

2. Previous studies

Many studies have revealed that one of the major factors to save in Japanese households is precautionary saving, which a household accumulates for income uncertainty. A survey conducted by the Central Council for Financial Services Information reports that the largest motivation to save in Japanese households is to prepare for sickness or unforeseen disasters (about 70%), most of which are precautionary motives. This is followed by the motive for living expenses after retirements (60%), which are consistent with the life cycle model to assume that people save in younger ages and dissave after retirement⁴. Those motives are much stronger than others including for children's education or marriage, purchase of own residence, expenditures for traveling or leisure or bequests.

However, the importance of precautionary saving depends on empirical studies and they have not reached a consensus yet. In what follows, we will review some important studies to evaluate how precautionary saving matters.

A representative measure of precautionary motives depends on the gap between marginal household utility when futures are certain and expected value of marginal utility when future consumption is uncertain (Leland (1968), Sandmo (1970), Dreze and

⁴ The survey allows a multiple answers so that the sum of responses in each choice exceeds 100%.

Modigliani (1972)). Some previous studies proposed some measures of precautionary saving, represented by Kimball (1990); absolute and relative coefficients of prudence. The relative coefficients is defined as the third derivatives of household utility divided by the second derivatives and the absolute one is defined as relative coefficients times consumption levels⁵

Based on this prudence theory, there are some studies to estimate the magnitude of the prudence coefficient. Dynan (1993) reported that the coefficient is close to zero in most cases (at most 0.3), which are much smaller when assuming a function with a constant relative risk aversion. On the other hand, Merrigan and Normandin (1996) uses a British household survey to show that the estimated coefficients are about two and Hori and Shimizutani (2002) utilize a Japanese household survey to report the coefficient is estimated to be four in 1999, when Japan experienced an unprecedented financial crises including a number of large bank failures in the end of 1998.

In addition to the estimates of prudence coefficients, there are other major streams in the empirical study of precautionary saving. One stream is to estimate saving function to include demographic variables as well as several proxies for uncertainty in the right hand side variables and evaluate how the proxy variable stimulates personal

⁵ If the third derivative of a utility function is zero (say, a quadratic function), the precautionary motives disappear.

savings rate. However, the importance of precautionary motives depends on each research. Dardanoni (1991) uses a British household data to show that a larger variation in income leads a decrease in consumption. Kazarosian (1997) reported that the ratio of financial assets out of permanent income is stimulated by 3 % when income risks are doubled. Other studies, however, report that the precautionary motives are weak. Guiso, Jappeli and Terlizzese (1992) showed that the precautionary motives occupy only 2% of total gross assets in Italy. Lussardi (1996) also estimates that precautionary motives are not large in fifties of Americans.

In Japan, Ogawa (1991) confirm that a larger income risks enhances personal saving rate. Ishihara and Doi (2003) demonstrates that unemployment risks increased savings/GDP ratio by 1% point and Murata (2003) discusses that precautionary motives are stronger in Japanese households with anxiety for pension scheme.

The third strategy is to adopt calibration technique based on the buffer stock savings model. The buffer stock saving theory insists that households uses their savings as a “buffer” for unexpected events in face of labor income uncertainty (Carroll (1997))⁶. This type of previous studies seems to have a consensus that precautionary

⁶ In this model, households set a target of savings level in the case that their incomes substantially decreases and they increases savings when the current level is below the target, even sacrificing current consumption At the same time, the theory assumes the following condition to avoid the situation that savings go to infinity;

motives occupy a substantial. Carroll and Samwick (1998) reports that a half of net financial assets are motivated by precautionary saving. Gourinchas and Parker (2002) also report that precautionary motives matters as well as the life-cycle motives. Abe and Yamada (2004) applies Gourinchas and Parker (2002) to Japanese household data and conclude that Japanese households are more patient and 40% of savings in younger generations has precautionary motives.

