Liquidity Constraint and Household Portfolio in Japan

Norihiro Kasuga[1]
Associate Professor
Nagasaki University
4-2-1 Katafuchi, Nagasaki
Nagasaki 850-8506 Japan
n-kasuga@net.nagasaki-u.ac.jp
Tel/Fax: 095-820-6396

Katsumi Matsuura
Professor
Hiroshima University
k.matsuur@hiroshima-u.ac.jp

Abstract

In this paper, we analyze the financial asset selection behavior of Japanese households. Especially, we focus on whether or not liquidity constraint decreases the amount of a household's risky assets. To investigate this, we first empirically examine which types of household suffer from liquidity constraint. Then, based on the probability obtained from this first stage, we use the Tobit model to estimate the risky asset ratio (=risky asset/total financial asset), and examine the relationship between liquidity constraint and household portfolio.

Our results show that the more households suffer from liquidity constraint, the less the households hold risky assets. This is consistent with previous empirical research on Italian households, implemented by Guiso et al.(1996). Our research suggests that the Japanese post-war financial system, which has provided money primarily to the industrial sector rather than the household sector (e.g. consumer loans), might lower the amount of risky assets held by Japanese households.

(JEL classiflcations:D12,E2)
Key words: risky asset ratio, liquidity constraint, household portfolio, saving rate

---

* Contact Author. Authors are grateful to Charles Yuji Horioka (Osaka University), Miki kohara (National Graduate Institute for Policy Studies), Yukiko Shigeno (Osaka Prefecture University) for helpful comments and suggestions. All remaining errors are ours.

1. Introduction *

It is quite difficult to compare directly each nation's statistics on financial assets. If we want to make a precise comparison, we must adjust our data definition, coverage, and so forth. However, recently we often find this kind of effort being made. For example, international comparisons of personal savings rates in OECD nations based on survey data is typically carried out (Poterba ed. 1994). According to their results (see table 1), savings rates in Japan are the highest among six countries and show similar patterns to Italy, but the median value of net financial assets is far greater than Italy. More recently, we can find new projects such as " International Savings Comparison Projects" on the web site.[1]

(Insert table 1 about here)

Similarly, another researchers have shed light on more specific issues, household portfolios (Guiso, Haliassos and Jappelli 2001). As Guiso et a1. mention in their preface, until recently, researchers in economics and finance paid relatively little attention to household portfolios, partly because of the difficulty of applying asset pricing theory, and partly because of the lack of micro data. In fact, it is almost impossible to do this kind of research without survey data. Therefore their work is very interesting and valuable but unfortunately, they just provide results for five countries (the United States, the United kingdom, Italy, Germany, and the Netherlands), so we constructed tables 2 and 3 adding adjusted Japanese data to their tables. Let us take a brief look at the overall characteristics of stockholding behavior.

(Insert tables 2 and 3 about here)

In table 2, we can see that the proportion of stockholders has increased drastically during the 1990s, although Japanese participation rates show a decreasing trend after1989. We can say that this is partly explained by severe recession and a weak stock market after the so-called "bubble economy." We also find the proportion of direct stockholding is not so low in Japan, but it is a little bit misleading result. It tells us that we should use "direct and indirect" measures to understand the comprehensive effect of risky assets. In addition, a fairly robust finding is a hump-shaped age profile of participation in risky assets, reported in table 3. Although the average rate is almost the same between Germany, Italy and Japan, the Japanese distribution is more skewed towards those households with an older head.

Here, we have concisely reviewed international comparison just for the purpose of establishing the trend. We need more diligent and devoted study if we would like to know further details. However, if we consider these stylized facts such as high savings rates, large median values of saving, and low proportion of stock holding, we can say that it is a very important task to analyze household portfolios in Japan.

From this point of view, we focus on the relationship between liquidity constraint and household portfolios in Japan. More concretely, we examine whether liquidity constraint (the probability that households will suffer from liquidity constraint) reduces the amount of risky assets in the household. The reason is as follows. First, there are few analyses on this issue in Japan, largely due to lack of information. However, in this paper, we could use valuable data to get more precise estimation results and this is a great advantage. Second, liquidity constraint is an important topic in terms not only of empirical but also theoretical viewpoints. Therefore we can apply our results to another country if we can empirically show the effectiveness of economic

theory.

This paper is organized as follows. In section 2, we review a series of research on liquidity constraint in Japan. In section 3, we briefly describe our data. In section 4, we explain our econometric model and estimation method. In section 5, we interpret our results with respect to the demand function of risky asset, and finally, we briefly summarize our findings.

2. Some Explanations for low participation rate and small share of risky asset in Japan

According to the 1998 Family Savings Survey conducted by Statistics Bureau, Management and Coordination Agency, the debt[2]/income ratio of households was not so high (9.0%). On the other hand, it is sometimes said that Japanese households tend not to hold "risky assets[3]," and portfolio shares of risky assets are quite low (Yonezawa, Matsuura and Takezawa 1999, Koto 2000). In short, characteristics of Japanese households portfolio is described as low share of consumer loan, low share of risky asset and high share of safe asset[4].For this reason, it is sometimes pointed out that enough money couldn't be supplied for enterprises with high-risk businesses in the Japanese capital market, and those companies were highly dependent on bank lending (Economic Planning Agency 1999).

