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Household portfolio allocation and stock market beliefs: Evidence from Japanese households

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Abstract

We analyze data from the Keio Household Panel Survey (KHPS) to investigate how individuals' beliefs about financial markets influence current and planned asset holdings. Our results reveal statistically and economically significant relations between specific beliefs and both present asset allocations and accumulation. These relations remain robust when we employ an instrumental variable approach with historical beliefs to address potential endogeneity. Furthermore, we examine how current beliefs shape long-term financial planning, highlighting their importance in influencing future asset allocation decisions. Overall, our findings suggest that correcting misconceptions and shaping financial market beliefs may offer a pathway to improving household financial well-being.

JEL CLASSIFICATION
A13, C33, C35, D14, G11

1 | INTRODUCTION

The main feature of the stock market that attracts households is the belief that the stock market yields higher returns than risk-free investments. Without this belief, households choose not to participate in the stock market even in the absence of any participation costs. These expectations are based on households' beliefs about different

dimensions of stock market functions, such as profitability, fairness, efficiency, and prudential supervision (i.e., trust in regulation). A growing body of evidence suggests that households' beliefs regarding the functioning of the stock market influence a range of economic and financial outcomes at both the household and aggregate levels (see, e.g., Balloch et al., 2015; Bucciol et al., 2016; Delis & Mylonidis, 2015; Fisch & Seligman, 2022; Georgarakos & Pasini, 2011; Guiso et al., 2008).

We investigate how subjective beliefs about the stock market shape both current and future financial behavior in a novel empirical context. Our analysis provides a deeper understanding of how Japanese households' beliefs about the functioning of the stock market influence a range of financial behaviors, namely: the decision to hold risky assets, the proportion of risky assets in their financial portfolio, and the overall level of financial assets. We find that beliefs, specifically those related to uncertainty, profits, and legality, affect households' financial outcomes. To explore the robustness of our results and account for potential endogeneity concerns, we exploit information related to when these beliefs were formed in an instrumental variable (IV) approach. In this approach, we find that the results relating to beliefs about profitability and uncertainty persist. Finally, we document the impact of these beliefs on future planned asset holdings. Overall, our results suggest that individual beliefs have a significant impact on both current and planned financial decisions, highlighting the potential importance of subjective beliefs on financial well-being.

Japan is particularly interesting to examine as the structure of household financial portfolios in Japan is significantly different from similarly developed Organisation for Economic Co-operation and Development (OECD) countries, especially the share of risky financial assets, defined as the ratio of securities to total financial wealth. Japan's aging population, as a result of high life expectancy and low fertility rate, is a distinct feature that makes Japan different from other similarly developed OECD countries. This demographic structure suggests that Japanese households should find stock ownership more attractive as they have a higher incentive for wealth accumulation. In contrast, the Bank of Japan (2017b) shows that the share of equity held by Japanese households was on average 10.0% in 2017 compared to 18.0% in the European Union and 36.0% in the United States.[1] Safe assets in the form of cash and deposits, however, make up the vast majority of Japanese household financial portfolios, which have been on average above 50.0% since 1990.[2]

In 1996, the Japanese government started a deregulation process, known as the Japanese Big Bang, which replicates the US and UK Big Bang experience. One of the aims of the Japanese Big Bang was to move household financial assets held as private bank deposits to investments in the capital market.[3] However, the observed level of risky asset holdings shows that no substantial progress has been achieved through financial deregulation alone on the issue of suboptimal use of household financial assets. This suggests that other important factors are contributing to the conservative investment approach by Japanese households.

Despite the importance of evaluating the impact of households' beliefs on their financial portfolio decisions, there are no studies to our knowledge that explore the role of these potentially important factors in Japan. A limited literature examines the role of households' trust in the functioning of the stock market on financial behaviors. Furthermore, this literature generally considers only the trust dimension of these beliefs and focuses on the United States or Europe (see, e.g., Balloch et al., 2015; Bucciol et al., 2016; Delis & Mylonidis, 2015; Fisch & Seligman, 2022; Georgarakos & Pasini, 2011; Guiso et al., 2008; Hanspal et al., 2020). The literature relating to Japanese households' cautious investment behavior in general is sparse (see, e.g., Alzuabi et al., 2022; Aoki et al., 2016; Ito et al., 2017; Iwaisako, 2009; Iwaisako et al., 2016; Kinari, 2007; Nakagawa & Shimizu, 2000), and

[1]This conservative investment approach by Japanese households is not recent. The Bank of Japan (2017a) shows that the share of risky assets in Japanese household financial portfolios has been hovering around 10.0% since 2004 and was even lower (around 7.0%) at the end of 1990s as a result of the collapse of stock market capitalization in the early 1990s.

[2]The rest of the portfolio consists, on average, of 5.0% investment trust, 30.0% insurance and pension, and 5.0% others. "Others" is defined by the Bank of Japan (2017b) as the residual that remains after deducting these categories from total financial assets.

[3]Bhamra and Uppal (2019) show that underdiversification not only affects the asset-allocation and inter-temporal consumption decisions of households, upon aggregation, it can also distort aggregate growth, which in turn amplifies social welfare losses.

the studies provide a wide range of explanations relating to the low share of risky assets in the financial portfolios of Japanese households.

We aim to fill these gaps in the literature by incorporating five dimensions of households' direct beliefs relating to the functioning of the stock market, as opposed to general indirect measures, using a variety of modeling approaches. Measures of the beliefs about the institutions that facilitate the holdings of risky assets are arguably far more important than relying on a generalized measure for this area of analysis.[4] More specifically, our contribution to the literature is fourfold. First, we are aware of no other empirical study for Japan that analyzes the effects of households' beliefs about the functioning of the stock market on the current holdings of risky assets and the current level of financial wealth. Second, our article highlights the importance of using direct measures of beliefs about the stock market, rather than relying on a general measure, which is the case in most of the literature. Third, we address the potential concern for reverse causality by instrumenting current beliefs using the historical formation of beliefs. That is, we exploit information contained in the survey about individuals' first beliefs about specific aspects of the stock market, along with information about when these beliefs were approximately formed. Finally, we explore further the impact of individuals' beliefs on future holdings of different financial assets.

The results suggest that the determinants of risky asset holding in Japan diverge from the literature, which predominantly considers the United States and Europe. Furthermore, the analysis indicates that individuals' beliefs about different dimensions of the stock market have statistically and economically significant associations with current risky assets holdings and the decisions to hold certain financial assets in the future. The results highlight that beliefs are potentially important determinants of a range of financial outcomes. This is potentially important from a policy perspective as these measures are malleable and could be influenced to promote improved financial well-being.

2 | RELATED LITERATURE

An important dimension of an individual's belief about the functioning of the stock market, which has recently received academic attention, is trust. Empirical evidence shows that aggregated general public trust has a positive and significant impact on financial outcomes, long-term growth, and development (see, e.g., Algan & Cahuc, 2010; Horváth, 2013; Knack & Keefer, 1997; Zak & Knack, 2001). Trust at the individual level has also been identified as influencing individuals' decisions in several aspects. For example, individuals with higher levels of trust have lower likelihoods of default in household debt and higher net worth (see, e.g., Jiang & Lim, 2018), have higher demand for insurance products (see, e.g., Cole et al., 2013; Delis & Mylonidis, 2015; De Meza et al., 2010), are more likely to use peer platform markets (see, e.g., van der Cruijsen et al., 2019), and are more likely to hold a bank account or switch to a new one (Ampudia & Palligkinis, 2018).[5]

The role of trust in explaining the nonparticipation puzzle has also been examined in the literature. Using data on Dutch households, Guiso et al. (2008) show that the probability of direct participation in the stock market increases by 6.5 percentage points (pp) for individuals who do trust others, and those who do participate have, on average, a 3.4 pp higher share in stocks.[6] Moreover, Guiso et al. (2008) use the Italian Bank customers survey to construct a measure of trust in institutions that facilitate stock market participation rather than a generalized measure of trust. The findings also show that trust has a positive impact on the participation rate and level of

[4]Most of the studies cited focus on the trust dimension and use a generalized measure as a proxy, except for Balloch et al. (2015), who use a measure specific to household trust in the stock market, and Guiso et al. (2008), who proxy for trust in the stock market with individuals' trust in bank officials and advisers.

[5]See van der Cruijsen et al. (2023) for an excellent survey of the literature related to individual trust in financial institutions.

[6]General trust is measured by the response to the question, "*Generally speaking, would you say that most people can be trusted or that you have to be very careful in dealing with people?*"

participation. The cross-country analysis by Guiso et al. (2008) shows that stock market participation is low in countries where trust levels are low. Guiso et al. (2008, p. 2560) argue that "*cultural differences in trust appear to be a new additional explanation for cross-country differences in stock market development*." We aim to contribute to this discussion by exploring the context of Japan and by exploring beliefs relating to financial institutions, as opposed to general trust.

In a related literature, Balloch et al. (2015) construct a direct measure of trust by averaging responses to three questions about households' level of trust in the stock market, trust in stockbrokers, and trust in investment advisers using the American Life Panel (ALP) surveys. Similar to Guiso et al. (2008), they find that trust is associated with the probability of participation and the share of investment in stocks.[7]

Georgarakos and Pasini (2011) also analyze the joint importance of trust and sociability on households' financial decisions using data from the Survey of Health, Ageing and Retirement in Europe. They find that both mistrust and sociability affect stock market participation through distinct channels. Mistrust affects participation negatively as it dissolves the perceived risk premium, whereas sociability enhances participation as it lowers the costs associated with it through cheaper information sharing. As well as confirming the importance of trust for the decision to participate in stock markets, Delis and Mylonidis (2015) find that happiness works in the opposite direction. Specifically, the negative effect of happiness is about 6% higher compared to the positive equivalent of trust on the ownership of risky financial assets.

