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Aging and Household Stockholdings: Evidence from Japanese Household Survey Data

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Abstract

Using Japanese household survey data from 2007 to 2010, we examine how household age, income, financial assets, and education affect the tendency to participate in the stock market. Our analysis suggests that the probability of stock market participation correlates weakly with age, holding constant other household characteristics, including the preference toward online financial transactions. The share of stocks in total household financial assets correlates positively with age, holding constant the other variables listed above. Our results suggest that older households tend to have more stocks than younger households, but this is mainly because older households have more financial assets on average than younger households: the effects of age per se are statistically significant but small in size.

Keywords: Stockholding Puzzle; Participation; Online Financial Transactions
JEL classification: C34, C35, D12, E21

***** Associate Director-General and Senior Economist, Institute for Monetary and Economic Studies, Bank of Japan (E-mail: hiroshi.fujiki@boj.or.jp)
****** Director and Senior Economist, Institute for Monetary and Economic Studies, Bank of Japan (E-mail: naohisa.hirakata@boj.or.jp)
******* Professor, Graduate School of Economics, Hitotsubashi University (E-mail: shioji@econ.hit-u.ac.jp)

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I. Introduction

Many developed economies, including Japan, are in the midst of a demographic transition that will profoundly affect national economies, including financial and real estate markets. Some economists argue, for example, that the run-up in asset prices in the 1990s is linked to demographic change. Recent papers making this case include Liu and Spiegel (2011) on stock prices and Takáts (2010) on real estate prices. Such arguments have attracted the attention of policymakers.

While these papers provide interesting empirical evidence based on aggregate data and financial market data, giving structural interpretations to the evidence has been found to be a challenging task, both from theoretical and empirical viewpoints. First, establishing clear theoretical links between asset price and aging requires several controversial assumptions, as pointed out by Poterba (2004). Second, regarding the stock market, empirical evidence based on micro data shows that the majority of households hold neither common stock nor other risky financial securities—a tendency called the "stockholding puzzle" by Mankiw and Zeldes (1991). This evidence suggests that, before jumping to a conclusion that the retirement of baby-boomers will inevitably lead to massive sales of stocks, one must first ask whether the presumption that older households tend to hold more stocks than younger households is truly justified.

This paper takes up the latter question. We utilize a large data set on the Japanese individual households' financial decisions, called the Survey of Household Finances (SHF). First, we establish that the stockholding puzzle holds in the Japanese data. Second, we analyze the simple correlation between stockholding and age in the SHF. We find that older households indeed tend to hold more stocks. Third, we ask if this tendency holds even after controlling for other important determinants of stockholdings. We do this through regression analyses of stockholdings, with household age, financial assets, education, among other variables, as explanatory variables. We examine whether the results are broadly consistent with findings based on micro data in other economies.[1]

Of the various financial assets, we restrict our attention to stocks in this paper. We believe that our analysis provides a sufficiently good approximation to the pattern of holdings of broader categories of risky financial assets. This is because shares and

[1] Cucuru *et al.* (2010) and Campbell (2006) study the U.S. case based on the Survey of Consumer Finance (SCF). Guiso, Haliassos, and Jappelli (2003) provide international comparisons on household stockholdings. Guiso, Haliassos, and Jappelli (2001) is a collection of notable studies in this field,both theoretical and empirical: the volume contains papers on empirical analysis of household portfolios in the United States, the United Kingdom, Italy, Germany, and the Netherlands.

other equities account for a significant portion of risky financial assets held by Japanese households (Figure 1).

We summarize our results below. We obtain the following two results regarding the stockholding puzzle and the simple correlation between stockholding and age.

First, the SHF data for the period from 2007 to 2010 show that at most 15% of households hold stocks, and we confirm the stockholding puzzle in the SHF data. Second, the SHF data for the period from 2007 to 2010 show that the relationship between the stock market participation rate and age is hump-shaped. However, the relationship between age and conditional share—defined as the percentage of stock in financial assets conditional on the fact that the household holds stock—is flat.

We obtain three results from the 2007–2010 SHF data through regression analyses:

(1) The stock market participation rates correlate weakly with age, holding constant other variables such as income, financial assets, education, and a dummy variable for preference toward online financial transactions.

(2) Conditional on stock market participation, the share of stocks in overall financial assets correlates positively with age, holding constant other variables discussed above.

(3) A dummy variable for preference toward online financial transactions correlates positively with the stock market participation rates, holding other variables constant. The result is consistent with the observation that, around the year 2000, the lowering of fees for online stock trading offered by many Japanese online securities firms significantly boosted online stock trading among Japanese households, following a series of deregulation of Japanese financial markets around that time.

In the current era of population aging, the question of how to finance old-age consumption has become a crucial issue for each household as well as for the country as a whole. Our finding that the stockholding puzzle is alive and well in Japan can be interpreted as evidence that there is room for the government to pursue more efficient risk sharing among generations. That is, if current stockholdings of Japanese households are less than optimal compared to what would obtain in a hypothetical world of zero participation cost, the government might be able to achieve a better allocation by encouraging stockholding. If this is the case, what kind of measures should be taken? Some might argue in favor of measures that specifically target elderly households, as our data indicate that older households tend to hold more stocks than younger households. This view might be justified if this tendency can be regarded as reflecting different preferences between the young and the old. After all, if younger people do not hold stocks because they do not like them, why should they be forced to

buy them?[2] However, our empirical analysis paints a very different picture. We find that older households hold more stocks than younger ones not because they are older but because they are on average more wealthy: that is, they simply have enough wealth to cover the entry cost into the stock market, unlike many of their younger counterparts. Therefore, our results are more in line with the view that the key to encourage stockholding is the reduction of entry cost into the stock market that is applicable to all the age groups. Targeting certain age groups would be less essential.[3]

On the other hand, the consequences of such policy measures may differ across household age groups. Our results suggest that younger households benefited more than older households from the prevalence of low-cost online stock trading in the early 2000s. Note that an increase in younger households' stock market participation could have an additional benefit: if they continue to participate in the market throughout their lives, it would eventually lead to an increase in the stock market participation of future older households, which would then have (on average) greater wealth. In addition, our estimation results suggest that younger households might benefit more than older households from policy measures to improve the financial literacy of households or to increase the number of professional advisers who can provide households with appropriate advice and information. According to our estimated participation equations, professional investment advice and financial literacy have a positive effect on the stock market participation of younger households.

Before moving on to the details of our analysis, we review the relevant literature based on Japanese household data. Amemiya, Saito, and Shimono (1993), an early study of household portfolios in Japan, analyzed demand for cash, deposits, and risky assets using 1984 data on households in Tokyo. Tachibanaki and Tanigawa (1990) used data for 1985. Fujiki and Shioji (2006) studied the cash and deposits demand of households using the Public Opinion Survey on Household Financial Assets and Liabilities.[4] Iwaisako (2009, 2012) and Kitamura and Uchino (2010) examined Japanese household portfolios using the Nikkei Needs Radar, which covers only households in the Tokyo metropolitan area.

Of these studies, those closest to ours are Iwaisako (2009, 2012). Regarding the relationship between age and stockholdings, Iwaisako (2009) reports results consistent with ours. In his regression exercises, Iwaisako (2012) also uses a variable that

[2] Cabinet Office (2005, Chapter 3 Section 2.3), provides the view that older households are less risk averse than younger households, but does not discuss the effect of the entry cost of stock market participation on household stockholdings.

[3] One of the aims of the Japanese financial "Big Bang," the deregulation of financial markets from the mid-1990s to early 2000s, was to enhance stock market participation.

[4] The data set was renamed the SHF in 2007.

represents household Internet use to control for stock market participation. Our data from the SHF explicitly ask about preferences for online financial transactions, while the Nikkei Needs Radar asks about Internet use in general.

The rest of the paper is organized as follows. Section II provides a brief overview of household portfolio theories related to our studies. Section III explains our data from the SHF data in detail. Section IV shows the results of regressions for the stock market participation and the conditional share. Section V describes robustness checks. Section VI gives a simulation of how aging affects total household stockholdings. Section VII concludes the paper.

II. Determinants of household stockholdings

We are interested in the effects of age on stockholding by Japanese households. However, many other variables besides age may affect stockholding, such as financial assets or labor income. In this section, we provide a brief theoretical overview of the effects of these variables on the stockholding of households to enable a grasp of the results of our regression analyses in the following sections.

A. Financial assets

We expect stock market participation to increase with the size of total financial assets for the following reasons.

In the absence of entry costs, standard portfolio theory suggests that each investor will hold riskless assets as well as a portfolio of risky securities that yields the maximum expected return for each level of variance of financial assets. This means that the stock market participation rate should be 100%. If we assume that buying and selling stock entails transaction costs, the poor will not hold risky assets, because the utility loss attributable to abstaining from stock market participation is too small to offset the fixed participation cost. Thus, we would expect a strong positive correlation between stock market participation and the investor's financial assets.

The relationship between the conditional share and financial assets depends on the forms of utility functions. For example, if the utility function is of the constant relative risk aversion (CRRA) type, the conditional share is independent of financial assets. If the utility function is of the constant absolute risk aversion (CARA) type, as a household accumulates greater wealth, the conditional share will decrease, since the value of the stockholding in its portfolio remains constant, regardless of financial assets.

B. Labor income

We would expect stock market participation and the conditional share of households with labor income to be higher than those of households without labor income. Among households with labor income, we would expect that as the stream of future labor income becomes more assured and as variations in labor income correlate less with variations in returns from stocks, the conditional share and participation in the stock market would grow. We illustrate our argument in the following two examples.[5]

Consider an economy that consists of two types of households: one type of households has no labor income at all, while the other type has labor income. We suppose that households without labor income have access to two types of assets: a safe financial asset and a risky financial asset. In comparison, households with labor income own one more type of asset; that is, human capital from which labor income is derived. We assume that all households can choose amounts of risky as well as safe financial assets. However, the amount of human capital is exogenously fixed for a household with labor income.

As a first scenario, consider the case in which human capital is riskless, that is, future labor income is completely predictable. In such a situation, holding constant other household characteristics, households with labor income have a larger portfolio share of the risky asset in total financial assets than households without labor income. This is because, given the same amount of total financial assets, the households with labor income have a safer and more predictable source of future income. As a consequence, as a share of total financial assets, these households would prefer to have riskier financial assets than the households without labor income.