Many economists have tried to find "rational" reasons for explaining the low portfolio share of risky assets in Japanese households, just like any other country. For example, Matsuura (1999) pointed out the low rate of returns on stocks in Japan as one of the important factors. Koto (2000) proposed a strong preference for home ownership and consequent holding of a consumer loan. If households have to pay periodically for a housing loan, they would prefer to have safer assets to avoid uncertainty. Yonezawa et al.(1999) suggested that the Japanese seniority wage system is another important factor. Under the seniority wage system, companies can control

workers' wage rates in the long run. As a result, wage rates are relatively lower when workers are young and relatively more expensive when they are old. They call this an "invisible contribution" to the company and regard it as a kind of risky asset because this system makes it hard for workers to resign from their company when they are young. They propose the hypothesis that this "invisible contribution" reduces the portfolio share of risky assets in younger households, and produces a statistically significant result.

Another explanation emphasizes the problem of liquidity (=borrowing) constraints. As Paxson (1990) showed households reduce illiquid (=difficult to convert to cash) assets and prefer to hold liquid assets to finance current consumption when a liquidity constraint exists and is exogenous. Although stocks can be easily converted to cash, prices may fluctuate drastically. Therefore, it may not always be possible to make up for a fall in income by selling stocks. It may also not be possible to cover unexpected expenditures due to illness etc. In this sense, we should classify risky assets as "illiquid" assets." If households expect to suffer from liquidity constraint and expect not to be able to borrow money for the purpose of future consumption, it is rational for households to select to hold money as deposits, which can be easily exchanged for cash with no price change. From this viewpoint, Guiso et al. (1996) conducted an empirical analysis using Italian data, Survey of Household Income and Wealth (SHIW1989) and showed liquidity constraints have a negative impact on the amount of risky assets.

The primary purpose of this paper is, therefore, to examine whether liquidity constraint reduces the amount of, and portfo1io share of risky assets. If liquidity constraint does lower the portfolio share of risky assets, then the propagation of "consumer loans" will affect the households' asset selection behavior and increase their portfolio share of risky assets. To achieve this purpose, we first empirically analyzed (1) what kinds of households suffer from liquidity

constraint. Then, (2) based on the probabilities obtained from the first stage, we used the Tobit model and estimated the demand function for risky assets (again, defined as stocks plus investment trusts) ratio (=risky asset/total financial asset), and examined the relationship between liquidity constraint and household portfolio. Although there have been some previous studies in Japan analyzing the relation between liquidity constraint and consumption (Hayashi1985, Kohara and Horioka1999), this might be the first paper examining the relationship between liquidity constraint and portfolio share in Japan. We use micro data from the Sixth Survey on the Financial Asset Selection of Households (SFASH) conducted by the Institute for Posts and Telecommunications Policy (IPTP). This Survey includes direct questions on liquidity constraint as well as on income and assets, making it well-suited for our study. Guiso et al.(1996), who use the SHIW, and Kohara and Horioka (1999), who use the 1993 Panel Survey of Consumer Lifestyles (conducted by the Institute for Household Economy) also estimate the liquidity constraint function using micro data. Our method is similar to theirs.

3. Data and Question

3.1. Data

The 1998 SFASH is a nationwide survey of 6,000 Japanese households with household heads aged above 20. The number of collected samples is 3,754. SFASH consists of questions on "income and assets," such as the annual income of each member, the amount of tax payment and social insurance contributions, the total amount of and changes to financial assets by type[6], and the amount of debt. SFASH also includes information on age, gender, occupation and education status of the household head. In order to ensure the reliability of the data, we eliminated the following samples, considering the aim of our analysis.

1) households which did not answer

2) the question on gender, age or occupation of the household head.

3) the question on the number of household members.

4) all questions on each types of income, and samples of whose amount of disposable income was negative.

As a result, we finally obtained 1605 effective samples.

3.2. Questions on Liquidity Constraint

SFASH includes following two direct questions on 1iquidity constraint.

(A) 1 Question: Have you ever applied for a loan provided by a financial institution? If so, was your loan application turned down and/or was the total amount of the loan for which you applied reduced ? (single answer)

Answer: 1. Yes 2. No

(A)-2 If you answered “1.Yes" to the above,

please circle more than one of the following questions: (multiple answer)

Answer: 1. Requested full amount of loan was approved.

2. Application was approved, but the amount of the loan was partly reduced.

3. Application was refused.

(B)-1Question: Have you ever given up on applying for a loan because you thought your application might be turned down? (single answer)

Answer: 1. Yes 2. No

More concretely, “liquidity constrained households” are described as follows;

(a)Households that applied for a loan but were refused.

(b)Households that applied for a loan but the amount of the loan was reduced (partially refused).

(c)Households that didn't apply for a loan because they thought their application might be turned down (gave up beforehand).

On the other hand, “no constrained households” are described as follows;

(d)Households that applied for a loan and the total amount of loan was fully approved by the financial institution.

(e)Households that didn't need a loan and as a consequence, did not apply for a loan

Households that fell into categories (a) to (d) were households that needed a loan (households in category (c) were considered potential loan applicants).

Clearly, these questions were asked about previous experiences of liquidity constraint, and not on current experience or future possibilities. However, there exist households that haven't applied for loan but consider they will need to apply for one in the near future. Or, there exist households whose applications were refused (or partially refused) in the past but who consider they aren't suffering from liquidity constraint now because their financial situation has been improved. Or, there exist households that have multi-experiences (e.g.(c)&(d)). If we could take these patterns into consideration, of course it would be favorable. However, we were forced to depend on previous experience because of data restrictions. We should be aware of this point when we interpret the estimation results.

