings in savings accounts, has also been found in past studies (e.g., Iwaisako, 2009). The proportion of the elderly who hold bonds and/or stocks is lower in Japan than in the United States. According to the US Health and Retirement Study, 25 percent of US elderly hold bonds and 30 percent hold stocks. Also, in the US, the elderly's holdings of bonds increase with age, but this pattern is not found in Japan.[8]

Figure 1C shows the distribution of (1) the share of savings among total financial assets for those who hold savings, (2) the share of bonds among total financial assets for those

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[6] Iwaisako (2009) finds that Japanese households' demand for riskier financial assets is reduced after the purchase of real estate. This is because, by taking out a large amount of housing loans, households have already taken risky positions in the market. Therefore, the high land prices and a limited supply of family-size rental housing will generate inefficiencies in financial markets.

[7] Regarding bonds and stocks, 12 percent of respondents hold bonds *and* stocks, 8.3 percent hold *only* bonds, and 9.0 percent hold *only* stocks.

[8] For comparison to the JSTAR, we use data from the Health and Retirement Study in the United States, which is a biennial longitudinal study, conducted from 1992 through 2014 from the first to the thirteenth waves. As we do with the JSTAR, for the HRS we restrict the sample to respondents between ages 50 and 74.

who hold bonds, (3) the share of stocks among total financial assets for those who hold stocks, and (4) the share of bonds or stocks among total financial assets for those who hold either one or the other. Figure 1C reveals that the overwhelming majority of Japanese households hold savings, and those savings constitute the largest share by far of their financial assets. Specifically, 92.0 percent of the respondents hold savings, and those savings constitute 88.1 percent of their financial assets. Among those who hold bonds, the bonds constitute 30.7 percent of their financial assets. Among those who hold stocks, the stocks constitute 24.2 percent of their financial assets. And among those who hold either bonds or stocks, 38.6 percent of their financial assets are in that form.

When we consider how these holdings change by respondent's age, we see that among those who hold either bonds or stocks—who are therefore active participants in the financial market—20.3 percent of the financial assets of those in their early 50s are in the form of stocks, and this share decreases to 15.3 percent by their early 70s. In contrast, the same group holds 19.9 percent of their financial assets in the form of bonds when they are in their early 50s, and this share increases to 25.7 percent by their early 70s. This pattern of reducing one's share of stocks in favor of holding more bonds as one ages, in order to reduce investment risk, is comparable to the pattern observed in elderly participants in the US financial market.

4   Determinants of Financial Assets

In this section, we use a regression framework to estimate the effects of individuals' personal characteristics on household portfolio choices.

4.1   Holdings of Financial Assets

We first estimate the determinant effects of personal characteristics on the holdings of savings, bonds, and stocks, as shown in Table 1. Specifically, columns 1, 2, and 3 show the estimated effects on the holdings of savings, bonds, and stocks, respectively. Individuals' characteristics include: log of the value of financial assets, log of the value of real estate, real

estate/total assets ratio, whether the family has a home mortgage, whether the family has other

debt, whether the family owns a home, log of family income; respondents' age, gender,

marital status (married or not), education (below high school, high school, some college, or

college), employment status (working or not), respondent's subjective probability of living

until at least age 80 divided by probability according to actuarial tables; whether expecting to

leave a bequest, Serial 7 numeracy test score,[9] self-assessed health (excellent, very good,

good, fair, or poor), and risk aversion.[10] We also control for city and calendar years in the

regression models (results not reported), and present robust standard errors clustered at the

individual level.

Compared to individuals who have only high-school education, those who have

college education are 7.7 percent more likely to hold bonds and 9.7 percent more likely to

hold stocks, while those with less than high-school education are 4.9 percent less likely to

hold bonds and 5.5 percent less likely to hold stocks. Education thus plays an important role

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[9] Serial 7 numeracy test is a test that counts down from one hundred by sevens, which is a clinical test used to test mental functions.

[10] To measure risk aversion, the JSTAR asks the respondents to consider a hypothetical scenario about receiving pay. Specifically, the wording of the questionnaire is: "If the method by which you are paid at work were to change next month only, which of the following options would you prefer? Please assume that the amount your pay increases is not related to your ability or effort, and that this change will be in effect for next month only. This question is not related to whether you are actually working, or whether this would actually happen at the company you work at. This is just a hypothetical question, like a quiz, so could you please try to answer in that spirit?
Q1 Which of these would you prefer? (1) There is a 90% probability that your pay would increase by 50%, and a 10% probability that your pay would increase by 5%. (2) There is a 100% probability that your pay would increase by 10%. If one answers (1) to above question, go to the next question. If the answer is (2), stop.
Q2 Which of these would you prefer? (1) There is a 80% probability that your pay would increase by 50%, and a 20% probability that your pay would increase by 5%. (2) There is a 100% probability that your pay would increase by 10%. If one answers (1) to above question, go to the next question. If the answer is (2), stop.
Q3 Which of these would you prefer? (1) There is a 70% probability that your pay would increase by 50%, and a 30% probability that your pay would increase by 5%. (2) There is a 100% probability that your pay would increase by 10%. If one answers (1) to above question, go to the next question. If the answer is (2), stop."
These questions continue until the underlined probabilities decrease (by an increment of 10 percent) to 10 percent and 90 percent, respectively. For details, see Question B014 in pp. 16-17 of the JSTAR questionnaire: https://www.rieti.go.jp/en/projects/jstar/data/questionnaire_2007_en.pdf. We define those who are risk-averse to be those who answer (2) in Q1 or Q2.

in determining whether one holds bonds or stocks. Moreover, those who achieve a higher score on the Serial 7 test are slightly more likely to hold bonds and stocks, controlling for education. Thus, those who have better mental functions according to this particular clinical test are more likely to hold bonds or stocks.