Second, consider a situation in which labor income is risky. Moreover, among households with labor income, suppose that the predictability of labor income varies from household to household. Then, the capital asset pricing model (CAPM) suggests that the households with riskier labor income—for example, those with volatile labor income that is uncorrelated with the return from the risky financial asset—would prefer to have a safer financial asset and less risky financial asset compared with households with relatively safe labor income.[6] It might be wondered whether households can insure the risk arising from the human capital; however, we assume that human capital is nontradable, and thus households cannot diversify away their labor income risk. The CAPM also suggests that the positive correlation between labor income and the risky asset return reduces the portfolio share of the risky asset in total

[5] The explanations here rely on Campbell and Viceira (2002, chapter 6).

[6] The conditions for this are shown in Campbell and Viceira (2002, chapter 6).

financial asset holdings. This is because holding human capital increases the overall risk of the household's financial and nonfinancial assets due to the positive correlation between labor income and the risky asset return.

Note that the discussions above assume exogenous labor income. However, as emphasized by Bodie, Merton, and Samuelson (1992), the ability to adjust labor supply heightens an investor's willingness to take on financial risk.

C. Age

We would expect age to have ambiguous effects on stock market participation and conditional share, given labor income and financial assets, as the following examples show.

Our first example is the case in which the effect of age on stock market participation and conditional share is negative, given labor income and financial assets. Suppose the amounts of annual labor income are given for all agents up to a predetermined age. Suppose further that agents can purchase either stock or risk-free financial assets. In this situation, compared to older agents, younger agents have a greater amount of safe future income. This means that the share of risky assets in the portfolio of financial assets tends to decline with age, up until the point at which labor income is zero.

Our second example is the case in which the effect of age on stock market participation and conditional share is positive, given labor income and financial assets. Assume two households with equal current subsistence levels and equal wealth, but different investment horizons. Given equal current consumption for both investors, the present value of future subsistence levels is higher for the investor with a longer horizon, compelling the long-horizon investor to set aside more wealth in riskless assets to meet subsistence needs and giving the long-horizon investor a more conservative portfolio, as underscored by Samuelson (1989).

D. Entrepreneurial risk

We would expect lower stock market participation and lower shares of stocks among those with a stake in private businesses, since one can reasonably assume that households operating private businesses face higher and more variable business income than other households. Indeed, Heaton and Lucas (2000) report evidence that private businesses may crowd out ownership of publicly traded equities and that households with more variable proprietary income tend to have smaller equity allocations.

E. Preference for online financial transactions

We assume that an individual who prefers online financial transactions would have higher stock market participation, given other variables, based on the following development in the Japanese financial markets.

After the Japanese financial "Big Bang," Japanese online securities firms dramatically reduced their fees for online stock trading. According to a survey by the Japan Securities Dealers Association in 2005, before the Big Bang, a purchaser of ¥1 million in stock paid an average of 1.2% in transaction fees. Following the Big Bang, however, a purchaser of ¥1million in stock online paid an average of 0.2%. Moreover, online securities firms began providing unique services, including after-hours transactions via proprietary trading systems, the ability to purchase foreign securities, and access to information relevant to personal investment.

Originally offered by online securities firms, these new services eventually spread to other Japanese financial institutions. The new services reduced transaction costs for stocks and the cost of gathering information for investing in stocks. Thus, we would assume that those preferring online financial transactions would exhibit higher stock market participation, given other variables.

III. Data

This section first discusses the data from the SHF, then goes on to discuss the trends in key variables.

A. SHF (Survey of Household Finances)

The SHF is an annual survey of household financial assets undertaken by the Central Council for Financial Services Information (CCFSI). Beginning in 1953, this nationwide survey canvasses households with two or more people. From 2007 to 2010, the survey targeted nationwide 8,000 households of two or more people. For the 2010 survey, 4,032 of 8,000 households responded. The samples are selected each year; the SHF data are not panel data.

The survey asks respondents for their amount of household financial assets and liabilities; selection of financial products, including outstanding amounts (to the nearest ¥10,000) of deposits (both current deposits and time deposits); postal savings (both postal savings current deposits and postal savings time deposits); money trusts and loan trusts; life insurance and postal life insurance; nonlife insurance; personal annuity insurance; bonds; stocks; investment trusts; workers' asset formation savings; and other financial products. In addition, the survey asks for various household characteristics, including annual income, age of household head, household composition, education, and employment status.

The CCFSI allows us to use the survey data from 1991 to 2010. Due to discontinuities in sampling designs in 2004 and 2007, we used data from 2007 to 2010 for households with at least two members in the regression analysis in Section IV.[7] In the regression analysis in Section V, we used data from 2007 to 2010 for single-person households. This analysis is possible because the SHF has collected data since 2007 for single-person households from a pool of individuals registered with a survey company through the Internet. The sampling probability is assigned based on the latest national censusby age, gender, and region.

B. Trends in key variables

From the 2007–2010 SHF data, we computed three annual average variables: unconditional share (US), participation rate (PR), and conditional share (CS). US is the average portfolio share held in stocks across all households. CS is the average portfolio share only for households that hold stocks, defined below:

$$US \equiv \frac{\sum_{i=1}^{N} S_i}{\sum_{i=1}^{T} W_i},$$

$$CS \equiv \frac{\sum_{i=1}^{N} S_i}{\sum_{i=1}^{N} W_i},$$

$$PR \equiv \frac{N}{T},$$

where S_i is the amount of stockholding, W_i is the amount of financial assets, $i = 1,\ldots,N$ is the index of households with stocks, $i = N + 1,\ldots,T$ is the index of households without stockholdings, and T is the sample size.[8]

Figure 2 shows the relationship between age and CS, US, and PR using pooled from 2007 to 2010. US shows a hump-shaped profile, resulting from the combination of a concave age profile for PR and a flat profile for CS. PR increases with age,

[7] Before 2003, the survey was carried out nationwide and targeted 6,000 households with more than two people; 4,158 households responded to the 2003 survey (response rate: 69.3%). The survey used a stratified two-stage random-sampling method. From 2004 to 2004, the survey was undertaken nationwide, targeting 10,080 individuals; 3,478 households responded to the 2006 survey (response rate: 34.5%). The response rates from 2004 to 2006 are much lower than those before 2004.

[8] US is decomposed into CS and PR as follows:

$$US = CS \cdot \underbrace{PR \cdot \frac{\overline{W}^N}{\overline{W}^T}}_{<1}, \overline{W}^N \equiv \frac{\sum_{i=1}^{N} W_i}{N}, \overline{W}^T \equiv \frac{\sum_{i=1}^{T} W_i}{T}.$$

peaking with the 60–69 age group. In contrast, CS is fairly constant across age groups (around 22%).

Figure 3 shows that PR increases with the scale of financial assets held by households, a result consistent with the theoretical prediction based on participation cost explained in Section II.A. At low levels of wealth, very few investors hold stock directly, while this percentage increases rapidly with greater wealth. This pattern is also reported in previous studies of other countries.

Figure 4 shows that CS decreases with the scale of financial assets held by households. However, the negative correlation between CS and the scale of financial assets appears weak compared to the negative correlation between PR and the scale of financial assets.[9] The results are consistent with the findings of Guiso, Haliasos, and Jappelli (2001), whose summary conclusion is that the relationship in certain countries between wealth and conditional share of stock is relatively modest.[10]

IV. Estimation

In this section, we used annual micro data from SHF from 2007 to 2010 and estimated a statistical model of the share of stocks in household financial assets and stock market participation as a function of age, financial assets, income, and several household characteristics that may affect portfolio decisions.

A. Statistical model

In the following analysis, we use the simplified model of household choice of financial assets used by Fujiki and Shioji (2006).

Suppose a household has a certain amount of wealth. We assume that every household will allocate some of its wealth to currency, which is consistent with the SHF report that nearly all households hold currency. We further assume that the household will choose one of two combinations of financial assets. The first combination consists of currency, stocks, and other financial products, such as bank deposits. The second combination consists of currency and financial products other than stocks. The theoretical background for separating stocks from other financial products is that stocks pose high price fluctuation risks compared to deposits, which are highly liquid. Stocks also differ qualitatively from products such as insurance, which have very long-term contract periods compared to deposits.

[9] The findings below are consistent with findings reported in previous studies in Japan and other countries. See Iwaisako (2012) for Japanese findings. Guiso, Haliassos, and Jappelli (2003) report conditions in the United States and European countries.

[10] See Guiso, Haliasos, and Jappelli (2001, table I.7) for details.

B. Empirical model

Armed with the statistical model above, using 2007–2010 SHF data, we estimated an individual's stock market participation and conditional share based on the sample selection model set forth by Heckman (1979).

In participation and share of stock in total financial assets regressions, we controlled for household income and wealth, household characteristics (family size, number of children, and region of residence), and variables related to the household head (age, gender, and occupation).

To estimate Heckman's model, we must include certain variables that may affect the decision to participate in the stock market, but not the stock share. In the participation equations, assuming that variations in information and entry costs are important in this regard, we included an education and dummy variable for preference for online financial transactions that affects the cost of gathering information and learning about stock markets.

C. Variables for regression

We explain the explanatory variables used in the estimation in detail.

(1) Age

We included dummy variables for the age range of the household head: under 29, 30–39, 40–49, 50–59 (omitted), 60–69, 70–79, and 80 and over. We set time dummies to indicate the survey year (omitting 2007).

In Section II, we noted that the effects of age on stock market participation and conditional share are ambiguous, given labor income and financial assets. These age dummies should capture two unobserved variables that evolve with age and affect stockholdings: the present value of remaining labor income for a household and the present value of future subsistence level for a household.

As pointed out by Ameriks and Zeldes (2004), it is impossible to separately identify age effects, time effects, and cohort effects on portfolio choice. Even if we have complete panel data on portfolios of households over time, any pattern in the data can be made to fit equally well by age and time effects, age and cohort effects, or time and cohort effects. Accordingly, we follow most other studies in setting cohort effects to zero. Based on this assumption, age effects can be estimated in any cross-section.[11]

[11] Identifying cohort effects requires additional assumptions or variables. For example, Malmendier and Nagel (2011) find that individuals who have experienced low stock market returns throughout their lives thus far report a lower willingness to assume financial risk, are less likely to participate in the stock market, invest a lower proportion of their liquid assets in stocks if they participate, and are more pessimistic about future stock returns.