Tables on loan applicants (question (A)-1, (A)-2 and (B)-1) are summarized in table 4.

(Insert table 4 about here)

As we can see in panel A, among households that have applied for loans, the number of

reduced households is 42 (2.52% of the total sample, 5.45% of the applicants), while the number of rejected households is 51 (3.18% of the total, 6.61% of the applicant). In panel B, we can see the number of households that hadn't applied for a loan and didn't apply as they thought their application might be turned down (gave up beforehand) is 81 (5.05% of the total). We can also see that the number of households that had applied for loans, and also gave up beforehand was 99 (6.17% of the total). The number of households that had had two experiences, (c) and (d), is 45 (2.80% of the total, 6.64% of the non refused households)(in panel C). The last case might be thought of as households that have had multi-loan experiences in the past-

In this paper, we define samples classified at least once in (a), (b) or (c) as "liquidity constrained households," because it is natural for us to think that the past experience of liquidity constraint would affect their future behavior on asset selection. Thus, the number of our defined sample is 219 (13.64%of the total), including both households that did not apply for loan as they thought their application might be turned down (180) and that applied for a loan but partially refused or totally rejected (26+13).

Our definition corresponds to Kohara and Horioka (1999)'s definition (3), which counts 6.87% of households with a spouse as "liquidity constraint households." In addition, Guiso et a1.(1996), whose definition is almost the same as ours, counts 1,249 of 8,017 (15.58%) as "liquidity constraint households." Previous researches based on direct questions about liquidity constraint report a much smaller number than Zeldes (1989), Hayashi (1985). This means proxy variables used by Zeldes and Hayashi might not be appropriate. However, even in this paper, we didn't ask from whom households could borrow. In addition, as we mentioned before, our research is based only on previous experience of liquidity constraint and not on present/future information. We should be cautions when we interpret the results[8].

4. Econometric Model and Variables

4.1. Econometric Model

As a first step, we estimated the liquidity constraint function based on a households' liquidity constraint by using the probit model. Then, based on the probability obtained from the first step, we used the Tobit model and estimated risky asset ratio (=risky asset/total financial asset), and examined the relationship between liquidity constraint and household portfolio. In this estimation process, we also avoided the heteroscedasticity problem.

In the first step, we use the following probit model. The dependent variable y_1 is 1 if households face a liquidity constraint, while y_1 is 0 if they don't.

$$y^*_{1i} = a + bx_i + u_i \qquad 1)$$

$$y_{1i} = 1 \quad \text{if } y^*_{1i} > 0$$

$$= 0 \quad \text{otherwise}$$

In this model, "a" and "b" are the parameters to be estimated, x_i is the vector of the explanatory variables, u_i is an error term (assumed to follow the i.i.d. process).

The log likelihood function for equation 1) is given by

$$L = \prod_{y_{1i}=1} \Phi((a+b x_i)/\sigma) \prod_{y_{1i}=0} (1-\Phi((a+b x_i)/\sigma))$$

The log likelihood is given by

$$LL_i = y_{1i} \operatorname{Log} \Phi((a+bx_i)/\sigma) + (1-y_{1i}) \operatorname{Log}(1-\Phi((a+bx_i)/\sigma)) \qquad 2)$$

$$\operatorname{Log} LL = \Sigma LL_i$$

Here, $\Phi(.)$ denotes the cumulative distribution function.

We can estimate the cumulative distribution function from equation (2), after normalizing

as σ =l in the case of homoskedasticity. However, in the case of heteroscedasticity ($\sigma=\sigma_i$), consistency of the estimated value can no longer be held (Harvey 1976, Yatchew and Grilicks 1984). So we use the LM (Lagrange-multiplier) test to examine heteroscedasticity, following the method explained in Greene (2000)[9].

Next, we consider the risky asset ratio (=risky asset/total financial asset). The ratio ranges from 0 to 100. In this case, the Tobit model with truncation in both ends is,

$$y^*_{2i}=a+bx_i+u_i \qquad 3)$$

$$y_{2i}=100 \quad \text{if } y^*_{2i}>100$$

$$= y^*_{2i} \quad \text{if } 0 <= y^*_{2i} <= 100$$

$$=0 \quad \text{if } y^*_{2i}<0$$

The log likelihood function of the obit model is as follows (see Maddala (1983)).

$$LogL=\Sigma_{y^*_{2i}>100} \log (\Phi((100-a-bx_i)/\sigma))+\Sigma_{y^*_{2i}<0} \log(1-\Phi((0-a-bx_i)/\sigma)) \qquad 4)$$

$$+\Sigma_{0 <= y^*_{2i}<= 100} \log (1/ \sigma * f\tilde{O}(y^*_{2i}-a-bxi)/ \sigma))$$

Like the Probit model, consistency of the estimated value by the Tobit model can no longer be held in the case of heteroscedasdeity. So we also use the LM test to examine heteroskedasticity, following Greene (2000), pp. 912-914.

4.2. Variables

(Liquidity Constraint)

For the liquidity constraint (represented as SEIYAKU), the following were adopted as explanatory variables: log of household disposable income (LDISP), log of household financial assets (LWEALTH), log of self-estimated real assets (LREAL), age of household head (AGE), square of AGE (AGE2, but divided by 100) and dummy variable for gender (FEMALE, =1 if household head is female). Regarding the occupation of the household head, a dummy variable SELFAGRI is 1 if his/her job is self-employed/agro forestry, PART is 1 if his/her job is part time, NOJOB is 1 if he/she doesn't have a job. With respect to the education of the household head, University (UNIV) and Junior high school (JUNIOR) graduation dummy were adopted[10].