The longer one expects to live, the longer is one's future investment outlook. Therefore, those with a longer outlook often take the risk of holding stocks, since they believe they will have more time to reap the benefits. This is supported by prior research in the U.S., such as Spaenjers and Spira (2015), who found that the share of financial assets allocated to stocks increases with subjective life horizon. Our JSTAR data in table 1 suggest that this pattern is also observed for Japanese elderly. Specifically, for every 10 percentage points' increase in respondents' subjective probability of living until at least age 80, they were 18.0 percentage points more likely to hold stocks. In addition, those who expect to leave a bequest to their descendants are 4.5 percent more likely to hold bonds and 2.4 percent more likely to hold stocks than others. Planning to leave a bequest reflects a person's extending their financial planning horizons beyond their own lifetime, which explains why the elderly with such plans are willing to increase their portfolio's share of risky assets.

Those respondents who have greater financial assets, real estate, and family income are more likely to hold bonds and stocks, while those who have a home mortgage or other debt are less likely to hold bonds. Those who own a home are more likely to hold bonds and stocks. Overall, those who have more total wealth are more likely to hold bonds and stocks, presumably because their overall financial well-being enables them to diversify their asset allocation.

However, those who have a larger share of real estate in their total assets are less likely to hold stocks. This result is also found in Japan by Iwaisako (2009), and it indicates that when one's share of real estate is large, the illiquidity of those holdings makes one less able or likely to diversify the household portfolio.

We next examine the personal characteristics of those who hold (i) bonds but no stocks, (ii) stocks but no bonds, and (iii) either bonds or stocks. In table 2, the estimated effects of personal characteristics on those three groups are shown in columns 1, 2, and 3, respectively. Although the majority of the results in table 2 are similar to what we found from the estimation results regarding the holdings of bonds and stocks in columns 2 and 3, respectively, in table 1, the estimate on risk aversion is positive and significant only in the specification for holdings of bonds but not stocks (column 1 in table 2). That is, we find that those who are more risk-averse are more likely to hold bonds but no stocks. Therefore, although those who have more wealth and more education are more likely to hold both bonds and stocks, individual attitudes such as risk aversion affect whether individuals have fewer stocks—i.e., fewer risky investments—in their portfolio.

4.2   Share of Savings, Bonds, and Stocks

Next, we estimate how individuals' personal characteristics are related to (i) the share of savings among their total financial assets for those who have positive savings, (ii) the share of bonds for those who have positive bond holdings, (iii) the share of stocks for those who have positive stock holdings; and (iv) the share of bonds and stocks for those who have either bonds or stocks. These estimates are shown in columns 1-4, respectively, of table 3.

As table 3 shows, the college-educated have a 3.8 percentage point lower share of savings than high school graduates, and those who did not finish high school have a 3.8 percentage point higher share of savings than high school graduates. This is another piece of evidence showing that those who are more educated tend to be more active in financial markets.

Compared to individuals in married households, unmarried people have a 3.4 percentage point lower share of their assets in savings, a 4.5 percentage point higher share in bonds, a 4.8 percentage point higher share in stocks, and a 5.8 percentage point higher share in bonds and stocks taken together.

Compared to men, women report that they have, on average, a 2.6 percentage point lower share of bonds, and a 4.3 percentage point lower share of stocks, indicating that women are less active than men in these financial markets. Those who have higher Serial 7 test scores have a lower share of savings, indicating that those with better mental functions are more likely to be active in the bond and/or stock markets.

Those who have greater wealth overall (i.e., greater financial assets, real estate holdings, and family income) have a lower share of that wealth in savings, as having more wealth enables them to diversify their asset allocation. Those who expect to leave a bequest have a 1.5 percentage point lower share of savings than those who do not plan to leave a bequest.

5   Effects of Expectations Regarding Pension Benefits on Household Portfolio Choices

5.1   Pension Expectation Question in the JSTAR

We utilize a unique question in the JSTAR that asks respondents who have not yet claimed pension benefits about their subjective expectations for future public pension benefits. Specifically, the JSTAR asks about the subjective probability that the expected public pension benefit level could be (1) reduced by 10 percent or more in the future, or (2) increased by 10 percent or more in the future.[11] Table 4 displays the summary statistics on the responses to this question. See questions 6 and 7 in the appendix for the wording of the questionnaire. The subjective probability of a more-than-10 percent drop in public pension benefits is 24.9 percent for respondents in their early 50s, while it is 13.5 percent for respondents in their late 60s. Although the median of the subjective probability that their pension benefits will

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[11] Although a question about an expected reduction in the pension benefits level was asked in all survey years, a question about an increase in those benefits was asked only since 2011. Therefore, the number of observations is smaller for the latter question.

decrease by more than 10 percent is 10 percent for all age groups, the 75th percentile is 30

percent for those in their early 50s but only 10 percent for those in their late 60s and early 70s.

These statistics indicate that younger respondents are more pessimistic than older ones about

the continuation of the existing structure of the public pension system. Note also that the

results indicate that many individuals are uncertain about their future pension benefits, since a

significant number of individuals report "don't know" answers in regard to their expectations

about reduced pension benefits; specifically, 40.0 percent of individuals in their early 50s and

35.9 percent of individuals in their late 60s give this answer. However, individuals who are

older and therefore closer to claiming their public pension are slightly more able to give a

specific answer to questions about their pension expectations.

In contrast, almost all respondents report that their subjective probability that their

public pension benefits would *increase* by more than 10 percent is zero percent. As a result,

the subjective probability of a more-than-10 percent increase in public pension benefits is 1.2

percent for respondents in their early 50s, and 1 percent for respondents in their late 60s.