The last stream to tackle with precautionary saving is to take advantage of peculiar institutions to evaluate precautionary saving. Especially, those studies focus on the effect of social security program on household saving behavior. Since households gain precautionary savings in the face of uncertainty, provision of more generous public or private insurance mitigates income anxiety and thus is supposed to diminish precautionary saving motives. Kotlikoff (1988) and Hubbard, Skinner and Zeldes (1994, 1995) are representative studies based on simulation and reached a similar conclusion that social insurance can significantly reduce savings partly by mitigating the need for precautionary savings. On the contrary, empirical studies to examine the effect of social security program on household savings are mixed. Engen

$$(R\beta)^\gamma < G$$

where R is gross interest rate, β is a discount rate, γ is a coefficient of relative risk aversion and G is income growth rate (assumed to be constant). Ishihara and Doi (2004) discusses that this buffer stock saving can account for both excess sensitivity and excess smoothness.

and Gruber (2001) find that gross financial assets increase by 14% points when compensation provided by unemployment insurance is discounted to a half. On the contrary, Starr-MacCluer(1996) examines the different savings behavior in household with and without health insurance and she cannot observe any clear distinction in saving behavior between those types of households.

This study echoes with the last type of savings study. As far as we know, there has been little research in Japan to estimate saving function including health status as an explanatory variable mainly due to the lack of household-level data with rich information on health status. This scarcity also hampered an empirical investigation of whether the public long-term care insurance is attributed to the rapid decline in the household savings rate. This study tries to fill up the gap and also provide an empirical assessment of the relationship between public elderly care insurance and precautionary savings.

3. Public long-term care insurance in Japan

This section describes briefly the public long-term care insurance in Japan, which was introduced in spring of 2000, with four key objectives enunciated by the Japan Ministry of Health, Labor, and Welfare (Mitchell, Piggott and Shimizutani (2004)).

First, the approach sought to reduce the burden of home care of the elderly, a burden traditionally borne by women. Socializing care burden was expected to stimulate female labor supply in Japan under rapidly aging and declining fertility (Shimizutani, et.al. (2004)). Second, the new system sought to make more transparent the relationship between benefits received and premiums paid. Third, the new program was designed to provide a means by which customers would receive comprehensive services from a variety of institutions of their choice. Fourth, the new insurance program sought to reduce the number of “social hospitalization” cases where elderly were hospitalized simply because of a lack of viable alternatives.

Under the new insurance system, all insured eligible people are now entitled to receive necessary care services (Mitchell, Piggott and Shimizutani (2004))⁷. This insurance is financed by premiums of the insured (all residents in Japan aged fourth and over) and public funds (central and local government). Although an insured is not automatically entitled to use care services through the public insurance, an individual is eligible to use care provision once he/ she is approved. In the process, each insured person applies to an expert committee under municipalities and a screening determination is made within 30 days. When certified in need of LTC, the person is

⁷ Detailed information on the scheme of Japan’s long-term care insurance is briefly provided by Mitchell, Piggott and Shimizutani (2004).

further determined as falling into one of six health condition categories, which determines benefit entitlements; Care Levels 1-5 and “support required.” Based on the care plan provided by a care manager, a user is free to contract care services with any providers under the “contract system”, at the burden of a 10% co-insurance up to a certain amount (Mitchell et. al (2004)).

This newly introduced public elderly care insurance household saving behavior. As discussed in the previous section, precautionary savings are motivated for income uncertainty in future. If this is the case, the public insurance should have mitigated some portions of anxiety since care costs in elder ages are mostly paid by insurance and out-of-pocket burden was substantially diminished. In addition, the eligibility expanded substantially to all the insured, instead of limited in lower-income households before 2000, which is alleged to have a large impacts on average household behavior.

Although utilization of the long-term care insurance did not increase in the first year, the amount of care usage expanded in FY 2001 after a year from the introduction, which coincidences with the sharp decline in household saving rate (Figure 2). After FY 2002, the care use has continued to be large, which proves a permanent effect. In the following sections, we will investigate how this elderly care insurance affected household saving behavior

4. Data

We take advantage of a rich micro-level data to test this hypothesis; “Basic Survey on People’s life” compiled by the Ministry of Health, Labour and Welfare. This survey was initiated in 1986 by combining four previous surveys perform the ministry. This study uses the micro-level data from this survey in 2001.

This survey consists of four different types of questionnaires. The household demographic survey contains detailed variables for each household member including sex, age, spouses, relationship between head of household and other family members, type of jobs, pensions as well as each household’s residential status, consumption in May. The health questionnaire includes individual member’s hospitalization, any self-conscious diseases, any diseases to go to hospitals or clinics, duration of going to hospitals or clinics, medical expenditures in May, any effects of diseases on daily life, days in beds per month, subjective judgment of health status and any stresses caused by specific reasons. The income and savings questionnaire asks annual household incomes and their decomposition, taxes and social security contribution as well as gross financial assets and liabilities as of the end of June, 2001.