LDISP was a variable for measuring the effect of budget constraint. We expected a negative sign if the greater the income, the less the need to borrow. On the other hand, we expected a positive sign if LDISP showed a strong demand for borrowing. It could be determined by empirical analysis. LWEALTH and LREAL were used to measure the asset effect, and we expected a negative sign for the coefficient. AGE and AGE2 were for measuring the effect of the difference in life stage, so we could not determine the ex/ante sign of the coefficient. The occupation dummy was for measuring the need for borrowing by occupation (e.g. we expected self-employed households needed much more borrowing than others). Education was adopted as a control variable for lifetime income.

(Risk Asset Ratio)

We estimated the risk asset ratio in two different ways.

In the first case, we adopt the log of the “risky asset/total financial asset" ratio (LRISK) as

a dependant variable. As explanatory variables, we used the log of the estimated probability of liquidity constraint. Here, we used LPROB instead of SEIYAKU because we wanted to measure the continuous effect of a liquidity constraint. In addition, we adopted the log of the "income/financial asset" ratio (LDISPWEL), the log of the "debt/financial asset" ratio (LDEBWEL) and the log of the "self-estimated real asset/financial asset" ratio (LREWEL) to avoid heteroscedasticity. Further, dummy variable HOUSING (=1 if household had housing loan) and UNIV were added.

In the second stage, we adopted "risky asset/total financial asset" ratio (RISKY) as a dependant variable. As explanatory variables, we used the estimated probability of liquidity constraint (PROB). Furthermore, we adopted "disposable income/financial asset" ratio (DISPWEL), "debt/financial asset" ratio (DEBWEL), home-ownership dummy MYHOME (=1 if household head had own house), HOUSING and UNIV.

If liquidity constraint restricts the risky asset ratio of a household, we expected a negative sign for the coefficient of LPROB or RISK. Our primary purpose was to examine it. We could not determine the ex-ante sign of LDISPWEL and DISPWEL, because it was possible for households whose head were retired to have a small income with a large amount of financial asset. In this case, the capability to hold risky asset was small if we considered the "flow" side while large if we considered the "stock" side. We expected negative signs for the coefficients of LDEBWEL and DEBWEL, and positive signs of the coefficients of LREWEL or MYHOME. We expected households with housing loans would increase their safe asset because they had to pay for their debt periodically (refer tokoto2000). Thus we expected a negative sign for the Coefficient of HOUSING. We adopted UNIV as a proxy for information processing capability because we needed a highly complicated judgment such as a target bland and/or timing for stock

investment. We expected a positive sign for UNIV.

4.3. Test for the mean difference between two subgroups

Table 5 shows the descriptive statistics for the principle variables. Before estimation, we divided the samples into two subgroups; one was households with a liquidity constraint (subgroup 1), and the other was households with no constraint (subgroup 2). Then we statistically tested the mean differences in the principal variables between the two subgroups (refer to z-value in Table 5).

(Insert table 5 about here)

We found a statistically significant difference at the 1% level for RISK, RISKY and LRISKFIN (= log of amount of financial risk asset). Subgroup 1 had greater mean values than subgroup 2 on all three variables. This fact shows liquidity constraint might have an effect on households' asset selection behavior.

LWEALTH and LREAL have a significant mean difference between two subgroups at the 1% level, although LDISP doesn't have a significant difference. In addition, subgroup 1 has greater mean values than subgroup 2 on LWEALTH and LREAL. It means that the amount of both real and financial assets has a strong effect on whether households suffer from liquidity constraint or not.

AGE and AGE2 seems not to have a significant mean difference. Speaking of occupation, subgroup 2 shows greater values than subgroup 1 on SELFAGRI and PART dummies. With respect to education, we should be aware that subgroup 1 has greater mean than subgroup 2 on

UNIV.

5. Estimation Results

5.1. Estimation on Liquidity Constraint

The estimation results for the liquidity constraint function are shown below.

SEIYAKU=-2.687 -0.017*LDISP-0.077*LWEALTH-0.034*LREAL+0.098*AGE 5)
(-4.090)*** (-0.295) (-3.884)*** (-2.678)*** (4.088)***
-0.105*AGE2+0.089*FEMALE+0.474*JIEIAGRI+0.398*PART+0.461*NOJOB
(-4.314)*** (0.656) (4.460)*** (1.998)** (3.046)***
+0.215*JUNIOR-0.289*UNIVERSITY
(2.064)** (-2.595)***

LL -597.12, *LM* test statistics 2.163

(Asymptotic t-value is shown in parenthesis, ***, **, *, shows significance level at 10%, 5% 1%, *LL* denotes log likelihood, *LM* denotes Lagrange multiplier. These signs have the same meaning through this paper).

Because the critical value of the chi-square distribution at the 95% significance level is 3.84, LM test statistics, 2.163, means the null hypothesis, “homoscedasticity at a 95% significance level,” wouldn't be rejected. In other words, the null hypothesis “homoscedasticity" is supported.

In equation (5), the signs of the coefficients are almost the same as we expected. Although LDISP is not significant, LWEALTH and LREAL are significantly negative at the 1% level. It means that the richer households are, the less they are suffering from a liquidity constraint. Speaking of occupation, because SELFAGRI is significantly positive at the 1% level, households in this category seem to have strong needs to borrow (or a high possibility of facing

liquidity constraint) because of income uncertainty. With respect to education, because JUNIOR is significantly positive at the 5% level and UNIV is significantly negative at the 10% level, it shows expected future high (low) income leads to low (high) probability of suffering from liquidity constraint.