Fisch and Seligman (2022) find that trust and financial literacy are positively related to financial market participation, the use of specific products, and preferences for the use of intermediaries. However, although trust is uniformly correlated with engagement, financial literacy has a U-shaped relation with market participation, with increases in financial literacy first associated with reductions and subsequently increases in the levels of participation. Bucciol et al. (2016) find that trust can compensate for a lack of risk tolerance, as their findings show that trust in the presence of risk aversion is associated with more frequent investment in risky assets.

In a recent line of research, van der Cruijsen et al. (2021) examine the role that financial literacy plays, and other socio economic and demographic variables, in the level of broad-scope trust (trust in financial institutions in general) and narrow-scope trust (trust in one's own financial institution). They find that financially literate consumers are more likely to trust banks, insurance companies, and pension funds.

Although no studies that explore the role of beliefs in financial markets in Japanese households' financial decisions and their implications for financial behaviors, several studies provide a general overview of Japanese household investment behavior, as well as explore the determinants of risky asset holdings. For example, Nakagawa and Shimizu (2000) show that the decline in the rate of return on stocks and the high volatility attached to this return explain the decline in a household's risky asset holdings. Iwaisako (2009) argues that the high land prices in Japan and the higher average downpayments, compared to the United States, leave Japanese households with a higher share of real estate in total wealth. This explains why Japanese households start to hold risky assets at a much later stage of life compared to US households. Ito et al. (2017) argue that the major difference in the decision to participate in the stock market between Japan and the United States is explained by financial literacy.

In summary, we contribute to the literature by exploring beliefs about the stock market, on a range of financial behaviors, in Japan. We are able to distinguish between current financial behaviors and planned future behaviors, and highlight the potential long-term impact of beliefs on the household's financial position. Furthermore, we exploit novel information available in the survey to account for endogeneity concerns in these relations.

[7]Guiso et al.'s (2008) results also indicate that stock-market-literate households are more likely to participate in stocks and invest a higher proportion of their wealth in the stock market. Furthermore, they argue that sociability does not play an important role for participation once stock market literacy is accounted for.

3 | DATA

We use data from the Keio Household Panel Survey (KHPS).[8] The KHPS is one of the most comprehensive longitudinal surveys of households in Japan, and it has been conducted annually since 2004. Respondents are selected by stratified two-stage random sampling of people aged 20–69, male and female.[9] The KHPS covers all eight regions of Japan, and the sample size for each region is determined according to the share of its population in the National Residents Register.[10] The KHPS provides detailed information about respondents' social and demographic characteristics, and information regarding their financial asset holdings.

Waves 9 to 13 (2012–2016) include questions related to respondent's beliefs about the functioning of the stock market. Therefore, we analyze data covering these waves, which contain information related to 2,981 households, and 12,182 household/year observations. Information is collected for the respondent and his/her spouse in the case of married couples. However, as the analysis focuses on household asset holdings, the household is the unit of analysis rather than individual respondents. Specifically, demographic characteristics and questions related to beliefs about the stock market are related to the head of the household, whereas items related to financial information are reported at the household level.

3.1 | Dependent variables

KHPS respondents are asked to self-report the value of the household's financial assets held at the time of the interview in two distinct categories: deposits and securities. The items included in the deposits category are as follows: postal savings certificates, national and regional (e.g., Shinkin) bank holdings of time deposits, installment savings and ordinary deposits, company deposits, gold investment and savings accounts, and wealth held in the form of medium-term government bond funds. The financial assets in this category are relatively risk free. The items included in the securities category are considered to be of higher risk and include: shares (reported at market value), bonds (at par value), stock investment trusts (market value), corporate and public bond investment trusts (market value), and loans in trust and money in trust (par value).

We explore three outcome variables: a dummy variable that captures the propensity to hold risky assets (securities); the proportion of risky assets in households' financial portfolios, defined as the ratio of securities to total financial wealth; and the level of financial wealth, defined as the natural log transformations of securities plus deposits. Table 1 provides summary statistics for these variables.[11] The average holdings of risky assets in our sample are 7% of total assets, and 23% in our sample hold a positive share of risky assets, which is much lower than US and European households (see Bank of Japan, 2017b).[12] In terms of total financial wealth, approximately 21% of respondents report having no financial wealth. This is not surprising given that the saving rate in Japan was the second highest (23%) among OECD countries in 1975, dropping to 2% in 2015. Similar figures are found in other surveys for Japan, such as the Financial Literacy Survey, which reports that the percentages of households that do not have any financial assets are 18%, 14%, and 13%, in 2011, 2016, and 2019, respectively.[13] In Section 3.2, Table 4 reports these statistics by broad age categories, confirming the low share of both assets held by young respondents.

[8]The KHPS is available from the Panel Data Research Centre at Keio University.

[9]For more information about the sampling methods used, see https://www.pdrc.keio.ac.jp/en/paneldata/datasets/jhpskhps/.

[10]The recovery rates for the KHPS for 2012–2016 are: 94.2%, 91.7%, 92.6%, 93.8%, and 94.0%. These recovery rates are considered a good indication of the reliability of the dataset.

[11]All variables are denominated in Japanese yen, and the values are reported in real terms, having been adjusted using the 2016 price level. Asset values such as land and housing are not included in the total financial wealth measure used to calculate the risky assets' share. Such assets are accounted for using net worth in the modeling approach.

[12]In the Appendix, Figure A1(a) shows the distribution of the proportion of risky assets that display a high percentage of zero holdings in our sample, and Figure A1(b) shows the distribution conditional on holding risky assets, which also indicates that those who do hold risky assets hold small proportions.

[13]The average level of household total financial wealth reported in the survey is approximately 9.6 million yen.

TABLE 1 Distribution of financial asset holdings.

	% of holding	Mean	*SD*	Median	75%	90%	95%
Risky assets ratio	23%	0.070	0.175	0	0	0.28	0.50
Financial assets	79%	4.953	2.844	5.772	6.945	7.862	8.329
Observations			12,182				

TABLE 2 Future holdings of financial assets.

Which financial assets would you like to purchase in preparation for your life twenty years from now? Or, which financial assets have you purchased for that purpose? Please circle all that apply.	
Time deposits	0.86
Government bonds	0.10
Stocks	0.11
Foreign-denominated financial products	0.07
Investment trust	0.11

We first explore how each dimension of individuals' beliefs in the stock market is associated with current financial outcomes. We then explore whether these beliefs have a long-term impact on the financial behavior of the individual by examining planned financial allocations. Therefore, in Section 7, we explore the long-term impact of these beliefs on an individual's future decisions about holding different types of assets. Specifically, the KHPS asks respondents the following questions: *"Which financial assets would you like to purchase in preparation for your life twenty years from now? Or, which financial assets have you purchased for that purpose? Please circle all that apply. Time deposits; government bonds; stocks; foreign-denominated financial products; and/or investment trust."* Table 2 reports the summary statistics related to these variables. The table confirms that safe assets in the form of cash and deposits make up the vast majority of Japanese household financial portfolios, which is in line with the discussion presented in Section 1. In Section 3.2, Table 4 reports the statistics related to these variables by broad age categories, which shows that responses do not differ across ages. This is expected as the aspiration of holding a financial portfolio at retirement age should be the same regardless of the current age of the respondent.

3.2 | Independent variables

Our main contribution is to explore the impact of an individual's beliefs about specific dimensions of the stock market on the current holdings of risky assets, current level of total financial assets, and probability of holding different financial assets in the future. Generally, studies examine only one dimension of individuals' perceived reliability of the stock market, which is trust. These studies proxy the level of individual trust in financial institutions using a general measure of trust. For example, the World Values Survey captures general trust by the responses to the question, *"Generally speaking, would you say that most people can be trusted or that you have to be very careful in dealing with people?"* This type of question is employed in the trust literature by several studies, (see, e.g., Bucciol et al., 2016; Delis & Mylonidis, 2015; Guiso et al., 2009). On the other hand, Balloch et al. (2015) use a measure of trust that is specific to household trust in the stock market, Fisch and Seligman (2022) use generalized and context-specific trust questions, and Guiso et al. (2008) proxy trust in the stock market with individuals' trust in bank officials and advisers.

We contribute to the literature by using five disaggregated measures of an individual's beliefs of the stock market, which collectively can be seen as an indicator of households' beliefs about the overall reliability of the stock market. This is similar to the measures used by Balloch et al. (2015) and Fisch and Seligman (2022). The statements used to construct the beliefs measures are:

> *Please circle the answer that best applies to you for each of the following statements regarding your belief about the stock market. (0) Disagree (1) Somewhat disagree (2) Can't say either way (3) Somewhat agree (4) Agree:*
>
> 1- *Profits cannot be made with certainty.*
> 2- *Significant losses are possible.*
> 3- *Illegal activities such as insider trading are widespread.*
> 4- *No much progress has been made in terms of disclosure of information on corporate performance.*
> 5- *Securities firms inappropriately favor large investors, such as large corporations, rather than general investors.*

The first two statements focus on individuals' beliefs about the profitability and riskiness of the stock market. The risk and return trade-off is crucial for households in deciding whether to participate in the stock market. The last three statements capture different dimensions of households' trust in the stock market. In particular, the "illegal activities" statement captures the fairness and the quality of investor protection, whereas the "information disclosure" statement captures stock market efficiency. Finally, the statement regarding the behavior of securities firms captures stock market prudential supervision. Table 3 shows the distribution of these variables, where it is clear that the majority of respondents agree with the statements concerning the profitability and riskiness of the stock market. However, most of the respondents could not decide about the statements related to the other three trust dimensions, with a higher proportion of respondents agreeing with these statements than disagreeing. In the subsequent analyses, we collapse our variables to a binary response. "Disagree," "somewhat disagree," and "can't say either way" are merged into one category and form the omitted outcome, and "agree" and "somewhat agree" are coded to take the value of 1.[14] The statistics related to these variables, by broad age categories, are reported in Table 4. It shows that younger respondents are less likely to agree with statements capturing different dimensions of households' trust in the stock market, but for the first two statements, the variation is small across the age categories.

