# Determinants of Financial Risk Behavior

## —Stockholding and Risk Preference—

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## Abstract

This paper conducts theoretical and empirical analysis on households' financial risk behaviors using the survey data called NEEDS-RADAR. It suggests that households except risk-averse ones allocate their financial asset to stock market in accordance with the increase of their income and saving. However, risk-averse households become more risk-averse by aging and do not allocate their financial asset to equity. Still, risk preference of stock market participants becomes moderate since contradictory some of the non-stockholders seem to be more risk-love by aging and stockholders in Japan are neither risk-love nor risk-averse. This market characteristic with Japanese wage system contributes the comparatively low stock market participation rate in Japan. Further, households' inherent nature, financial knowledge, environmental risk factors, and social system constitute key factors that affect their risk behavior. These findings mostly coincide with the past studies. Additionally suggested theoretically and empirically are that relative risk aversion and decreasing absolute aversion of households and the independency of the financial risk asset ratio from the amount of total financial assets.

Keyword: risk preference, risk asset, relative risk aversion, partial adjustment, household

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## 1. INTRODUCTION

Financial risk behavior is a recent active research area in Japan. The proportion of risk assets such as stockholding in Japan has been less than that of United States and European countries such as England, Germany, and France(注1). Further, under on-going change from the paternalistic society onto more self-governing society, the default rate on government-managed pension is uprising sharply (注2) and the saving rate is also declining (注3). These changes clearly shadow financial stability of the future capital market in Japan.

Yonezawa, Matsuura and Takezawa(1999) traces the cause of the comparatively low risk asset proportion of Japan onto the seniority based Japanese wage system. If households try to keep the risk level of their assets constant, Japanese households may try to hold less risky asset in their young period because of the mandated lower wage rate at young. Elmendorf and Kimball(2000) analyze the relation between labor income risk and the demand for risky assets and argue that individuals respond to an increase in one risk by reducing their exposure to another risk. Gomes and Michaelides(2005) studies life-cycle asset allocation and finds that labor income risk and moderate risk aversion can well explain seemingly low equity market participation rate in the U.S. They find that the more the households are low risk aversion the less their precautionary saving incentive are that their investment on stock market does not become optimal resource allocation because of their lower rate of saving. On the other hand, risk-averse households save more than the low risk-averse households do, thus, their participation rate of stock market becomes higher than that of low risk-averse households'. However, the more risk-averse households invest smaller fraction of their wealth in stock. As a result, the risk preference level of stock market participants becomes moderate. Yao and Zhang(2005) compares the equity holding behavior of house owner with that of renter and finds that the former shows less risky asset holding ratio than that of the latter. They infer that the vulnerability of house owner against the price fluctuation of real estate is the cause of the less risky asset holding behavior. Guiso, Jappelli and Terlizzese(1996) study the relationship between income risk, liquidity constraints and portfolio choice and report those causalities with decreasing absolute risk and decreasing prudence decrease the amount of risk asset. Campbell and Cocco(2003) analyze their household risk management models on housing mortgage and reports fixed interest rate should not be optimal for risk-averse households.

The past study on concerning the relation between demographic factors and demand for risk assets, Perraudin and Sörensen (2000) utilize sample selection analysis and report that factors such as risk attitudes, family size, sex, education, and liquidity significantly affect financial asset choice but race, marital status, and occupation are turned out to be less important.

This paper assumes that each individual has inherent risk preference based on one's status such as sex, age and education though it is still arguable whether risk preference changes gradually in accordance with the accumulation of age and environmental risk factors. Further, after Elmendorf and Kimball(2000) and Gomes and Michaelides(2005), this paper takes the position that individuals try to keep their holding risk level constant. Hence, individuals who are under risk invoking environment

such as bearing house loan, instability of job, and children may reduce risk asset allocation such as equity holding. However, considering Japanese past homogeneously higher rate of saving and lower financial asset allocation on stocks, it is still arguable that risk-averse households save and/or hold stocks more than risk-love households do and that moderate risk aversion can well explain Japanese stock market. It may be valuable to analyze profiles of main participants and what characterize Japanese stock market

For the above objectives this paper conducts brief theoretical analysis utilizing the past study of Shiraishi and Matsuura(2002) et al (注4), with life cycle theory of Friedman(1957), precautionary saving of Kimball (1990) and risk aversion of Pratt (1964) on the theoretical backgroung. Shiraishi and Matsuura(2002) suggest the possibility of the independency of the risk asset ratio from the amount of financial assets. Then, three different models are served for the analysis in the second paragraph. The first to the third models refer to Baltagi, Griffin and Xiong (2000) to draw estimation models. The first model, dynamic model, is based on the partial adjustment of demand on assets and assumes linear relation between household saving/stockholding and income. The second model, static model, just utilizes Keynesian consumption function type linear relation between household saving/stockholding and income. Both models try to find the effect of individual risk preference and holding risk environment on the level of saving and/or stockholding. The third model analyzes the relationship between respondents' risk preference judgment and explanatory variables of the second model.

In the third paragraph, the empirical analysis is presented using the annual survey data called NEEDS-RADAR, which is conducted by Nihon Keizai Shimbun, Inc. Since the survey focuses on households' saving and investment behavior, this papers' analysis on the financial risk behavior is namely stockholding behavior. The characteristic of this research and the explanation of the employed data are in APPENDIX 1. And the descriptive statistics on the overall profile of respondents, financially classified profile of stockholders and non-stockholders are in Table 1-1 and in Table 1-2 respectively. In the fourth paragraph, conclusion is presented.

Concerning to the main findings different from the past studies are as follows. Firstly, the descriptive data shows clear difference on the risk preference judgment scores between stockholders and non-stockholders. Hence, several empirical analyses are applied, static and dynamic, OLS and GLS, tobit and sample selection, to clarify the difference of the effect of risk preference judgment on the saving/stockholding behavior. The results indicate that stockholders having profile of comparatively less risk-averse as well as more risk-love keep larger amount of stock among stockholders but that non stockholders having profile of comparatively more risk-averse save more among non-stockholders. Further, the analysis on the relationship between the risk preference judgment and the explanatory variables seem suggesting that financial information as well as higher education are working differently for stockholders and non-stockholders. On the overall findings on the relation between risk preference, risk invoking environment and saving/stockholding behavior, it is found that the marginal effect of risk environment, such as the effect of the increase of the number of dependent children and the house loan, on the saving

behavior is not so much different as expected between stockholders and non stockholders. Secondly, individuals may become more risk averse by aging but this paper's finding is that non-stockholders seem becoming more risk-averse as well as risk-love by aging but the age effect on stockholders seems very week. The fact may indicate that stock market participants in Japan are moderate risk-averse not because of the aging effect of risk preference on overall households but aging effect of risk preference on non stockholders and less risk-averse households and on income combined. The results of pseudo panel dynamic analysis supports moderate risk-aversion hypothesis. The other findings mostly coincide with the past studies.

## 2. ESTIMATION MODELS

With the consideration on all of the above, this paper firstly conducts brief theoretical analysis on the dynamic demand of financial risk asset. Then, by utilizing the results of the analysis, this paper presents estimation models.

### 2.1 Brief Theoretical Consideration

Assume partial adjustment process of the demand of financial assets as follows,

$$\omega_{it} - \omega_{it-1} = \delta_i(\omega_{it}^* - \omega_{it-1}) + \varepsilon_{it}, \qquad (1)^{(注5)}$$

where $\omega_{it}$ represents household $i$'s sum of the demands of risk free and risk asset at the start of time $t$, $\delta_i$ is the time invariant partial adjustment multiplier inherent to household $i$ and $\omega_{it}^*$ is the desirable or desired level of asset holding based on the permanent income hypothesis; or it may be precautional saving for after retirement. Subscripts in the right hand side of the characters represent the time of behavior.

Then, the following discussion is served to verify that this partial adjustment process can be applied to both the estimation of the amount of financial assets as well as risk assets and risk asset ratio. Shiraishi and Matsuura(2002) et al draw the demand of financial risk asset ratio shown as

$$\theta_t = \frac{-u'(\omega_t)}{\omega_t u''(\omega_t)} \frac{\pi_t}{\sigma_t^2}, \qquad 0 \le \theta_t \le 1 \qquad (2)^{(注6)}$$

where $u'(\cdot)$ is a marginal utility of asset, $\theta_t$ is risk asset ratio, $\pi_t$ is risk premium and $\sigma_t^2$ is the variance of risk premium. After adjustment, the amount of optimal risk assets is shown as

$$\theta_t \omega_t = \frac{-u'(\omega_t)}{u''(\omega_t)} \frac{\pi_t}{\sigma^2}, \qquad (3)$$

as is drawn from the optimization in APPENDIX 2. Then, this paper specifies household utility function under following two assumptions.

ASSUMPTION 1

Absolute risk aversion is a decreasing function of asset.

ASSUMPTION 2

Households have utility functions of constant relative risk aversion and the degree of risk aversion is inherent to each household.

Gollier(2002) finds that under assumption 1 the more the households hold total asset the more they hold risk assets.

Then, household $i$'s indirect utility function, concerning financial assets, can be specified experimentally as

$$u(\omega_{i_t}) = \{(1-\theta_{it})\omega_{it}\}^{1-\gamma_i} / 1-\gamma_i, \quad 0 \le \theta < 1. \quad (4)$$

where $\gamma_i$ determines household $i$'s intertemporal substitution.

Utilizing this utility function, equation (2) is rewritten as

$$\theta_{it} = \frac{1}{\gamma_i}\frac{\pi_t}{\sigma_t^2}. \qquad (5)$$

As long as this equation and above assumptions stand, it should be noted that firstly risk asset ratio is independent from the amount of financial asset-holding and secondly the intertemporal elasticity of substitution inherent to each household is time invariant and as well is assumed to be independent from the financial risk asset ratio of the household. And the risk asset ratio becomes constant when both the risk premium and the variance are constant or the ratio of risk premium over the variance is constant.

Under all of the above assumption, the partial adjustment process of the demand of financial risk asset can be shown as

$$\theta_{it}\omega_{it} - \theta_{it-1}\omega_{it-1} = \theta_{it}^{*}\delta(\omega_{it}^{*} - \omega_{it-1}) + \varepsilon_{it}. \qquad (6)$$

where $\theta_{it}^{*}$ is the desirable or desired level of risk asset ratio for the adjustment. Then, this paper assumes that household's consumption follows permanent income hypothesis. For the following analysis, this paper adds additional assumption.

ASSUMPTION 3

Household accumulates financial asset as much as the amount that the income of the period is larger than the permanent income. And household draw financial asset as much as the amount that the income of the period is less than the permanent income.

Then the amount of adjustment of each period can be modeled as

$$\theta_{it}^{*}\delta_i(\omega_{it}^{*} - \omega_{it-1}) = \theta_{it}^{*}(y_{it} - c_{it}) + \varepsilon_{it}, \qquad (7)$$

where $y_{it}$ is the total income and $c_{it}$ is the amount of consumption equivalent to permanent income. Thus, consumption shows random walk shown as

$$c_{it} = \left\{rf_t + \theta_{it}\pi_t + \left(\theta_{it}\sigma_t\Phi(t)\right)^{-1/2}\right\} \qquad (8)$$

as in APPENDIX 2. In consecutively, the desirable or desired level of asset holding is subordinately determined.

When the desirable or desired level of risk asset ratio for the adjustment, $\theta_{it}^{*}$, is equal to $\theta_{it}$, it means that risk asset ratio is partially adjusted; the optimal risk asset ratio is only applied to the amount of adjustment of each period, that is $y_{it} - c_{it}$, and the risk asset ratio of the amount of previous period, $\omega_{it-1}$, is still $\theta_{it-1}$.

Complete adjustment for the optimal risk asset ratio defined by equation (5) is calculated by

$$\theta_{it}^{*} = \frac{(\omega_{it-1} + y_{it} - c_{it})\theta_{it} - \theta_{it-1}\omega_{it-1}}{y_{it} - c_{it}} \qquad (9)$$

for a reference.

ASSUMPTION 4

In the partial adjustment process of the demand of financial risk, the optimal risk asset ratio of the period defined in equation (5), is applied only to the amount of adjustment of each period in equation (7).

Assumption 4 means that $\theta_{it}^{*} = \theta_{it}$ in equation (7). Then, the partial adjustment process of the demand of risk asset in each period, shown by equation (6), can be modeled as

$$\theta_{it}\omega_{it} = \theta_{it}\beta^{*}y_{it} + \theta_{it-1}\omega_{it-1} + e_{it}. \qquad (10)$$

where $\beta^{*}$ is the coefficient of income estimated by

$$\omega_{it} = -const_i + \beta^{*}y_{it} + u_{it}. \qquad (11)$$

And the coefficient of income estimated by

$$\theta_{it}\omega_{it} = -const_i + \beta_1 y_{it} + \beta_2\theta_{it-1}\omega_{it-1} + e_{it}. \qquad (12)$$

in equation （10） can be calculated as

$$\beta_1 = \frac{\mathrm{cov}(y_{it}, \omega_{it}\theta_{it})}{\mathrm{var}(y_{it})}$$

$$= \frac{\mathrm{cov}(y_{it}, \omega_{it-1}\theta_{it-1} + \theta_{it}\beta^* y_{it\,it-1})}{\mathrm{var}(y_{it})} \qquad (12)$$

under simple linear regression assumption; this becomes important to verify why risk asset and risk asset ratio can be estimated by the same partial adjustment estimation model framework. Further, coefficient of income can be statistically significant if risk asset ratio can be regarded as time invariant during the surveyed year and is independent from income.