(2) Financial assets and income

For financial assets and income, we use dummies of financial assets and income percentiles: below 10%, 10–20%, 20–30%, 30–40%, 40–50% (omitted), 60–70%, 70–80%, 80–90%, and the top 10%.[12]

(3) Other household characteristics

We included the following household characteristics as conditioning variables: household type (household headed by a male or not, household size); whether a household head is self-employed; the education of the household head (higher than college degree or not). We also included a dummy variable for occupation to capture possible differences in income variability, whether the head is self-employed or not, whether a household head is employed as a regular worker or not, and in what industry the household head works (agriculture, construction, manufacturing, transportation, wholesale and retail, services, medical, public sector, and other).

(4) Preference for online financial transactions

Many studies include Internet use as a conditioning variable for stock market participation. Thanks to the SHF, we can construct a dummy variable for the preference for online financial transactions, rather than Internet use. The distinction is important, because Internet use does not necessarily mean stock market participation.[13]

We construct a dummy variable for preference of online financial transactions as follows. In the SHF 2010, respondents were asked, "What features are important for you when you choose financial institutions?" and were instructed to choose up to three of 13 possible answers. These 13 answers included (1) branch or automated teller machines (ATMs) are located in the neighborhood (chosen by 79% of respondents); (2) the financial status is sound and trustworthy (32% of respondents); (3) there is a nationwide branch network (28% of respondents); and so forth. Of these 13 answers, 7% of respondents chose "Provides a wide range of online services and transactions." We constructed a dummy variable to assume the value of one if a household chose this answer and used a dummy variable as a proxy for the household's preference for online financial transactions.

Note that even if a household indicates a preference for online financial transactions, the household may limit its activities to online banking, rather than engaging in online stock transactions as well. However, households preferring online

[12] We adopt a dummy variable to capture nonlinearities. For robustness checks, we also estimate specifications that adopt polynomials for age and financial assets. The results are nearly identical to the benchmark results.

[13] Iwaisako (2012) uses a variable representing household Internet use but does not discuss its effects on stock market participation and estimation results.

financial transactions are more likely to take advantage of the benefits of cheap and quick online stock transactions and are thus more likely to participate in the stock market in this way.

D. Results of regression

Table 1 gives the results of the participation and the conditional share equations for stocks.

In the conditional share equation, the estimated coefficients on the age dummy indicate that holding other variables constant, the conditional share increases as the age of the household head increases. However, the coefficients for the age dummy are not statistically different from zero at the 5 percent significant level. in the participation equation.

The coefficients of financial assets and income increase as the age of the household head increases and are statistically significant in the participation equation, while they decrease as the age of the household head increases and are significant in the conditional share equation. These results oppose the average results summarized in Figure 2, which do not control for the other variables that could affect stockholding. Our regression supports the idea that older households tend to hold more stock than younger households. However, this is likely due to the greater amount of financial assets or higher income, not the effects of age *per se*.

Note that the conditional share decreases with financial asset and increases with income. And on the contrary, the participation increases with financial assets and decreases with income. How should these findings be reconciled? In the presence of entry costs for stockholdings, households with higher financial assets are likely to hold stocks. This implies that if households with lesser financial assets hold stocks, they are less risk averse. Households that are less risk averse hold large shares of stocks in financial assets. So, conditioning on participation, financial assets and share are negatively correlated.

The regression coefficients of the participation equation indicate that the self-employed and farmers are less likely to hold stocks. These coefficients of the participation equation are negative and statistically significant, which is consistent with the entrepreneurial risk hypothesis discussed in Section II.

The coefficient for a dummy variable for a household's preference for online financial transactions in the participation equation is positive and statistically significant. The result supports our hypothesis that the emergence of online stock transactions reduced the cost of gathering and processing information and the fees

associated with a household's acquisition of stocks.[14]

One may argue that the effects of online stock transactions on stock market participation differ with household age. This is because holding other conditions constant, younger households, who tend to be more comfortable with and more adept at handling computers or cell phones than older households, have readier access to the benefits of online financial transactions and other technological innovations in finance. Figure 5 shows the evidence for our argument. The age participation profile of households that choose the answer "Provides a wide range of online services and transactions" appears above the age participation profiles of households that do not select this answer. Figure 6 shows that younger households choose the "Provides a wide range of online services and transactions" response more frequently than older households.

V. Robustness check

This section provides two analyses to check the robustness of the results obtained in the previous sections. First, we based the analysis on single-person household data. The analysis aims to check the results of the relationship between household stockholdings and the preference for online transactions. Second, we examine four other additional factors that affect stock market participations and conditional share based on the previous research. Specifically, we add the proxy variables that are not considered in the previous sections—bequest motive, saving motive, information gathering, and risk attitude—and examine whether or not there is a change in our empirical findings on the relationship between age and stock market participations, and age and conditional share in Section VI.

A. Analysis based on single-person household data

For this subsection, we used data from single-person households from 2007 to 2010 from a pool of individuals registered through the Internet with a survey company. The sampling probability is assigned based on the latest national census, by age, gender, and region.

It is reasonable to assume that single-person households in the sample would tend to be more accustomed to adopting new technologies like the Internet than the average

[14] It might be wondered whether households wishing to purchase stocks for the first time would actually begin with online stock transactions. If so, our analysis would suffer from an endogeneity bias due to this reverse causality. To counter this problem, we estimated probit models to obtain predicted values for the dummy variable for preference for online financial transactions, using the same variable used in the benchmark estimation as explanatory variables. Next, we substituted the predicted values for the observed values of the dummy variable in the benchmark estimation. The results are nearly identical to the benchmark results.

single-person household. Based on this reasoning, we proposed the following three hypotheses.

First, we would expect single-person households to be more likely to hold stock than households of two or more people. Second, even if we control for Internet use by restricting our attention to our single-person household data, we would still expect higher participation rates among those preferring online financial transactions. Third, once we control for Internet use, we would not expect that younger people prefer online financial transactions more than those who areolder. We will examine whether our hypotheses prove true.

Figure 7 supports our first hypothesis. The figure illustrates the age participation profiles of single-person households and households of two or more people. Here we would like to note three key items. First, both age participation profiles increase with age.[15] Second, participation rates for all age groups are greater in single-person households than in households with two or more people. Third, the slope of the profile of the single-person households is steeper than that of households of two or more people.

Figure 8 supports our second hypothesis. Figure 8 illustrates the age participation profiles for households who chose the answer "Provides a wide range of online services and transactions" on the one hand and who did not choose the answer "Provides a wide range of online services and transactions" on the other. First, as with households of two or more people, single-person households choosing this answer are more likely to hold stocks. Second, in contrast to households of two or more people, the two profiles have nearly identical slopes.

Figure 9 supports our third hypothesis, illustrating the relationship between the proportion of households choosing the answer "Provides a wide range of online services and transactions" and age group. Unlike the sample of households with two or more people, we see no correlation between age group and percentage of households choosing the answer "Provides a wide range of online services and transactions." This suggests that once a young person is accustomed to online financial transactions, he or she will probably remain more likely to hold stocks at some point.

Table 2 shows the estimation results for the single-person household sample. As we would expect, the coefficient for a dummy variable for a person's preference for online financial transactions in the participation equation is positive and statistically

[15] Single-person households above 70 years of age are excluded from the sample, due to the difficulty of surveying older households through the Internet. This means that we cannot confirm whether the age participation profile of single-person households is hump-shaped, like the profile for households consisting of two or more people.

significant. Once again, these results support our hypothesis that the emergence of online stock transactions reduced the cost of gathering and processing information and fees associated with household stockholdings. Table 2 shows positive and significant coefficients for both participation and conditional share for age dummies for those aged 50–59 and 60–69 years.

B. Including additional variables

To check the robustness of our empirical findings on the relationship between age and stock market participation, and age and conditional share in Section VI, we add proxy variables for bequest motive, saving motive, information gathering, and risk attitude in household stockholdings to our statistical model in Section IV.

(1) Variables for regression

A household head may want to hold stocks to leave bequest. We construct a dummy variable on bequest motive for household stockholdings as below. In the SHF, respondents were asked about "Attitude toward bequest" and instructed to choose one of eight possible answers. Of these eight answers, 44.5% of respondents chose the answer "Leave bequest to children regardless of whether the children take care of the respondent or not." We construct a dummy variable to assume a value of one if a household chose this answer and use the dummy variable as a proxy for the household's bequest motive. We expect that households with a bequest motive are more likely to holds stocks.

A household may want to hold stocks to prepare for a particular type of future spending, for example, spending after retirement or spending for a child's higher education. To check this possibility, we can use a question in the SHF on saving motives to prepare dummy variables for preparation for a particular type of future spending. Among the possible answers in the question, the respondents are asked about saving motives and instructed to choose up to three of 11 options, which include "For medical or disasters expenses," "For educational expenses for children," "For investing in own home," "For wedding expenses for children," "For retirement," and "For bequest to children." We convert each category into a dummy variable, assigning a value of one if a respondent chooses it as one of his or her three reasons for saving and zero otherwise. We expect that these dummy variables are positively correlated with the stockholdings.

A household head may want to hold stocks if he or she has more information on the financial products. To check this possibility, we can use two questions in the SHF. First, we use a question on the sources of information about financial investments. The respondents are asked about the source of information and instructed

to choose up to three of 11 options, which include "From professional advice." We convert this category into a dummy variable, assigning the value of one if a respondent chooses it as one of his or her three sources of information and zero otherwise and generate a professional advice dummy. We expect that stock market participation is more likely if a household has sought professional advice.[16] Second, we use a question as to whether the households are very familiar with the deposit insurance system in Japan.[17] In the SHF, the respondents were asked, "The deposit insurance system protects deposits of up to ¥10 million in principal, and their interest income, on a per financial institution and per depositor basis. Do you know about this system?" and were instructed to select one of the following three answers: "Yes, even know about the details," "Have heard or read something about it," or "No, do not know anything about it." Among these, we generate the deposit insurance dummy, with a value of one for the households that selected the first answer. We expect that the coefficient of the deposit insurance dummy is positive.

A household head may want to hold stocks if he or she is willing to take on the risk to seek a higher return. To check this possibility, we generate a yield-emphasis dummy, with a value of one for the households that select "Can expect high yield" or "Can expect capital gain."[18] We expect that the estimated coefficients of the yield-emphasis dummy are positive in both the participation and conditional share equations.

(2) Estimation results

Table 3 reports the results of the participation and the conditional share equations that include the variables related to the bequest motive, saving motive, information gathering, and risk attitude. The estimates for the variables are presented in the shaded area of the table. We point out five things in the estimation results.