5.2. Estimation of Portfolio Share of Risky Assets

The estimation results using LRISK are shown in equation (6) and results using RISKY are shown in equation (7). The LM test statistics are 0.48 and 1.57 respectively. Here, like equation (5), the null hypothesis, “homoscedasticity," is supported.

LRISKY=-0.197 -2.949*LPROB-2.430*LDISPWEL-0.540*LDEBWEL 6)
(-0.141) (-5.624)*** (-9.208)*** (-1.899)*
<-0.432> <-0.356> <-0.079>
+0.528*LREWEL+2.448*UNIVERSITY-0.293*HOUSING
(2.036)** (3.883)*** (-0.481)**
<0.077>

σ=6.586(20.167) LL=-1376.91 LM=0.48
< > denotes marginal effect around sample means.

The coefficient of LPROB is significantly negative at the 1% level. Thus, we guess the greater the increase in probability of facing a liquidity constraint, the less the portfolio share of risky assets which households hold. The marginal effect around the sample mean is -0.432. Because the mean and median of LRISKY are 0.9807 and 0, we can say that the effect of liquidity constraint for households to decrease risky assets, is not so weak.

In equation (6), the coefficient of HOUSING is negative but statistically insignificant. On

the other hand, the coefficient of LDISPWEL is significantly negative at the 1% level. It might reflect the fact that the capability of holding risky household assets for households with an aged head is high enough, because they receive a low income but hold a large amount of financial assets. The coefficient of LDEBWEL is significantly negative at the 10 % level while the coefficients of LREWEL and UNIV are significantly positive at the 50 % and 10 % level.

RISKY=-26.732 -1.269*PROB-1.902*DISPWEL+0.165*DEBWEL 7)
(-5.245)*** (-4.970)*** (-3.348)*** (3.271)***
<-0.124> <-0.189> <0.016>
+16.260*MYHOME+15.378*UNIVERSITY-8.209*HOUSING
(4.894)*** (4.773)*** (-2.570)**

σ=34.603(20.860) *LL*=-1863.35 *LM*=1.57

In equation (7), the coefficient of PROB is also negative at the 10 % level. Therefore we get to know the former result; the greater the increase in probability of facing a liquidity constraint, the less the assets which households hold, is strongly supported. The marginal effect of PROB is -0.124.

Table 6 shows RISK and the expected value of RISKY when PROB increases, under the condition that DISPWEL and DEBWEL are the sample means, MYHOME=1, HOUSING=1 and UNIV=1. If PROB increase from 10% to 20%, RISK and the expected value of RISKY decrease 9.70 % and 1.97 % respectively. We can interpret this simulation result as an indication of the strength of the effect of liquidity constraint.

(Insert table 6 about here)

Note that the coefficient of HOUSING is significantly negative at the % level in equation (7). It means risky assets with a drastic price fluctuation would be restricted because housing loans must be repaid periodically. The coefficient of DISPWEL is significantly negative at the 1 % level while the coefficient of DEBWEL is significantly positive at the 1 % level. We need further investigation of these points. The coefficient of MYHOME and UNIV are significantly positive at the 1% level.

6. Conclusions

In this paper, we propose liquidity constraint as one of the factors restricting the portfolio share of risky assets in Japanese households. To examine this hypothesis, we estimated the probability of liquidity constraint, and showed that it restricts the portfolio share of risky assets. If households anticipate the possibility of facing a liquidity constraint in future, it is rational for them to restrict the portfolio share of risky assets. This is because, if households anticipate an income fall or unexpected expenses in the future, they need to hold safer financial assets to prepare for it. In addition, in this paper, we also confirm that the portfolio share of risky assets can be restricted if households have a housing loan. This might be affected by the fact that it is not so easy to roll over a housing loan in Japan.[11] Our results are almost the same as the Italian case by Guiso et a1.(1996), so we can say that we could also empirically show the correctness of the theoretical implication by Paxson (1990) based on Japanese data. We hope this kind of empirical research will be examined in other countries, and that this kind of effort will bring a better understanding of international differences in saving behavior, portfolio behavior, and so forth.

Lastly, let's think about the specific reasons for the low portfolio share of risky assets in

the Japanese market. After World War II, Japanese banks have supplied most of their money to companies and have not supplied much money to households (e.g. consumer loans). According to the financial settlement at the end of March 1999, there has been an increase in lending to individuals. However, if we look in detail, consumer loans are decreasing while housing loans are increasing. Consumer loans by 10 city banks were down 105%(while the total amount of lending was down 6.0%), down 5.9 % (down 0.1 %) by regional banks, and down 7.2 % (up 4.2 %) by second tier regional banks (Kinyu Journal, May 2000). The fact that the percentage decline in consumer loans is greater than the percentage decline in total lending, would seem to be due to the increase in personal bankruptcies and the shrinkage of banks during the recession. It is partly because Japanese banks' inability to screen an individual's financial capability due to their negative attitude toward consumer loans. The characteristics of Japanese households' financial asset selection behavior should be understood in relation to the financial system described above.

[References]

Abowd, John M., and Henry S. Farber, (1982), "Job Queues and the Union Status of Workers," *Industrial and Labor Relations Review* Vo1.35, N0.3, April, 354-367.

Economic Planning Agency, (1999), "FY1999 annual economic report," Ministry of Finance Printing Bureau, [in Japanese: Heisei 11nendo Nenji Keizakei Houkoku].