And by assuming the first order partial correlation or auto regression process of risk asset ratio shown as

$$\theta_{it} = \rho\theta_{it-1} + u_{it}, \qquad (14)$$

equation （10） can be rewritten as

$$\theta_{it}\omega_{it} = \theta_{it}\beta y_{it} + \rho\theta_{it}\omega_{it-1} + e_{it}. \qquad (15)$$

and thus it becomes

$$\omega_{it} = \beta^* y_{it} + \rho\omega_{it-1} + v_{it}. \qquad (16)$$

The background the coefficient of lag dependent variable of risk asset ratio in equation （14）and that of risk asset in equation （15） can coincide is shown under simple linear regression assumption as follows

$$\frac{\mathrm{cov}(\omega_{t-1}\theta_{t-1}, \omega_t\theta_t)}{\mathrm{var}(\omega_{t-1}\theta_{t-1})} = \rho\phi \qquad (17)$$

where $\phi$ is the coefficient of the first order partial correlation or auto regression process shown by

$$\omega_{it} = \phi\omega_{it-1} + u_{it}, \qquad (18)$$

and the financial asset can be assumed random walk under Assumption 3, permanent income hypothesis assumption during the surveyed year; and thus $\phi$ is equal to 1.

Lastly by dividing both sides of equation （15） by $\omega_{it}$ and utilizing the random walk assumption of financial asset, the adjustment process of risk asset ratio is shown as

$$\theta_{it} = \theta_{it}\beta^* y_{it} / \omega_{it} + \rho\theta_{it-1} + e_{it}. \qquad (19)$$

And the coefficient of income estimated by

$$\theta_{it} = const_i + \beta_1 y_{it} + \beta_2\theta_{it-1} + e_{it}. \qquad (20)$$

in equation （19） is calculated by

$$\beta_1 = \frac{\mathrm{cov}(y_{it}, \theta_{it})}{\mathrm{var}(y_{it})}$$

$$= \frac{\mathrm{cov}\left(y_{it}, \dfrac{\theta_{it-1}\omega_{it-1} + \theta_{it}\beta^* y_{it}}{\omega_{it}}\right)}{\mathrm{var}(y_{it})} \qquad (21)$$

under simple linear regression assumption.

Hence, the partial adjustment process shown in equation （１） can be applied to both financial assets as well as financial risk assets and risk asset ratio. Equation （15）（19） suggest the possibility that the coefficient of lagged dependent variables coincides between the sum of financial assets and risk asset if risk asset ratio is independent from the level of income and the amount of financial assets. Further, the brief consideration on the relationship between the partial adjustment process based on permanent income hypothesis and Euler equation is written in APPENDIX 3.

**2.2 Drawing The Estimation Models**

Firstly households' dynamic demand function of financial assets is modeled as follows.

$$\omega_{it} = f(risk_{it}, x_{it}, y_{it}, p_{it}, z_t) \qquad (22)$$

$f(\cdot)$ represents household $i$'s sum of the demands of risk free and risk asset at time $t$. $risk_{it}$ represents household's risk preference and risk environment variables. $x_{it}$ represents household's status including invariant status （注７） such as sex and acquired ability such as knowledge of financial information. $y_{it}$ represents household's own yearly dispensable income. $p_{it}$ represents the price of stock. However,

all the households are assumed facing the same price, such as the price index of Dow-Jones and TOPIX, this variable is abbreviated and the effect of the price change is included in the time dummy variable $z_t$.

Composing the effect of individual inherent risk preference and holding risk environments, the desirable amount of assets in the model is given by

$$\omega_{it}^{*} = \beta_i^{*} + \beta_j^{*} risk_{it} + \beta_k^{*} x_{it} + \beta_l^{*} y_{it} + \gamma^{*} z_t. \qquad (23)$$

where $j = 1,2,\ldots$, $k = 1,2,\ldots$, $l = 1,2,\ldots,$.

Substituting equation (23) into (1) leads to the following dynamic demand model for panel data analysis:

$$\omega_{it} = \beta_i + (1-\delta)\omega_{it-1} + \beta_j risk_{it} + \beta_k x_{it} + \beta_l y_{it} + \gamma z_t + v_{it}, \qquad (24)$$

where $\beta_i = \delta\beta_i^{*}$, $\beta_\Delta = \delta\beta_\Delta^{*}$ for $\Delta = j,k,l$ and $\gamma = \delta\gamma^{*}$. Since this paper's employed data is not panel data, the above model is employed only for pseudo panel analysis. And this paper mostly estimates the following cross section model,

$$\omega_i = \beta_i + \beta_j risk_i + \beta_k x_i + \beta_l y_i + \gamma z + u_i, \qquad (25)$$

for the analysis of risk free saving and stock holding behavior. This model is applicable for the estimation of the demand of financial risk asset ratio since it is affected by holding risk environment.

The other type of model employed is unordered multinomial logit model for the analysis of the relation between risk preference judgments and explanatory variables employed in the former demand estimation model. Unordered model is employed to avoid one sided belief like that risk preference is ordered from risk-averse to risk-love. Further, the estimated coefficient directions by unordered multinomial logit model turned out to be not in one direction. This fact may indicate that risk preference judgment is not simply ordered for respondents. The estimation model, multinomial probit model, is written in as follows,

$$probit(risk_i = j) = \frac{e^{\beta_j \exp lanatory\_variable_i}}{\sum_{k=1}^{5} e^{\beta_k \exp lanatory\_variable_i}}, \quad j = 1,2,\ldots,5. \qquad (26)$$

## 3. EMPIRICAL ANALYSIS

The first focus of empirical analysis is to prove the theoretical framework of financial risk behavior modeled in the last section. And the second focus is to prove the medium risk preference households are the main player of stock market in Japan as Gomes and Michaelides(2005) predicts. The other critical points are shown in each sub-section.

Concerning to the first focus, it must be noticed in what degree inherent nature of respondents' risk preference, invariant nature such as sex, transitory nature such as age and risk invoking environment such as having dependent children and bearing house loan affect the choice and the demand of risk asset. There are other two critical explanatory variables: information and education. Although there are other risk factors which are not picked up in this survey or which this analysis fails to include, the model assumes that some of the effect of remained variables may be picked up by the risk preference parameters.

On the analysis of the second focus, certification of the moderate risk-averse player assumption, it must be noticed that each respondent's risk preference level is judged based on their responses on the financial behavioral questions. They are scored from 1 to 5. Households judging themselves as risk-averse are labeled 1 and who judge not risk-averse are labeled 5. As well, households judging themselves as risk-love are labeled 1 and who judge not risk-love are labeled 5.

See Table 1-1 additional notes, laid after attached table, of sample respondents' profile.

There are other noticeable points concerning to the first and the second focus. The past studies of Gomes and Michaelides(2005) and as well Shiraishi and Mastuura(202) et al suggest the possibility of the independency of risk asset ratio from the amount of financial assets as well as the level of income. Then, the income may explain the stockholding amount but it can not explain risk asset ratio. Further, if individuals try to keep their risk level constant based on their risk preference level, individuals facing the risk invoking environments may reduce their risk asset ratio. Then, if the risk asset ratio is inherent to each household, both inferences are contradictory.

### 3.1 Financial and Risk Preference Profile of Stockholders and Non Stockholders

Descriptive statistics on the financial profile of stockholders and non stockholders are in Table 1-2. Both stockholders and non stockholders are classified to three brackets: upper, middle and lower. Stockholders are classified by the total value of stockholding, stock asset ratio and the sum of stockholding and saving. Non stockholders are classified only by their total value of risk free saving. The data indicates that stockholders are having rather higher incomes, elder and less risk-averse on average than those of non stockholders. By focusing on the stockholders data, it is found that stockholders whose total stock values are within upper one third have more than 3.5 times financial asset, sum of stocks and risk free saving than those in the lower one third on average. However, on to the stock asset ratio, stockholders whose stock asset ratios are classified in the lower one third have more financial assets than those whose stock asset ratios are in the upper one third as well as in the medium. It seems that households who have the most financial assets are not the ones facing the highest financial risk. It is notable that stockholders whose financial assets are in the upper one third have the lowest stock asset share among three brackets. These findings may indicate that elders have more stocks and financial assets and still they are not the highest financial risk holder compared to their holding financial asset value. And the additional notable point is that in all of three classified categories, stockholders in the upper one third are the most risk lovers yet the scores of risk preference judgments are still at around 3. That means they are neither risk-averse nor risk-love. Concerning to the average age, stockholders in the upper one third are eldest in two out of three categories. Then, goes on to the non-stockholders data, it is noticeable that the most risk-averse households in the four classified categories get more income, save more than comparatively more risk-love non-stockholders and are the eldest. These descriptive statistical data do not deny the stock market analysis of Gomes and Michaelides(2005) that the risk preference level of stock market participants becomes moderate. Still, it is noticeable that the most risk-love households and the most risk-averse households have more financial assets than others.

Graph 1 shows the distribution of households risk preference. The data includes gamble preference data which is only surveyed in the year from 2001 to 2004. The data shows that there are more risk-averse households than risk-love households; females are more risk averse than men; and the difference of sex is more evident on gamble preference.

### 3.2 Who Save And Hold Stocks More?

The theoretical model employed here is in equation (25) and the estimation results are in Table 2-1 and 2-2. Since the marginal effect of – 2 of the explanatory variable of risk-averse means that one step move to not risk-averse direction would decrease the amount of saving by 200,000 yen (= $-2 \times 100{,}000$). That means risk-averse household saves more than not risk-averse household. Similarly, score 1 of financial information gathering indicates that the respondent is actively gathering financial information from media, the estimated marginal effect of – 10 for risk-free saving means that the 1 step deterioration on the financial information gathering behavior would reduce the amount of saving by 1000,000 yen ($-10 \times 100{,}000$).

Concerning to the explanatory variable $risk_i$, which represents inherent nature on risk and holding risk environment, the included variables are two risk preference variables, allowance dependents variables showing the number of dependent children and parents living together, debt variables shown as housing loans remain and loan repayment, loans on deeds and demands of money after retirement variable shown as after retirement yearly living expense and the money for descendants variable shown as leave money for children, and market-price-vulnerable asset holding variable which is type of living (注8) in concrete. Concerning to the explanatory variable $x_i$, which represents household invariant and transitory status, the included variables are age, employment and status dummy variables representing education at university, sex and marriage. Both retired and unemployed individuals are included in the employment status variable shown as working. Concerning to the explanatory variable $y_i$, which represents household's yearly income, the included variables are either of the two sets of income variables; ordinary gross income and gross extra income, inferred dispensable income (注9) and inferred after tax extra income (注10). Further, household financial information gathering variable is included as additional explanatory variable. This variable should be included in either $risk_i$ or $x_i$ since it may affect risk preference as well as transitory status of financial knowledge. The remained explanatory variables, set time dummy variables, are from the date 2001 to 2005. The results of table 2-1 and 2-2 estimation are conducted by OLS.

Obtained results are generally as expected in that most of the explanation variables are statistically significant and the coefficient directions coincide with expectation. Income, age and the status of university graduate show positive coefficient direction. Allowance dependents variables and debt variables show minus sign. The demands of money after retirement variable show plus sign and the money for descendant variable show minus sign. These results are consistent in both cases: non stockholders and stockholders, risk free saving and the sum of saving and stock.

In details, firstly, it should be noted that the size of the coefficient of extra income is three to four times larger than that of ordinary income. The result coincides with permanent income hypothesis and related empirical studies (注11). Concerning to the risk preference judgment on saving, non-stockholders' risk-averse judgment coefficient is estimated as -2.23 and its' statistical significance is 1% and stockholders' risk preference coefficients are not statistically

significant even at 10%. On the other hand, on the sum of the risk free saving and the stock amount, stockholders' risk-averse judgment coefficient is estimated as 2.11 and its' statistical significance is 5%. These results stand out the difference of financial behavior between non-stockholders and stock holders. In all respondent case, risk-love judgment coefficient is -1.622 at 10% significance in the case of risk free saving and it is -5.985 at 1% significance on the sum of saving and the stock amount. These results may indicate that risk-love households save more on average and the amount by holding stock whereby comparatively more risk-averse households have more risk free saving on average.

Thirdly, there are some consistent but controversial estimation. Ordinary gross income coefficient of sum of saving and stock is positive and at 1 % significance but the size is more than 10 times larger than that of extra income. Female dummy variable is consistently plus and it can be understood that the married female including widows replies household financial asset. Single status variable shows consistent plus sign and this fact may reinforce the positive sign of female dummy.

### 3.3 The Determinants of Stockholding, Stock Amount and Stock Asset Ratio

In this section, using tobit, truncated LL and sample selection analysis, the focus is estimating the demand of risk asset, namely stock, by amount and by risk asset ratio as well as finding the relationship between the motivation of holding stock and the size of demand. The results are in table 3-1, 3-2, 3-3 and 3-4.

Firstly, referring to the overall findings, from both of the analysis, tobit and sample selection(注12), on amount and on ratio, it turned out that most of the statistically significant variables are duplicated; sample selection analysis is adopted to discern the difference. Further, coefficient size of probit dependent, namely, contribution weight on choice probability and the weight of the coefficient size of OLS dependent within explanatory variables turned out to be generally proportional.