Therefore, in the regression analysis below, we will focus on examining how the *drop* over

time in expectations about the level of pension benefits influences the financial decision

making of individuals.

5.2   Pension Expectations and Household Portfolio Choice

We now examine how individuals' expectations about the future of their public pension

benefits affect their household portfolio choices. Our empirical specification is

$$HPC_i = \alpha + y_i\beta + X_i\Gamma + \varepsilon_i, \tag{1}$$

where HPC_i is the household portfolio choice (i.e., the allocation among savings, bonds, and stocks), y_i is the measure of public pension expectations (which are the probability of expecting a more-than-10-percent drop in future pension benefits, as well as the expected level of future public pension benefits per year), X_i is the personal characteristics also used in the regression analysis in section 4, and ε_i is the error term. The key coefficient of interest is β, which reflects the effect of public pension expectations on household portfolio choices.

Table 5 presents the estimation results, where the dependent variable HPC_i is whether the respondents' hold savings, bonds, or stocks, while table 6 presents those results for those cases in which the dependent variable HPC_i is the share of respondents' savings, bonds, or stock holdings among their total financial assets for those who have positive savings, positive bond holdings, or positive stock holdings, respectively. Note that in all specifications we include an indicator for whether the individuals reported "don't know" to the pension expectation questions.

In table 5, the estimate β is insignificant and small in magnitude in all specifications. In those results, expectations that public pension benefits will decline in the future have no effect on the respondents' holdings of savings, bonds, and stocks.[12] On the other hand, in table 6, the estimate β is positive when the dependent variable is the share of bonds, and is negative when the dependent variable is the share of stocks. Specifically, when individuals' subjective expected probability of a more-than-10-percent drop in pension benefits rises by 10 percent, the share of bonds held increases by 1 percentage point and the share of stocks held decreases by 1 percentage point. Expectations that public pension benefits will decline in the future induces people to reduce the share of their stock holdings and increase the share of

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[12] However, those who expect to receive a greater amount of pension benefits are more likely to hold stocks.

their bond holdings, but these effects are small.[13] Therefore, expectations about whether the pension benefits decline in the future do not influence the amount of financial assets individuals hold nor their holdings of bonds and stocks, but it will influence the fraction of portfolio invested in risky assets for those who already hold bonds and stocks.

6   Conclusion

Using the Japanese Study of Aging and Retirement (JSTAR), a Japanese panel survey of people aged 50 and above, we examined the determinants of household portfolio choices made by the elderly in Japan. We find that 21 percent of families hold stocks among their financial assets, and among these families stocks represent 24 percent of their financial assets. These numbers are much lower than those in the US, which are 35 percent and 54 percent, respectively (based on the authors' analysis of the U.S Health and Retirement Survey). In Japan, the elderly people who are likely to hold stocks are more educated, earn a higher income, have a higher subjective expectation of living until at least age 80, and have better mental functions. These patterns are also found in the US, except that mental functionality is unrelated to stock holdings among Americans (based again on the authors' analysis of the U.S Health and Retirement Survey).

We also examined the relationship between household portfolio choices and expectations regarding future public pension benefits. We find that many elderly Japanese believe that their pension benefits will decrease, not increase, in the future. Specifically, among those who plan to receive public pension benefits, the probability that they expect public pension benefits to decline by more than 10 percent is 21.4 percent; in contrast, the probability that they expect these benefits to *increase* by more than 10 percent is only 1.0 percent.

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[13] Furthermore, those who report "don't know" about the drop in pension benefits have a 2.0 percentage point greater share of savings in their household portfolio.

We also find that among those who hold bonds and stocks, those who expect a greater decline in future public pension benefits hold a larger share of bonds and a smaller share of stocks. Since public pension benefits are fixed income, expecting that such public pension benefits will decline (i.e., expecting lower future additional income) induces people to invest less in risky assets like stocks. However, since these effects are small, we conclude that low expectations about their future pension benefits are not a strong reason for Japanese elderly having a smaller share of stocks in their portfolio; instead, educational and income differences turn out to be more important factors in influencing this portfolio distribution.

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Appendix: JSTAR Questionnaire on Public Pension Expectations

(1)   In the future do you expect to receive any further public pension benefits?

　　　1. Yes

　　　2. No

　　　3. Don't know

　　　4. Refuse to answer

　　If the answer was 1, go to (2).

(2)   What type of pension is it? Please select the most appropriate choice from the following.

　　　1. National Pension Plan (basic old-age pension)

　　　2. Old-age welfare annuity or retirement mutual pension (including basic pension)

　　　3. Survivor's pension

　　　4. Disability pension

　　　5. Don't know

　　　6. Refuse to answer

　　Regardless of the answer, go to (3).

(3)   At what age do you expect to begin receiving that pension?

　　　1. Age:_____

　　　2. Don't know

　　　3. Refuse to answer

　　Regardless of the answer, go to (4).

(4)   Approximately how much do you expect to receive per year before taxes? If you don't mind, please tell me the total amount that will be deposited into your bank or postal account.

　　　1. Approximately ____ yen

　　　2. Don't know

　　　3. Refuse to answer

　　Regardless of the answer, go to (5).

(5)   Approximately what percent of your last working salary does that total amount to? If you did not work before, please say so.

1. ____%

2. Did not work

3. Don't know

4. Refuse to answer

Regardless of the answer, go to (6).

(6)   Do you think it is likely that the amount you expect to receive could be reduced by 10% or more in the future? If you think it could be reduced, please provide the probability of such a reduction occurring in the future. If you don't think it could be reduced, please say so.