First, the bequest motive does not affect both the participation and the conditional share equations. As shown in Table 3, the coefficients for the bequest motive dummy are not statistically significant in either the participation equation or the conditional share equation.

Second, the savings for some types of future spending affect both the participation and the conditional share. For the participation equation, the coefficients on the dummy variables for "For wedding expenses for children" and for "For retirement" are

[16] Shum and Faig (2006) examine the relationship between professional investment advice and U.S. household stockholdings using the Survey of Consumer Finance. They report that stock ownership is positively correlated with having sought professional investment advice.

[17] Fujiki and Shioji (2006) investigate the relationship between knowledge of the deposit insurance system in Japan and household portfolios.

[18] Fujiki and Shioji (2006) examine the role of the yield-emphasis dummy in the household portfolio.

positive and statistically significant, but other saving motives dummy variables are not statistically significant. For the conditional share equation, the coefficients on the dummy variables for "For medical or disaster expenses," "For wedding expenses for children," "For investing in own home," and "For retirement" are negative and statistically significant.

Third, gathering information from professional advice is positively correlated with the participation for younger households. Table 3 indicate that the coefficient of the cross-term of the professional advice dummy and age 20–29 group dummy is positive and statistically significant, while the coefficient on the professional advice dummy is not statistically significant. This indicates that younger households that seek professional advice are more likely to hold stocks, while older households that seek professional advice are less likely to hold stocks. In addition, the coefficient of the deposit insurance system dummy is positive and statistically significant in the participation equation, while the coefficient is negative and statistically significant in the conditional share equation.

Fourth, the yield-emphasis dummy is positively correlated with both participation and the conditional share and statistically significant.

Finally, despite the inclusion of those variables, our main finding in Section IV remains unchanged. The results in Table 3 confirm that the participation rate is weakly correlated with age given other variables, such as financial wealth and incomes of households, while the conditional share increases as age increases given the other variables. In addition, the coefficient for a dummy variable for a household's preference for online financial transactions in the participation equation is positive and statistically significant.

VI. Simulation of how aging affects household stockholdings

This section discusses a simulation of how aging affects household stockholdings. Figure 10 illustrates the latest official projections for the Japanese population (over age 20) by age group published in January 2012 by the National Institute of Population and Social Security Research. These projections point to two changes that would affect household stockholdings. First, the population over age 20 in 2010 is 105.125 million and may fall by 2050 to 84.106 million. Second, the ratio of the population over the age of 60 appears likely to continue to rise over time.

Based on these projections, aging will affect household stockholdings though two channels. First, the decrease in population and the number of households will reduce household stockholdings. Second, the increase in the ratio of the population over age 60 will increase household stockholdings due to the two positive effects of financial

asset accumulation on participation and of aging on stockholding share.

The overall quantitative effects of aging on household stockholding depend on the relative size of the two channels. We undertook a simulation to gauge the overall effect.

Figure 11 shows two projected paths for household stockholdings based on the projected population shown in Figure 10 and the 2010 SHF. We will discuss the two paths in turn.

First, assume that conditional shares, participation rates, and financial assets per household remain constant at 2010 levels over the projection period from 2020 to 2060. Based on this assumption, we calculate the stockholdings path reflecting the future age structure of Japanese population seen in Figure 10. The blue dotted line in Figure 11 indicates the results of this simulation; we call this path the baseline projection. The baseline indicates that household stockholdings in 2020 and 2030 will be higher than in 2010 (around ¥80 trillion) since the second channel, the positive effect of the increase in the ratio of the population over age 60, dominates the first channel, the negative effect of the decrease in population and the number of households. . However, household stockholdings in 2050 and 2060 are lower than in 2010. Within these timeframes, the first channel dominates the second channel.

Second, we assume that participation rates for all age groups will rise by 1.4 percentage points from 2010 to 2060. The red line in Figure 11 corresponds to the household stockholdings based on this assumption. The red line shows that the household stockholdings in 2050 will be close to those in 2010. Therefore, if we wish to offset the decrease in household stockholdings due to aging, given the current income and asset profile, one measure would be to raise the participation rate of all age groups by 1.4 percentage points. Is this achievable?

One way to achieve this change would be to expand online stock transactions, thereby increasing participation rates for the current young age group, which will in turn be succeeded by younger generations. In the following we examine how such a mechanism works.

Figure 12 illustrates the impact of the increase in preference for online financial transactions on stock market participation by age group. The impact is attributable to the marginal effects obtained from the coefficients on households' online financial transactions (Table 1), evaluated at current levels of stock market participation and other conditioning variables. The numbers in the figure are normalized to the deviations from the participation rate at age 80 or over. In passing, the figure shows that the spread of online stock transactions puts the participation rate of younger households (age 20–29) above that of older households (age 80 or over) by about

1.4%.

Suppose that younger generations, born 10, 20, 30, and 40 years later exhibit the same preference levels for online financial transactions. Suppose further that the level of preference for online financial transactions for each age group will not decline forever. In 2050, the participation rates for all age groups would then rise by 1.4 percentage points compared to levels for current age groups.

These projections make numerous restrictive assumptions. Nevertheless, taken at face value and assuming that other variables such as income and financial asset profiles remain constant, they suggest that sustaining the current growth in preference for online transactions for younger generations will maintain current levels of Japanese household stockholdings, despite the continuation of population aging.

VII. Conclusion

This paper investigated how household age, wealth, and education affect stockholding of Japanese households by running regressions using 2007–2010 SHF data. We obtained three results.

First, participation rates correlate weakly with age, given other variables such as income, financial assets, education, and a dummy variable for preference for online financial transactions. Older households do tend to hold more stock than younger households, but for reasons involving greater financial assets or higher income, not the effects of age *per se*.

Second, the conditional share correlates positively with age, holding constant the other variables discussed above.

Third, a dummy variable for preference for online financial transactions correlates positively with participation rates, holding other variables constant. The result is consistent with the observation that, around the year 2000, the lowering of fees for online stock trading offered by many Japanese online securities firms significantly boosted online stock trading by Japanese households, following a series of deregulation of Japanese financial markets around that time.

In an aging society, households seek to finance their future consumption through savings or public or private transfers. Our evidence that the stockholding puzzle is alive and well in Japan suggests that the government might wish to encourage greater stockholding to pursue more efficient risk sharing among generations. In this case, what kind of measures should be taken? One might argue in favor of measures targeted at older households: our data indicate that older households tend to hold more stocks than younger households. However, our estimation results give us a different message. Older households tend to hold more stocks than younger households not because their

preference is different but because they are on average wealthy enough to cover the entry cost into the stock market, unlike many of the younger households. Therefore, the key to encouraging stockholding is reducing the entry cost to the stock market, which applies irrespective of household age. This would suggest taking measures to lower the entry cost of stock market participation regardless of age.

The effect of such policy measures may differ across household age groups. Our results suggest that younger households benefited more than older ones from the prevalence of low-cost online stock trading in the early 2000s. An increase in younger households' stock market participation could provide an additional benefit in the long run, if it eventually leads to an increase in the stock market participation of future older households. In addition, we conclude that younger households might benefit more than older ones from policy measures to enhance financial literacy of households or to increase the number of professional advisers who could provide households with appropriate advice and information. This is because our estimated participation equations indicate that professional investment advice and financial literacy have positive effects on the stock market participation of younger households.

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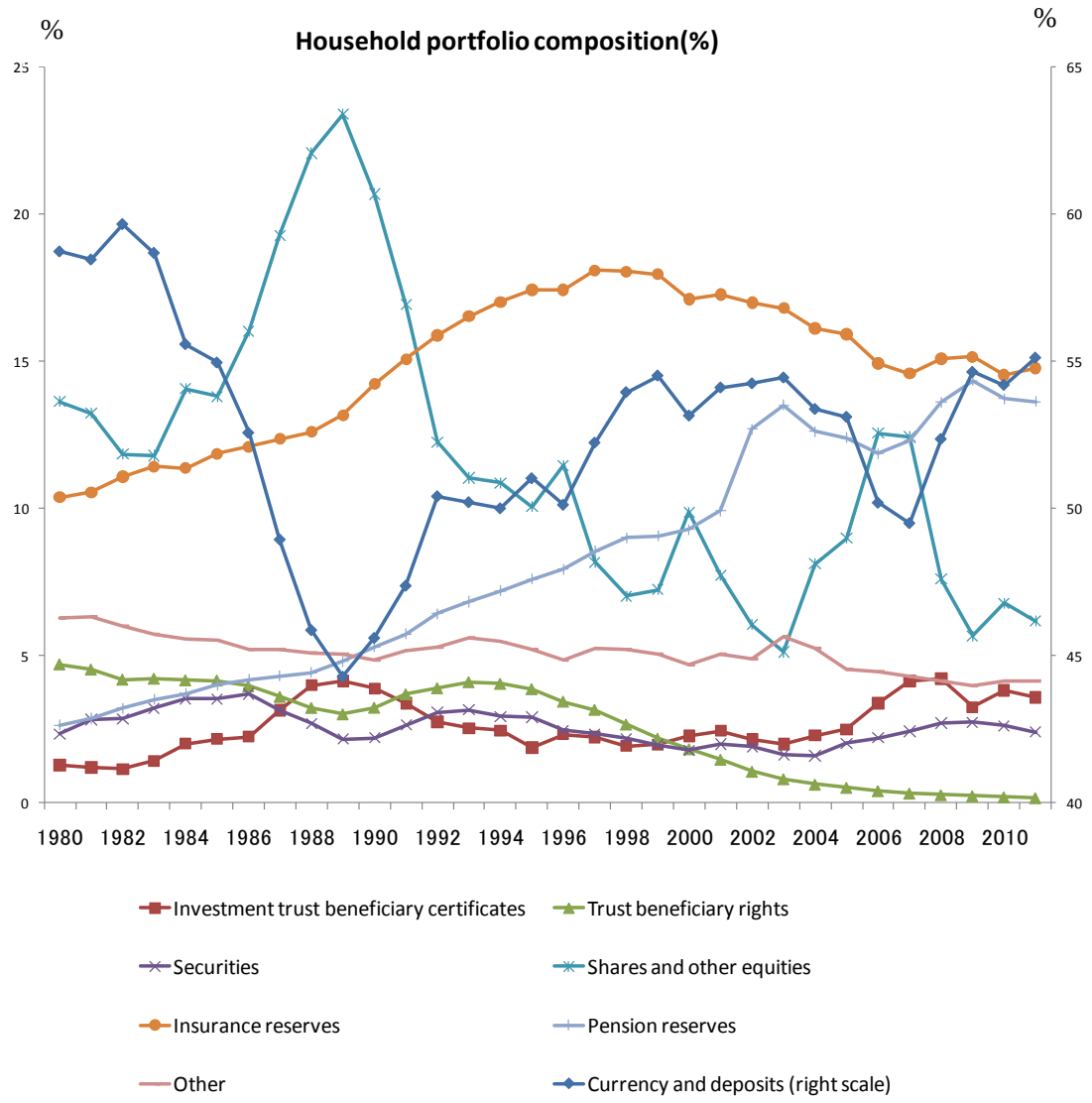