Then, referring to the size and the direction of statistically significant risk preference judgments, risk-averse coefficient is estimated to be consistently positive and risk-love coefficient is consistently negative, and the size of the latter is much larger than that of the former. It is found that stockholders judging themselves as comparatively not risk-averse as well as more risk-love have more stock as well as higher risk asset ratio on average and the risk-love characteristic show more weight on the decision. This fact seems contradictory at first glance but is consistent with the descriptive data in table 1-2.

Thirdly, comparing the estimation results of this section with the ones in the former section, a very natural finding is attained that comparatively risk-averse characteristic is connected with the demand of risk-free saving and risk-love characteristic is connected with the demand of risk asset.

Fourthly, comparing the weight of coefficients, explanatory power, between the determinants of stock amount and those of stock asset ratio, it is found that age effect is outstanding in the former. On the other hand, within the latter, risk preferences, age and financial information gathering have higher weights. Further, it is found that income and debt variable weights are far smaller in the latter. This fact seems suggesting that the demand of risk asset ratio is rather on the side of the inherent nature adhered to each

individual and thus the effect of environmental factors and income-earning ability become comparatively small.

Lastly, referring to the other noticeable as well as consistent results, the type of living variable again shows negative coefficients indicating that holding one's own house is not regarded as or actually not counted in the size of risk asset in Japan.

### 3.4 Pseudo Panel Static and Dynamic Analysis

Pseudo panel static and dynamic analysis is employed to check whether it can raise the explanatory power of the model. The estimation model of the former is equation (25) and the latter is equation (24), （15）and（19）theoretically. Since original NEEDS-RADAR survey is not a panel data, it would be necessary to explain data construction. To simulate the actual panel data, this paper makes the order of respondents as ID after sorting each year's data by sex, education, marriage and age in this order and organized to be nearly full balanced data in the meaning that each year compose the same number of responses which coincides in sex, education and marriage; unfortunately age profile is rather different. Let this paper labels pseudo panel plain OLS analysis using this data set and ID as ID order.

Secondly, by grouping this data set by age in each year, construct the age representative household, namely individual means by age, to find how much the representative model can raise or degenerate explanatory power of the model. Let this paper labels pseudo panel plain OLS analysis using this data set and ID as ID age analysis. Similarly, by grouping the data set by age group, 10-year interval groups ranging from less than 27 years to older than 68 years old and matching ages after adjusting the difference of survey date（注１３）, construct the generation representative household, namely individual means by generation. Let this paper labels pseudo panel plain OLS analysis using this data set and ID as ID generation analysis.

The results are in table 4-1. After comparing statistical significance, consistency of each variable, especially proportional size of coefficient, with those of cross section analyses, unfortunately it turned out that ID age analysis degenerate explanatory power of each variable though adjusted R-square shows some improvement. The result of ID generation analysis turned out to be worse. Hence, the data set for pseudo panel dynamic analysis use ID order to construct lag variables.

In this analysis, instrumental variables' method is adopted. Status variables, dependent allowance variables and debt variables are dropped from the explanatory variables and make these variables instrumental variables. Further, estimation is conducted by grouping the same ID order from 1997 to 2005, namely individual means by ID order.

The rationality of this change is as follows. Cross section analyses suggest that risk asset ratio is rather inherent and the explanatory power of risk-averse, risk-love, age and financial information gathering behavior on risk asset ratio is outstanding. Then, it means that the adjustment of asset allocation from time $t$ to $t+1$, namely $\delta$ asset, may be dominated by income and by those four variables. The result is in table 4-3 and 4-4.

Comments are as follows. Firstly, comparing the result of dynamic analysis with that of static and cross section analyses, it is found that the proportional size of risk-averse coefficient become larger and the direction of the risk-love coefficient changes from

minus to plus. This change does not coincide with the descriptive statistic in table 1-2 suggesting comparatively not risk-averse as well as more risk-love households tend to have more stock amount than other stockholders. However, this result can be understood that by composing lag dependent variable, starting point of stock demand changes from zero to the average. There is one more noticeable and unexpected result. Coefficient size and proportional weight of explanatory variables appear to be extremely resembled. This is mystery. One possibility is that in both cases, adjustment of demand of stock asset is dominated by the demand of risk asset ratio.

### 3.5 The Relation Between The Risk Preference And The Explanatory Variables Of Financial Assets

The estimation model is equation (26). The results are in Table 5-1 and 5-2 on risk-averse attitudes of non-stockholders and stockholders respectively, and in Table 5-3 and 5-4 on risk love attitudes of non-stockholders and stockholders respectively.

The overall findings are that variant and invariant status and financial information gathering behavior seem endogenously affecting the respondents' risk preference judgment. This indication seems stronger on risk-averse judgment. Further, it turned out that debt variables such as the amount of housing loan remain seem rather independent from the risk preference judgment.

Limiting the argument on the relation between risk preference judgment and age, the analysis indicates that non stockholders seem becoming risk-averse as well as risk-love by aging. On the other hand, aging effect on stockholders' risk preference seems very much limited.

Further, on the difference between risk-averse judgment and risk-love judgment, it seems that compared to the results of risk-averse judgment, the effect of status on risk-love judgment seems weak and limited. On the other hand, the number of dependent children becomes significant on risk-love judgment.

The last notable point is that information gathering behavior, which is assumed to be linked to the level of financial information and knowledge, and university graduate status, namely higher education, seem affecting stockholders and non stockholders differently. Comparing the transition of the size and direction of the former on risk-averse judgment, it changes (0.022, -0.034, -0.042, -0.017, and 0.071) from the left to the right for non stockholders and the change for stockholders' is (0.058, 0.005, -0.024, -0.022, -0.017); the change is generally minus to plus for non stockholders and plus to minus for stockholders. If it is, then, non stockholders' statistical distribution of risk-averse judgment diverts and splits into two direction by financial information gathering; some to more risk-averse and some to not risk-averse. On the hand, statistical distribution of stockholders' risk-averse judgment centralizes by financial information gathering. Further on the effect of education, education is not significantly affecting the risk-averse judgment of stockholders. However, statistically on this papers' analysis, education seems affecting the risk-averse judgment of non stockholders. Concerning to the risk-love judgment, the results may suggest that some of the stockholders and non stockholders becomes not risk love if anything by university education. The last notable point is that stockholders risk-love judgment seems endogenously affected by their frequency of stock trading; the more they trade, the more they judge themselves as

risk-lover.

## 4. CONCLUSION

Overall analysis indicates that households gradually allocate their financial asset to risk asset in accordance with the increase of their income and financial asset accumulation. This finding just coincides with the past studies. However, it turned out that there seems to exist two types of households in the financial market. A kind of households who are comparatively less risk-averse move toward risk love by aging, thus they keep more stock amount in accordance with the increase of their income and financial asset accumulation.

However, comparatively more risk-averse households move toward more risk-averse by aging and by gathering financial information. Hence, the size of stock market participants is rather constrained. Still, the participants of stock market in Japan are subjectively as well as objectively moderate risk-averse, since even comparatively risk-love households judge their risk preference level neither risk averse nor risk love. It can be said that the constraint of participants and the seniority based Japanese wage system may be the two main backgrounds of comparatively lower rate of stock market participation. Still, the results do not deny the possibility that average Japanese hold risks other than financial assets.

There is a notable fact in sample respondents' profile that stock market participants are mostly middle to upper income household. The lower income households seem not participating in stock market. Hence there is a possibility that risk asset ratio seems independent from the amount of financial assets because of the characteristic of limited participants; lower income households tend to be risk-averse and do not participate in stock market.

On concerning to risk preference, the determinants of risk behavior seem global. However, more than half sample respondents judge their risk preference risk-averse if anything at least and nearly three out of four judges themselves at least neither sides. The improvement of financial knowledge and the growth of university graduates may increase market participants; still population aging seems promoting some of the risk-averse households more risk-averse. It is obvious that the effects of aging do not work in one direction.

Recently the amount of investment trust is increasing dramatically and it may appeal to the moderate risk-averse households. Still, it is evident that continuous survey on households' risk factors is critical to predict their financial risk behavior.

Lastly, the independency of financial risk asset ratio from the amount of financial asset and income as well as the dependency to households are still on going controversy.

APPENDIX 1.

The NEEDS-RADAR survey is conducted by one of the largest newspaper company, Nihon Keizai Shimbun, Inc. This survey started from 1983 to understand households' financial needs and their actual financial behaviors.

Survey Dates: November

Survey Area: Within a radius of 40km from Tokyo Station

Respondents: Two Step Random Sampling of 4500, men and women, aged from 25 to 74 years old

Sampling Method: Distribution and collection method using questionnaire

Average Response Rate: 57%

Notes: This survey is conducted annually but this is not a panel data

APPENDIX 2.

Assume all the households are confronting the same financial markets, risk premium and risk free interest rate, budget constraints, and are holding homogeneous portfolios. Let households' assets at the start of time $t$ as $\omega_t$, risk asset ratio as $\theta_t$, return of risk free assets as $rf_t$, and expected risk premium of risk assets as $\pi_t$, and variance of the latter as $\sigma_t^2$. Then, the asset at the start of time $t+1$ can be shown as

$$\omega_{t+1} = \left[1 + rf_t + \theta_t \pi_t + (\theta_t \sigma_t \Phi(t))^{-1/2}\right]\omega_t \qquad \text{AP（1）}$$

where $\Phi(t)$ is normally distributed stochastic variable. Then, households' maximize expected utility under this budget constraint. Using Taylor expansion and dropping the third and higher order terms, following expected utility function can be drawn.

$$E[u(\omega_{t+1})] \cong u(\omega_t) + u'(\omega_t)\omega_t(rf_t + \theta_t \pi_t) + 1/2u''(\omega_t)\omega_t^2\theta_t^2\sigma_t^2 \qquad \text{AP（2）}$$

Differentiating above equation by $\theta$, following equation can be drawn from the first order condition,

$$u'(\omega_t)\pi_t + u''(\omega_t)\omega_t\theta_t\sigma_t^2 = 0 \qquad \text{AP（3）}$$

By adjusting this equation, equation (2) and (3) can be drawn.

APPENDIX 3.

The relationship between the adjustment process based on permanent income hypothesis and the Euler equation is as follows.

The relationship between the expected amount of financial asset at the start of time $t+1$ and the amount at the start of time $t$ are assumed to satisfy the following equation.

$$u'(E(\omega_{it+1}))\xi_i(1 + E(r_t)) = u'(\omega_{it}) \qquad \text{AP（4）}$$

where $E(\omega_{it+1})$ is household $i's$ expected amount of financial asset at the start of time $t+1$, $\xi_i$ is the subjective discount and $E(r_t)$ is the expected return based on the weighted average of the expected return of risk free and risk asset. The realized asset at time $t+1$ is shown as $\omega_{t+1}$ and the difference between the expected asset and the realized asset is caused by the stochastic part of the return of risk asset.

Then in this paper's model, the partial adjustment process, $\omega_{t+1} - \omega_t$, is independent from the stochastic part of the return of risk asset, namely $\theta_{it}(y_{it} - c_{it}) + \varepsilon_{it}$ and $c_{it} = r_t W_i$. Though the permanent income is influenced by the expected return of the weighted average of risk free and risk asset and it is shown as $E(r_t)W_i$. $W_i$ is theoretically defined as household $i$'s sum of the non humanitarian asset and the present value of the future income. Further, household $i$'s inherent relative risk aversion determined by $\gamma_i$ influences the realized asset at time $t+1$, the risk asset ratio and the demand of desirable asset.

Table 1-1. Discriptive Statistic: Profile of Sample Respondents （2003 and 1999 - 2005）

| | 2003 | | | 1999 - 2005 | | |
|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total |
| Number of Respondents †1 | 1041 | 1072 | 2113 | 7287 | 7504 | 14791 |
| Ave. Age | 48.7 | 47.1 | 47.9 | 49.1 | 45.8 | 47.4 |
| % College and University Graduate | 56.4 | 45.4 | 50.8 | 56.4 | 45.4 | 50.8 |
| % Working †2 | 82.7 | 57.5 | 70.1 | 85.2 | 56.0 | 70.4 |
| % Who Have Stock | 27.8 | 22.3 | 25.1 | 28.5 | 21.7 | 25.0 |
| Ave. Total Stock Value †3 | 16.0 | 10.2 | 13.1 | 17.8 | 10.0 | 13.9 |
| Ave. Households' Income †3 | 65.6 | 63.7 | 64.7 | 70.1 | 65.3 | 67.5 |
| Ave. Households' Financial Assets †3 | 109.4 | 98.8 | 104.1 | 113.8 | 97.5 | 105.5 |
| Ave. Financial Information †4 | 3.6 | 3.7 | 3.7 | 3.6 | 3.7 | 3.7 |
| Ave. Risk Averse Self-Judgment †4 | 2.6 | 2.3 | 2.4 | 2.6 | 2.3 | 2.4 |
| Ave. Risk Love Self-Judgment †4 | 3.8 | 4.0 | 3.9 | 3.7 | 3.9 | 3.8 |
| Ave. Gamble Preference-Judgment †4 | 3.9 | 4.5 | 4.2 | 3.8 | 4.5 | 4.2 |

Notes:

1. See additional notes on †1 ～ †4.
2. In Japan, it is legally and customary difficult to separate married couples' assets. Hence, the response of married female on her financial assets is regarded as household's total financial assets.
3. 1997 to 2005 data is used for the pseudo panel dynamic analysis.
4. Survey period of Gamble Preference-Judgment is from 2001 to 2004.