1. ____ %

2. No possibility (zero percent)

3. Don't know

4. Refuse to answer

(7)   Do you think it is likely that the amount you expect to receive could be increased by 10% or more in the future? If you think it could be increased, please provide the probability of such an increase occurring in the future. If you don't think it could be increased, please say so.

1. ____ %

2. No possibility (zero percent)

3. Don't know

4. Refuse to answer

Figure 1. Distribution of Assets by Age of Respondents.

(A) Amount of Financial Assets, Real Estate, Total Assets, Mortgage and Debt (in 10,000 yen)
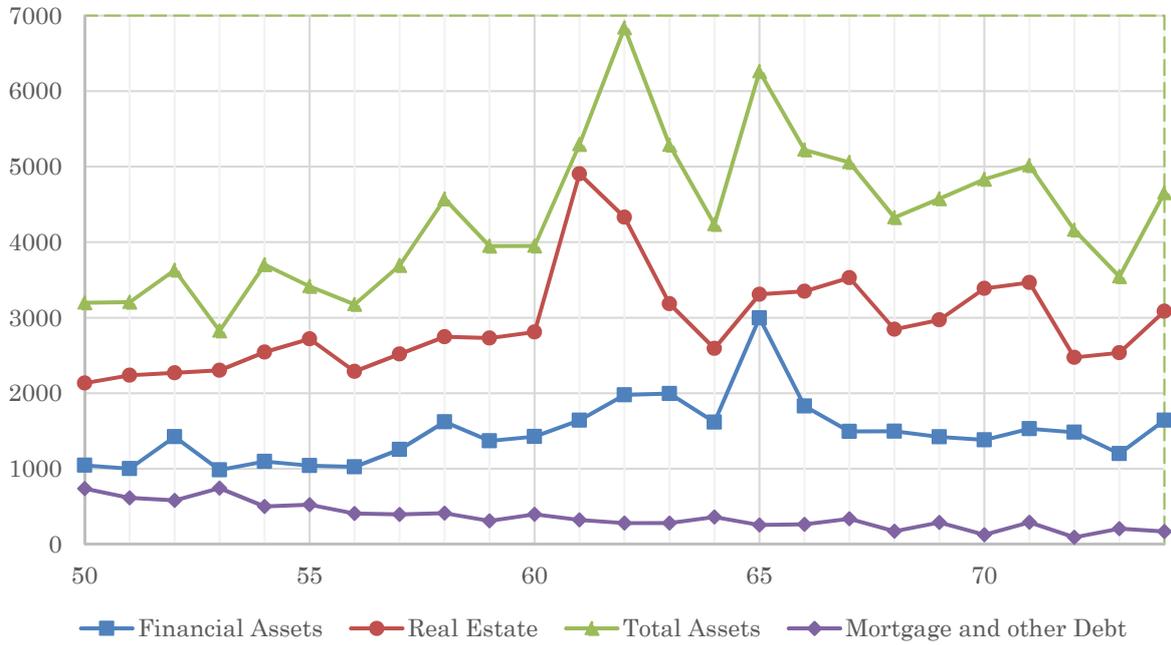
(B) Proportion of Respondents that Hold Savings, Bonds, Stocks, and Bonds or Stocks
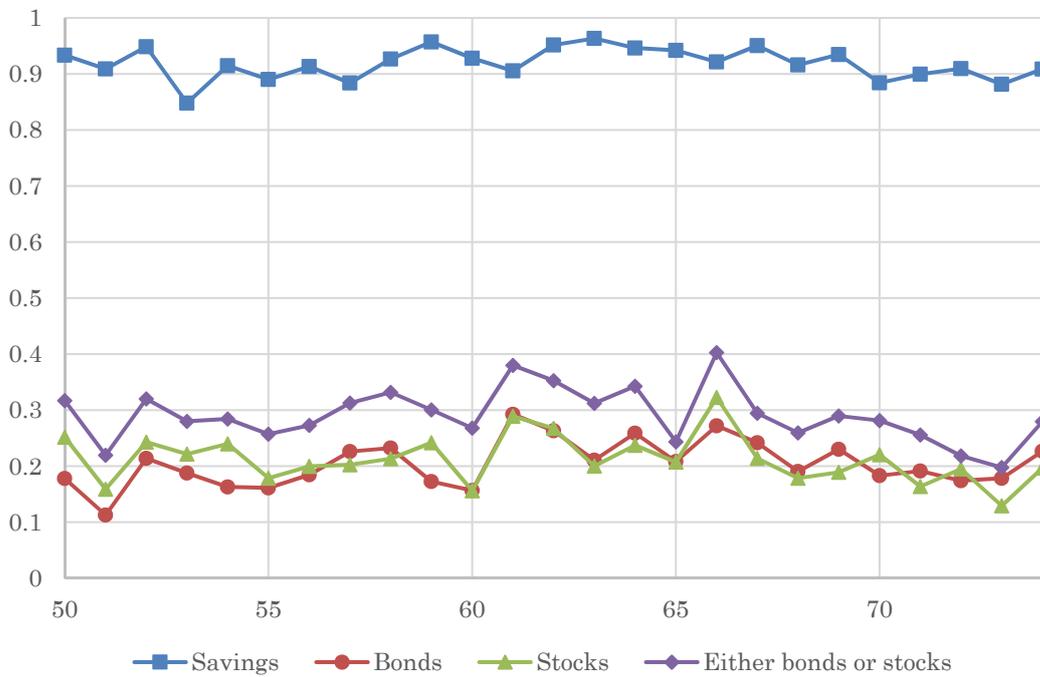
(C) Share of Savings for Those Who Have Savings, Share of Bonds for Those Who Have Bonds, and Share of Stocks for Those who Have Stocks by Age of Respondents:
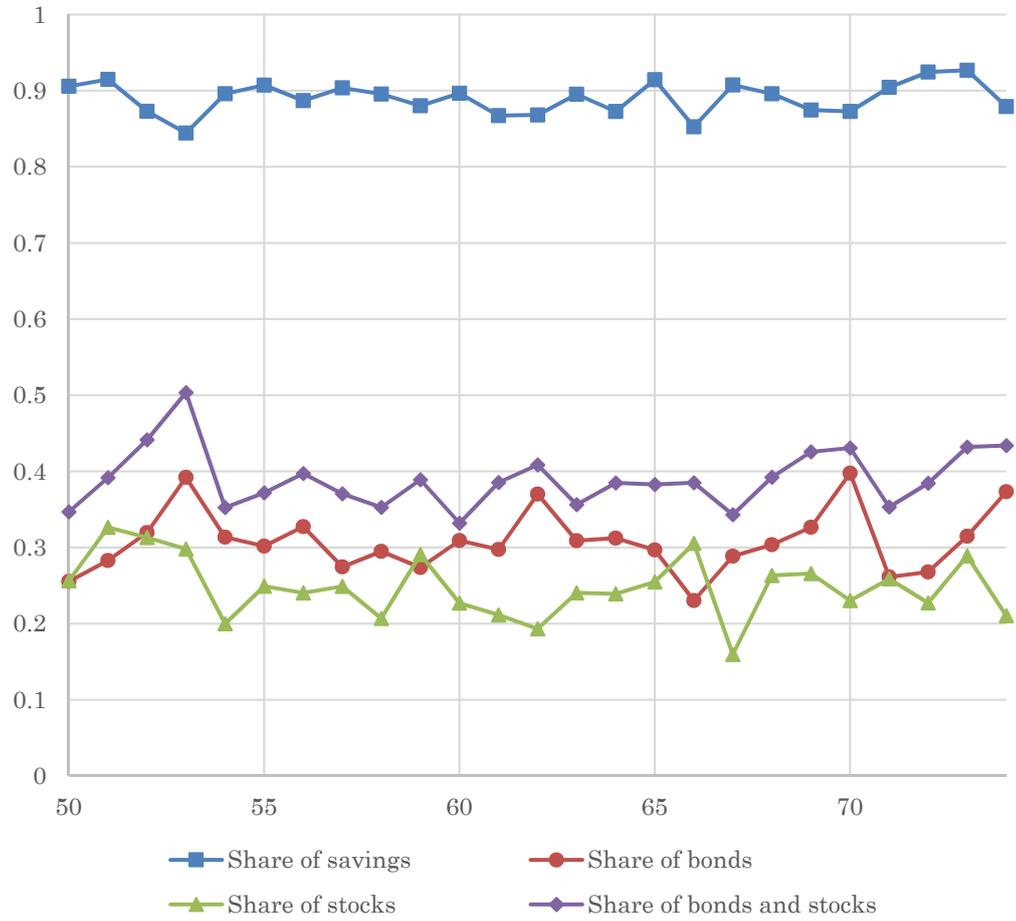
Table 1. Regression Results: Whether the Respondents Have Financial Assets