In line with the literature, we use the standard demographic and socioeconomic characteristics that have been identified as influencing the stock market participation decisions of households (see, e.g., Campbell, 2006; Cardak & Wilkins, 2009; Guiso & Sodini, 2013; Haliassos & Bertaut, 1995). These variables are defined along with their associated summary statistics in Table 5.

4 | EMPIRICAL STRATEGY

Each of the three different outcome variables examined in this paper has an important feature that requires a specific modeling approach. Generally, we estimate the following equation:

$$Household\ Financial\ Decisions_i = \boldsymbol{\beta}_1\ Beliefs_i + \boldsymbol{\beta}_2 X_i + \epsilon_i, \quad (1)$$

where *Household Financial Decisions* is one of three variables: share of risky assets, propensity to hold risky assets, and level of financial assets. *Beliefs* captures responses to the questions outlined earlier. In our specifications,

[14]Some studies merge adjacent categories with small percentages (see, e.g., Bucciol et al., 2016).

TABLE 3 Definition and summary statistics: Statements capturing beliefs about the stock market.

Please circle the answer that best applies to you for each of the following statements regarding your belief about the stock market.	Agree	Some- what agree	Can't say either way	Some-what disagree	Disagree	Dummy
Profits are uncertain						
Profits cannot be made with certainty.	0.38	0.31	0.25	0.04	0.02	0.69
Losses are possible						
Significant losses are possible.	0.49	0.30	0.18	0.02	0.01	0.79
High illegal activities						
Illegal activities such as insider trading are widespread.	0.21	0.27	0.42	0.08	0.02	0.48
No disclosure of information						
Not much progress has been made in terms of disclosure of information on corporate performance.	0.15	0.25	0.51	0.07	0.02	0.40
Firms favor large investors						
Securities firms inappropriately favor large investors, such as large corporations, rather than general investors.	0.19	0.28	0.46	0.05	0.02	0.48

Note: As discussed in Section 3.2, these variables are collapsed to dummy variables which equal to 1 if the respondent agrees or somewhat agrees with the statement, and 0 otherwise.

TABLE 4 Summary statistics of financial outcomes and belief statements by age categories.

		Age categories			
	Mean	20–39	40–49	50–59	60+
Current holding of:					
Risky assets ratio	0.07	0.04	0.06	0.08	0.10
Financial assets	4.95	4.10	4.54	5.10	5.78
Future holding of:					
Time deposits	0.86	0.87	0.87	0.88	0.84
Government bonds	0.10	0.08	0.07	0.10	0.15
Risky assets	0.23	0.22	0.22	0.23	0.24
Belief statements					
Profits are uncertain	0.69	0.65	0.69	0.69	0.71
Losses are possible	0.79	0.77	0.80	0.80	0.79
High illegal activities	0.48	0.44	0.45	0.49	0.52
No disclosure of information	0.40	0.34	0.37	0.42	0.46
Firms favor large investors	0.48	0.36	0.42	0.51	0.58
Observations	12,182	2,329	3,225	3,165	3,463

Note: The reported statistics for the belief statements are based on dummy variables created by collapsing the original response categories provided in Table 3.

TABLE 5 Summary statistics: Independent variables.

Continuous variables		**Mean**	***SD***
Equivalized income	Household disposable income adjusted for household composition using the Organisation for Economic Co-operation and Development (OECD) scale. Specifically, household total pre-tax income is divided by 1.5 for each adult other than the household's head and by 0.3 for each child	5.62	0.59
Net worth	Inverse hyperbolic sine transformation of the real total value of household financial and non-financial assets minus total debt (including mortgage); includes house and plot values	4.80	5.73
Binary variables		**Percentage**	
Married	1 if respondent is married or cohabiting, 0 otherwise	0.78	
Male	1 if respondent is male, 0 if female	0.50	
Retirement income	1 if respondent has sufficient income and assets for retirement, 0 otherwise	0.09	
Homeowner	1 if respondent is a home owner, 0 otherwise	0.79	
Age categories (+70 is the omitted category)		0.04	
20–29	1 if respondent's age is 20–29, 0 otherwise	0.03	
30–39	1 if respondent's age is 30–39, 0 otherwise	0.16	
40–49	1 if respondent's age is 40–49, 0 otherwise	0.26	
50–59	1 if respondent's age is 50–59, 0 otherwise	0.26	
60–69	1 if respondent's age is 60–69, 0 otherwise	0.25	
Education level (Junior high school and below is the omitted category)		0.11	
High school	1 if respondent's highest level of education is high school, 0 otherwise	0.46	
College	1 if respondent's highest level of education is college, 0 otherwise	0.16	
University+	1 if respondent's highest level of education is university or higher, 0 otherwise	0.27	
Employment status (Currently employed is the omitted category)		0.63	
Part-time	1 if respondent is in part-time employment, 0 otherwise	0.14	
Unemployed	1 if respondent is unemployed, 0 otherwise	0.02	
Other	1 if respondent is in the other category that includes retirement, 0 otherwise	0.21	
Self-reported health status (Being of poor health is the omitted category)		0.15	
Good	1 if respondent reports being in good health, 0 otherwise	0.41	
Normal	1 if respondent reports being in normal health, 0 otherwise	0.44	
Region (Kantō is the omitted category)		0.33	
Hokkaidō	1 if respondent lives in Hokkaidō, 0 otherwise	0.06	
Tōhoku	1 if respondent lives in Tōhoku, 0 otherwise	0.06	
Chūbu	1 if respondent lives in Chūbu, 0 otherwise	0.17	
Kinki	1 if respondent lives in Kinki, 0 otherwise	0.19	
Chūgoku	1 if respondent lives in Chūgoku, 0 otherwise	0.05	
Shikoku	1 if respondent lives in Shikoku, 0 otherwise	0.03	
Kyūshū	1 if respondent lives in Kyūshū, 0 otherwise	0.11	
Observations		12,240	

we include these statements individually initially and then as a group. Consequently, the coefficient of interest is β_1, which gives the impact of a household's beliefs about the stock market. X_i is the vector of observable household control variables described in Table 5; ϵ_i is a white noise error term.

The share of holding risky assets is defined on the close interval $y_{it} \in [0, 1]$, with a significant portion of the sample observations falling at one of the extremes. Therefore, we use the fractional response model (FRM); see Papke and Wooldridge (1996) for further details and full formulations of the FRM.[15] The propensity to hold risky assets, which is a dummy variable, is examined using the probit model and the level of financial wealth is modeled using a Tobit model, which are commonly used in the household finance literature.[16] The standard errors are clustered at the household level.[17]

5 | RESULTS

5.1 | Baseline specification

Before discussing the impact of households' beliefs about the stock market, we discuss the demographic and socioeconomic determinants of our three dependent variables. The average marginal effects of the FRM and probit and Tobit models, corresponding to the share of risky assets held, decision to hold risky assets, and level of financial assets, respectively, are presented in Table 6.[18] In line with the literature, Table 6 shows that being male has a positive and statistically significant effect on the proportion and probability of holding risky assets; however, the impact is insignificant on the level of financial assets. Being married is positively related to the level of financial assets, as presented in Column 3. A possible mechanism for this effect is that married or cohabiting households potentially have more resources than single people (see, e.g., Haliassos & Bertaut, 1995). However, in the context of Japan, being married displays a statistically insignificant association with the decision to hold risky assets and the share of risky assets.

The effects of age, employment, and health status on our outcome variables are in line with the literature that explores financial behaviors in Japanese households but contradict the findings of US and European studies. In general, risky asset holdings have been documented to have a humped-shape pattern with age, reaching a peak at middle age before declining; see Ameriks and Zeldes (2004) for the United States and Guiso et al. (2002) for Europe. For Japan, however, Table 6 shows that younger respondents are less likely to hold risky assets, and their level of financial assets is lower than those who are over 70. Iwaisako et al. (2016) and Iwaisako (2009) argue that the unique Japanese housing market can provide a possible explanation to this relation as high land prices in Japan and higher average downpayments compared to the United States force Japanese households to postpone their risky investments until a later stage of life. Table 6 shows that those who are in the category of "other" (student, housewife, or retired) and those who are in part-time employment are more likely to hold risky assets than those who are employed (the omitted category), a result likely to be driven by retired individuals; see Iwaisako et al. (2004) for similar findings. Interestingly, compared to those who reported poor health status, respondents who reported normal health status and good health hold a lower proportion of risky assets, and are less likely to hold risky assets in their portfolio; however, health does not appear to influence the level of financial assets. In accordance with the predictions of finance theory, home ownership, level of education, equivalized income, subjective level of retirement income, and net wealth are all positively associated with the share of risky assets, decision to hold risky

[15]Using linear models does not account for the fact that bounded variables are subject to floor and ceiling effects (Gallani & Krishnan, 2017).
[16]Full formulation of these models can be found in Greene (2012) and Wooldridge (2019).
[17]For a robustness check, random-effect specifications were also used for the three models. The results of these checks are reported in Table A1 and Table A2 in the Appendix.
[18]These controls are included in all subsequent tables but, for brevity, presented in full only in Table 6.