Attached Table: The Number of Respondent Sample Each Year（1999 - 2005）

| | Male | | Female | | Total |
|---|---|---|---|---|---|
| | Single | Married | Single | Married | |
| Junior and High School Graduates | 61 | 393 | 47 | 538 | 1039 |
| College and University Graduates | 90 | 497 | 90 | 397 | 1074 |
| Total | 151 | 890 | 137 | 935 | 2113 |

Notes: Analyzed respondents' sample data is randomly picked up from the unbalanced original data to organize even number of responses on sex, marriage and education. The original data composes 2500 to 2900 samples for each surveyed year.

Additional Notes on Table 1-1:

†1 Samples used for analysis are randomly chosen to construct balance data concerning to sex, education and marriage although the data is not completely balanced for sex. Further Needs Radar survey is conducted in Tokyo, hence the percentage of two year college and university graduates are thought to be

higher than that of overall Japanese average.

†2 Both of the respondents who are after retirement and are not employed are categorized as non working individuals.

†3 Unit is 100,000yen.

Income in this table is gross annual earning including bonus and expense for tax and social security but do not include extra income.

Financial asset is the sum of the value of stocks and risk free saving. Risk free saving includes investment trust for convenience. The percentage of the amount of investment trust over risk free saving is about 2.0%( =3.05/(208-55.4) ) for stockholder and 4.3%(=3.05/71.4) for non-stockholder per person in the data. That is the average of during the survey year of 1999 t0 2005.

†4 Answers and Equivalent Scores on All of the Following Questions(Q1 –Q4) are as follows:

Yes= 1, Yes if anything =2, Neither =3, No if anything =4, No= 5

Q1. Are you actively gathering financial information from media?

(Respondents' financial risk attitude is judged by the reply on the following two questions).

Q2. Are you a kind of a person who do not save or invest if there is even a bit of a chance of losing money even if there is a chance of high return? Respondents who reply "YES" is judged as "Risk Averse" and "NO" as "Not Risk Averse" on their financial behavior.

( Original Japanese question: 少しでも元本割れの可能性があれば、たとえ高収益が期待できるとしても預け入れ・投資を考えないほうである)

Q3. Are you a kind of a person who prefers high return financial products and/or services even if there is some chance of a risk of losing money. Respondents who reply "YES" is judged as "Risk Love" and "NO" as "Not Risk Love" on their financial behavior.

(Original Japanese question: 多少のリスクがあっても、収益性の高い貯蓄・投資商品を利用したい)

Q4. Do you like to do gamble?

Table 1-2. Discriptive Statistic: Financial Profile of Stockhoulders and Non-Stockhoulders（1999 – 2005)）

Stockholders Data †1 (Unit: Income, Stock, Investment and Saving, 100,000 yen)

| | Preference Self-Judgment †2 | | AGE | INCOME | STOCK | Stock + Saving | Stock Share †3 |
|---|---|---|---|---|---|---|---|
| | Risk-Averse | Risk-Love | | | | | |
| Ave. Stockhoulder | 2.71 | 3.30 | 52.7 | 85.8 | 55.4 | 208.0 | 0.302 |
| Amount Upper 1/3 †4 | 2.96 | 2.99 | 57.1 | 96.5 | 135.8 | 355.4 | 0.448 |
| Amount Middle 1/3 | 2.67 | 3.36 | 51.9 | 85.3 | 23.9 | 163.0 | 0.282 |
| Amount Low 1/3 | 2.50 | 3.54 | 49.2 | 75.7 | 6.7 | 105.4 | 0.174 |
| Stock Ratio Upper 1/3 †5 | 2.93 | 3.08 | 52.5 | 87.0 | 110.1 | 191.4 | 0.608 |
| Stock Ratio Middle 1/3 | 2.71 | 3.29 | 52.5 | 86.2 | 40.3 | 180.4 | 0.230 |
| Stock Ratio Low 1/3 | 2.48 | 3.51 | 53.2 | 84.3 | 16.0 | 252.1 | 0.068 |
| Stock + Saving Upper 1/3 †6 | 2.81 | 3.12 | 58.7 | 98.9 | 117.6 | 447.6 | 0.268 |
| Stock + Saving Middle 1/3 | 2.69 | 3.33 | 52.8 | 83.7 | 35.6 | 135.6 | 0.277 |
| Stock + Saving Low 1/3 | 2.61 | 3.44 | 46.6 | 75.6 | 13.2 | 41.1 | 0.363 |

Notes

†1 Total 3702 response

†2 Risk-averse(Yes:1 ⇔ No: 5) and Risk-love(Yes: 1 ⇔ No: 5) respectively.

†3 Stock/(Stock+Saving). Stock indicates the total value of holding stocks at the survey.

†4 Upper 1231 (⇔3702/3) respondents whose replay values of stocks are classified within upper 1/3 of stockholders

†5 Upper 1231 (⇔3702/3) respondents whose replay stock asset ratios are classified within upper 1/3 of stockholders

†6 Upper 1231 (⇔3702/3) respondents whose replay values of the sum of stocks and saving are classified within upper 1/3 of stockholders

Non Stockholders Data †1 (Continue Table 1-2) (Unit: 100,000 yen)

| | Ave. Risk Self-Judgment | | AGE | INCOME | Saving |
|---|---|---|---|---|---|
| | Averse | Love | | | |
| Ave. Non Stockholder | 2.35 | 3.93 | 45.7 | 61.6 | 71.4 |
| Saving. Upper 1231 †2 | 2.18 | 3.86 | 56.7 | 82.5 | 323.3 |
| Saving Upper 1/3 †3 | 2.25 | 3.91 | 51.8 | 75.3 | 173.0 |
| Saving. Middle 1/3 | 2.31 | 3.94 | 44.2 | 61.0 | 34.2 |
| Saving Low 1/3 | 2.49 | 3.95 | 41.2 | 48.5 | 7.0 |

†1 Total 11089 response

†2 To compare data with upper 1/3 of stockholders

†3 Upper 3696(⇔11089／3) respondents whose replay values of total saving are within upper 1/3 of non-stockholders

Graph 1. Descriptive Statistic on Respondents' Risk Preference

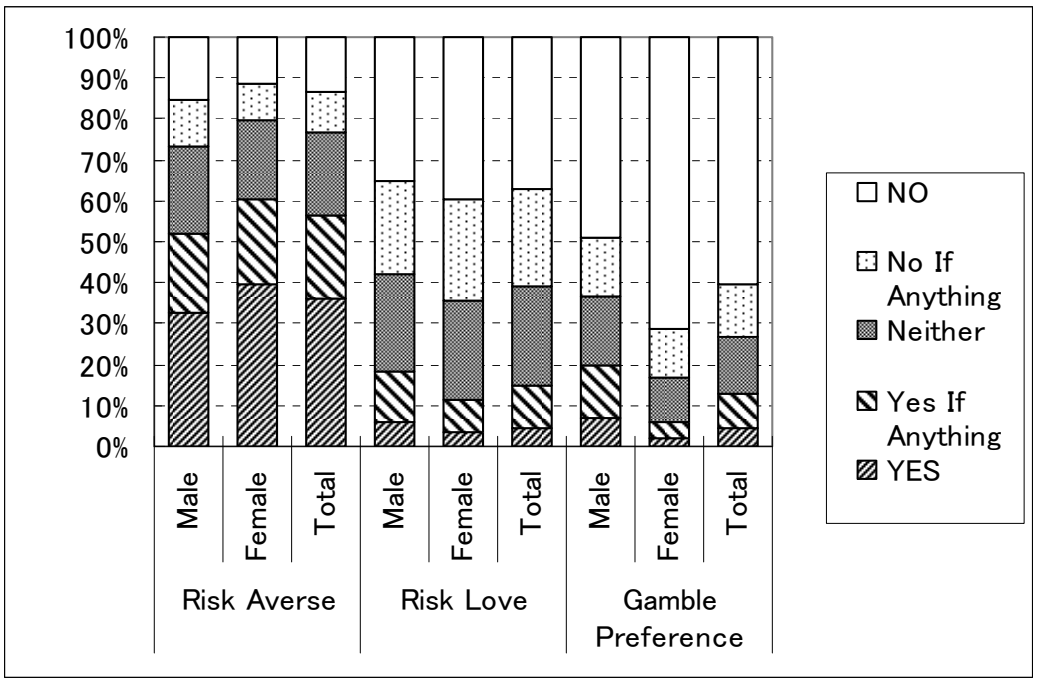

Table 2-1. Determinants of Risk Free Saving (OLS)

| Independents (Unit: 100,000) | Full Data | | | Non-Stockholders | | | Stockholders | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | t-value | Sig. | Coef. | t-value | Sig. | Coef. | t-value | Sig. |
| Intercept | -82.050 | -8.66 | *** | -62.620 | -6.88 | *** | -167.710 | -6.04 | *** |
| Ordinary Gross Income (Unit: 100,000yen) | 0.113 | 29.96 | *** | 0.100 | 25.87 | *** | 0.110 | 12.82 | *** |
| Extra or Temporary income (Unit: 100,000yen) | 0.419 | 24.90 | *** | 0.530 | 24.86 | *** | 0.290 | 9.54 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | -1.218 | -1.57 | | -2.230 | -3.00 | *** | 2.370 | 1.04 | |
| Risk Love (Yes: 1 ⇔ No: 5) | -1.622 | -1.63 | * | -1.530 | -1.55 | | 2.280 | 0.85 | |
| University_Dummy | 15.275 | 6.89 | *** | 13.270 | 6.12 | *** | 15.190 | 2.53 | *** |
| Female_Dummy | 5.069 | 2.24 | ** | 0.660 | 0.30 | | 23.620 | 3.77 | *** |
| Single_Dummy | 15.297 | 3.93 | *** | 11.200 | 3.07 | *** | 21.120 | 1.68 | * |
| Age | 2.912 | 27.09 | *** | 2.310 | 22.24 | *** | 4.440 | 14.03 | *** |
| Retired or Jobless Dummy | 22.041 | 8.63 | *** | 20.580 | 8.16 | *** | 16.240 | 2.45 | *** |
| Dependent Parents (Number) | -2.474 | -0.83 | | -3.010 | -1.05 | | 4.460 | 0.56 | |
| Dependent Children (Number) | -11.464 | -9.33 | *** | -10.950 | -9.18 | *** | -9.810 | -2.93 | *** |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -9.801 | -11.23 | *** | -6.950 | -7.75 | *** | -11.170 | -5.01 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -1.909 | -2.99 | *** | -2.400 | -3.99 | *** | 2.650 | 1.36 | |
| Housing Loans Remain (Unit: 100,000yen) | -1.067 | -12.35 | *** | -0.900 | -10.18 | *** | -1.360 | -6.03 | *** |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.239 | -5.02 | *** | -0.200 | -4.66 | *** | -0.310 | -1.86 | * |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | -0.131 | -4.28 | *** | -0.130 | -3.88 | *** | -0.120 | -1.81 | * |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.233 | 4.69 | *** | 0.130 | 2.75 | *** | 0.600 | 4.13 | *** |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | -6.670 | -7.76 | *** | -4.560 | -5.42 | *** | -11.480 | -5.03 | *** |
| D2005 | -10.234 | -2.83 | *** | -1.280 | -0.36 | | -38.470 | -4.01 | *** |
| D2004 | 7.611 | 2.10 | ** | 4.050 | 1.15 | | 18.580 | 1.92 | ** |
| D2003 | 1.933 | 0.54 | | 4.650 | 1.32 | | -7.920 | -0.83 | |
| D2002 | 9.878 | 2.75 | *** | 7.560 | 2.16 | ** | 16.050 | 1.67 | * |
| D2001 | 3.785 | 1.05 | | 4.370 | 1.25 | | 1.860 | 0.19 | |
| | NOBs: 12097 | | | NOBs: 9022 | | | NOBs: 3075 | | |
| | F-value = 219.1*** | | | F-value =146.8*** | | | F(zero slopes)=43.7*** | | |
| | Adj. R-sq. =0.2931 | | | Adjusted R-sq. =0.2709 | | | Adjusted R-sq. =0.2709 | | |
| | B.I.C = 74515.9 | | | B.I.C = 54052.5 | | | B.I.C = 19876.5 | | |
| | LL= -74403.1 | | | LL = -53943.2 | | | LL = -19780.1 | | |

Notes: For each explanation variable, 1%, 5% and 10% level of statistical significance is shown by ***, ** and * respectively.