	Whether Respondents Hold:					
	Savings		Bonds		Stocks	
Variable	Coef.	SE	Coef.	SE	Coef.	SE
log(Financial assets)	0.116	0.003 ***	0.021	0.002 ***	0.022	0.002 ***
log(Real estate)	-0.053	0.002 ***	0.051	0.004 ***	0.047	0.004 ***
Real estate/Total assets	0.405	0.017 ***	-0.392	0.028 ***	-0.276	0.029 ***
Home mortgage	0.002	0.005	-0.033	0.012 ***	-0.017	0.013
Other debt	0.003	0.005	-0.018	0.009 **	-0.001	0.009
Home ownership	-0.017	0.008 **	0.038	0.017 **	0.077	0.020 ***
Working	0.009	0.004 **	-0.016	0.010	-0.015	0.010
log(Family income)	-0.004	0.002 **	0.019	0.003 ***	0.015	0.003 ***
Probability of living until age 80	-0.009	0.004 ***	0.012	0.008	0.018	0.008 **
Plan to leave bequest	-0.005	0.003	0.045	0.009 ***	0.024	0.009 ***
Serial 7	-0.002	0.002	0.007	0.003 **	0.009	0.003 ***
Self-assessed health: very good	0.003	0.004	0.014	0.011	0.008	0.010
Self-assessed health: good	0.000	0.004	-0.020	0.010 **	-0.009	0.010
Self-assessed health: fair or poor	0.000	0.006	-0.015	0.012	0.000	0.012
Risk aversion	-0.010	0.007	0.026	0.020	-0.022	0.020
55≤Age<60	-0.008	0.007	0.002	0.015	-0.006	0.015
60≤Age<65	-0.004	0.007	0.019	0.016	0.003	0.017
65≤Age<70	-0.002	0.008	0.008	0.017	-0.009	0.018
70≤Age<75	-0.011	0.008	0.009	0.018	-0.001	0.019
75≤Age<80	-0.002	0.009	-0.007	0.021	0.003	0.022
Below high school	-0.005	0.005	-0.049	0.011 ***	-0.055	0.011 ***
Some college	-0.011	0.005 **	0.020	0.014	0.028	0.016 *
College	-0.020	0.005 ***	0.077	0.016 ***	0.097	0.017 ***
Single	0.003	0.005	0.046	0.012 ***	0.009	0.012
Female	-0.008	0.004 **	0.039	0.009 ***	0.007	0.010
# of Household members	0.000	0.002	0.000	0.004	0.002	0.005
# of Children <18	-0.008	0.013	-0.024	0.026	0.058	0.035
R-squared	0.568		0.191		0.167	
N	11,988		11,988		11,988	
Mean of dependent variable	0.938		0.189		0.176	