This survey is a cross-section data. As regards the questionnaires on household

demographics and health, the sample is 5,240 districts which are randomly chosen based on the census and the number of sample was 280 thousand households (780 thousand household members). The final sample size is 247,195. On the other hand, the questionnaire on income and savings are sent to all households and their members in the 2,000 districts among the 5,240 areas (40 thousand households and 120 thousand family members). The sample size is 30,386. Those samples are matched by identifying codes completely. Since we need any variables on income and savings, we confine our sample in those in the income and savings survey, i.e. the 30,386 households.

In order to make the estimates more precisely, we removed some samples from our sample. First, we excluded any households whose member is greater than 10. Second, since we focus on the relationship between public long-term care insurance and household saving behaviors, we confine the sample into the insured; those whose age of head of households is greater or equal to 40 and less than 80. Those households whose head is aged 80 or over in the later elderly period are also removed. Third, we do not use any sample whose gross financial assets or liabilities are greater than 100 million yen.

Table 1 reports the basic statistics. The average of gross financial assets or

liabilities is about 8 million yen and 3.5 million yen, respectively. The net financial assets (gross financial assets minus liabilities) are about 4.5 million yen. On the other hand, household disposable income is 5.7 million yen. In this study, we will use two different savings rates. One is defined as gross financial assets divided by household disposable income with the average of 2.04. The other is defined as net financial assets divided by household disposable income with the average of 1.28. The average age of head of household is 59.5 and about 80% live in detached houses. Among all heads of households, about 30% have a job. About 20% live by themselves.

The remaining variables are related with health status of head of households.

While only 1% of total households are hospitalized, about 40% have any self-conscious diseases among 43 detailed items (i.e. headache, stomachache) or any diseases to go to hospitals or clinics. About 15% respond that their disease affects their daily lives or some day in beds per month. More than 30% answer that their health condition is nice or better and 40% report that their health are neither nice nor bad. The survey also asks whether each household member has stresses caused by some specific reasons.

Table 1 reports some related variables with future incomes or the needs for long-term care for heads, co-residents and any members who live separately. Lastly, the dataset contains the variable to stand whether a head is approved to be eligible for care use

through the public long-term care insurance.

Table 2 decomposed those main variables by age cohorts. We observe several interesting findings. Gross financial assets increase with age and peak out in aged 60-69 while liabilities diminish with age straightforwardly. As a result, net financial assets are negative in aged 40-49 probably due to a large amount of loans for residential purchases and the net value increases until aged 70-79. This is also true for saving rates. We notice a large increase in saving rate along with age.

On the other hand, it is easy to imagine that health status deteriorated in higher ages. Almost of all indicators to health status become worse in the samples whose head is older. For example, the portion of those who have any self-conscious diseases is around a quarter in aged 40-49 while almost a half in aged 70-79 conceive some diseases.

5. Estimation strategy and results

In this section, we estimate household saving function based on the micro-data from the *Basic Survey on People's life*. The basic specification is as follows.

$$\frac{W_i}{Y_i^P} = F(\text{age}_i, \text{age}_i^2, \text{health}_i, X_i) \quad (1)$$

where W_i is household gross or net financial assets and Y_i^P is household permanent

income (here, we use current household disposable income as a proxy but in future we will use King et. al. (1982) to estimate permanent incomes for individual household based on a cross-sectional data). The independent variables include a quadratic in age of head of households and head's health status and other demographic variables reported in Table 1 as well as dummy variables for each prefecture (47 prefectures in Japan).

Following Engen and Gruber (2001), we also estimate a slightly different specification.

$$\ln W_i = F(\text{age}_i, \text{age}_i^2, Y_i^p, \text{health}_i, X_i) \quad (2)$$

where the dependent variable is logarithm of gross or net financial assets and Y_i^p is now included in the right hand side.

Table 3 reports the results based on specification (1). Since the results do not vary much between two types of measures of saving rates, we will mainly focus on those obtained when gross financial assets are the dependent variable. First, we notice that household saving rate is reduced significantly when head of household is hospitalized (Health Status 1) or have more in-bed days (Health Status 7). Those results are natural since those head of households have fewer physical opportunities to work to earn. On the contrary, *higher* saving rates are observed in those households with any diseases to go to hospitals or clinics (Health Status 3) or longer duration to go

there (Health Status 4). This might be surprising but these findings could be explained by that those heads have less serious diseases instead of hospitalization or in beds and have no disadvantages to work. They could also be more prudent for their health conditions so that they save more. The coefficients on medical expenditure out of annual disposable income (Health Status 5) are not significant partly because the medical costs data is available only in a single month (May) and thus noisy. The other coefficients on any self-conscious disease (Health Status 2) or negative effects on daily life (Health Status 6) are positive but not significant.