Figure 1: Household portfolio composition in Japan
Source: Flow of Funds, Bank of Japan

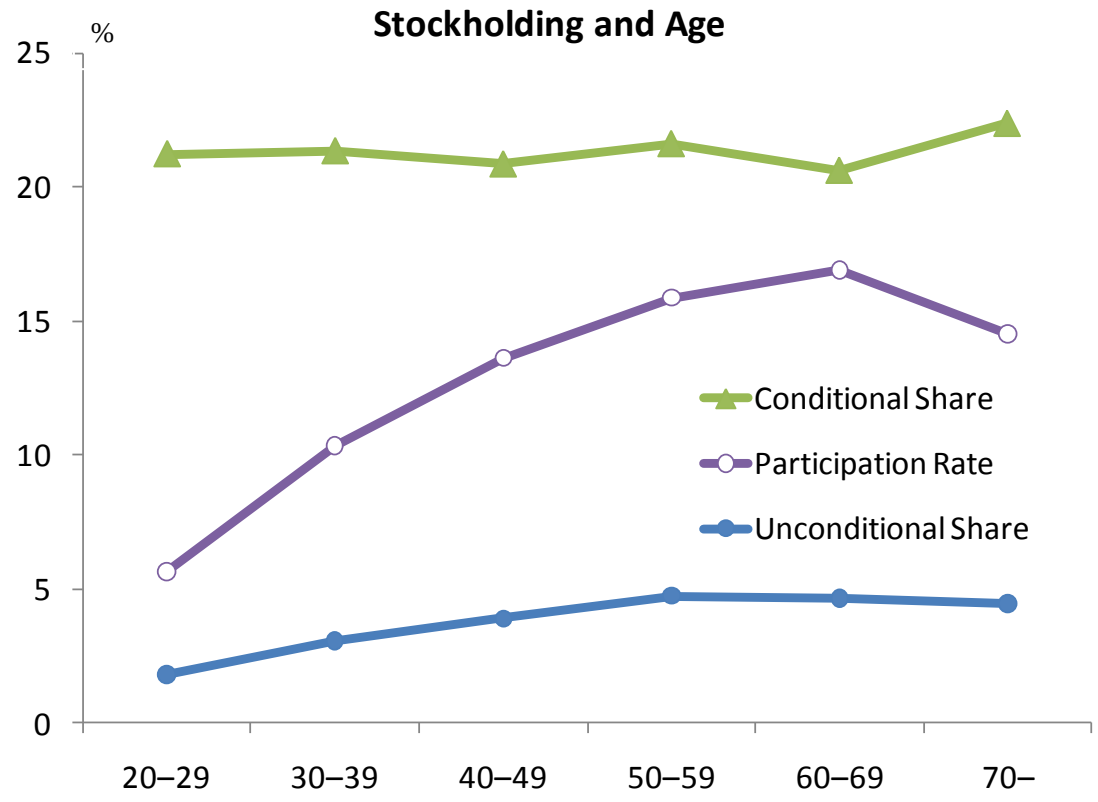

Figure 2: Stockholding and age

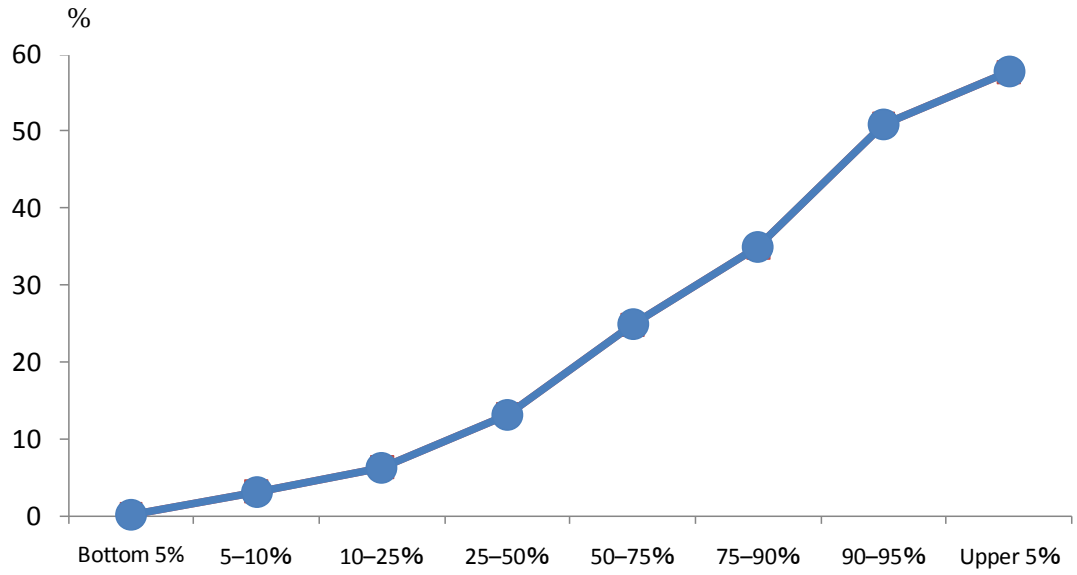

Figure 3: Participation rate and financial assets

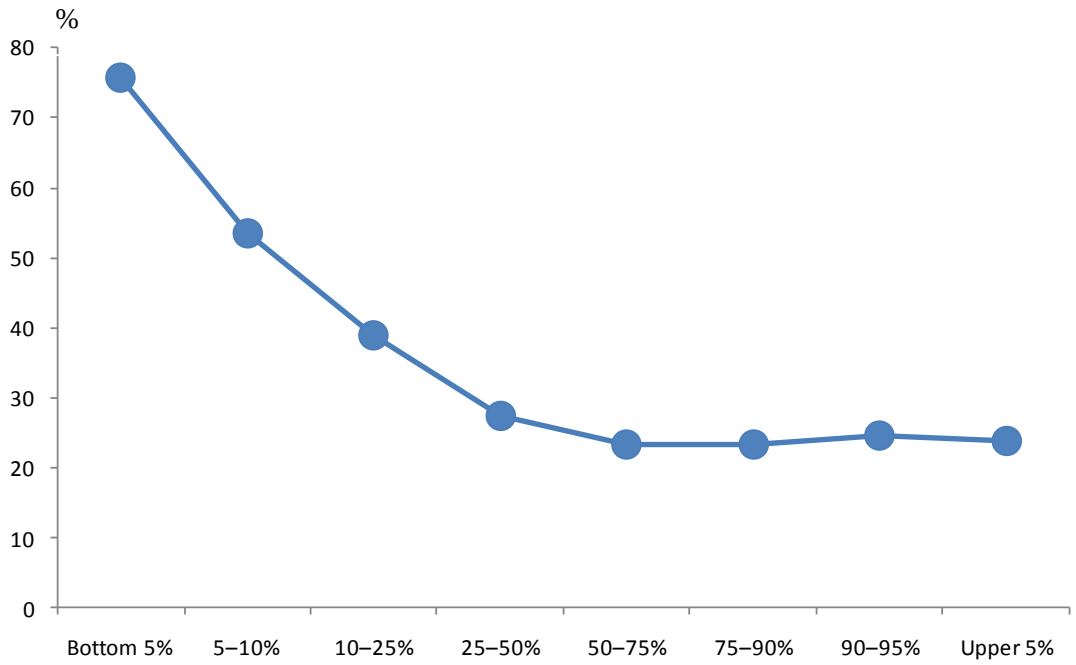

Figure 4: Conditional share and financial assets

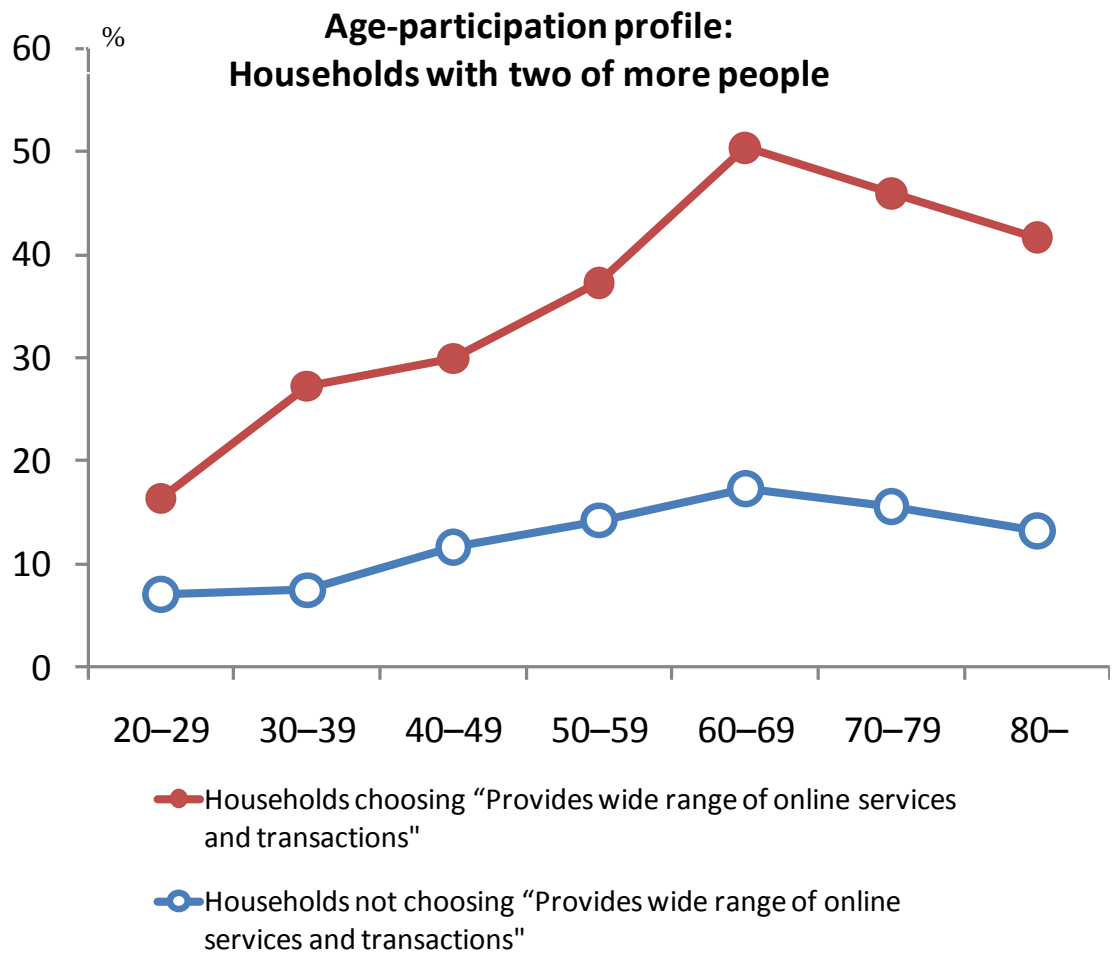

Figure 5: Age participation profiles of households by choice of “Provides a wide range of online services and transactions”