Greene,William H, (1998), "Gender Economics Courses in Liberal Arts Colleges: Comment," *mimeo*.

Guiso, Luigi, Tu11io Jappelli and Daniele Terlizzese, (1996), "Income Risk, Borrowing Constraints and Portfolio Choice," *American Economic Review* 86, No.1, 158-172.

Guiso, Luigi, Michael Haliassos and Tullio Jappelli, (2001), *Households Portfolios, Massachusetts*, The MIT press.

Hayashi, Fumio, (1985), "The Effect of Liquidity Constraints on Consumption: A Cross-Sectional Analysis," *Quarterly Journal of Economics* 100, February, 183-206.

Institute for Posts and Telecommunications Policy, (1999), "The Sixth Survey on the Financial Asset Selection of Households, [in Japanese: Kakei ni okeru kinyu Shisan sentaku ni kansuru Chosa Dai-6-kai].

Koto, Hisaya, (2000), "Asset selection behavior of Japanese Households: Home ownership, Seniority-Based Pay Systems and Share Ownership,".Bank of Japan, Financial Markets Bureau, Working Paper Series 2000-J-9, [in Japanese: Wagakuni kakei no Sisan Sentaku Koudou ni Tsuite -Mochiie Senko, Nenko Joretsu Chingin Seido to Kabushiki Hoyu-].

Maddala, G. S., (1983), *Limited Dependent and Qualitative variables in Econometrics*, Cambridge University Press.

Matsuura, Katsumi, (1999), "Changes in Stock Investment Behavior of Households, *Security*

Analyst Journal, 6-17, September [in Japanese: Kakei no Kabushiki Toshi Kodo no Henka].

Kohara, Miki and Charles Y. Horioka, (1999), "Consumption and Borrowing Constraint: Who faces Borrowing Constraint?," Paper presented at the autumn conference of the Japan Economics Society, [in Japanese: Syo-hi to Kariire Seiyaku: Dare ga kariire Seiyaku ni chokumen shite iru ka].

Paxson, Christina, (1990), "Borrowing Constraint and Portfolio Choice," *Quarterly Journal of Economics* 105(2), May, 535-543.

Poirier, Dale J., (1980), "Partial Observability in Bivariate Probit Models," *Journal of Econometrics* 12, 209-217.

Poterba, James (ed.), (1994), International Comparisons of Household Saving, Chicago, IL, University of Chicago Press.

Yonezawa, Yasuhiiro, Katsumi Matsuura and Yasuko Takezawa, (1999), "Seniority-Based Pay systems and Demand for Stocks: Why are there little Household Demand for Stocks in Japan?," Gendai Finance N0.6, 3-18, [in Japanese: Nenko Joretsu Chingin Seido to Kabushiki Juyo -Naze Wagakuni kakei no kabushiki Juyo ha Sukunai noka].

Zeldes, Stephen, (1989), "Consumption and Liquidity Constraint: An Empirical Investigation," *Journal of Political Economy* 97, 305-346.

[1] Please see http://www.vwl.uni-mannheim.de/boersch/forchung/intern-savings.htm The project wazs performed under the auspices of the EU-sponsored TMR (Training and Mobility of Researchers) Project on Savings and Pensions.

[2] This “debt" means “ consumer loan” which excludes mortgage.

[3] Here we define “risky assets” as “stocks plus investment trusts." This definition corresponds to “ direct and indirect holdings in tables 2 and 3.

[4] A “safe asset” means “savings and deposits.”

[5] Koto (2000)'s finding, “housing loans and risky assets are substitutable” may also be interpreted in the same way.

[6] E.g. savings, deposits, stocks, investment trust.

[7] Similar questions were asked as part of the Panel Survey of Consumer Lifestyles used by Kohara and Horioka (1999). However, the sample for that survey consisted of females aged 20~34.

[8] Speaking of the subgroup which didn’t apply for a loan and gave up beforehand, they seemed not to be able to borrow money because they didn't have enough capability even though they had full information. In this sense, they are different from the subgroup whose applications were refused or partially refused. We can analyze the equation excluding the former subgroup, but even in this case, new problems such as sample selection bias will arise. One more possible way to estimate is to classify samples into three subgroups; (a)the subgroup which can't borrow money even though they are have full information, (b)the subgroup which can’t borrow money just because of imperfect information, (c)the subgroup which are not suffering from liquidity constraints. The latter method is an additional task for our future research.

[9] Greene (2000) pp.826-829. Let’s say, $\mathrm{Var}(u_i)= \sigma^2_i = \{\exp(cz_i)\}^2$.. z_i means a possible factor of hetero-sckedasticity, while c means a parameter to be estimated. We can examine the LM test subject to c=0.

[10] For household annual income, we compare total income from each individual source (such as business revenues or salaries) with total annual income of each household member, and adopt the larger amount. Similarly, for financial assets, we adopt the larger amount of either the total financial assets or the sum of each type of financial asset.

[11] However, it is easier to roll over when land prices increase or when interest rates decrease.