Table 2-2. Determinants of Sum of Stock and Risk Free Saving (OLS)

| Independents (Unit: 100,000) | Full Data | | | Stockholders | | |
|---|---|---|---|---|---|---|
| | Coef. | t-value | Sig. | Coef. | t-value | Sig. |
| Intercept | -89.702 | -8.50 | *** | -186.338 | -5.81 | *** |
| Ordinary Gross Income (Unit: 100,000yen) | 0.140 | 33.27 | *** | 1.090 | 16.50 | *** |
| Extra or Temporary income (Unit: 100,000yen) | 0.520 | 27.77 | *** | 0.064 | 11.22 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | 0.889 | 1.03 | | 5.596 | 2.11 | ** |
| Risk Love (Yes: 1 ⇔ No: 5) | -5.985 | -5.41 | *** | -4.271 | -1.37 | |
| University_Dummy | 19.229 | 7.79 | *** | 20.819 | 2.98 | *** |
| Female_Dummy | 1.870 | 0.74 | | 17.560 | 2.40 | ** |
| Single_Dummy | 22.236 | 5.13 | *** | 30.915 | 2.12 | ** |
| Age | 3.524 | 29.43 | *** | 5.876 | 15.90 | *** |
| Retired or Jobless Dummy Working | 30.544 | 10.74 | *** | 32.993 | 4.28 | *** |
| Dependent Parents (Number) | -1.599 | -0.48 | | 16.742 | 1.80 | * |
| Dependent Children (Number) | -13.609 | -9.94 | *** | -12.634 | -3.25 | *** |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -15.063 | -15.49 | *** | -17.404 | -6.70 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -2.361 | -3.32 | *** | 2.313 | 1.02 | |
| Housing Loans Remain (Unit: 100,000yen) | -1.188 | -12.35 | *** | -1.504 | -5.74 | *** |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.283 | -5.33 | *** | -0.368 | -1.89 | * |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | -0.129 | -3.81 | *** | -0.127 | -1.68 | * |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.303 | 5.47 | *** | 0.844 | 5.03 | *** |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | -8.486 | -8.86 | *** | -17.251 | -6.49 | *** |
| D2005 | -3.333 | -0.83 | | -26.405 | -2.36 | ** |
| D2004 | 8.379 | 2.08 | ** | 16.091 | 1.43 | |
| D2003 | 2.356 | 0.59 | | -12.104 | -1.08 | |
| D2002 | 8.617 | 2.16 | ** | 6.036 | 0.54 | |
| D2001 | 2.697 | 0.68 | | -2.812 | -0.25 | |
| | NOBs: 12053 | | | NOBs: 3063 | | |
| | F-value = 279.6*** | | | F-value = 62.4.6*** | | |
| | Adj. R-sq. =0.3471 | | | Adj. R-sq. =0.3155 | | |
| | B.I.C = 75517.6 | | | B.I.C = 20264.3 | | |
| | LL= -75404.9 | | | LL= -20167.9 | | |

Notes: For each explanation variable, 1%, 5% and 10% level of statistical significance is shown by ***, ** and * respectively.

Table 3-1. Determinants of Stock Amount (Tobit Analysis and Truncated Data Log Likelyhood Analysis)

| Dependent (Unit: 100,000) | Tobit | | | | Log Likelyhood | | |
|---|---|---|---|---|---|---|---|
| | Full Data | | | dP/dX | Truncated Data | | |
| Independents | Coef. | t-value | sig. | 1 | Coef. | t-value | sig. |
| Intercept | -186.374 | -14.84 | *** | -0.434 | 14.249 | 5856.60 | *** |
| Ordinary Gross Income (Unit: 100,000yen) | 0.086 | 19.91 | *** | 0.000 | 0.007 | 13141.50 | *** |
| Extra or Temporary income (Unit: 100,000yen) | 0.189 | 11.20 | *** | 0.000 | 0.029 | 15638.60 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | 6.663 | 6.60 | *** | 0.016 | 1.784 | 9344.11 | *** |
| Risk Love (Yes: 1 ⇔ No: 5) | -15.425 | -12.51 | *** | -0.036 | -2.286 | -10088.10 | *** |
| University_Dummy | 25.404 | 8.93 | *** | 0.059 | 3.427 | 6815.10 | *** |
| Female_Dummy | -3.879 | -1.33 | | -0.009 | -2.325 | -4119.14 | *** |
| Single_Dummy | 7.094 | 1.29 | | 0.017 | -1.354 | -1033.24 | *** |
| Age | 2.623 | 18.09 | *** | 0.006 | 0.535 | 17993.60 | *** |
| Retired or Jobless Dummy | 25.677 | 8.08 | *** | 0.060 | 7.126 | 12954.70 | *** |
| Dependent Parents (Number) | -1.062 | -0.29 | | -0.002 | 4.850 | 8015.54 | *** |
| Dependent Children (Number) | -4.675 | -2.96 | *** | -0.011 | -2.009 | -6105.85 | *** |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -22.552 | -20.99 | *** | -0.053 | -2.275 | -11144.10 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -2.654 | -3.02 | *** | -0.006 | -0.329 | -1267.28 | *** |
| Housing Loans Remain (Unit: 100,000yen) | -0.060 | -0.56 | | 0.000 | 0.017 | 1105.66 | *** |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.169 | -2.36 | ** | 0.000 | -0.063 | -4896.16 | *** |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | -0.019 | -0.55 | | 0.000 | -0.003 | -572.87 | *** |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.132 | 2.07 | ** | 0.000 | -0.052 | -5029.29 | *** |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | -1.101 | -1.02 | | -0.003 | -1.146 | -6066.86 | *** |
| D2005 | 15.468 | 3.40 | *** | 0.036 | -6.234 | -7943.46 | *** |
| D2004 | 5.351 | 1.16 | | 0.012 | -6.773 | -7718.63 | *** |
| D2003 | 4.822 | 1.05 | | 0.011 | -5.905 | -6727.71 | *** |
| D2002 | 4.173 | 0.91 | | 0.010 | -9.711 | -10411.90 | *** |
| D2001 | -0.299 | -0.07 | | -0.001 | -7.687 | -8838.84 | *** |
| SIGMA | 102.184 | 73.590 | [.000] | | 1.040 | 579423 | [.000] |
| Log-likelihood | | -75404.9 | | | | -10996800 | |
| Schwarz | | 75517.6 | | | | 10996900 | |

Full Data: NOBs=12097(Positive 3075)、Truncated Data: NOBs＝3075

Notes: Determinants are selected by LM and LR test.

Table 3-2. Determinants of Stock Asset Ratio (Tobit Analysis and Truncated Data Log Likelyhood Analysis)

| Dependent (Unit: ×100 = %) | Tobit | | | | Log Likelyhood | | |
|---|---|---|---|---|---|---|---|
| | Full Data | | | dP/dX | Truncated Data | | |
| Independents | Coef. | t-value | sig. | 1 | Coef. | t-value | sig. |
| Intercept | -0.601 | -11.47 | *** | -0.362 | 0.437 | 2.32 | ** |
| Ordinary Gross Income (Unit: 100,000yen) | 0.000 | 15.03 | *** | 0.000 | 0.000 | -0.68 | |
| Extra or Temporary income (Unit: 100,000yen) | 0.000 | 6.23 | *** | 0.000 | 0.000 | -1.35 | |
| Risk Averse (Yes: 1 ⇔ No: 5) | 0.027 | 6.41 | *** | 0.016 | 0.016 | 1.10 | |
| Risk Love (Yes: 1 ⇔ No: 5) | -0.064 | -12.36 | *** | -0.039 | -0.008 | -0.44 | |
| University_Dummy | 0.104 | 8.72 | *** | 0.063 | -0.053 | -1.30 | |
| Female_Dummy | -0.021 | -1.69 | * | -0.012 | -0.132 | -2.91 | *** |
| Single_Dummy | 0.006 | 0.27 | | 0.004 | 0.149 | 1.91 | * |
| Age | 0.009 | 14.23 | *** | 0.005 | -0.002 | -0.75 | |
| Retired or Jobless Dummy | 0.091 | 6.81 | *** | 0.055 | 0.089 | 1.95 | ** |
| Dependent Parents (Number) | -0.025 | -1.60 | * | -0.015 | 0.034 | 0.68 | |
| Dependent Children (Number) | -0.006 | -0.90 | | -0.004 | 0.025 | 1.16 | |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -0.089 | -19.73 | *** | -0.054 | 0.025 | 1.69 | * |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -0.014 | -3.91 | *** | -0.009 | -0.032 | -2.20 | ** |
| Housing Loans Remain (Unit: 100,000yen) | 0.001 | 2.11 | ** | 0.001 | 0.002 | 1.78 | * |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.001 | -1.87 | * | 0.000 | 0.000 | 0.31 | |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | 0.000 | 0.14 | | 0.000 | 0.000 | 0.67 | |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.000 | 0.04 | | 0.000 | 0.001 | 1.59 | |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | 0.011 | 2.33 | ** | 0.006 | -0.002 | -0.11 | |
| D2005 | 0.072 | 3.77 | *** | 0.043 | -0.116 | -2.28 | ** |
| D2004 | 0.013 | 0.66 | | 0.008 | -0.039 | -0.81 | |
| D2003 | 0.021 | 1.11 | | 0.013 | -0.173 | -3.17 | *** |
| D2002 | 0.011 | 0.59 | | 0.007 | -0.093 | -6.97 | *** |
| D2001 | 0.002 | 0.09 | | 0.001 | -0.016 | -1.13 | |
| SIGMA | 0.440 | 68.73 | [.000] | | 0.402 | 16.26 | [.000] |
| Log-likelihood | | -4963 | | | | -540.2 | |
| Schwarz | | 5076.8 | | | | -447.5 | |

Full Data: NOBs=12092(Positive 3070)、Truncated Data: NOBs＝1666

Notes: Determinants are selected by LM and LR test.

Table 3-3. Determinants of Stock Amount (Sample Selection Analysis)

| Dependent (Unit: 100,000) | Probit Dependent | | | dP/dX | OLS Dependent | | |
|---|---|---|---|---|---|---|---|
| Independents | Coef. | t-value | sig. | 1 | Coef. | t-value | sig. |
| Intercept | -1.828 | -15.09 | *** | -0.434 | -184.261 | -15.01 | *** |
| Ordinary Gross Income (Unit: 100,000yen) | 0.001 | 20.17 | *** | 0.000 | 0.085 | 20.17 | *** |
| Extra or Temporary income (Unit: 100,000yen) | 0.002 | 11.24 | *** | 0.000 | 0.188 | 11.24 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | 0.065 | 6.60 | *** | 0.015 | 6.608 | 6.60 | *** |
| Risk Love (Yes: 1 ⇔ No: 5) | -0.151 | -12.56 | *** | -0.036 | -15.291 | -12.56 | *** |
| University_Dummy | 0.248 | 8.94 | *** | 0.059 | 25.145 | 8.94 | *** |
| Female_Dummy | -0.038 | -1.33 | | -0.009 | -3.867 | -1.33 | |
| Single_Dummy | 0.070 | 1.31 | | 0.017 | 7.143 | 1.31 | |
| Age | 0.026 | 18.30 | *** | 0.006 | 2.603 | 18.30 | *** |
| Retired or Jobless Dummy | 0.252 | 8.09 | *** | 0.060 | 25.493 | 8.09 | *** |
| Dependent Parents (Number) | -0.010 | -0.27 | | -0.002 | -0.995 | -0.27 | |
| Dependent Children (Number) | -0.046 | -2.97 | *** | -0.011 | -4.652 | -2.97 | *** |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -0.220 | -21.39 | *** | -0.052 | -22.337 | -21.39 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -0.026 | -3.01 | *** | -0.006 | -2.625 | -3.01 | *** |
| Housing Loans Remain (Unit: 100,000yen) | -0.001 | -0.56 | | 0.000 | -0.060 | -0.56 | |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.002 | -2.36 | ** | 0.000 | -0.168 | -2.36 | ** |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | 0.000 | -0.55 | | 0.000 | -0.019 | -0.55 | |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.001 | 2.09 | ** | 0.000 | 0.132 | 2.09 | ** |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | -0.011 | -1.05 | | -0.003 | -1.132 | -1.05 | |
| D2005 | 0.142 | 3.18 | *** | 0.034 | 16.372 | 3.62 | *** |
| D2004 | 0.052 | 1.16 | | 0.012 | 5.284 | 1.16 | |
| D2003 | 0.047 | 1.05 | | 0.011 | 4.753 | 1.05 | |
| D2002 | 0.040 | 0.90 | | 0.010 | 4.072 | 0.90 | |
| D2001 | -0.003 | -0.07 | | -0.001 | -0.318 | -0.07 | |
| SIGMA | | | | | 101.359 | 0 | [1.00] |
| RHO | | | | | 1 | 0 | [1.00] |
| Log-likelihood | | | | | | -21340.3 | |
| Schwarz | | | | | | 21582.6 | |

Full Data: NOBs=12097(Positive 3075)

Notes: Determinants are selected by LM and LR test.