Note: Regressions include indicators for municipality, year, and missing variables. Robust standard errors clustered at the individual level are shown in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 2. Regression Results: Whether the Respondents Have Financial Assets

	Whether Respondents Hold:					
	Bonds but do not hold Stocks		Stocks but do not hold Bonds		Bonds or Stocks	
Variable	Coef.	SE	Coef.	SE	Coef.	SE
log(Financial assets)	0.013	0.002 ***	0.013	0.001 ***	0.034	0.003 ***
log(Real estate)	0.014	0.003 ***	0.010	0.003 ***	0.061	0.004 ***
Real estate/Total assets	-0.114	0.022 ***	0.002	0.019	-0.390	0.031 ***
Home mortgage	-0.014	0.009	0.003	0.010	-0.031	0.014 **
Other debt	-0.018	0.006 ***	-0.001	0.007	-0.019	0.010 *
Home ownership	0.004	0.012	0.043	0.016 ***	0.081	0.021 ***
Working	-0.003	0.008	-0.003	0.007	-0.018	0.011 *
log(Family income)	0.004	0.002	0.000	0.002	0.019	0.004 ***
Probability of living until age 80	0.004	0.006	0.010	0.006 *	0.022	0.009 **
Plan to leave bequest	0.023	0.007 ***	0.002	0.006	0.047	0.010 ***
Serial 7	0.005	0.002 *	0.007	0.002 ***	0.013	0.004 ***
Self-assessed health: very good	0.008	0.009	0.002	0.008	0.016	0.011
Self-assessed health: good	-0.011	0.008	0.001	0.007	-0.019	0.011 *
Self-assessed health: fair or poor	-0.014	0.010	0.001	0.009	-0.013	0.013
Risk aversion	0.046	0.018 ***	-0.001	0.014	0.025	0.022
55≤Age<60	0.000	0.011	-0.009	0.012	-0.006	0.017
60≤Age<65	0.009	0.013	-0.006	0.013	0.013	0.019
65≤Age<70	0.006	0.013	-0.011	0.013	-0.003	0.020
70≤Age<75	-0.002	0.014	-0.012	0.014	-0.003	0.021
75≤Age<80	-0.013	0.016	-0.002	0.016	-0.009	0.024
Below high school	-0.022	0.008 ***	-0.029	0.007 ***	-0.077	0.012 ***
Some college	0.008	0.011	0.016	0.011	0.036	0.016 **
College	0.009	0.012	0.029	0.013 **	0.106	0.017 ***
Divorced or widowed	0.036	0.009 ***	-0.001	0.008	0.045	0.013 ***
Never married	0.014	0.007 *	-0.018	0.007 ***	0.020	0.011
Female	-0.003	0.003	-0.001	0.003	-0.001	0.005
# of Household members	-0.034	0.016 **	0.048	0.027 *	0.024	0.035
R-squared	0.064		0.042		0.238	
N	11,988		11,988		11,988	
Mean of dependent variable	0.089		0.076		0.266	

Note: Regressions include indicators for municipality, year, and missing variables. Robust standard errors clustered at the individual level are shown in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 3. Regression Results: Share of Savings, Bonds, and Stocks among Total Financial Assets

Variable	Savings (for those with savings)		Bonds (for those with bonds)		Stocks (for those with stocks)		Bonds and stocks (for those with bonds or stocks)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
log(Financial assets)	-0.028	0.002 ***	-0.050	0.012 ***	-0.062	0.011 ***	-0.040	0.010 ***
log(Real estate)	-0.014	0.003 ***	-0.001	0.007	0.003	0.006	0.001	0.007
Real estate/Total assets	0.063	0.018 ***	-0.025	0.058	0.055	0.053	0.009	0.054
Home mortgage	0.007	0.008	-0.002	0.019	0.021	0.019	0.008	0.018
Other debt	0.005	0.006	0.005	0.017	0.004	0.017	0.011	0.017
Home ownership	-0.034	0.011 ***	0.012	0.026	0.048	0.024 **	0.035	0.026
Working	0.006	0.006	-0.001	0.013	0.007	0.013	-0.003	0.013
log(Family income)	-0.007	0.002 ***	-0.003	0.007	-0.016	0.008 **	-0.006	0.007
Probability of survival until age 80	-0.005	0.005	-0.010	0.013	-0.002	0.012	-0.009	0.012
Plan to leave bequest	-0.015	0.005 ***	-0.012	0.012	-0.011	0.012	-0.012	0.012
Serial 7	-0.004	0.002 **	-0.005	0.007	-0.001	0.007	-0.006	0.006
Self-assessed health: very good	-0.008	0.006	0.014	0.014	-0.024	0.014 *	-0.005	0.013
Self-assessed health: good	0.013	0.006 **	-0.011	0.013	-0.021	0.014	-0.024	0.014 *
Self-assessed health: fair or poor	0.011	0.007	0.000	0.021	-0.044	0.018 **	-0.023	0.019
Risk aversion	0.006	0.011	-0.019	0.022	0.002	0.020	-0.029	0.021
55≤Age<60	0.007	0.009	-0.005	0.024	-0.007	0.022	-0.008	0.022
60≤Age<65	-0.003	0.010	0.017	0.024	-0.032	0.023	-0.010	0.023
65≤Age<70	-0.005	0.011	0.004	0.025	0.009	0.026	0.008	0.025
70≤Age<75	-0.005	0.011	0.015	0.028	-0.006	0.026	0.016	0.027
75≤Age<80	-0.003	0.013	0.013	0.033	0.023	0.033	0.016	0.032
Below high school	0.038	0.006 ***	-0.008	0.020	-0.031	0.020	-0.035	0.020 *
Some college	-0.011	0.008	-0.005	0.017	-0.007	0.017	-0.013	0.017
College	-0.038	0.009 ***	0.000	0.016	-0.024	0.016	-0.003	0.016
Single	-0.034	0.007 ***	0.045	0.018 **	0.048	0.020 **	0.058	0.018 ***
Female	0.002	0.006	-0.026	0.014 *	-0.043	0.015 ***	-0.032	0.014 **
# of Household members	-0.002	0.003	0.008	0.007	0.010	0.006	0.015	0.006 **
# of Children <18	-0.013	0.017	0.025	0.041	-0.047	0.042	-0.003	0.037
R-squared	0.134		0.069		0.153		0.055	
N	11248		2271		2115		3184	
Mean of dependent variable	0.896		0.306		0.248		0.383	