Table 1: International Comparison of Saving Rates (cited from Poterba (1994) Table 2-4)

Age-Specific Personal Saving Rates, OECD Nations (%)

	< 30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	>7 4
United States	-2.2	7.1	9.4	9.8	11.2	13.9	16.6	8.6	7.1	1.1	n.a
United Kingdom	5.0[a]	8.0	12.0	12.0	11.0	10.0	13.0	6.0	2.0	9.0	n.a
Canada	0.0	3.0	3.0	5.0	5.0	8.0	11.0	9.0	6.0	6.0	8.0
Germany	9.8	9.8	10.6	10.2	10.2	10.4	11.0	12.2	9.2	9.7	10.2[a]
Italy	10.0	20.0	26.0	22.0	23.0	31.0	32.0	34.0	36.0	31.0	n.a
Japan	17.9[a]	27.4	31.8	31.8	28.5	31.5	34.5	31.7	32.0	33.8	31.1[a]

a: Saving rate for German and Japanese households > 74 relates to those 75-79.
That for Japanese, U.K ., and U.S. households <30 is an arithmetic average of the saving rates for those <24 and 25-29.

	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	-
United States	0.9	2.5	2.0	2.3	2.3	1.6	2.8	7.0	5.8	6.1	-
Canada	0.0	0.9	1.3	2.4	5.2	8.2	11.0	17.2	15.4	11.1	-
Italy	4.1	4.3	10.1	9.3	10.2	15.8	13.6	8.9	10.0	7.4	-
Japan	15.4	25.1	33.5	40.8	48.5	51.6	63.3	79.5	76.4	69.5	-

Date Sources for International Comparisons of Personal Savings

	Date Source	Sample size
U.S.A	Consumer Expenditure Survey	3,500- 7,000
U.K	Family Expenditure Survey	7,000
Canada	Family Expenditure Survey	2,100- 3,500
Germany	German Income and Expenditure Survey	45,000
Itely	Survey of Household Income and Wealth	8,000
Japan	National Survey of Family Income and Expenditure	50,000

Notes:

United States: 1990 Consumer Expenditure Survey.
Canada: 1984 Survey of Consumer Finances ,converted to 1990 Canadian dollars and then converted to U.S. dollars using the 1990 exchange rate.
Italy: 1987 Survey of Household Income and Wealth.] converted to U.S. dollars using the average prevailing exchange rate in the year of the survey
Japan: 1989 National Survey of Family Income and Expenditure] and then the U.S. inflation rate between the base year and 1990.

Table 2: Propotion of Households investing in Risky Assets

(Cited from Table .3 and I 4 in Guiso et al. (2001) and add Japanese data)

I Direct stockholding

year/country	U.S.A.	U.K.	Netherlands	Germany	Italy	Japan
1983	19.1	8.9	n.a.	9.7	n.a.	15.4
1989	16.8	22.6	n.a.	10.3	4.5	19.2
1995	15.2	23.4	11.5	10.5	4.0	19.0
1998	19.2	21.6	15.4	n.a.	7.3	18.8

II Direct and Indirect stockholding

year/country	U.S.A.	U.K.	Netherlands	Germany	Italy	Japan
1983	n.a.	n.a.	n.a.	11.2	n.a.	18.0
1989	31.6	n.a.	n.a.	12.4	10.5	29.1
1995	40.4	n.a.	29.4	15.6	14.0	23.4
1998	48.9	31.4	35.1	n.a.	18.7	21.8

Date Sources

	Date Source	Sample size
Unaited States	Survey of Consumer Finances	4,000-4,500
United Kingdom	Family Expenditure Survey	7,000
	Financial Resarch Survey	58,000
Netherlands	CentER Savings Survey	2,000
Germany	German Income and Expenditure Survey	40,000-46,000
	Spiegel-Verlag Survey *Soll und Haben*	4,000-8500
Italy	Survey of Household Income and Wealth	7,000-8,000
Japan	Famiy Savings Survey	6,000
	Survey on the Financial Asset Choices	6,000

Sources

United States: Survey of Consumer Finances.
United Kingdom: Family Expenditure Survey.
Netherlands: CentER Saving Survey.
Germany: German Income and Expenditure Survey (1983) and *Soll und Haben* Survey (1989 and 199
(For comparison with earlier periods, all data refer to West Germany.)
Italy: Survey of Household Income and Wealth.
Japan: Family Savings Survey.

Table 3: Propotion of Households investing in Risky Assets, by age
(Cited from Table Ⅰ.2 and Ⅰ.6 in Guiso et al. (2001) and add Japanese data)

Ⅰ. Direct stockholding (Sheres held directly)

	Under 30	30-39	40-49	50-59	60-69	70 and over	Average
United States	11.8	16.0	21.2	24.8	23.7	18.2	19.2
United Kingdom	10.8	19.6	24.5	28.1	26.2	18.5	21.6
Netherlands	4.7	6.8	13.4	18.4	17.8	21.2	14.4
Germany	8.5	11.3	12.1	11.2	10.1	6.1	10.0
Italy	3.4	9.9	8.4	9.3	6.4	4.2	7.3
Japan	5.7	11.3	12.8	19.6	17.5	15.4	15.1

Ⅱ. Direct and Indirect stockholding

	Under 30	30-39	40-49	50-59	60-69	70 and over	Average
United States	34.3	51.8	58.3	61.4	47.1	32.4	48.9
United Kingdom	20.4	31.5	37.0	41.2	34.8	21.9	31.5
Netherlands	12.1	25.6	33.7	40.1	38.6	35.9	33.5
Germany	18.6	21.8	22.0	21.0	17.1	11.7	18.9
Italy	11.9	27.5	24.2	23.4	15.8	7.8	18.9
Japan	7.4	16.8	17.2	25.4	24.1	21.3	20.5

Sources
- United States: 1998 Survey of Consumer Finances.
- United Kingdom: 1997-1998 Financial Resarch Survey.
- Netherlands: 1997 CentER saving Survey.
- Germany: 1993 data (Unified), Income and Expenditure Survey.
- Italy: 1998 Survey of Household Income and Wealth
- Japan: 1998 Survey on the Financial Asset Choices.