Table 3-4. Determinants of Stock Asset Ratio (Sample Selection Analysis)

| (Unit: ×100 = %) | Probit Dependent | | | dP/dX | OLS Dependent | | |
|---|---|---|---|---|---|---|---|
| Independents | Coef. | t-value | sig. | 1 | Coef. | t-value | sig. |
| Intercept | -1.386 | -10.35 | *** | -0.367 | -0.576 | -9.36 | *** |
| Ordinary Gross Income (Unit: 100,000yen) | 0.001 | 14.62 | *** | 0.000 | 0.000 | 14.10 | *** |
| Extra or Temporary income (Unit: 100,000yen) | 0.001 | 5.80 | *** | 0.000 | 0.000 | 5.77 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | 0.061 | 5.75 | *** | 0.016 | 0.027 | 5.36 | *** |
| Risk Love (Yes: 1 ⇔ No: 5) | -0.146 | -11.18 | *** | -0.039 | -0.062 | -10.59 | *** |
| University_Dummy | 0.236 | 8.12 | *** | 0.062 | 0.104 | 8.04 | *** |
| Female_Dummy | -0.046 | -1.42 | | -0.012 | -0.021 | -1.38 | |
| Single_Dummy | 0.022 | 0.40 | | 0.006 | 0.004 | 0.16 | |
| Age | 0.020 | 13.31 | *** | 0.005 | 0.008 | 12.46 | *** |
| Retired or Jobless Dummy | 0.211 | 5.92 | *** | 0.056 | 0.089 | 5.68 | *** |
| Dependent Parents (Number) | -0.055 | -1.33 | | -0.015 | -0.027 | -1.43 | |
| Dependent Children (Number) | -0.011 | -0.68 | | -0.003 | -0.006 | -0.84 | |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -0.203 | -19.53 | *** | -0.054 | -0.087 | -19.07 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -0.033 | -3.55 | *** | -0.009 | -0.015 | -3.53 | *** |
| Housing Loans Remain (Unit: 100,000yen) | 0.002 | 1.67 | * | 0.000 | 0.001 | 2.00 | ** |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.001 | -1.90 | * | 0.000 | 0.000 | -1.48 | |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | 0.000 | -0.16 | | 0.000 | 0.000 | 0.47 | |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.000 | 0.05 | | 0.000 | 0.000 | 0.08 | |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | 0.026 | 2.08 | ** | 0.007 | 0.010 | 1.81 | * |
| D2005 | 0.159 | 3.43 | *** | 0.042 | 0.073 | 3.54 | *** |
| D2004 | 0.030 | 0.62 | | 0.008 | 0.009 | 0.42 | |
| D2003 | 0.046 | 1.01 | | 0.012 | 0.021 | 1.07 | |
| D2002 | 0.029 | 0.60 | | 0.008 | 0.007 | 0.31 | |
| D2001 | 0.009 | 0.20 | | 0.002 | 0.001 | 0.04 | |
| SIGMA | | | | | 0.434 | 0 | [1.00] |
| RHO | | | | | 1 | 0 | [1.00] |
| Log-likelihood | | | | | | -4900.3 | |
| Schwarz | | | | | | 5142.5 | |

Full Data: NOBs=12097(Positive 3075)

Notes: Determinants are selected by LM and LR test.

Table 4-1. Determinants of Stock Amount (Pseud Panel)

| Dependent (Unit: 100,000) | Plain OLS ID = Order | | | OLS on individual means (BETWEEN) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ID = AGE | | | ID = Generation | | |
| Independents | Coef. | t-value | sig. | Coef. | t-value | sig. | Coef. | t-value | sig. |
| Intercept | -6.773 | -1.73 | ** | -1.798 | -0.20 | | 23.631 | 0.99 | |
| Ordinary Gross Income (Unit: 100,000yen) | 0.027 | 17.32 | *** | 0.025 | 4.86 | *** | 0.056 | 2.74 | *** |
| Extra or Temporary income (Unit: 100,000yen) | 0.103 | 14.82 | *** | 0.109 | 4.64 | *** | -0.017 | -0.17 | |
| Risk Averse (Yes: 1 ⇔ No: 5) | 2.19 | 6.86 | *** | 4.266 | 4.78 | *** | 8.463 | 3.12 | *** |
| Risk Love (Yes: 1 ⇔ No: 5) | -4.335 | -10.58 | *** | -5.265 | -4.43 | *** | -5.533 | -1.37 | |
| University_Dummy | 3.922 | 4.29 | *** | 4.013 | 2.54 | *** | -2.174 | -0.53 | |
| Female_Dummy | -3.423 | -3.67 | *** | -3.214 | -2.01 | ** | -3.617 | -0.96 | |
| Single_Dummy | 6.913 | 4.31 | *** | 0.947 | 0.35 | | 2.638 | 0.32 | |
| Age | 0.593 | 13.39 | *** | 0.341 | 4.17 | *** | 0.135 | 0.55 | |
| Retired or Jobless Dummy | 8.34 | 7.93 | *** | 17.557 | 6.20 | *** | 14.526 | 1.77 | * |
| Dependent Parents (Number) | 1.031 | 0.84 | | 10.789 | 3.13 | *** | 25.725 | 2.18 | ** |
| Dependent Children (Number) | -2.231 | -4.40 | *** | -6.496 | -4.13 | *** | -8.825 | -1.42 | |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -5.24 | -14.56 | *** | -7.235 | -6.83 | *** | -17.787 | -5.79 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -0.458 | -1.74 | * | -0.613 | -0.91 | | -0.648 | -0.28 | |
| Housing Loans Remain (Unit: 100,000yen) | -0.114 | -3.21 | *** | 0.032 | 0.29 | | -0.936 | -1.35 | |
| Housing Loan Repayment (Unit: 100,000/Year) | -0.047 | -2.39 | ** | -0.033 | -1.08 | | -0.058 | -0.52 | |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | 0.002 | 0.15 | | 0.06 | 1.18 | | 0.054 | 0.17 | |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.064 | 3.11 | *** | 0.044 | 0.73 | | 0.291 | 0.98 | |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | -1.767 | -4.99 | *** | 0.354 | 0.34 | | -0.147 | -0.04 | |
| D2005 | 5.165 | 3.47 | *** | 3.267 | 1.32 | | 5.428 | 0.94 | |
| D2004 | 0.817 | 0.55 | | 0.976 | 0.39 | | 9.175 | 1.58 | |
| D2003 | 0.463 | 0.31 | | 2.281 | 0.92 | | 0.796 | 0.14 | |
| D2002 | -1.231 | -0.83 | | -3.626 | -1.47 | | 1.355 | 0.24 | |
| D2001 | -1.168 | -0.79 | | -1.848 | -0.74 | | 0.713 | 0.13 | |
| Adjusted R-squared | | 0.163 | | | 0.270 | | | 0.383 | |
| Log-likelihood | | -63680 | | | | | | | |
| Schwarz | | 63793 | | | | | | | |

Ahrens-Pincus Unbalancedness measure APUI = .44891 for ID = Age and APUI = .14470 for ID = Generation

Full Data: NOBs=12097

Table 4-2. Determinants of Stock Asset Ratio(Pseud Panel)

| Dependent (Unit: ×100 = %) | Plain OLS ID = Order | | | OLS on individual means (BETWEEN) ID = AGE | | | ID = Generation | | |
|---|---|---|---|---|---|---|---|---|---|
| Independents | Coef. | t-value | sig. | Coef. | t-value | sig. | Coef. | t-value | sig. |
| Intercept | 0.051 | 3.56 | *** | 0.086 | 2.72 | *** | 0.074 | 1.04 | |
| Ordinary Gross Income (Unit: 100,000yen) | 0.000 | 11.48 | *** | 0.000 | 4.41 | *** | 0.000 | 1.73 | * |
| Extra or Temporary income (Unit: 100,000yen) | 0.000 | 5.67 | *** | 0.000 | 0.54 | | 0.000 | -1.56 | |
| Risk Averse (Yes: 1 ⇔ No: 5) | 0.009 | 7.95 | *** | 0.017 | 5.54 | *** | 0.010 | 1.19 | |
| Risk Love (Yes: 1 ⇔ No: 5) | -0.020 | -12.94 | *** | -0.018 | -4.31 | *** | 0.020 | 1.66 | * |
| University_Dummy | 0.020 | 5.98 | *** | 0.014 | 2.53 | *** | 0.001 | 0.05 | |
| Female_Dummy | -0.015 | -4.24 | *** | -0.009 | -1.65 | * | -0.008 | -0.75 | |
| Single_Dummy | 0.013 | 2.28 | ** | 0.021 | 2.31 | ** | 0.036 | 1.49 | |
| Age | 0.002 | 9.90 | *** | 0.001 | 4.33 | *** | 0.001 | 1.67 | * |
| Retired or Jobless Dummy | 0.026 | 6.74 | *** | 0.054 | 5.55 | *** | 0.042 | 1.70 | * |
| Dependent Parents (Number) | -0.006 | -1.28 | | 0.030 | 2.55 | *** | 0.009 | 0.24 | |
| Dependent Children (Number) | -0.002 | -0.84 | | -0.011 | -2.02 | ** | -0.009 | -0.51 | |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -0.022 | -16.48 | *** | -0.042 | -11.49 | *** | -0.071 | -7.80 | *** |
| Type of Living （House Owner: 1 ⇔Rent Room: 8） | -0.003 | -3.58 | *** | -0.004 | -1.63 | ** | -0.008 | -1.08 | |
| Housing Loans Remain (Unit: 100,000yen) | 0.000 | 2.62 | *** | 0.001 | 2.59 | *** | 0.000 | 0.16 | |
| Housing Loan Repayment (Unit: 100,000/Year) | 0.000 | -1.48 | | 0.000 | -1.22 | | 0.000 | -0.76 | |
| Total Amount of Loans on Deeds (Unit: 100,000yen) | 0.000 | 1.19 | | 0.000 | 1.09 | | 0.000 | 0.50 | |
| After Retirement Yearly Living Expense (Unit: 100,000) | 0.000 | -0.04 | | 0.000 | -0.58 | | 0.001 | 1.19 | |
| Leave Money for Children (Yes: 1 ⇔ No: 5) | 0.002 | 1.29 | | 0.002 | 0.49 | | -0.006 | -0.52 | |
| D2005 | 0.028 | 5.05 | *** | 0.021 | 2.49 | *** | 0.010 | 0.56 | |
| D2004 | -0.001 | -0.23 | | -0.002 | -0.26 | | -0.014 | -0.79 | |
| D2003 | 0.003 | 0.48 | | 0.003 | 0.33 | | -0.013 | -0.76 | |
| D2002 | -0.008 | -1.46 | | -0.015 | -1.75 | * | -0.018 | -1.07 | |
| D2001 | -0.003 | -0.60 | | -0.007 | -0.80 | | -0.006 | -0.33 | |
| Adjusted R-squared | | 0.131 | | | 0.270 | | | 0.354 | |
| Log-likelihood | | -63680 | | | | | | | |
| Schwarz | | 63793 | | | | | | | |

Ahrens-Pincus Unbalancedness measure APUI = .44892 for ID = Age and APUI = .14476 for ID = Generation

Full Data: NOBs=12097

Table 4-3. Determinants of Stock Amount (Pseud Panel Dynamic Instrument) (Dependent Unit:100,000)

Instrumented: Riskaverse, Risklove

Instruments: Stockamount(-1), Income, Extraincome, Information, Single Female, University, Age, Employ, Children, Parents, Typeliving, Repayhouseloan

| Independents | Coef. | t-value | sig. |
|---|---|---|---|
| Intercept | -90.825 | -4.01 | *** |
| Stockamount(-1) | 0.875 | 54.27 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | 14.865 | 4.96 | *** |
| Risk Love (Yes: 1 ⇔ No: 5) | 19.838 | 3.63 | *** |
| Dispensable Income (Unit: 100,000yen) | 0.005 | 2.76 | *** |
| Extra or Temporary Income (Unit: 100,000) | 0.059 | 5.18 | *** |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -7.190 | -4.57 | *** |
| D2005 | 38.368 | 2.31 | ** |

NOBs = 16772, No of Groups = 2113(Obs per group: min =6 avg =7.9 max = 8)

R-sq: within = 0.0051 between = 0.6386 overall 0.0080

chi2(7) = 4793.04 Prob > chi2 = 0.0000

Table 4-4. Determinants of Stock Asset Ratio (Pseud Panel Dynamic Instrument) (Dependent Unit: ×100 = %)

Instrumented: Riskaverse, Risklove

Instruments: Stock_Ratio(-1), Income, Extraincome, Information, Single Female, University, Age, Employ, Children, Parents, Typeliving, Repayhouseloan

| Independents | Coef. | t-value | sig. |
|---|---|---|---|
| Intercept | -71.877 | -4.06 | *** |
| Stock_Ratio(-1) | 0.879 | 47.60 | *** |
| Risk Averse (Yes: 1 ⇔ No: 5) | 10.815 | 4.52 | *** |
| Risk Love (Yes: 1 ⇔ No: 5) | 16.730 | 3.97 | *** |
| Dispensable Income (Unit: 100,000yen) | 0.005 | 3.20 | *** |
| Extra or Temporary Income (Unit: 100,000) | 0.028 | 3.17 | *** |
| Gathering Financial Information (Yes: 1 ⇔ No: 5) | -6.118 | -5.15 | *** |
| D2005 | 38.045 | 2.89 | *** |

NOBs = 16772, No of Groups = 2113(Obs per group: min =6 avg =7.9 max = 8)