TABLE 6 Demographic and socioeconomic determinants of financial outcomes: Marginal effects.

	Share of risky assets	Probability of holding risky assets	Log of financial assets
Married	−0.011	0.021	0.264***
	(0.008)	(0.017)	(0.091)
Male	0.018***	0.026*	−0.035
	(0.007)	(0.015)	(0.082)
Age			
20–30	−0.077***	−0.185***	−1.335***
	(0.019)	(0.043)	(0.214)
30–40	−0.048***	−0.131***	−0.668***
	(0.014)	(0.033)	(0.172)
40–50	−0.032**	−0.080***	−0.534***
	(0.013)	(0.030)	(0.162)
50–60	−0.021*	−0.037	−0.448***
	(0.012)	(0.030)	(0.159)
60–70	−0.013	−0.014	−0.202
	(0.011)	(0.027)	(0.143)
Education			
High school	0.019*	0.031	0.491***
	(0.010)	(0.023)	(0.123)
College	0.038***	0.090***	0.845***
	(0.011)	(0.027)	(0.141)
University+	0.054***	0.142***	0.999***
	(0.011)	(0.024)	(0.131)
Employment			
Part-time	0.020***	0.040**	0.092
	(0.008)	(0.018)	(0.103)
Unemployed	−0.021	−0.053	−0.289
	(0.013)	(0.033)	(0.178)
Other	0.020***	0.052***	0.666***
	(0.007)	(0.016)	(0.089)
Self-reported health status			
Good	−0.014**	−0.029*	−0.002
	(0.007)	(0.016)	(0.086)
Normal	−0.021***	−0.046***	−0.082
	(0.007)	(0.015)	(0.081)

(Continues)

TABLE 6 (Continued)

	Share of risky assets	Probability of holding risky assets	Log of financial assets
Homeowner	0.027***	0.054***	0.453***
	(0.009)	(0.018)	(0.083)
Equivalized income	0.023***	0.087***	0.968***
	(0.005)	(0.011)	(0.059)
Net wealth	0.004***	0.014***	0.224***
	(0.001)	(0.001)	(0.007)
Enough retirement income	0.039***	0.144***	1.030***
	(0.006)	(0.015)	(0.081)
Region			
Hokkaidō	−0.100***	−0.232***	−0.216
	(0.016)	(0.039)	(0.170)
Tōhoku	−0.026*	−0.050*	−0.131
	(0.015)	(0.030)	(0.152)
Chūbu	−0.003	−0.004	0.195**
	(0.008)	(0.018)	(0.096)
Kinki	−0.011	−0.001	0.087
	(0.007)	(0.018)	(0.102)
Chūgoku	−0.029**	−0.051*	0.201
	(0.014)	(0.031)	(0.157)
Shikoku	−0.018	−0.006	0.259
	(0.013)	(0.037)	(0.188)
Kyūshū	−0.029***	−0.064***	−0.198
	(0.010)	(0.022)	(0.121)
2013	0.001	−0.007	−0.060
	(0.003)	(0.007)	(0.043)
2014	0.007**	0.011	0.052
	(0.003)	(0.007)	(0.045)
2015	0.012***	0.015*	0.074
	(0.004)	(0.008)	(0.046)
2016	0.012***	0.010	0.043
	(0.004)	(0.008)	(0.050)
Observations	12,182	12,182	12,182

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

assets, and level of financial assets. In summary, the results of the baseline specification are in line with the small number of studies that use Japanese data. However, the results can be seen to be only partially consistent with studies that use US and European data.

5.2 | Role of stock market beliefs

This section incorporates the effects of the five dimensions of an individual's beliefs about the stock market along with the baseline specifications individually, Specifications (1)–(5), before jointly including them in one specification, Specification (6), for each of the three dependent variables. The results are reported in Table 7.[19] The consistency of the results indicates that these variables are not correlated and each one captures a unique characteristic of the respondent's behavior. Therefore, the discussion in the following sections is based on the results presented in Specification (6) in Table 7.

The first two statements reflect individuals' beliefs about the profitability and riskiness of investing in the stock market. These perceptions directly influence how households evaluate the potential risk–return trade-off, a fundamental concept in financial decision making.

According to the capital asset pricing model (CAPM), the expected return on an asset is determined by its systematic risk, measured by beta, relative to the market as a whole. The model implies that higher expected returns are compensation for bearing higher levels of market risk. On the other hand, alpha refers to the excess return of a portfolio over what would be predicted by the CAPM, or any other risk-based benchmark.

If households perceive the stock market as excessively risky or doubt its potential for delivering sufficient returns, they may rationally choose not to participate, even if actual risk-adjusted returns are favorable. Similarly, if individuals believe that they (or certain assets) can consistently generate positive alpha, they may be more inclined to participate in the market despite perceived risks. In essence, participation in the stock market is not solely determined by objective measures of risk and return, but also by subjective beliefs about market risk (beta) and potential excess returns (alpha). These beliefs shape households' expectations and ultimately influence whether they view stock market investment as worthwhile.[20]

Table 7 reveals that those who respond in the affirmative to the *"profit cannot be made with certainty"* statement hold a lower proportion of their financial assets in risky assets and have a lower propensity to invest in stock markets. Considering Specification (6), an individual who agrees that profits cannot be made with certainty is found to hold 2.2 pp less in the share of risky assets and is 5.1 pp less likely to hold risky assets. In line with the discussion in the previous paragraph, households that disagree with the statement (i.e., believe profits can indeed be made with certainty) hold optimistic expectations about positive alpha, thereby increasing their incentive to allocate more of their portfolios to risky assets. Conversely, those who agree that profits cannot be guaranteed perceive lower or negligible alpha from equity investments, rationally leading them to reduce their exposure to risky assets.

On the other hand, respondents who agree with the statement *"significant losses are possible"* exhibit a greater likelihood of holding risky assets, maintain a higher proportion of risky assets in their portfolios, and have higher overall levels of financial assets, as reported in Column 6 of Table 7. In quantitative terms, individuals agreeing that significant losses are possible have a 1.9 pp higher share of risky assets and are 6.7 pp more likely to invest in risky assets. In line with the CAPM, we interpret agreement as reflecting households' beliefs regarding the market's systematic risk and corresponding risk premium. Specifically, acknowledging the

[19]In unreported results, factor analysis was used to construct a factor that combines the profitability and riskiness variables, and another factor that combines the effect of the trust variables. The results of these two factors, when included in the modeling approaches, are negative and statistically significant as expected.

[20]We are grateful to an anonymous referee for making this valuable suggestion.

TABLE 7 Stock market beliefs and financial outcomes: Marginal effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7:IV)
(1) Share of risky assets							
Profits are uncertain	−0.019***					−0.022***	−0.055***
	(0.004)					(0.004)	(0.019)
Losses are possible		−0.001				0.019***	0.079***
		(0.005)				(0.006)	(0.017)
High illegal activities			−0.022***			−0.023***	−0.013
			(0.004)			(0.005)	(0.018)
No disclosure of info.				−0.015***		−0.007	−0.019
				(0.004)		(0.005)	(0.018)
Firms favor large investors					0.007	0.016***	0.019
					(0.004)	(0.004)	(0.018)
(2) Prob. of holding risky assets							
Profits are uncertain	−0.038***					−0.051***	−0.119**
	(0.009)					(0.010)	(0.047)
Losses are possible		0.013				0.067***	0.233***
		(0.011)				(0.013)	(0.036)
High illegal activities			−0.066***			−0.077***	−0.061
			(0.010)			(0.011)	(0.041)
No disclosure of info.				−0.041***		−0.020*	−0.092**
				(0.009)		(0.011)	(0.041)
Firms favor large investors					0.028***	0.055***	0.076*
					(0.009)	(0.010)	(0.044)
(3) Financial assets holding							
Profits are uncertain	0.091*					−0.047	−0.054
	(0.053)					(0.059)	(0.050)
Losses are possible		0.290***				0.393***	0.119**
		(0.064)				(0.073)	(0.051)
High illegal activities			−0.090*			−0.191***	0.014
			(0.052)			(0.059)	(0.039)
No disclosure of info.				−0.078		−0.118**	0.011
				(0.051)		(0.055)	(0.040)
Firms favor large investors					0.160***	0.195***	−0.001
					(0.052)	(0.053)	(0.021)
Observations	12,182	12,182	12,182	12,182	12,182	12,182	12,182

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses. Each specification in each panel represents a separate regression, and each regression includes the set of micro determinants as in Table 6. IV stands for instrumental variable.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

potential for substantial losses implies awareness of higher systematic market risk, which rational investors typically associate with higher expected returns as compensation. Thus, these households rationally choose greater exposure to risky assets, anticipating returns that are commensurate with the increased risk. This interpretation is consistent with observed behavior following major market downturns. Individuals who acknowledge significant downside risk may be those with greater market experience or higher financial literacy. Consequently, such households remain engaged with risky investments precisely because they expect higher returns to adequately offset the elevated risk.

Individuals' belief about the regulation framework and fairness of the stock market in Japan has the expected impact on their decisions and holdings of risky assets, and the level of financial assets. Specifically, the results in Table 7 show that agreeing that *"illegal activities such as insider trading are widespread"* has a negative and significant impact on households' engagement with risky assets and on the level of financial assets they hold.