Note: Regressions include indicators for municipality, year, and missing variables. Robust standard errors clustered at the individual level are shown in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 4. Public Pension Expectations

Sample: Respondents who are not currently receiving public pension benefits, but plan to receive them

in the future

(A) Probability of a More-than-10% Decrease in Pension Benefits

| | | | | | Number of observations | |
	Mean	P25	P50	P75	Report percentage	Don't know
50≤Age<55	24.9	10	10	30	383	574
55≤Age<60	20.5	10	10	20	507	739
60≤Age<65	14.5	0	10	10	391	518
65≤Age<70	13.5	0	10	10	33	59
70≤Age<75	10.0	10	10	10	4	3

(B) Probability of a More-than-10% Increase in Pension Benefits

| | | | | | Number of observations | |
	Mean	P25	P50	P75	Report percentage	Don't know
50≤Age<55	1.0	0	0	0	145	94
55≤Age<60	0.9	0	0	0	155	72
60≤Age<65	1.2	0	0	0	188	77
65≤Age<70	0.0	0	0	0	12	7

Table 5. Expected Pension Benefits and Holdings of Savings, Bonds, and Stocks.

	Respondents Hold:					
	Savings		Bonds		Stocks	
Variable	Coef.	SE	Coef.	SE	Coef.	SE
Probability of more-than-10% drop in pension	0.0002	0.0001	-0.001	0.0004	0.0001	0.0004
Probability of more-than-10% drop in pension: missing	0.0002	0.007	-0.027	0.016 *	-0.018	0.016
Expected pension benefits	0.0000	0.0001	0.0002	0.0002	0.0004	0.0002 **
Expected pension benefits: missing	-0.002	0.009	0.010	0.023	-0.0004	0.023
log(Financial assets)	0.114	0.005 ***	0.029	0.004 ***	0.033	0.004 ***
log(Real estate)	-0.048	0.004 ***	0.044	0.007 ***	0.046	0.007 ***
Real estate/Total assets	0.400	0.030 ***	-0.402	0.055 ***	-0.281	0.055 ***
Home mortgage	0.003	0.008	-0.035	0.018 **	-0.010	0.019
Other debt	0.007	0.009	-0.032	0.016 **	-0.003	0.017
Home ownership	-0.006	0.014	0.011	0.031	0.096	0.034 ***
Working	0.012	0.008	-0.033	0.021	-0.019	0.020
log(Family income)	-0.005	0.004	0.027	0.007 ***	0.008	0.007
Probability of survival until age 80	-0.009	0.006	0.010	0.014	0.012	0.014
Plan to leave bequest	-0.014	0.007 **	0.048	0.016 ***	0.007	0.016
Plan to leave bequest: Missing	0.005	0.009	-0.027	0.022	-0.018	0.022
Serial 7	-0.003	0.003	0.013	0.007 **	0.009	0.007
Not asked Serial 7	-0.010	0.026	0.101	0.064	0.042	0.066
Self-assessed health: fair or poor	-0.003	0.013	-0.038	0.024	-0.035	0.024
Risk aversion	0.010	0.011	-0.012	0.032	-0.081	0.033 **
Risk aversion: Missing	-0.003	0.008	0.000	0.018	0.005	0.018
60≤Age<65	-0.002	0.010	-0.002	0.022	-0.016	0.023
65≤Age<70	-0.009	0.017	-0.006	0.040	-0.012	0.037
70≤Age<75	-0.047	0.037	-0.114	0.069 *	-0.100	0.083
75≤Age<80	-0.029	0.021	-0.016	0.155	-0.183	0.050 ***
Below high school	-0.003	0.010	-0.042	0.019 **	-0.050	0.020 **
Some college	-0.016	0.008 **	0.029	0.022	0.030	0.022
College	-0.025	0.009 ***	0.085	0.024 ***	0.079	0.025 ***
Single	-0.019	0.012	0.054	0.022 **	0.021	0.022
Female	0.005	0.007	0.046	0.017 ***	-0.022	0.018
# of Household members	-0.002	0.003	0.001	0.007	0.005	0.008
# of Children <18	0.002	0.015	-0.055	0.030 *	0.044	0.039
R-squared	0.538		0.203		0.183	
N	3105		3105		3105	
Mean of dependent variable	0.942		0.209		0.206	

Note: Regressions include indicators for municipality, year, and missing variables. Robust standard errors clustered at the individual level are shown in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6. Expected Pension Benefits and Share of Savings, Bonds, and Stocks.