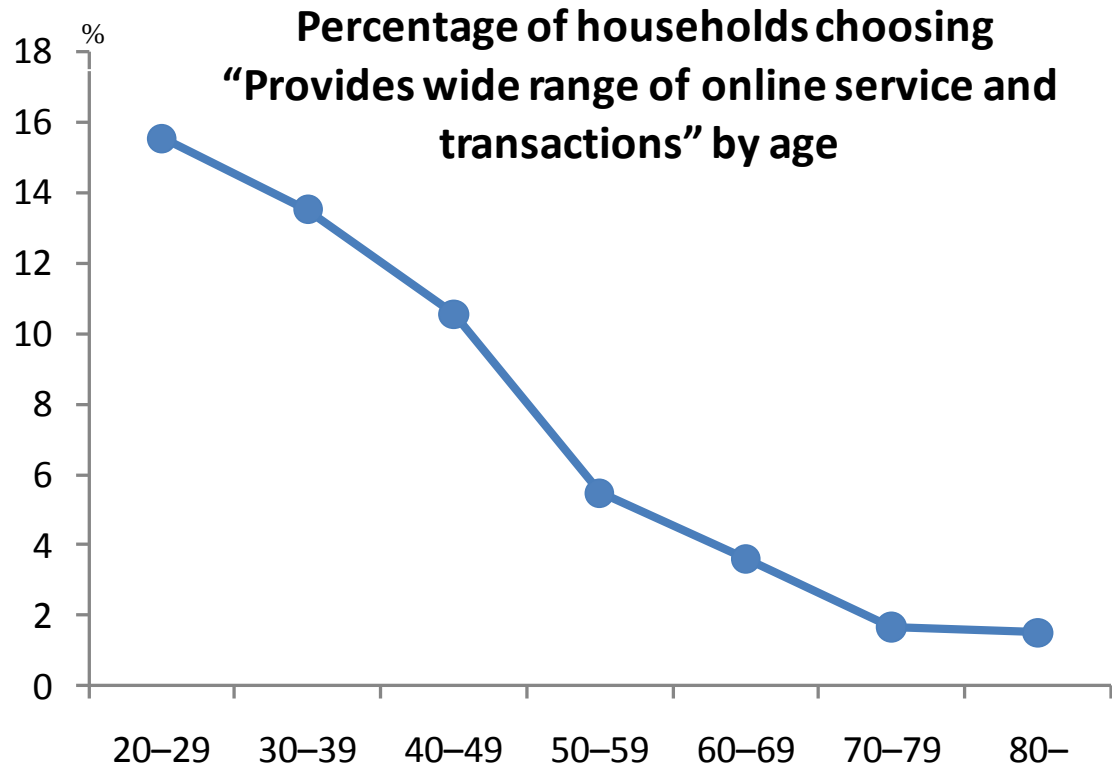

Figure 6: Percentage of the households choosing "Provides a wide range of online services and transactions" by age

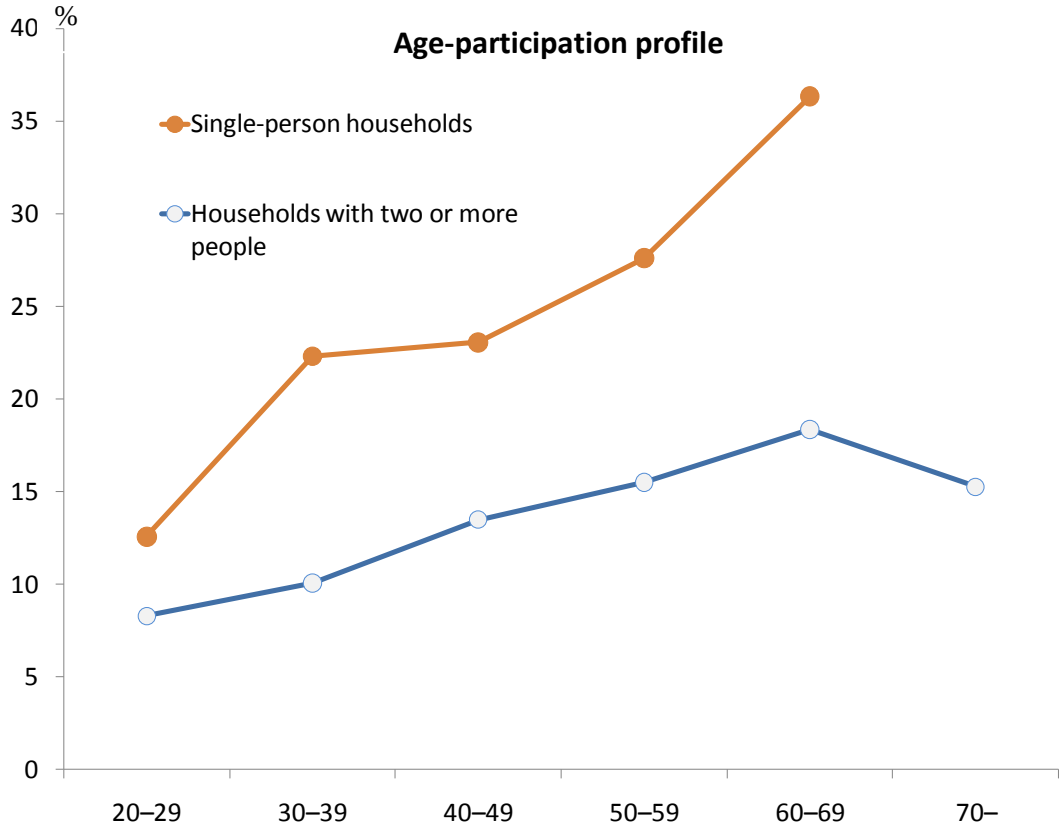

Figure 7: Age participation profiles of single-person households and households of two or more people