The results related to the *"not much progress has been made in terms of disclosure of information on corporate performance"* statement show a similar pattern to the statement related to the illegal activities, except that it is statistically insignificant for the share of risky assets. This is expected as this statement reflects an individual's belief in the efficiency and transparency of the stock market. The final statement *"securities firms inappropriately favor large investors, such as large corporations, rather than general investors"* can also be argued to reflect household's experience in the stock market. The results show that, similar to the *"significant losses are possible"* statement, individuals who agree with this statement have a higher probability of holding risky assets, higher level of financial assets, and higher share of risky assets.

In general, these results are in line with the findings of Guiso et al. (2008), Delis and Mylonidis (2015), Georgarakos and Pasini (2011), Balloch et al. (2015), and Bucciol et al. (2016). However, most of these studies use a generalized measure of trust, except for Balloch et al. (2015), who use a measure of trust that is specific to household trust in the stock market, and Guiso et al. (2008), who proxy trust in the stock market with individuals' trust in bank officials and advisers. We use measures that directly reflect individuals' perceived belief of the functioning of the stock market, which is in line with Balloch et al.'s (2015) argument to use a specific and direct measure of trust. To confirm the robustness of our findings, in Table 8 we use data related to two general measures of trust: trust in government and trust in neighbours.[21] Specifically, the survey asks if the respondent supports the current administration and if he/she trusts neighbours.[22] As can be seen from the results in Table 8, trust in government is statistically significant only for the level of financial wealth regression. Table 8 confirms that direct measures of households' beliefs are larger in economic magnitude and retain their statistical significance even after incorporating generalized trust measures (see Panel C compared to Panel B). These results emphasize that measures of the belief and trust in the institutions that facilitate holdings of risky assets are arguably far more important than relying on a generalized measure of trust for this analysis.

Guiso et al. (2008) argue that the trust measure they use is not a proxy for other indicators, such as optimism or expectations about stock market performance, as they control for these characteristics in their model specifications. Similarly, in supporting the inclusion of a measure of trust and a measure of financial literacy, Balloch et al. (2015) argue that knowing about the market does not make the market trustworthy. Therefore, we can argue that the five statements used in this article are a direct measure of households' beliefs in different dimensions of the functioning of the stock market. In particular, the "illegal activities" statement captures the fairness and quality of investor protection, whereas the "information disclosure" statement captures stock market efficiency. Furthermore, the empirical results reported in Specification (6) of Table 7 show that each statement remains a key determinant of the

[21]The trust in government variable is of particular importance as the Japanese government announced in January 2013 (at the same time Wave 10 was taking place) its "three-arrows" strategy to achieve an early end to deflation and overcome economic stagnation.

[22]These two questions are available in only two waves, 2015 and 2016. Therefore, Table 8 also reports the results related to the main belief statements (see Panel C) to confirm that the results are not driven by the small sample size.

TABLE 8 General trust and financial outcomes (2015 and 2016 only).

	Share of risky assets	Probability of holding risky assets	Log of financial assets
Panel A: General measures only			
Trust in government	−0.004	−0.003	0.165**
	(0.007)	(0.014)	(0.075)
Trust in neighbors	−0.017*	−0.037*	−0.118
	(0.010)	(0.021)	(0.107)
Observations	4,525	4,525	4,525
Panel B: Belief statements only			
Profits are uncertain	−0.023***	−0.046***	0.062
	(0.007)	(0.015)	(0.082)
Losses are possible	0.022***	0.063***	0.421***
	(0.008)	(0.018)	(0.103)
High illegal activities	−0.022***	−0.084***	−0.213**
	(0.008)	(0.016)	(0.083)
No disclosure of info.	−0.004	−0.006	−0.089
	(0.008)	(0.016)	(0.080)
Firms favor large investors	0.012*	0.033**	0.218***
	(0.007)	(0.015)	(0.081)
Observations	4,525	4,525	4,525
Panel C: Beliefs and general measures			
Profits are uncertain	−0.022***	−0.045***	0.060
	(0.007)	(0.015)	(0.082)
Losses are possible	0.022***	0.062***	0.418***
	(0.008)	(0.018)	(0.102)
High illegal activities	−0.021***	−0.084***	−0.222***
	(0.008)	(0.016)	(0.083)
No disclosure of info.	−0.004	−0.006	−0.092
	(0.008)	(0.016)	(0.080)
Firms favor large investors	0.013*	0.033**	0.211***
	(0.007)	(0.015)	(0.081)
Trust in government	−0.002	0.004	0.150**
	(0.007)	(0.014)	(0.075)
Trust in neighbors	−0.015	−0.033	−0.114
	(0.010)	(0.021)	(0.107)
Observations	4,525	4,525	4,525

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

outcome variables, even after including all of the variables along with the baseline variables in one specification. Therefore, our results confirm that different dimensions of households' beliefs in the stock market are a significant determinant of households' financial decisions, and the effects do not diminish across the modeling approaches, even after including generalized trust, which is typically smaller in economic magnitude than the aspects of beliefs of the stock market (see Panel A compared to Panel B in Table 8).

6 | INSTRUMENTAL VARIABLES

In our setting, there is a potential concern for reverse causality and omitted variable bias. Given that the belief measures and financial questions are surveyed at the same time, it is also plausible that an individual's financial behaviors could influence his/her beliefs about financial markets. For example, individuals who hold risky assets may experience positive outcomes as a result of investing, which in turn could have a positive effect on their beliefs about the stock market. Likewise, there could be unobserved omitted characteristics, which are related to our measures of beliefs and financial behaviors, for example, financial literacy. To address these concerns and explore our hypothesis that beliefs affect financial behaviors, we instrument current beliefs with past beliefs. That is, we exploit information contained in the KHPS, which asks respondents to identify when they first formed their beliefs and what this initial belief was, aligned to the five dimensions outlined earlier. We argue that these historical beliefs are closely related to current beliefs, because of a stability of preferences and behaviors over the life course, and that these past beliefs are based on historical life experiences and, as a result, are unrelated to current financial behaviors, other than through current beliefs. This approach is similar to Jiang and Lim (2018), who elicit a causal impact of trust on debt behaviors, by linking past life experiences and current trust levels in the US context.

Specifically, we use information on an individual's first beliefs about the stock market, and the age the individual formed these beliefs. These historical beliefs are closely related to an individual's current beliefs, that is, satisfying the key relevance assumption of the IV approach. We further argue that these initial beliefs are formed before the individual had the opportunity to interact meaningfully with financial markets. We do not make any assumption about how these beliefs were formed, instead assuming that they capture the individual's past experiences, which affected their beliefs about financial markets. Given that these beliefs refer to earlier periods, we argue that they represent a suitable instrument for the current beliefs in this context, given the potential persistence in individual attitudes and beliefs.

It is important to acknowledge potential violations of the exclusion restriction underlying our identification strategy. Our approach assumes that individuals formed their initial beliefs about financial markets before any meaningful interactions with financial markets and that these beliefs influence current portfolio choices only through their contemporaneous beliefs. The exclusion restriction could be violated if individuals began interacting with financial markets before forming their initial beliefs and if portfolio allocations are highly persistent, as past asset holding could jointly predict both the respondent's earliest beliefs and their contemporaneous asset holdings through persistent portfolio choices. Although we are unable to test this assumption directly because of data limitations, we believe it is plausible given that a large proportion of individuals formed their beliefs at a relatively early age, reducing the likelihood of meaningful interactions with financial markets before their beliefs were formed, and given the substantial gap between when individuals formed their initial beliefs and when we observe their current asset allocations, reducing concerns around highly persistent asset allocations.

For each of the five belief statements, the survey asked respondents to state what their belief was in the past and at what age they formed this belief. The specific wording is as follows: *"This question asks your beliefs about the securities market in the past. Please circle one answer which is most applicable as your first belief in the following questions. Please also mention your approximate age when you had such belief."* The questions are aligned to the current beliefs, consistent across the 2015 and 2016 waves, covering dimensions relating to profits, uncertainty,

illegal activities, information disclosure, and attitudes toward large firms. Given that these beliefs are formed historically, we assume that these are time invariant and are applied across all waves.

Before the formal analysis, we present descriptive statistics on respondents' ages and the corresponding years in which they report first forming their beliefs about the stock market. Figure A2(a) presents the age at which respondents first formed their beliefs about the financial markets, and Figure A2(b) shows the corresponding year these beliefs were formed. What is essential for our arguments is that these opinions were formed significantly in the past. Considering the year of formation, there are clearly spikes between the late 1980s and 2000s. These spikes likely correspond to major economic and financial events that may have shaped individuals' perceptions of risk and return. For instance, the late 1980s and early 1990s coincide with the aftermath of the 1987 stock market crash and the beginning of Japan's prolonged economic stagnation following its asset price bubble. The late 1990s and early 2000s align with the dot-com bubble and subsequent crash events that received widespread media attention and likely had a formative impact on investor sentiment. Additionally, during this period, there was significant deregulation in global financial markets, which may have prompted increased public awareness and engagement with equity markets.

Overall, the variation across respondents suggests that these beliefs are not shaped uniformly but rather are based on personal, historical experiences. It is also worth noting that a significant number of individuals report forming their opinions before age 25, that is, a period when generally the individual is more likely to have had limited interactions with wealth accumulation and stock market participation.