R-sq: within = 0.006 between = 0.6326 overall 0.0058

chi2(7) = 4756.06 Prob > chi2 = 0.0000

Table 5-1. The Relationship Between Risk Averse Attitudes and Other Independent Variables(Non-Stockholders)

| | Risk Averse | Risk Averse If Anything | | | | Neither Side | | | | Not Risk Averse If Anything | | | | Not Risk Averse | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Score | 1 | 2 | | | | 3 | | | | 4 | | | | 5 | | | |
| Independents | dP/dX | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. |
| Intercept | 0.020 | 0.927 | 0.165 | 4.33 | *** | 1.278 | 0.230 | 5.94 | *** | 0.095 | 0.001 | 0.32 | | -3.475 | -0.416 | -12.35 | *** |
| Ordinary Gross Income | 0.000 | 0.000 | 0.000 | 1.23 | | 0.000 | 0.000 | -0.63 | | 0.000 | 0.000 | -0.63 | | 0.000 | 0.000 | -2.61 | *** |
| Extra or Temporary income | 0.000 | 0.000 | 0.000 | 0.65 | | -0.001 | 0.000 | -1.27 | | 0.000 | 0.000 | 0.70 | | -0.001 | 0.000 | -1.65 | * |
| University_Dummy | 0.011 | 0.135 | 0.031 | 2.38 | ** | -0.137 | -0.022 | -2.40 | ** | 0.066 | 0.007 | 0.83 | | -0.238 | -0.026 | -3.49 | *** |
| Female_Dummy | 0.043 | -0.004 | 0.020 | -0.07 | | -0.215 | -0.021 | -3.68 | *** | -0.209 | -0.008 | -2.59 | *** | -0.373 | -0.033 | -5.58 | *** |
| Single_Dummy | -0.050 | 0.188 | 0.012 | 1.97 | ** | 0.274 | 0.028 | 2.88 | *** | 0.069 | -0.005 | 0.52 | | 0.249 | 0.016 | 2.24 | ** |
| Age | 0.002 | -0.018 | -0.002 | -6.46 | *** | -0.017 | -0.002 | -6.40 | *** | -0.008 | 0.000 | -2.19 | ** | 0.012 | 0.002 | 3.82 | *** |
| Retired or Jobless Dummy | 0.011 | -0.068 | -0.007 | -1.02 | | -0.022 | 0.002 | -0.32 | | -0.094 | -0.005 | -1.00 | | -0.032 | -0.001 | -0.41 | |
| Dependent Parents (Number) | -0.005 | -0.061 | -0.014 | -0.79 | | 0.070 | 0.011 | 0.93 | | 0.011 | 0.000 | 0.10 | | 0.073 | 0.007 | 0.83 | |
| Dependent Children (Number) | 0.006 | -0.006 | 0.001 | -0.20 | | -0.002 | 0.002 | -0.05 | | -0.081 | -0.005 | -1.86 | * | -0.045 | -0.004 | -1.17 | |
| Gathering Financial Information | 0.022 | -0.257 | -0.034 | -11.50 | *** | -0.300 | -0.042 | -13.38 | *** | -0.290 | -0.017 | -9.56 | *** | 0.532 | 0.071 | 14.56 | *** |
| Stock Trading (Frequency 1 to 7) | 0.015 | 0.009 | 0.007 | 0.12 | | 0.070 | 0.019 | 0.98 | | -0.113 | -0.007 | -0.76 | | -0.323 | -0.035 | -1.22 | |
| Type of Living | -0.004 | -0.015 | -0.005 | -0.96 | | 0.027 | 0.003 | 1.75 | * | 0.045 | 0.003 | 2.10 | ** | 0.031 | 0.003 | 1.69 | * |
| Housing Loans Remain | 0.000 | 0.002 | 0.000 | 0.83 | | -0.001 | 0.000 | -0.24 | | 0.004 | 0.000 | 1.09 | | -0.003 | 0.000 | -0.94 | |
| Housing Loan Repayment | 0.000 | -0.001 | 0.000 | -0.73 | | 0.001 | 0.000 | 1.00 | | -0.001 | 0.000 | -0.65 | | 0.002 | 0.000 | 1.58 | |
| Loans on Deeds | 0.000 | 0.000 | 0.000 | 0.52 | | 0.002 | 0.000 | 2.08 | ** | 0.001 | 0.000 | 0.73 | | 0.001 | 0.000 | 1.45 | |
| D2005 | -0.022 | 0.187 | 0.024 | 2.15 | ** | 0.120 | 0.011 | 1.37 | | 0.070 | 0.000 | 0.59 | | -0.055 | -0.013 | -0.54 | |
| D2004 | -0.022 | 0.182 | 0.023 | 2.09 | ** | 0.148 | 0.016 | 1.70 | * | 0.015 | -0.004 | 0.12 | | -0.056 | -0.013 | -0.57 | |
| D2003 | -0.015 | 0.199 | 0.030 | 2.31 | ** | 0.056 | 0.002 | 0.63 | | 0.048 | 0.000 | 0.41 | | -0.105 | -0.017 | -1.04 | |
| D2002 | -0.001 | 0.069 | 0.013 | 0.79 | | 0.075 | 0.013 | 0.87 | | -0.196 | -0.016 | -1.57 | | -0.074 | -0.009 | -0.75 | |
| D2001 | -0.012 | 0.199 | 0.032 | 2.34 | ** | 0.056 | 0.004 | 0.65 | | -0.102 | -0.011 | -0.84 | | -0.077 | -0.013 | -0.75 | |

NOBs = 9052 Schwarz B.I.C. = 13151.2 Log likelihood = -12750.3 LR (zero slopes) = 1133.23[.000]

Table 5-2. The Relationship Between Risk Averse Attitudes and Other Independent Variables(Stockholders)

| | Risk Averse | Risk Averse If Anything | | | | Neither Side | | | | Not Risk Averse If Anything | | | | Not Risk Averse | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Score | 1 | 2 | | | | 3 | | | | 4 | | | | 5 | | | |
| Independents | dP/dX | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. |
| Intercept | -0.237 | 1.006 | 0.009 | 2.30 | ** | 1.614 | 0.148 | 3.80 | *** | 1.238 | 0.037 | 2.59 | *** | 1.315 | 0.043 | 2.71 | *** |
| Ordinary Gross Income | 0.000 | 0.000 | 0.000 | 1.95 | ** | 0.000 | 0.000 | 1.50 | | 0.000 | 0.000 | 0.07 | | 0.000 | 0.000 | 1.00 | |
| Extra or Temporary income | 0.000 | 0.000 | 0.000 | 0.32 | | 0.000 | 0.000 | -0.84 | | 0.001 | 0.000 | 1.20 | | 0.001 | 0.000 | 1.74 | * |
| University_Dummy | -0.016 | 0.144 | 0.016 | 1.33 | | 0.031 | -0.008 | 0.30 | | 0.146 | 0.013 | 1.24 | | 0.024 | -0.006 | 0.20 | |
| Female_Dummy | 0.084 | -0.247 | 0.019 | -2.18 | ** | -0.490 | -0.032 | -4.48 | *** | -0.477 | -0.019 | -3.86 | *** | -0.733 | -0.052 | -5.67 | *** |
| Single_Dummy | -0.128 | 0.557 | 0.007 | 2.23 | ** | 0.676 | 0.033 | 2.81 | *** | 0.712 | 0.026 | 2.72 | *** | 0.989 | 0.062 | 3.86 | *** |
| Age | 0.002 | -0.014 | -0.002 | -2.37 | ** | -0.008 | 0.000 | -1.33 | | -0.004 | 0.000 | -0.65 | | -0.008 | 0.000 | -1.18 | |
| Retired or Jobless Dummy | 0.017 | 0.027 | 0.019 | 0.23 | | -0.091 | -0.004 | -0.79 | | -0.263 | -0.029 | -1.99 | ** | -0.099 | -0.003 | -0.72 | |
| Dependent Parents (Number) | 0.024 | -0.259 | -0.033 | -1.72 | * | -0.152 | -0.014 | -1.09 | | 0.110 | 0.032 | 0.75 | | -0.161 | -0.009 | -0.97 | |
| Dependent Children (Number) | -0.004 | -0.014 | -0.006 | -0.24 | | 0.053 | 0.008 | 0.91 | | 0.059 | 0.006 | 0.90 | | -0.013 | -0.004 | -0.19 | |
| Gathering Financial Information | 0.058 | -0.208 | 0.005 | -5.59 | *** | -0.344 | -0.024 | -9.53 | *** | -0.386 | -0.022 | -9.41 | *** | -0.368 | -0.017 | -8.70 | *** |
| Stock Trading (Frequency 1 to 7) | 0.006 | -0.024 | 0.000 | -1.27 | | -0.023 | 0.001 | -1.27 | | -0.020 | 0.001 | -0.97 | | -0.079 | -0.007 | -3.72 | *** |
| Type of Living | -0.001 | -0.017 | -0.004 | -0.46 | | -0.015 | -0.004 | -0.42 | | 0.025 | 0.003 | 0.64 | | 0.043 | 0.006 | 1.12 | |
| Housing Loans Remain | -0.001 | 0.000 | -0.001 | -0.02 | | 0.006 | 0.001 | 1.27 | | 0.001 | 0.000 | 0.12 | | 0.008 | 0.001 | 1.62 | * |
| Housing Loan Repayment | 0.001 | 0.002 | 0.001 | 0.93 | | -0.013 | -0.002 | -2.57 | *** | 0.001 | 0.001 | 0.22 | | -0.008 | -0.001 | -1.68 | * |
| Loans on Deeds | 0.000 | 0.001 | 0.000 | 0.42 | | 0.001 | 0.000 | 1.04 | | 0.000 | 0.000 | 0.14 | | 0.000 | 0.000 | 0.05 | |
| D2005 | -0.048 | 0.317 | 0.025 | 1.95 | ** | 0.174 | -0.005 | 1.08 | | 0.254 | 0.009 | 1.44 | | 0.340 | 0.020 | 1.87 | * |
| D2004 | -0.007 | -0.063 | -0.018 | -0.38 | | 0.146 | 0.027 | 0.95 | | 0.012 | -0.003 | 0.07 | | 0.034 | 0.000 | 0.18 | |
| D2003 | -0.018 | 0.125 | 0.010 | 0.78 | | 0.065 | -0.003 | 0.41 | | 0.022 | -0.009 | 0.12 | | 0.215 | 0.019 | 1.19 | |
| D2002 | 0.005 | 0.051 | 0.014 | 0.32 | | -0.064 | -0.010 | -0.41 | | 0.014 | 0.006 | 0.08 | | -0.125 | -0.014 | -0.67 | |
| D2001 | 0.030 | -0.280 | -0.032 | -1.71 | * | -0.141 | -0.005 | -0.92 | | -0.197 | -0.012 | -1.13 | | 0.011 | 0.019 | 0.06 | |

NOBs = 3679 Schwarz B.I.C. = 5985.99 Log likelihood = -5641.16 LR (zero slopes) = 359.773 [.000]

Table 5-3. The Relationship Between Risk Love Attitudes and Other Independent Variables(Non-Stockholders)

| | Risk Love | Risk Love If Anything | | | | Neither | | | | Not Risk Love If Anything | | | | Not Risk Love | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Score | 1 | 2 | | | | 3 | | | | 4 | | | | 5 | | | |
| Independents | dP/dX | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. |
| Intercept | -0.010 | 0.860 | 0.036 | 1.69 | * | 1.477 | 0.276 | 3.23 | *** | 0.905 | 0.152 | 1.98 | ** | -0.970 | -0.454 | -2.15 | ** |
| Ordinary Gross Income | 0.000 | 0.001 | 0.000 | 1.97 | ** | 0.000 | 0.000 | 0.90 | | 0.000 | 0.000 | 1.99 | ** | 0.000 | 0.000 | 0.99 | |
| Extra or Temporary income | 0.000 | 0.001 | 0.000 | 0.85 | | 0.001 | 0.000 | 0.96 | | 0.001 | 0.000 | 1.00 | | 0.000 | 0.000 | 0.16 | |
| University_Dummy | -0.009 | 0.154 | -0.009 | 1.09 | | 0.174 | -0.025 | 1.37 | | 0.466 | 0.043 | 3.66 | *** | 0.286 | -0.001 | 2.28 | ** |
| Female_Dummy | -0.007 | 0.039 | -0.015 | 0.27 | | 0.213 | -0.007 | 1.69 | * | 0.333 | 0.021 | 2.65 | *** | 0.267 | 0.007 | 2.17 | ** |
| Single_Dummy | -0.002 | 0.173 | 0.007 | 0.75 | | 0.138 | 0.014 | 0.67 | | 0.089 | 0.003 | 0.43 | | 0.021 | -0.020 | 0.11 | |
| Age | 0.000 | -0.013 | 0.000 | -1.98 | ** | -0.017 | -0.002 | -2.99 | *** | -0.017 | -0.002 | -2.99 | *** | -0.001 | 0.003 | -0.18 | |
| Retired or Jobless Dummy | -0.004 | 0.154 | 0.002 | 0.92 | | 0.090 | -0.008 | 0.60 | | 0.150 | 0.006 | 1.00 | | 0.137 | 0.004 | 0.93 | |
| Dependent Parents (Number) | 0.002 | -0.052 | 0.002 | -0.29 | | 0.000 | 0.017 | 0.00 | | -0.170 | -0.023 | -1.05 | | -0.071 | 0.002 | -0.45 | |
| Dependent Children (Number) | -0.006 | 0.209 | 0.000 | 2.59 | *** | 0.234 | 0.005 | 3.18 | *** | 0.196 | -0.004 | 2.67 | *** | 0.225 | 0.005 | 3.11 | *** |
| Gathering Financial Information | -0.010 | -0.075 | -0.028 | -1.48 | | 0.156 | -0.042 | 3.43 | *** | 0.199 | -0.034 | 4.35 | *** | 0.659 | 0.114 | 14.39 | *** |
| Stock Trading (Frequency 1 to 7) | 0.003 | 0.055 | 0.010 | 0.37 | | -0.012 | 0.019 | -0.08 | | -0.101 | -0.002 | -0.69 | | -0.177 | -0.030 | -1.19 | |
| Type of Living | 0.002 | -0.060 | 0.000 | -1.60 | | -0.066 | -0.002 | -1.99 | ** | -0.069 | -0.003 | -2.07 | ** | -0.050 | 0.003 | -1.54 | |
| Housing Loans Remain | 0.000 | -0.009 | 0.000 | -1.55 | | -0.008 | 0.000 | -1.63 | * | -0.005 | 0.001 | -0.92 | | -0.009 | -0.001 | -1.82 | * |
| Housing Loan Repayment | 0.000 | 0.002 | 0.000 | 0.43 | | 0.002 | 0.000 | 0.63 | | -0.001 | -0.001 | -0.27 | | 0.002 | 0.000 | 0.58 | |
| Loans on Deeds | 0.000 | -0.003 | 0.000 | -1.95 | ** | -0.002 | 0.000 | -1.75 | * | -0.002 | 0.000 | -2.08 | ** | -0.003 | 0.000 | -3.03 | *** |
| D2005 | -0.020 | 0.491 | -0.011 | 2.27 | ** | 0.424 | -0.053 | 2.16 | ** | 0.728 | 0.017 | 3.74 | *** | 0.844 | 0.067 | 4.41 | *** |
| D2004 | -0.025 | 0.516 | -0.022 | 2.21 | ** | 0.680 | -0.038 | 3.24 | *** | 0.867 | 0.004 | 4.14 | *** | 1.077 | 0.082 | 5.23 | *** |
| D2003 | -0.028 | 0.630 | -0.020 | 2.66 | *** | 0.697 | -0.053 | 3.23 | *** | 0.959 | 0.007 | 4.47 | *** | 1.192 | 0.094 | 5.65 | *** |
| D2002 | -0.014 | 0.160 | -0.022 | 0.76 | | 0.506 | 0.008 | 2.77 | *** | 0.515 | 0.010 | 2.81 | *** | 0.524 | 0.018 | 2.91 | *** |
| D2001 | -0.013 | 0.522 | 0.008 | 2.69 | *** | 0.452 | 0.009 | 2.57 | *** | 0.416 | 0.000 | 2.34 | ** | 0.401 | -0.005 | 2.30 | ** |