Health status 1 to 7 refers to variables measured by any physical symptoms and thus stands for current health conditions of head of households. On the contrary, Health Status 8 and 9 are some measures of health anxiety, rather than objective or clinical evaluation. As regards self-evaluation on own health condition (Health Status 8), we observe that households with higher subjective evaluation on their health condition have higher savings rates. This might be contradictory with the precautionary motives but this might reflect that households with lower evaluation have some obstacles to work or larger expenditure on medical costs. As regards stresses a head of household suffers (Health Status 9), stresses caused by future income uncertainty dampen current savings rates. This could also be explained by the same

story applicable to the results on Health Status 8. On the contrary, anxiety for the needs for elderly care for themselves stimulates saving rates substantially. This implies that the public long-term care insurance did not overcome future risks of being in need of care and still motivates precautionary saving. Lastly, entitlement for public insurance diminished savings rate. This might be considered as an evidence that the new insurance scheme diminished household savings rate but at the same time, those head of household have worse health condition for a long time, which diminished saving rates.

Table 4 reports the results based on Specification (2). We should note that the sample in those regressions have positive net wealth when its logarithm is taken as the dependent variable. Although there are some coefficients with different signs or significance in comparison with those in Table 1, what we discussed above is also true for Table 2.

What we observed above is as follows. First, health conditions measured by hospitalization or in-beds days per month have negative effect on saving rates since those households have less chances to work. Second, health conditions measured by any diseases to go to hospitals or clinics or longer duration to go there might make households realize the needs for saving. Third, other variables related with health

conditions are positive but not significant. Fourth, health anxiety measured by subjective evaluation makes households to save less. Fifth, health anxiety measured by stresses caused by future income uncertainty dampens current savings rates while those for the needs for elderly care for themselves stimulates saving rates substantially.

Those results implies that there are different effect of health status on household saving behavior between health conditions and health anxieties. Since the theory of precautionary saving addresses future income uncertainty, we focus on the effect of health anxiety on saving. Lastly, we will perform the following regression to examine the effect of health anxiety on saving rates, controlling for health conditions.

$$\frac{W_i}{Y_i^P} = F(\text{age}_i, \text{age}_i^2, \text{healthcondition}_i, \text{healthanxiety}_i, \text{healthcondition}_i \times \text{healthanxiety}_i, X_i) \quad (3)$$

Table 5 reports the results. We will focus on the coefficients on health anxieties. Those on subjective evaluation on self-evaluation are still negative. In this case, we make a dummy variable to take 1 if a head of household responds that his condition is worse or bad. Those households have lower savings rates, which is consistent with Table 3. The coefficients on the stresses for elderly care for themselves are positive and significant, which is also consistent with Table 3. However, any coefficients on approval of public long-term care insurance are negative but insignificant.

Those empirical results implies that households with larger anxieties for care

needs in future still have higher saving rates and even the entitlement to use public insurance did not diminish household savings.

Finally, we should make some remarks on the results. As discussed above, the data in this study is cross-sectional. Ideally, we need panel data to examine whether a household saves differently in face of the public elderly care insurance. We do not deny the possibility that the magnitude to save more in households with stronger stresses has been reduced. One possibility to address this issue, we will pool the micro-data from Basic Survey on People' life in 1998 as well as 2001 and examine the difference in the household saving behavior.

6. Conclusion

Japan's unusually high saving rate has held interests for both academics and policy makers. On the contrary, in the 1990s, we observe a declining trend in the household savings rate with a large jump down in FY 2001 (from 9.1% to 6.5% in the SNA data) and this reduction is often explained by the popular hypothesis to insist that this trend is accounted for by the rapid increase in the portion of the elderly who dissave as the life-cycle model assumes. In this paper, we propose an alternative hypothesis to address this remarkable decline; the introduction of the public long-term care insurance

reduced the precautionary saving motives in Japanese households. We take advantage of a rich micro-level data to test this hypothesis by estimating the saving function with health status in each head of household. So far, our empirical estimates did not find any clear evidence that the long-term care insurance caused the decline in precautionary saving.

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