6.1 | Method

To overcome potential concerns about the empirical approach, that is, the potential endogeneity of the beliefs statements, we adopt an IV approach where we jointly model individual beliefs and financial outcomes. To do this, we employ a set of instruments, X_2, that are strongly associated with current beliefs but arguably exogenous to current financial behaviors. Hence, we estimate the following joint model:

$$Household\ Financial\ Decisions_i = X'\lambda + \theta\ Beliefs + \epsilon_1, \tag{2}$$

$$Beliefs_i^* = X'\pi_1 + \pi_2\ Past\ Beliefs + \epsilon_2, \tag{3}$$

where *Household Financial Decisions* is the outcome of interest, *Beliefs* are the potentially endogenous variables, *Past Beliefs* are the instrumental variables, and X is the set of controls included previously. ϵ_1 and ϵ_2 are white noise error terms.

The model is estimated simultaneously by a conditional (recursive) mixed process estimator (CMP), given that the dependent variables considered are nonlinear in nature and are defined as earlier, that is, asset share, binary asset holding, and censored level of financial assets. Furthermore, the potentially endogenous independent variables are binary outcomes. Consequently, the CMP is an appropriate estimator in this context, given that there is simultaneity between beliefs and financial outcomes, but the availability of instruments allows the construction of a recursive set of equations, similar to a two-stage least squares regression. In the estimation, CMP is a limited information maximum likelihood estimator where the first-stage parameters are reduced form, that is, showing the relation between the endogenous variable and instrument, and the second-stage parameters are structural (see Roodman, 2011). In the results, we report average conditional marginal effects.

6.2 | Results

Before discussing the outcome equations relating to financial behaviors, we first consider the first-stage equations, which capture the factors associated with agreeing with each of the statements about the financial markets (see Table 9). Given

TABLE 9 Determinants of agreement with belief statements.

	Profitability	Riskiness	Illegal	Disclosure	Large investors
Married	0.010	0.018	−0.007	−0.014	−0.048***
	(0.014)	(0.011)	(0.016)	(0.015)	(0.015)
Male	0.005	−0.006	−0.002	0.020	0.060***
	(0.012)	(0.011)	(0.014)	(0.013)	(0.013)
Age					
20–30	−0.066*	0.025	−0.059	−0.102**	−0.181***
	(0.036)	(0.033)	(0.043)	(0.041)	(0.041)
30–40	−0.045	0.043	−0.071**	−0.102***	−0.171***
	(0.030)	(0.027)	(0.033)	(0.031)	(0.033)
40–50	−0.025	0.045*	−0.082***	−0.068**	−0.125***
	(0.029)	(0.026)	(0.031)	(0.030)	(0.032)
50–60	−0.014	0.043*	−0.038	−0.024	−0.059*
	(0.028)	(0.025)	(0.031)	(0.030)	(0.031)
60–70	0.010	0.054**	−0.003	0.016	0.003
	(0.027)	(0.023)	(0.029)	(0.028)	(0.029)
Education					
High school	−0.024	−0.014	0.010	−0.022	0.018
	(0.017)	(0.015)	(0.021)	(0.019)	(0.020)
College	−0.008	0.022	0.007	0.021	0.033
	(0.021)	(0.019)	(0.024)	(0.022)	(0.023)
University+	−0.026	0.008	−0.016	−0.030	0.033
	(0.019)	(0.017)	(0.023)	(0.021)	(0.021)
Employment					
Part-time	−0.010	−0.013	−0.014	0.001	0.020
	(0.016)	(0.014)	(0.018)	(0.016)	(0.018)
Unemployed	−0.004	0.027	0.015	0.053	0.061*
	(0.034)	(0.030)	(0.039)	(0.036)	(0.036)
Other	0.004	−0.005	−0.004	−0.004	0.003
	(0.015)	(0.013)	(0.017)	(0.016)	(0.016)
Self-reported health status					
Good	0.004	−0.007	−0.032*	−0.029*	−0.025*
	(0.015)	(0.013)	(0.017)	(0.015)	(0.015)
Normal	−0.029**	−0.022*	−0.040**	−0.041***	−0.039***
	(0.014)	(0.012)	(0.016)	(0.015)	(0.015)

(Continues)

TABLE 9 (Continued)

	Profitability	Riskiness	Illegal	Disclosure	Large investors
Homeowner	0.017	0.016	−0.026*	−0.019	0.004
	(0.013)	(0.012)	(0.016)	(0.014)	(0.014)
Equivalized income	−0.001	−0.008	−0.034***	−0.006	0.019**
	(0.009)	(0.007)	(0.010)	(0.010)	(0.010)
Net wealth	0.002*	0.001	0.000	0.001	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Enough retirement income	−0.054***	−0.017	−0.064***	−0.052***	−0.025
	(0.016)	(0.014)	(0.019)	(0.019)	(0.018)
Past impression variables					
Profits are uncertain	0.193***				
	(0.009)				
Losses are possible		0.178***			
		(0.008)			
High illegal activities			0.261***		
			(0.010)		
No disclosure of info.				0.242***	
				(0.010)	
Firms favor large investors					0.281***
					(0.010)
Years dummies	Yes	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes	Yes
Observations	12,084	12,084	12,084	12,084	12,084

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

the joint modeling approach, we comment on the individual significance of the instrumental variables. In the first stage, in each equation, we include the exclusion restrictions, that is, the past belief variable relating to the specific belief. Across all the first-stage equations, we find that the past beliefs related to the potential endogenous variable are statistically significant determinants of current beliefs. Moreover, the correlations between the error terms are generally statistically significant. These findings support our earlier hypothesis that initial historic beliefs are closely related to current beliefs.

The results related to the socioeconomic variables indicate that younger individuals are less likely to agree with the last three statements, which capture different dimensions of trust in the stock market, compared to those who are over 70 years old (the omitted category). A similar pattern is also found for the subjective health measure and the future retirement income variable. Overall, however, there appears to be a limited effect of demographic and socioeconomic characteristics on the determinants of different dimensions of beliefs about the stock market. The only strong and consistent determinants of current beliefs are past beliefs, validating our empirical strategy.

In addition, the lack of statistical significance in the explanatory variables further highlights that these beliefs are determined at an individual level and are independent of observable characteristics. This supports our arguments that these beliefs are based on individual historical life experiences and are not systematically determined.

The findings of this section can help identify the causes of the low level of engagement in the stock market observed by Japanese households, compared to US or European households. Specifically, as noted earlier, these past beliefs are formed around events such as the dot-com bubble, significant relaxation of regulation, and Japan's period of reduced economic growth. Indicating that past experiences faced by Japanese households have a long-lasting impact on individual attitudes toward financial institutions. However, an important policy implication is the finding that younger individuals have a more positive attitude toward the functioning of the stock market.

Turning our attention to the financial outcomes, that is, the second stage, once the approach is adopted, the beliefs variables appear to have a limited effect on the financial outcomes of the household, except for the beliefs relating to losses and uncertainty. In our preferred specification, presented in Column 7 of Table 7, we find losses and profits maintain a statistically significant association with the share of risky assets held and the decision to hold risky assets. This suggests that when we account for potential endogeneity and reverse causality concerns, the effect of the beliefs variables is slightly reduced, although the beliefs relating to profits and uncertainty maintain an important relation with financial behaviors. In contrast, when the IV approach is adopted, we find that beliefs fail to affect the level of financial assets. This highlights the importance of accounting for reverse causality and omitted variable bias in the estimation of the relation between household financial outcomes and subjective beliefs and, more broadly, trust.

7 | LONG-TERM IMPACT OF BELIEFS ON INDIVIDUALS' FINANCIAL DECISIONS

In this section we examine the potential long-term impact of a household's beliefs about the functioning of the stock market on its planned future holdings. Individuals are asked to give their preference for holding five types of assets in preparation for their life 20 years from now in yes/no responses (see Section 3.1 for the wording of these questions and Table 2 for the associated summary statistics). Specifically, these financial assets are: time deposits, government bonds, stocks, foreign-denominated financial products, and/or investment trusts. For ease of computation, the stocks, foreign-denominated financial products, and investment trust categories are merged into one category as they capture individual exposure to similar levels of risk. Individuals can respond positively to all the categories of assets they envisage holding 20 years from now, and so these categories are not mutually exclusive.

7.1 | Methodologies: Seemingly unrelated regression

A novel aspect of the modeling approach in this section lies in jointly estimating probit models that correspond to the decision to hold each of the three financial asset categories, given that they are not mutually exclusive outcomes. This enables us to simultaneously investigate the relation between the different dimensions of households' beliefs and the decision to hold each type of financial asset using a system of equations, in which the error terms are assumed multivariate normal. Allowing the error terms in the regression equations to be correlated addresses the potential issue that there could be unobserved factors that affect all equations, while also improving the efficiency of the estimators.[23]

[23]Several studies employ a joint modeling approach in the literature of household finance (see, e.g., Bridges & Disney, 2010; Brown & Taylor, 2008; Gray, 2014).

In general, the probit model is interpreted in terms of an underlying latent variable, y_i^*, of which y_i is the realized observation, where the subscript i denotes the household index.[24] In this artical, y_i^* is the propensity of the respondent to hold the asset type in the future. The realized discrete choice made by the individual, y_i, is defined according to the following choice rule:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0. \end{cases} \tag{4}$$

The seemingly unrelated regression is represented by the form:

$$\begin{aligned} y^*1_i &= g(\mathbf{x}_i'\boldsymbol{\gamma}_1 + \mathbf{h}_i'\boldsymbol{\phi}_1 + \boldsymbol{\varepsilon}_{1i}) \\ y^*2_i &= g(\mathbf{x}_i'\boldsymbol{\gamma}_2 + \mathbf{h}_i'\boldsymbol{\phi}_2 + \boldsymbol{\varepsilon}_{2i}) \\ y^*3_i &= g(\mathbf{x}_i'\boldsymbol{\gamma}_3 + \mathbf{h}_i'\boldsymbol{\phi}_3 + \boldsymbol{\varepsilon}_{3i}), \end{aligned} \tag{5}$$

where $y1_i$, $y2_i$ *and* $y3_i$ are the propensity of holding time deposits, government bonds, and stocks/investment trust, respectively. $\mathbf{x}_i$ and $\mathbf{h}_i$ are matrices of the standard controls and the beliefs variables, respectively. Details of how this type of joint model can be estimated under these distributional assumptions are found in Roodman (2011).