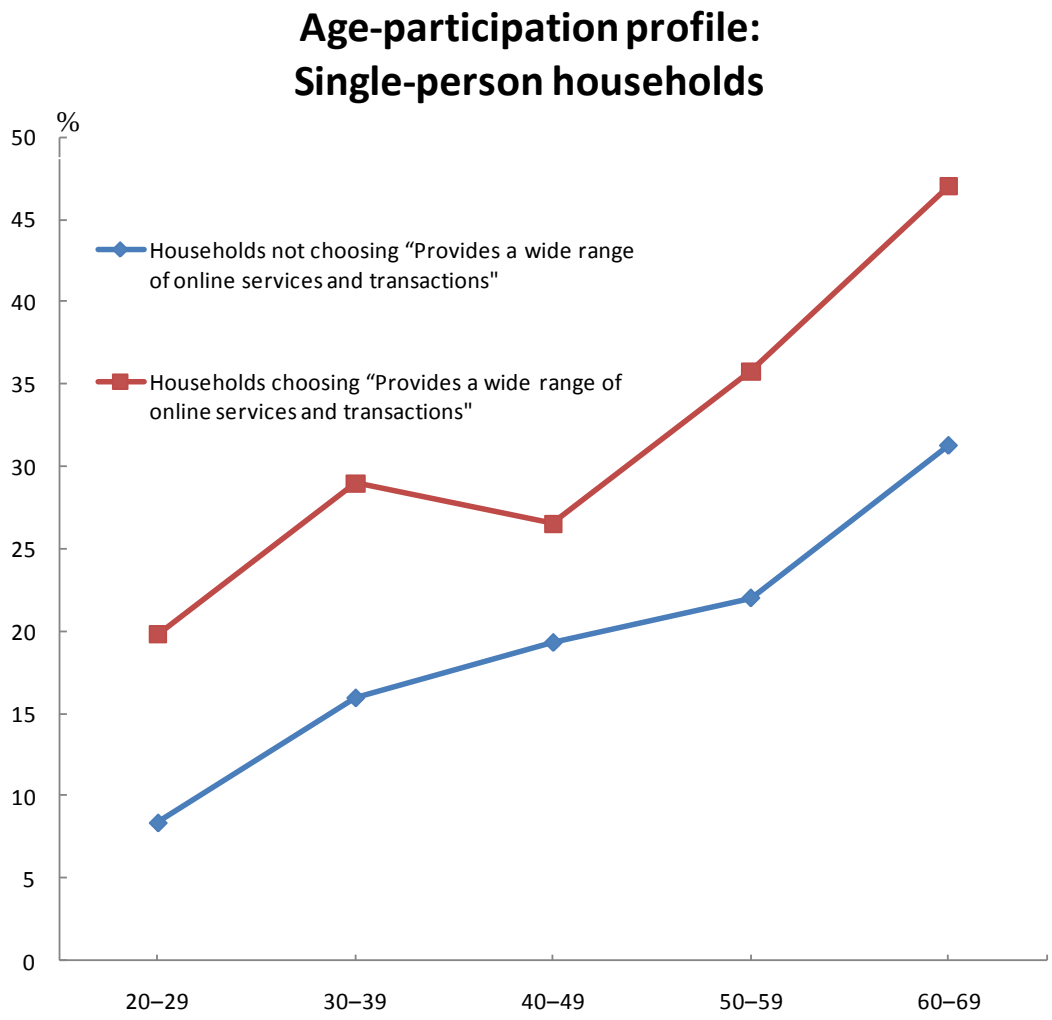

Figure 8: Age participation profile of single-person households

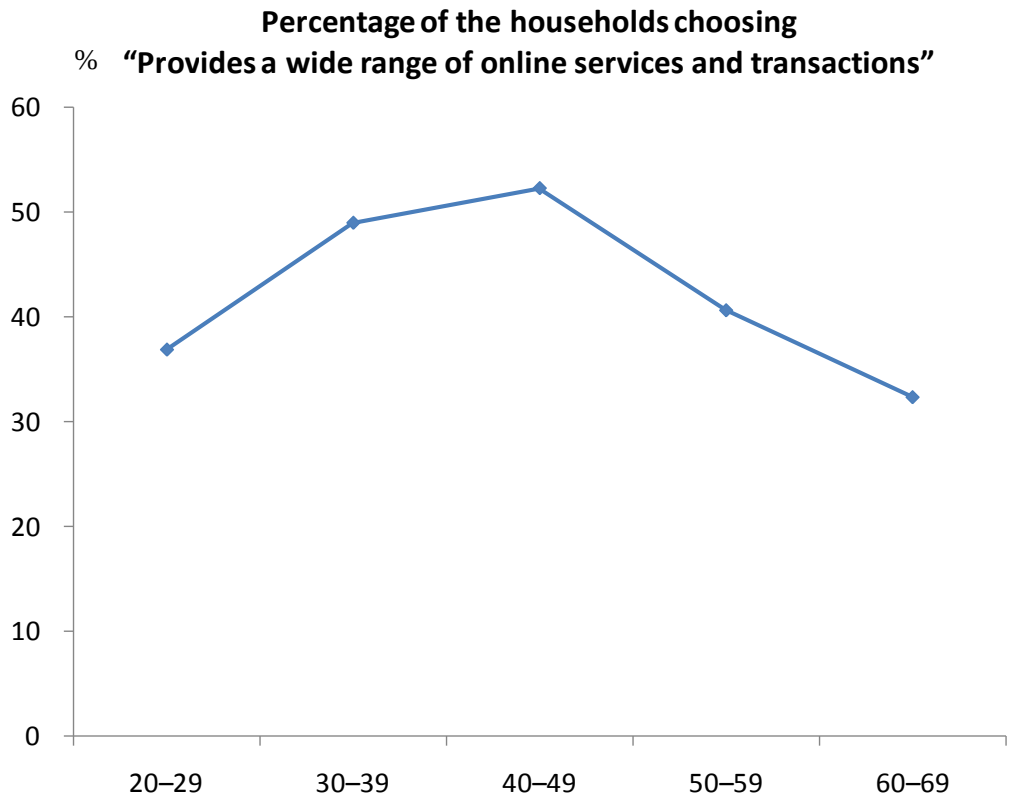

Figure 9: Percentage of households choosing "Provides a wide range of online services and transactions" by age

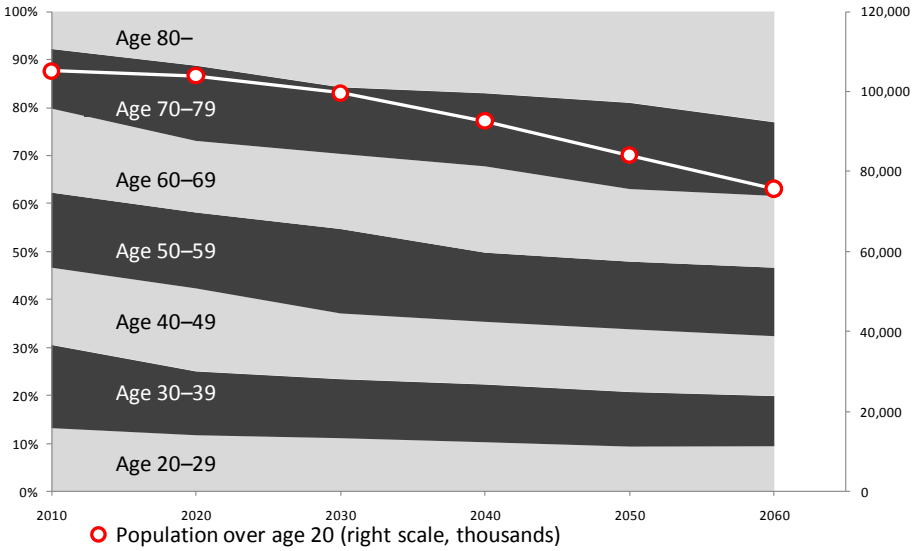

Figure 10: Projection of Japanese age structure and population

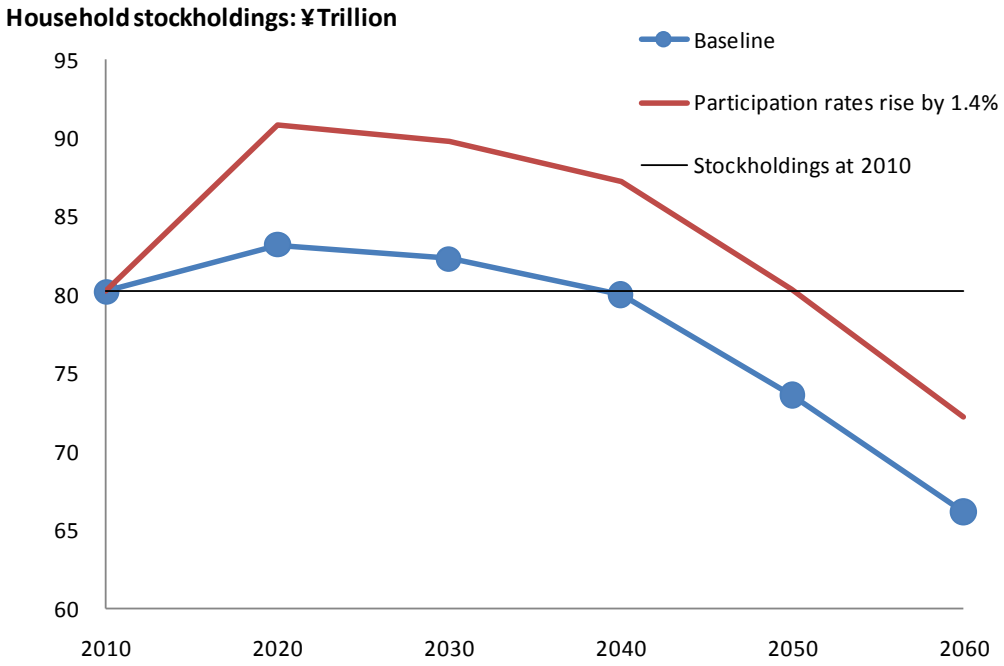

Figure 11: Projections of household stockholdings

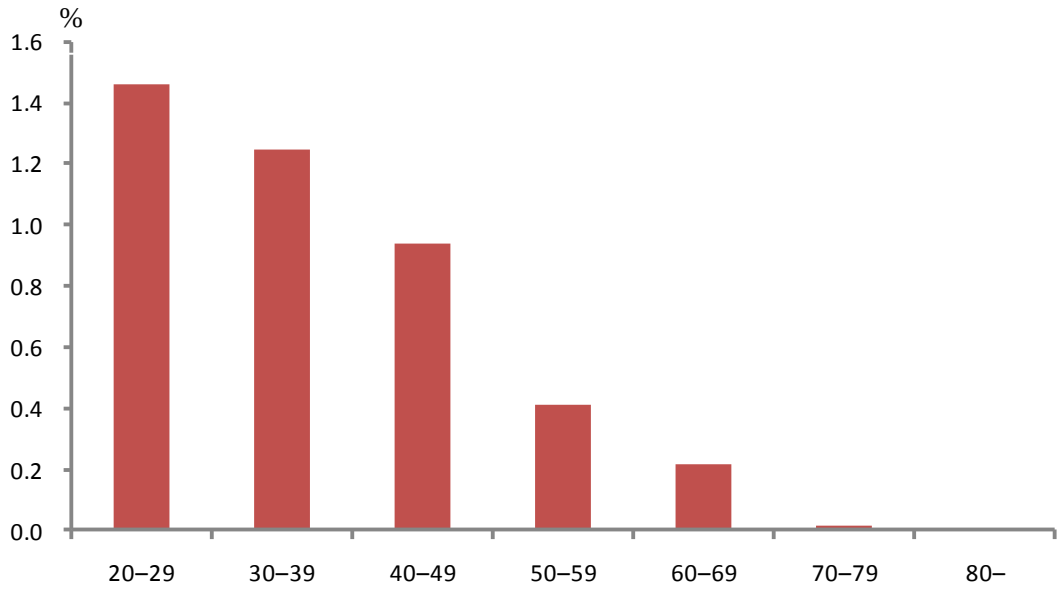

Figure 12: Impact of preference for online financial transactions on stock market participation

Note: The impact is attributable to marginal effects obtained from estimated coefficients of the preference for online transactions shown in Table 1, evaluated at the current level of stock market participation and other conditioning variables. The numbers in the figure are normalized to deviations from the participation rate at age 80 or over.