Variable	Share of savings (for those with savings)		Share of bonds (for those with bonds)		Share of stocks (for those with stocks)	
	Coef.	SE	Coef.	SE	Coef.	SE
Probability of more-than-10% drop in pension	0.0002	0.0002	0.001	0.0005 *	-0.001	0.0004 **
Probability of more-than-10% drop in pension: missing	0.020	0.010 **	0.011	0.023	0.001	0.022
Expected pension benefits	0.0000	0.0001	-0.0003	0.0002	-0.0004	0.0001 ***
Expected pension benefits: missing	0.017	0.013	-0.012	0.031	-0.066	0.028 **
log(Financial assets)	-0.0373	0.004 ***	-0.069	0.019 ***	-0.067	0.015 ***
log(Real estate)	-0.011	0.005 **	0.002	0.011	0.005	0.008
Real estate/Total assets	0.044	0.035	-0.038	0.097	0.061	0.082
Home mortgage	0.006	0.012	-0.022	0.027	0.041	0.027
Other debt	0.017	0.010 *	-0.009	0.030	-0.030	0.023
Home ownership	-0.035	0.019 *	-0.024	0.040	0.047	0.033
Working	0.008	0.012	0.009	0.024	-0.040	0.025
log(Family income)	-0.006	0.005	0.005	0.011	-0.016	0.013
Probability of survival until age 80	-0.002	0.008	-0.001	0.020	-0.014	0.018
Plan to leave bequest	-0.003	0.009	-0.018	0.022	-0.008	0.021
Plan to leave bequest: Missing	-0.002	0.013	0.072	0.029 **	-0.003	0.027
Serial 7	-0.010	0.004 **	0.003	0.009	0.007	0.011
Not asked Serial 7	-0.067	0.040 *	0.086	0.079	0.003	0.081
Self-assessed health: fair or poor	0.032	0.015 **	0.022	0.049	-0.039	0.032
Risk aversion	0.031	0.016 **	-0.062	0.037 *	0.007	0.046
Risk aversion: Missing	0.016	0.011	0.009	0.025	-0.096	0.026 ***
60≤Age<65	0.001	0.013	0.025	0.031	-0.023	0.028
65≤Age<70	-0.002	0.023	-0.005	0.051	0.005	0.057
70≤Age<75	0.055	0.038	0.138	0.085	-0.116	0.162
75≤Age<80	0.066	0.031 **	-0.072	0.088		
Below high school	0.028	0.012 **	0.036	0.047	0.038	0.053
Some college	-0.018	0.012	0.018	0.027	-0.006	0.027
College	-0.051	0.014 ***	0.013	0.025	0.027	0.024
Single	-0.042	0.013 ***	0.072	0.036 **	0.061	0.035 *
Female	0.008	0.010	-0.038	0.026	-0.052	0.025 **
# of Household members	-0.002	0.005	0.001	0.011	0.018	0.009 *
# of Children <18	0.002	0.020	0.044	0.059	-0.087	0.048 *
R-squared	0.145		0.150		0.250	
N	2925		648		640	
Mean of dependent variable	0.884		0.308		0.250	

Note: Regressions include indicators for municipality, year, and missing variables. Robust standard errors clustered at the individual level are shown in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Appendix Table 1. Summary statistics.

	Age Group				
	50-54	**55-59**	**60–64**	**65–69**	**70–74**
Holdings of savings	0.908	0.916	0.942	0.933	0.897
Holdings of bonds	0.172	0.193	0.238	0.227	0.192
Holdings of stocks	0.223	0.209	0.231	0.220	0.183
Holdings of either bonds or stocks	0.283	0.295	0.332	0.296	0.250
Probability of more-than-10% drop in pension	25.19	22.04	15.92	12.36	8.624
Probability of more-than-10% drop in pension: missing	0.598	0.605	0.553	0.561	0.103
Probability of more-than-10% increase in pension	1.242	0.229	1.412	0.000	0.000
Probability of more-than-10% increase in pension: missing	0.400	0.328	0.253	0.318	0.000
Expected pension benefits	128.0	121.4	105.3	83.46	54.94
Expected pension benefits: missing	0.889	0.752	0.589	0.448	0.226
log(Financial assets)	5.824	6.014	6.364	6.248	5.953
log(Real estate)	6.029	6.271	6.580	6.558	6.332
Real estate/Total assets	0.594	0.598	0.567	0.586	0.588
Home mortgage	0.409	0.293	0.156	0.103	0.051
Other debt	0.326	0.253	0.240	0.203	0.215
Home ownership	0.242	0.220	0.186	0.165	0.187
Working	0.920	0.852	0.565	0.216	0.078
log(Family income)	6.307	6.182	5.991	5.883	5.732
Self-assessed health: excellent	0.310	0.293	0.276	0.193	0.134
Self-assessed health: very good	0.254	0.277	0.232	0.238	0.242
Self-assessed health: good	0.349	0.336	0.345	0.370	0.332
Self-assessed health: fair or poor	0.087	0.095	0.148	0.199	0.293
Plan to leave bequest	0.409	0.419	0.418	0.439	0.385
Serial 7	4.542	4.364	4.207	4.038	3.891
Risk aversion	0.104	0.097	0.094	0.091	0.099
Below high school	0.059	0.120	0.195	0.302	0.436
High school	0.412	0.497	0.505	0.483	0.395
Some college	0.200	0.158	0.125	0.101	0.081
College	0.329	0.225	0.174	0.114	0.088
Married	0.015	0.012	0.011	0.017	0.025
Probability of living until age 80	0.810	0.840	0.808	0.824	0.908
Female	0.411	0.376	0.521	0.563	0.525
# of Household members	1.919	2.057	2.018	2.105	2.236
# of Children <18	0.182	0.041	0.006	0.004	0.001
N	1101	1459	1473	1461	1422