7.2 | Results

Table 10 presents the results relating to individuals' preferences for holding different types of assets when planning for the future. Before discussing the beliefs about the functioning of the stock market on future asset holding aspiration, we consider the demographic and socioeconomic determinants. The analysis reveals that there is an inertia in asset holding, with those who currently hold risky assets in their financial portfolio more likely to report that they would hold risky financial assets in the future. Moreover, males are more likely to report a preference for holding risky assets and government bonds when planning for the future. Interestingly, we find that individuals with a university education and higher income show a preference for holding risky assets, but they are less likely to report a preference for time deposits. Conversely, married individuals have a more conservative investment plan, being more likely to state a preference for holding time deposits as opposed to risky assets. This finding accords with what is generally found in the literature that married households are more conservative in their asset allocation by nature (see, e.g., Fratantoni, 1998).

Table 10 shows that individuals' beliefs about the functioning of the stock market have a statistically and economically significant impact on the decision to hold each of the three financial assets in the future. Among the three financial assets listed in the question, the stock category is regarded as a risky choice given the relative riskiness of the financial investments included in this category compared to investing in time deposits or government bonds. Therefore, individuals who agree with each statement are expected to have a lower probability of holding these assets. Consequently, these individuals are expected to have a higher probability of buying time deposits and/or government bonds (relatively safe assets). The results in Table 10 are in line with these prior expectations. Specifically, the results show that individuals who have a negative belief regarding the functioning of the stock market have a higher probability of holding time deposits and a lower probability of holding stocks as future investments. In terms of magnitude, Table 10 shows that those agreeing that *"illegal activities such as insider trading are widespread"* for example, have a 1.9% higher probability of holding time deposit as a future investment and a 2.7% lower probability of holding stocks compared to those who disagree with this statement.

[24]Full formulations of the probit model can be found in Greene (2012) and Wooldridge (2019).

TABLE 10 Long-term impact of stock market beliefs on individuals' financial decisions.

	Future holdings of time deposits	Future holdings of gov. bonds	Future holdings of risky assets
Profits are uncertain	0.0324***	−0.0048	−0.0691***
	(0.0071)	(0.0071)	(0.0084)
Losses are possible	0.0190**	0.0115	−0.0127
	(0.0083)	(0.0083)	(0.0099)
High illegal activities	0.0186***	−0.0245***	−0.0266***
	(0.0070)	(0.0067)	(0.0083)
No disclosure of info.	−0.0075	−0.0010	0.0043
	(0.0070)	(0.0068)	(0.0083)
Firms favor large investors	−0.0238***	0.0224***	0.0450***
	(0.0063)	(0.0060)	(0.0074)
Currently hold risky assets	−0.1168***	0.0082	0.2715***
	(0.0066)	(0.0067)	(0.0068)
Married	0.0223***	−0.0148**	−0.0227**
	(0.0074)	(0.0071)	(0.0088)
Male	−0.0599***	0.0176***	0.0584***
	(0.0070)	(0.0066)	(0.0081)
Age			
20–30	0.0002	−0.0423**	0.0697***
	(0.0224)	(0.0210)	(0.0263)
30–40	0.0243	−0.0576***	0.0409**
	(0.0173)	(0.0162)	(0.0205)
40–50	0.0149	−0.0688***	0.0341*
	(0.0164)	(0.0153)	(0.0196)
50–60	0.0231	−0.0420***	0.0134
	(0.0162)	(0.0149)	(0.0193)
60–70	−0.0108	0.0035	0.0114
	(0.0155)	(0.0142)	(0.0186)
Education			
High school	−0.0130	0.0059	−0.0026
	(0.0103)	(0.0094)	(0.0119)
College	−0.0233*	0.0145	0.0125
	(0.0122)	(0.0112)	(0.0139)
University+	−0.0618***	0.0243**	0.0791***
	(0.0109)	(0.0103)	(0.0126)

(Continues)

TABLE 10 (Continued)

	Future holdings of time deposits	Future holdings of gov. bonds	Future holdings of risky assets
Employment			
Part-time	−0.0001	0.0135	0.0091
	(0.0101)	(0.0093)	(0.0115)
Unemployed	0.0094	−0.0015	0.0209
	(0.0224)	(0.0214)	(0.0257)
Other	0.0041	0.0086	0.0144
	(0.0087)	(0.0079)	(0.0101)
Self-reported health status			
Good	−0.0109	−0.0132	−0.0041
	(0.0087)	(0.0082)	(0.0102)
Normal	0.0002	−0.0110	−0.0211**
	(0.0086)	(0.0080)	(0.0100)
Homeowner	0.0302***	−0.0108	−0.0179**
	(0.0076)	(0.0073)	(0.0090)
Equivalized income	−0.0144***	0.0256***	0.0335***
	(0.0052)	(0.0049)	(0.0062)
Net wealth	0.0010*	0.0009	0.0003
	(0.0006)	(0.0006)	(0.0007)
Enough retirement income	0.0031	0.0061	0.0410***
	(0.0099)	(0.0094)	(0.0115)
Years dummies	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes
Observations	12,150	12,150	12,150

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

These results provide an important evaluation of the current and future structure of Japanese households' financial portfolios. This is important as the Japanese government has been trying to move household financial assets held as private bank deposits to investments in the capital market. Aronson (2011, p.16) argues that *"achieving this goal would help provide ample assets for private retirement and for governmental social welfare payments, and would enable Japan to regain an important role in the international community."*

However, although the process has succeeded in reshaping the legal structure of the financial system to a more open system based largely on markets and information disclosure, no substantial progress has been achieved related to the suboptimal use of household financial assets. For example, the Organisation for Economic Co-operation and Development (2025) shows that the shares of equity held by Japanese households are on average 7.6% in 2000, 6.9% in 2010, and 8% in 2020; for the United States, these figures are 35% in 2000, 27.1% in 2010, and 36% in 2020.

Therefore, the results in this article may suggest that tackling factors related to individual beliefs about the stock market may enhance an individual's participation in the stock market and lead to diversified financial portfolios at the household level. Such efforts may complement the Japanese government's strategies aimed at growing Japan's financial services industry and achieving broad societal goals.

8 | CONCLUSION

We thoroughly explore the impact that an individual's beliefs about the stock market have on a range of current and planned future asset holdings. Our results highlight that beliefs affect the decision to hold risky assets, the share of risky assets held, and the level of financial assets. These results highlight the important role individual subjective beliefs have on observed financial behaviors. We find that the results relating to beliefs about uncertainty and profitability are robust to a novel IV approach, where current beliefs are instrumented using past beliefs. Finally, the analysis reveals that these beliefs are important not only for current financial decisions but also for planned future asset allocations, further highlighting the long-term impact of these beliefs.

Overall, this article has furthered our understanding of the role of subjective beliefs and household portfolio decisions. It has contributed to the growing number of studies that explore the role of trust in financial institutions. Furthermore, by considering the context of Japan, it highlights potentially important explanatory variables that have not been explored for Japanese households before. These factors might provide an explanation for the low stock market participation rate and be crucial for understanding Japanese household investment decisions.

The results provide valuable insight into how financial reforms may influence individual beliefs about financial markets and how these beliefs, in turn, affect household financial decisions. For example, the deregulation of financial markets in many developed countries during the 1980s, which aimed to promote competition and efficiency, and Japan's Financial System Reform (Japanese Big Bang) in 1996, which aimed to rebuild its financial sector, likely shaped public perceptions of the stock market. Our findings suggest that addressing misconceptions and improving an understanding of financial markets, for instance, through targeted financial literacy programs, could enhance households' financial well-being.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Keio University at https://www.pdrc.keio.ac.jp/en/paneldata/datasets/jhpskhps/.