NOBs = 10950 Schwarz B.I.C. = 14426.3 Log likelihood = -14035.7 LR (zero slopes) = 1386.77 [.000]

Table 5-4. The Relationship Between Risk Love Attitudes and Other Independent Variables(Stockholders)

| | Risk Love | | Risk Love If Anything | | | Neither | | | | Not Risk Love If Anything | | | | Not Risk Love | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Score | 1 | | 2 | | | 3 | | | | 4 | | | | 5 | | | |
| Independents | dP/dX | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. | Coef. | dP/dX | t-value | sig. |
| Intercept | 0.153 | -1.041 | 0.167 | -1.79 | * | -1.649 | 0.136 | -2.95 | *** | -2.540 | -0.054 | -4.35 | *** | -4.361 | -0.402 | -7.10 | *** |
| Ordinary Gross Income | 0.000 | 0.000 | 0.000 | 0.12 | | 0.000 | 0.000 | -0.03 | | 0.000 | 0.000 | -0.45 | | 0.000 | 0.000 | -0.63 | |
| Extra or Temporary income | 0.000 | 0.001 | 0.000 | 1.00 | | 0.000 | 0.000 | 0.15 | | 0.000 | 0.000 | -0.34 | | 0.000 | 0.000 | -0.25 | |
| University_Dummy | -0.013 | 0.170 | 0.004 | 1.14 | | 0.190 | 0.012 | 1.30 | | 0.296 | 0.035 | 1.96 | ** | -0.039 | -0.038 | -0.25 | |
| Female_Dummy | -0.039 | 0.215 | -0.051 | 1.31 | | 0.596 | 0.018 | 3.78 | *** | 0.658 | 0.023 | 4.05 | *** | 0.821 | 0.049 | 4.91 | *** |
| Single_Dummy | 0.020 | -0.169 | 0.014 | -0.59 | | -0.318 | -0.014 | -1.15 | | -0.187 | 0.021 | -0.66 | | -0.493 | -0.042 | -1.61 | |
| Age | -0.001 | 0.013 | 0.001 | 1.60 | | 0.002 | -0.001 | 0.26 | | 0.005 | -0.001 | 0.59 | | 0.014 | 0.001 | 1.65 | * |
| Retired or Jobless Dummy | -0.009 | -0.109 | -0.043 | -0.62 | | 0.223 | 0.021 | 1.31 | | 0.121 | -0.009 | 0.69 | | 0.366 | 0.040 | 2.05 | ** |
| Dependent Parents (Number) | -0.001 | -0.037 | -0.010 | -0.18 | | 0.065 | 0.012 | 0.33 | | -0.056 | -0.018 | -0.28 | | 0.099 | 0.016 | 0.47 | |
| Dependent Children (Number) | -0.013 | 0.160 | 0.000 | 1.88 | * | 0.217 | 0.014 | 2.65 | *** | 0.169 | 0.000 | 1.97 | ** | 0.166 | -0.001 | 1.86 | * |
| Gathering Financial Information | -0.048 | 0.324 | -0.052 | 5.10 | *** | 0.605 | -0.014 | 9.89 | *** | 0.819 | 0.028 | 13.05 | *** | 1.147 | 0.086 | 17.65 | *** |
| Stock Trading (Frequency 1 to 7) | -0.006 | 0.055 | -0.003 | 1.97 | ** | 0.090 | 0.004 | 3.39 | *** | 0.096 | 0.004 | 3.49 | *** | 0.092 | 0.002 | 3.27 | *** |
| Type of Living | 0.003 | -0.041 | 0.000 | -0.86 | | -0.028 | 0.003 | -0.62 | | -0.085 | -0.010 | -1.77 | * | -0.027 | 0.003 | -0.55 | |
| Housing Loans Remain | 0.000 | -0.004 | -0.001 | -0.56 | | 0.002 | 0.000 | 0.30 | | 0.002 | 0.000 | 0.25 | | 0.001 | 0.000 | 0.13 | |
| Housing Loan Repayment | 0.000 | 0.001 | 0.000 | 0.13 | | 0.000 | 0.000 | 0.07 | | 0.004 | 0.001 | 0.91 | | 0.003 | 0.000 | 0.65 | |
| Loans on Deeds | 0.000 | -0.002 | 0.000 | -1.38 | | -0.002 | 0.000 | -1.44 | | -0.002 | 0.000 | -1.63 | * | -0.002 | 0.000 | -1.23 | |
| D2005 | -0.030 | 0.469 | 0.022 | 2.15 | ** | 0.302 | -0.016 | 1.40 | | 0.487 | 0.027 | 2.16 | ** | 0.356 | -0.004 | 1.53 | |
| D2004 | -0.015 | 0.071 | -0.022 | 0.32 | | 0.198 | -0.002 | 0.93 | | 0.330 | 0.026 | 1.48 | | 0.289 | 0.013 | 1.26 | |
| D2003 | -0.006 | 0.055 | -0.005 | 0.26 | | -0.017 | -0.029 | -0.08 | | 0.238 | 0.032 | 1.11 | | 0.146 | 0.008 | 0.66 | |
| D2002 | -0.021 | 0.109 | -0.029 | 0.47 | | 0.234 | -0.015 | 1.05 | | 0.527 | 0.050 | 2.31 | ** | 0.395 | 0.015 | 1.68 | * |
| D2001 | -0.036 | 0.400 | -0.007 | 1.73 | * | 0.448 | -0.004 | 2.00 | ** | 0.651 | 0.040 | 2.80 | *** | 0.533 | 0.008 | 2.21 | ** |

NOBs = 3660 Schwarz B.I.C. = 5604.19 Log likelihood = -5259.57 LR (zero slopes) = 869.457 [.000]

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[1] Nakagawa and Katagiri(1999). They report that the transition of Japanese households’ financial risk asset ratio has been 10 to 20% in 90’s . In their research, financial risk asset includes stock, investment fund and foreign currency deposit. In the same period, that of U.S. is 40 to 50% and it is 20% for U.K. That of France is nearly 40% and the ratio goes up from 10 to 20% for Germany after integration. The types of financial assets classified as risk assets are different in each country. Based on the Family Saving Survey of Ministry of Internal Affairs and Communications, the ratio of Japanese households holding stock is about 20%. The Survey of Consumer Finances (2001) reports that 52% of U.S. households hold stocks. This rate includes their indirect equity holding through pension funds. Still, there is a report that Japanese households’ holding risk level, if composing the price volatility of housing, is not less than that of U.S. households(Kotou(2000). As well, Matsuura(2004) reports the general trend of minus risk premium of Japanese stock market especially after 1985.
古藤久也(2000)「我が国家計の資産選択行動について－持家選好・年功序列賃金制度と株式保有」日本銀行金融市場局
松浦克己（2004）、「安全資産投資と株式投資－ﾘｽｸ・ﾌﾟﾚﾐｱﾑ・ﾊﾟｽﾞﾙとﾏｲﾅｽのﾘｽｸ・ﾌﾟﾚﾐｱﾑ・ﾊﾟｽﾞﾙ－」郵政総合研究所ﾚﾎﾟｰﾄ

[2] Recent payment rates are 73.0%, 70.9%, 62.8%, 63.4%, 63.6% in the year of 2000, 2001, 2002, 2003, 2004 respectively. Payment rates are calculated by 100% minus default rates.

[3] The rate declines by 4.6% from the year 1995 to 2002.
古賀麻衣子（2004）、「貯蓄率の長期的低下傾向をめぐる実証分析：ﾗｲﾌｻｲｸﾙ・恒常所得仮説にもとづくｱﾌﾟﾛｰﾁ」，日本銀行調査統計局ﾚﾎﾟｰﾄ

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金子隆[1998]「金利選好の変化と個人間格差」村本孜編著『日本人の金融資産選択』東洋経済新報社

[5] or $Asset_{it} = \delta \Delta Asset_{it} + (1 + r_t) Asset_{it-1} + \varepsilon_{it}$ if income gain or interest from assets is not assumed to be consumed; capital gain is not assumed to be realized. And $Asset_{it} = Asset_{it-1} + \varepsilon_{it}$ if $\delta \Delta$ equals 0; the demand of asset becomes random walk.

[6] Nakagawa and Katagiri(1999) refer to this point in the notes of their paper that overlooking the household asset composition there seems not so much difference by age (p3). Chacko and Viceira(2005) draw the same equation using Bellman equation. Though there are past studies which come to an inference of increasing relative risk aversion

such as Quizon, Binswanger and Machina(1984) et al.
Chacko G. and L. Viceira(2005) “Dynamic Consumption and Portfolio Choice with Stochastic Volatility in In Complete Markets,” *The Review of Financial Studies*, Vol.18, No 4, pp.1369-1402. Quizon J., H. Binswanger and M. Machina(1984), “Attitude Toward Risk: Further Remarks,” *The Economic Journal*, Vol.94, No.343, pp.144-148.

[7] $X_{it} = X_i$ for time invariant status

[8] score 1. house owner, 2. multifamily housing owner, 3. a store with sleeping quarters, 4. rented house, 5. rented multifamily housing, 6. public housing, 7. live-in, 8. rent room

[9] For simplicity, this paper regards all the sample respondents as salaried workers working for private company and simplify the allowance deduction of each dependent 380,000yen for income tax and 330,000 yen for residential tax except spouse who or whose husband is more than 70 years old. In that case, 580,000 is deducted on income tax case and 450,000yen is deducted on residential tax case. About expense for social insurance premium, for simplicity, 70/1000 is used for welfare annuity insurance, 82/1000 is used for health insurance, 12.5/1000 is used for nursing care insurance for the worker after age 40, 6/1000 is used for employment insurance. Then, dispensable income is calculated by the following procedure. 1. Find taxable income by deducting income deduction from gross employment income, 2. Further, deducting basic deduction, deduction for spouse and other dependents. This paper does not consider deduction for medical expenses and for life insurance. 3. Further, deducting expense for social insurance premium; nursing care insurance, health insurance, employment insurance. 4. Deduct income tax and residential tax from gross employment income

[10] Original extra income is the nearest five year total value. Hence, considering Japanese tax system on miscellaneous and occasional income, this paper uniformly deducts 20% from the facial value and divides it by 5.

[11] 石原秀彦・土居丈朗(2004)「1990 年代の日本における消費・貯蓄行動について」ESRI 経済分析 174 号

[12] $y_i^* = \beta X_i + u_i$

$$\text{When } y_i^* < c, \quad y_i = y_i^*$$

$$\text{When } y_i^* \geq c, \quad y_i = c$$

Log Likelihood Function

$$\ln L = -\frac{1}{2}\sum_{y>c}\ln(2\pi\sigma^2) - \sum_{y>c}\frac{(y_i - \beta X_i)^2}{2\sigma^2} + \sum_{y\leq c}\ln\Phi\left(\frac{c-\beta X_i}{\sigma}\right)$$

[13] An age group from 28 years to 37 years old in 2004 is matched with that from 29 years old to 38 years old in 2005 as the same generation.