Notes
- All statistics use sample weights.

Definisions

United States	Ⅰ.	
United Kingdom	+ mutual funds	
Netherlands	+ investmet accounts	
Germany	+ retirement accounts	*
Italy		
Japan	Ⅰ. + investment trust	*

Notes
*no information on pension funds

Except for the United States, information on the specific types of mutual funds and investment accounts is unavairable, and one cannot disentangle indirect stoskholding in mutual funds and managed investment accounts from investment in other financial assets. For this reason, the reported figures overestimate the true value of indirect stockholding.

Table 4 Cross Tables of Loan Applicants (question (A)-1, (A)-2, (B)-1)

Panel A

	Realization of Borrowing				
Loan Experienc	Unconstra	Reduced	Rejected	None	Total
Yes	678	42	51	0	771
No	0	0	0	834	834
Total	678	42	51	834	1605

Panel B

	Discouraged beforehand		
Loan Experienc	Yes	No	Total
Yes	99	672	771
No	81	753	834
Total	180	1425	1605

Panel C

	Discouraged beforehand		
Realization of B	Yes	No	Total
Unconstrained	45	633	678
Reduced	16	26	42
Rejected	38	13	51
None	81	753	834
Total	180	1425	1605

Table 5: Descriptive Statistics, Test for Mean Defference between (2) and (3)

		(1) Total		(2) No Constraint		(3) Liquidity Constraint		
Names	Meanings of Variab	Mean	S.D.	Mean	S.D.	Mean	S.D.	Z-value
SEIYAKU	Dummy (=1 if Liqui	0.136	0.343	-	-	-	-	-
RISK	Dummy (=1 if Holdi	0.186	0.391	0.201	0.401	0.091	0.289	3.877 ***
RISKY	Ratio for Risk/Tota	3.703	11.090	3.998	11.536	1.839	7.437	3.656 ***
(LRISKFIN	Log of RISKFIN	0.981	2.132	1.062	2.204	0.469	1.550	5.037 ***
(RISKFIN	The amount of Fina	86	395	96	423	22	92	5.713 ***)
LDISP	Log of DISP	6.482	0.73	6.492	0.728	6.423	0.743	1.275
(DISP	The amount of Dis	829	5741	836	579	788	540	1.210)
LWEALTH	Log of WEALTH	6.052	2.050	6.154	2.009	5.410	2.185	4.734 ***
(WEALTH	The amount of Tot	1186	1598	1251	1642	780	1220	5.037 ***)
LREAL	Log of REAL	4.989	3.735	5.108	3.727	4.239	3.712	3.217 ***
(REAL	The amount of Self	2240	4204	2360	4343	1480	3087	3.682 ***)
(LDEBT	Log of DEBT	2.014	3.093	1.909	3.071	2.680	3.154	-3.374 ***
(DEBT	The amount of Deb	410	11781	409	1207	417	974	-0.108)
LDISPWEL	Log of DISPWEL (%	0.150	1.494	0.064	1.449	0.692	1.653	-0.044
(DISPWEL	The amount of DIS	7.386	50.124	6.612	49.758	12.284	52.236	-3.605 ***)
LREWEL	Log of REWEU%	0.637	1.270	0.631	1.246	0.676	1.410	-0.446
(REWEL	The amount of REA	12.481	184.234	10.270	164.373	26.470	279.032	-0.837)
LDEBWEL	Log of DEBWEL (%	0.070	1.007	0.061	0.954	0.125	1.295	-0.702
(DEBWEL	The amount of DEI	6.765	139.238	4.677	115.977	19.979	238.725	-0.931)
MYHOME	Dummy (=1 if Owni	0.632	0.483	0.641	0.48	0.571	0.496	2.013 **
AGE	Age	50.765	13.554	50.833	13.713	50.338	12.523	0.536
AGE2	Square of Age	27.607	13.851	27.719	14.024	26.900	12.712	0.873
FEMALE	Dummy (=1 if Fema	0.093	0.290	0.088	0.283	0.123	0.331	-1.5
SELFAGRI	Dummy (=1 if Self-	0.189	0.392	0.175	0.380	0.283	0.452	-3.370 ***
PART	Dummy (=1 if Part	0.044	0.204	0.041	0.199	0.059	0.237	-14.347 ***
NOJOB	Dummy (=1 if no jo	0.172	0.378	0.171	0.377	0.178	0.384	4.012 ***
JUNIOR	Dummy (=1 if junio	0.214	0.411	0.200	0.400	0.306	0.462	0.660
UNIV	Dummy (=1 if Unive	0.248	0.432	0.265	0.441	0.142	0.349	4.663 ***
HOUSING	Dummy (=1 if havir	0.222	0.416	0.222	0.416	0.224	0.418	-0.049
Number of Samples			1605		1386		219	

Note) The amount of asset shows 10 thouthand yen. AGE2 is devided by 100.
We didn't use variables in the parenthesis explicitly in our analysis, but show the number just for reader's reference.
***, **, * denotes significance at 1%, 5%, 10% level respectively.

Table 6 The Effect of PROB

PROB (%)	0	10	20	30	40	50
RISKY (%)	31.95	20.16	11.46	5.83	2.64	1.06
Expected	7.18	3.90	1.93	0.86	0.35	0.13