		Share			Participation		
		Coef.	Std. Err.		Coef.	Std. Err.	
Financial asset	–20%	0.5738	0.1373	***	-1.1420	0.2316	***
percentile dummy	20–30%	0.1556	0.0346	***	-0.1591	0.0839	*
bottom 40-50% is omitted	30–40%	0.0773	0.0268	***	0.1184	0.0701	*
	50–60%	-0.1133	0.0253	***	0.6078	0.0606	***
	60–70%	-0.1369	0.0271	***	0.8252	0.0585	***
	70–80%	-0.1887	0.0300	***	1.0435	0.0575	***
	80–90%	-0.2119	0.0325	***	1.2056	0.0576	***
	90–100%	-0.2548	0.0385	***	1.5994	0.0584	***
Income	–10%	0.0807	0.0260	***	-0.4234	0.0766	***
percentile dummy	10–20%	0.0464	0.0234	**	-0.3101	0.0714	***
40–50% is omitted	20–30%	0.0701	0.0256	***	-0.2375	0.0815	***
	30–40%	0.0544	0.0207	***	-0.3033	0.0646	***
	50–60%	-0.0190	0.0205		0.0166	0.0722	
	60–70%	0.0082	0.0160		0.0174	0.0565	
	70–80%	-0.0011	0.0167		0.0549	0.0588	
	80–90%	-0.0066	0.0164		0.1973	0.0570	***
	90–100%	0.0178	0.0163		0.2170	0.0576	***
Household size		-0.0024	0.0051		-0.0503	0.0175	***
Household head, male		0.0174	0.0233		0.1585	0.0759	**
House owner dummy		0.0001	0.0096		0.1358	0.0321	***
Education	College education or more				0.2707	0.0314	***
Preference for online financial transactions dummy					0.5154	0.0521	***
Industry dummies	Agriculture	0.0464	0.0311		-0.3653	0.0949	***
	Construction	-0.0022	0.0189		-0.1162	0.0629	*
	Manufacturing	-0.0080	0.0129		-0.0382	0.0470	
	Transportation	-0.0184	0.0238		-0.0758	0.0798	
	Wholesale and retail	-0.0071	0.0167		0.0397	0.0607	
	Services	0.0378	0.0344		-0.0758	0.1142	
	Medical	0.0142	0.0270		-0.3357	0.0948	***
	Public sector	0.0293	0.0177	*	-0.3462	0.0580	***
Occupation dummies	Self-employed	0.0053	0.0158		-0.1320	0.0554	**
	Non full-time worker	0.0266	0.0139	*	-0.0882	0.0495	*
Age dummies	20–29	-0.1393	0.0388	***	0.2019	0.1179	*
age 50–59 is omitted	30–39	-0.0351	0.0176	**	0.0493	0.0583	
	40–49	-0.0048	0.0136		-0.0045	0.0481	
	60–69	0.0223	0.0136		0.0594	0.0491	
	70–79	0.0312	0.0171	*	0.0882	0.0615	
	80–	0.0406	0.0233	*	0.0462	0.0838	
Time dummies	2008	0.0038	0.0122		0.0295	0.0436	
year 2007 is omitted	2009	-0.0315	0.0121	***	0.0215	0.0432	
	2010	-0.0386	0.0120	***	0.0838	0.0428	*
	Constant	0.4513	0.0642	***	-1.7628	0.1121	***

Table 1: Benchmark results of pooled regression for participation and the share of stocks

Note:

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

		Share			Participation		
		Coef.	Std. Err.		Coef.	Std. Err.	
Financial asset	–10%	0.1495	0.0683	**	-1.0647	0.1040	***
percentile dummy	10–20%	0.0059	0.0417		-0.5751	0.0875	
40–50% is omitted	20–30%	0.0339	0.0361		-0.3936	0.0829	***
	30–40%	-0.0300	0.0265		0.0047	0.0747	
	50–60%	-0.0609	0.0265	**	0.1869	0.0737	**
	60–70%	-0.0573	0.0283	**	0.3967	0.0730	***
	70–80%	-0.1093	0.0333	***	0.6750	0.0733	***
	80–90%	-0.1240	0.0355	***	0.7769	0.0749	***
	90–100%	-0.1202	0.0457	***	1.1990	0.0804	***
Income	–10%	0.0409	0.0302		0.0917	0.0935	
percentile dummy	10–20%	0.0112	0.0291		0.1167	0.0893	
40–50% is omitted	20–30%	0.0265	0.0290		0.0949	0.0890	
	30–40%	0.0046	0.0292		0.0945	0.0878	
	50–60%	-0.0203	0.0252		0.2084	0.0741	***
	60–70%	-0.0172	0.0289		0.2732	0.0848	***
	70–80%	-0.0333	0.0271		0.3120	0.0784	***
	80–90%	-0.0207	0.0259		0.1848	0.0794	**
	90–100%	0.0055	0.0257		0.2106	0.0809	***
Household head, male		0.0858	0.0177	***	0.3586	0.0387	***
House owner dummy		-0.0509	0.0184	***	-0.0148	0.0655	
Education	College education or more				0.0751	0.0392	*
Preference for online financial transactions dummy					0.3193	0.0355	***
Industry dummies	Agriculture	0.0235	0.0721		0.2679	0.2527	
	Construction	0.0018	0.0342		-0.3178	0.0987	***
	Manufacturing	0.0033	0.0168		0.1602	0.0533	***
	Transportation	-0.0306	0.0299		0.1655	0.0982	*
	Wholesale and retail	0.0114	0.0210		0.0851	0.0672	
	Services	0.0225	0.0410		-0.0599	0.1245	
	Medical	-0.0290	0.0304		-0.3196	0.0801	***
	Public Sector	-0.0159	0.0235		-0.2756	0.0677	***
Occupation dummies	Self-employed	-0.0004	0.0206		-0.0636	0.0701	
	Non full-time worker	0.0125	0.0181		0.0542	0.0566	
Age dummies	20–29	-0.0308	0.0210		-0.0067	0.0667	
age 40–49 is omitted	30–39	0.0150	0.0195		0.0431	0.0638	
	50–59	0.0344	0.0201	*	0.0917	0.0682	
	60–69	0.0635	0.0219	***	0.2482	0.0714	***
Time dummies	2008	-0.0362	0.0147	**	0.0542	0.0484	
year 2007 is omitted	2009	-0.0549	0.0147	***	0.0065	0.0484	
	2010	-0.0526	0.0153	***	-0.0653	0.0495	
	Constant	0.3289	0.0859	***	-1.3584	0.1067	***

Table 2: Results of pooled regression for participation and the share of stocks using single-person household data

Note:

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

		Share			Participation		
		Coef.	Std. Err.		Coef.	Std. Err.	
Financial asset	–20%	0.5127	0.1365	***	-1.1646	0.2376	***
percentile dummy	20–30%	0.1434	0.0340	***	-0.1276	0.0868	
40–50% is omitted	30–40%	0.0839	0.0260	***	0.1089	0.0724	
	50–60%	-0.0915	0.0253	***	0.5446	0.0627	***
	60–70%	-0.1034	0.0276	***	0.7535	0.0607	***
	70–80%	-0.1478	0.0304	***	0.9274	0.0600	***
	80–90%	-0.1626	0.0330	***	1.0565	0.0602	***
	90–100%	-0.1963	0.0389	***	1.3983	0.0616	***
Income	–10%	0.0642	0.0257	**	-0.4390	0.0791	***
percentile dummy	10–20%	0.0325	0.0226		-0.2602	0.0732	***
40–50% is omitted	20–30%	0.0510	0.0247	**	-0.2171	0.0840	**
	30–40%	0.0372	0.0204	*	-0.3172	0.0666	***
	50–60%	-0.0226	0.0197		-0.0299	0.0743	
	60–70%	0.0082	0.0153		0.0033	0.0579	
	70–80%	-0.0002	0.0159		0.0254	0.0603	
	80–90%	-0.0030	0.0158		0.1689	0.0585	***
	90–100%	0.0216	0.0156		0.1788	0.0591	***
Households size		-0.0014	0.0054		-0.0414	0.0195	**
Household head, male		0.0167	0.0224		0.1422	0.0775	*
House owner dummy		0.0045	0.0094		0.1245	0.0332	***
Education	College education or more				0.2314	0.0324	***
Preference for online financial transactions dummy					0.3714	0.0547	***
Industry dummies	Agriculture	0.0436	0.0301		-0.3294	0.0970	***
	Construction	-0.0015	0.0180		-0.0647	0.0643	
	Manufacturing	-0.0011	0.0124		0.0027	0.0482	
	Transportation	-0.0122	0.0229		-0.0233	0.0813	
	Wholesale and retail	-0.0050	0.0160		0.0554	0.0622	
	Services	0.0364	0.0329		-0.0770	0.1174	
	Medical	0.0154	0.0259		-0.2997	0.0966	***
	Public sector	0.0290	0.0174	*	-0.3314	0.0592	***
Occupation dummies	Self-employed	-0.0009	0.0152		-0.1250	0.0567	**
	Non full-time worker	0.0229	0.0133	*	-0.0911	0.0507	*
Age dummies	20–29	-0.1506	0.0474	***	0.3471	0.1655	**
age 50–59 is omitted	30–39	-0.0508	0.0249	**	0.1626	0.0876	*
	40–49	-0.0096	0.0191		-0.0127	0.0724	
	60–69	0.0201	0.0165		-0.0003	0.0633	
	70–79	0.0430	0.0199	**	0.0515	0.0759	
	80–	0.0469	0.0284	*	0.0077	0.1065	
Time dummies	2008	0.0034	0.0117		0.0319	0.0446	
year 2007 is omitted	2009	-0.0284	0.0115	**	0.0285	0.0441	
	2010	-0.0306	0.0130	**	0.0024	0.0485	
Bequest motive dummy		-0.0058	0.0163		0.0071	0.0627	
Age dummy×Bequest motive dummy	20–29	-0.0112	0.0770		-0.3977	0.2465	
	30–39	0.0117	0.0314		-0.2119	0.1127	*
	40–49	-0.0032	0.0253		-0.0073	0.0964	
	60–69	0.0131	0.0220		0.0805	0.0867	
	70–79	-0.0382	0.0265		0.0203	0.1041	
	80–	-0.0062	0.0411		0.1027	0.1614	
Saving motive dummies	For medical or disaster expenses	-0.0210	0.0092	**	0.0517	0.0351	
	For educational expenses for children	-0.0215	0.0132		0.0260	0.0476	
	For wedding expenses for children	-0.0396	0.0154	**	0.1215	0.0588	**
	For investing in own home	-0.0195	0.0113	*	0.0566	0.0433	
	For retirement	-0.0189	0.0107	*	0.1035	0.0375	***
	For bequest to children	-0.0255	0.0163		0.0834	0.0710	
Professional advice dummy		-0.0100	0.0301		0.0971	0.1207	
Age dummy×Professional advices dummy	20–29	0.0440	0.0981		0.9313	0.4499	**
	30–39	0.0805	0.0544		0.0755	0.2195	
	40–49	-0.0082	0.0440		0.1233	0.1760	
	60–69	-0.0005	0.0365		0.2517	0.1549	
	70–79	0.0194	0.0390		0.2753	0.1678	
	80–	-0.0154	0.0595		0.2083	0.2525	
Deposit insurance system dummy		-0.0266	0.0127	**	0.3569	0.0318	***
Yield-emphasis dummy		0.0468	0.0131	***	0.4260	0.0380	***
	Constant	0.4063	0.0816	***	-2.0791	0.1241	***

Table 3: Robustness check of pooled regression for participation and the share of stocks

Note: Variables in the shaded area are added for the robustness check.

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.