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APPENDIX A

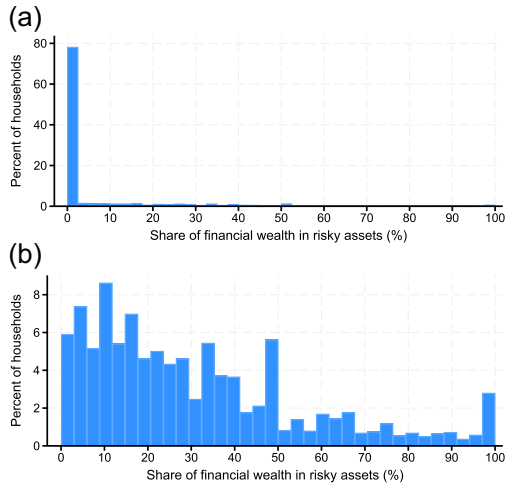

FIGURE A1 Distributions of the proportion of risky assets. This figure shows (a) the distribution of the financial wealth invested in risky assets and (b) the distribution conditional on holdings. Risky assets are defined as the total value of the securities category, and total financial wealth is defined as the total value of deposits and securities categories combined. Securities comprise: shares (reported at market value), bonds (at par value), stock investment trusts (market value), corporate and public bond investment trusts (market value), and loans in trust and money in trust (par value). Deposits comprise: postal savings certificates; national and regional (e.g., Shinkin) bank holdings of time deposits, installment savings, and ordinary deposits; company deposits; gold investment and savings accounts; and wealth held in the form of medium-term government bond funds. [Color figure can be viewed at wileyonlinelibrary.com]

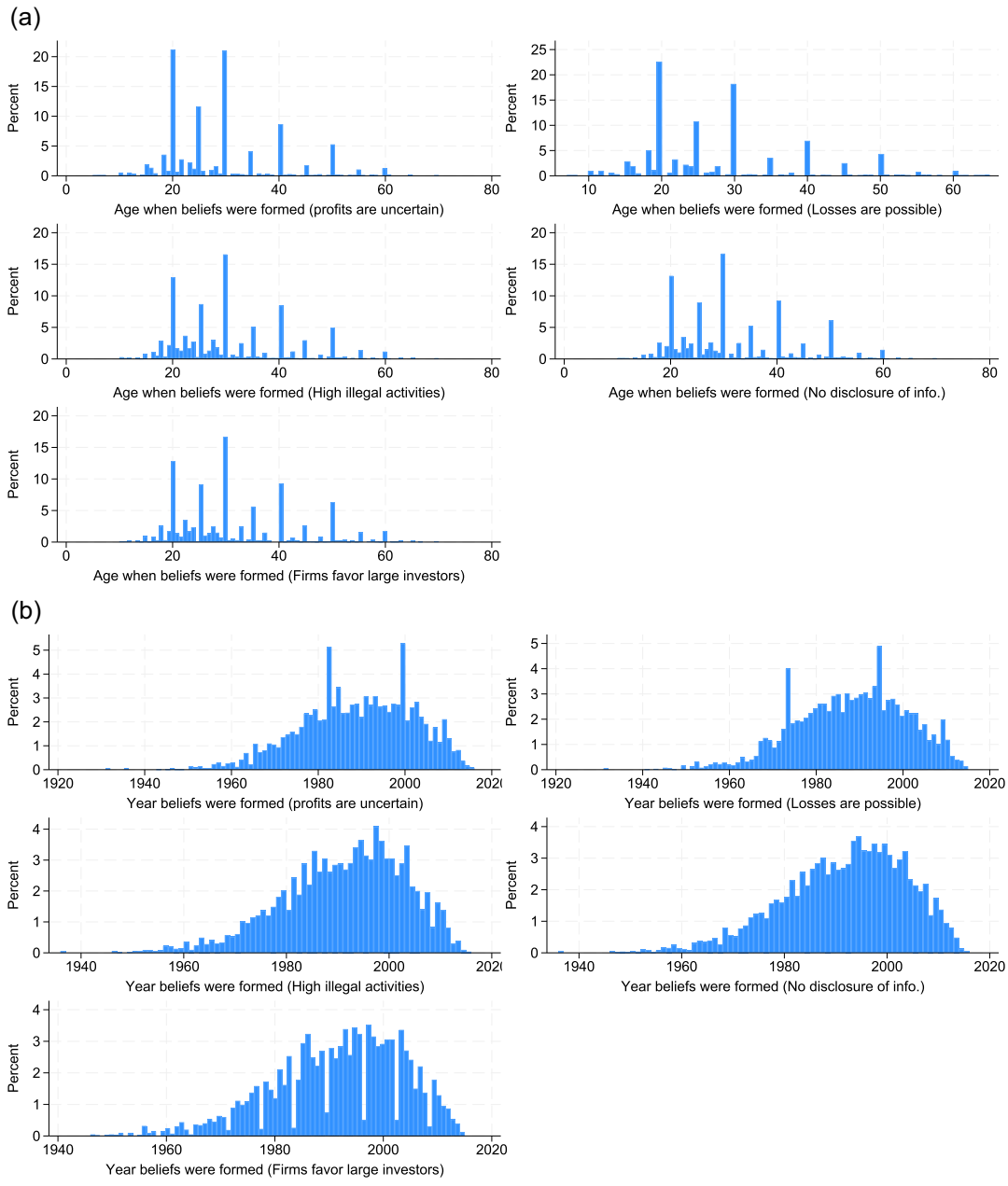

FIGURE A2 Distributions of the historical formation of beliefs about financial markets. This figure shows (a) the distribution of the age at which individuals formed their beliefs about financial markets and (b) the distribution of the year in which individuals formed their beliefs about financial markets. [Color figure can be viewed at wileyonlinelibrary.com]

TABLE A1 Demographic and socioeconomic determinants of financial outcomes: Random effects regressions.

	Share of risky assets	Probability of holding risky assets	Log of financial assets
Married	−0.080	0.026**	0.452***
	(0.064)	(0.011)	(0.099)
Male	0.149***	0.009	−0.178*
	(0.055)	(0.012)	(0.106)
Age			
20–30	−0.669***	−0.153***	−1.548***
	(0.163)	(0.030)	(0.229)
30–40	−0.431***	−0.125***	−0.936***
	(0.114)	(0.021)	(0.168)
40–50	−0.294***	−0.085***	−0.691***
	(0.102)	(0.019)	(0.153)
50–60	−0.183*	−0.057***	−0.432***
	(0.098)	(0.018)	(0.143)
60–70	−0.078	0.000	−0.159
	(0.087)	(0.015)	(0.120)
Education			
High school	0.148*	0.033*	0.789***
	(0.087)	(0.018)	(0.161)
College	0.322***	0.082***	1.432***
	(0.098)	(0.021)	(0.191)
University+	0.476***	0.154***	1.786***
	(0.090)	(0.019)	(0.177)
Employment			
Part-time	0.173***	0.019*	−0.055
	(0.061)	(0.011)	(0.079)
Unemployed	−0.191*	−0.051**	−0.065
	(0.110)	(0.022)	(0.147)
Other	0.179***	0.028***	0.369***
	(0.059)	(0.010)	(0.081)
Self-reported health status			
Good	−0.101*	−0.011	−0.036
	(0.055)	(0.009)	(0.068)
Normal	−0.168***	−0.011	−0.131**
	(0.051)	(0.008)	(0.062)

(Continues)

TABLE A1 (Continued)

	Share of risky assets	Probability of holding risky assets	Log of financial assets
Homeowner	0.269***	0.044***	0.402***
	(0.071)	(0.011)	(0.090)
Equivalized income	0.196***	0.044***	0.596***
	(0.036)	(0.006)	(0.047)
Net wealth	0.034***	0.007***	0.166***
	(0.005)	(0.001)	(0.005)
Enough retirement income	−0.218***	−0.031***	−0.402***
	(0.036)	(0.006)	(0.048)
Regions			
Hokkaidō	−0.861***	−0.186***	−0.433*
	(0.138)	(0.032)	(0.231)
Tōhoku	−0.286**	−0.072***	−0.312
	(0.125)	(0.023)	(0.204)
Chūbu	−0.040	−0.009	0.302**
	(0.065)	(0.015)	(0.140)
Kinki	−0.099	−0.009	0.001
	(0.064)	(0.014)	(0.134)
Chūgoku	−0.283**	−0.048**	0.239
	(0.118)	(0.023)	(0.217)
Shikoku	−0.132	−0.009	0.397
	(0.119)	(0.032)	(0.287)
Kyūshū	−0.282***	−0.071***	−0.415**
	(0.087)	(0.018)	(0.166)
2013	−0.003	−0.008	−0.061
	(0.026)	(0.006)	(0.046)
2014	0.065**	0.013**	0.035
	(0.029)	(0.006)	(0.046)
2015	0.114***	0.020***	0.075
	(0.031)	(0.007)	(0.048)
2016	0.117***	0.016**	0.077
	(0.035)	(0.007)	(0.050)
Observations	12,182	12,182	12,182

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

TABLE A2 Stock market beliefs and financial outcomes: Random effects regressions.

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Share of risky assets						
Profits are uncertain	−0.152***					−0.180***
	(0.031)					(0.034)
Losses are possible		0.005				0.165***
		(0.039)				(0.044)
High illegal activities			−0.178***			−0.181***
			(0.033)			(0.039)
No disclosure of info.				−0.120***		−0.058
				(0.031)		(0.036)
Firms favor large investors					0.048	0.117***
					(0.032)	(0.033)
(2) Prob. of holding risky assets						
Profits are uncertain	−0.023***					−0.032***
	(0.006)					(0.006)
Losses are possible		0.013**				0.039***
		(0.006)				(0.008)
High illegal activities			−0.023***			−0.024***
			(0.006)			(0.007)
No disclosure of info.				−0.015***		−0.008
				(0.005)		(0.006)
Firms favor large investors					0.003	0.009
					(0.005)	(0.006)
(3) Financial assets holding						
Profits are uncertain	0.025					−0.026
	(0.040)					(0.047)
Losses are possible		0.114**				0.141**
		(0.048)				(0.056)
High illegal activities			−0.021			−0.063
			(0.040)			(0.046)
No disclosure of info.				0.006		−0.005
				(0.039)		(0.044)

(Continues)

TABLE A2 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Firms favor large investors					0.074*	0.073*
					(0.039)	(0.041)
Observations	12,182	12,182	12,182	12,182	12,182	12,182

Note: The results reported in this table refer to the average marginal effect (AME) of a 1-point change in the explanatory variable in question on the expected value of the dependent variables. Standard errors pertaining to these AMEs are clustered at the household level and are reported in parentheses. Each specification in each panel represents a separate regression, and each regression includes the set of micro determinants as in Table 6.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.