Commitments in Marriage and Under-savings[1]

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Abstract

In this paper, we hypothesize that for married individuals with hyperbolic discounting putting saving or consumption decisions in the hand of spouses or getting spouses involved into decision makings functions as commitment devices, and then we empirically examine the hypothesis. Using the micro-data of married Japanese couple from waves 2008 and 2009 of the Preference Parameters Study of Osaka University, we conducted a cross-sectional analysis. Our results are as follows: wives who discount hyperbolically and discuss together but husbands mainly decide on savings and investments are more likely to save as they think they should. In addition, we have a similar effect when we alternate from decisions on savings and investment to decision on expenditures. However, we do not have significant effects for husband sample. From these, we conclude that for wives with hyperbolic discounting putting saving or consumption decisions in the hand of spouses or getting spouses involved into decision makings functions as commitment devices. (156 words)

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1. Introduction

We all are conscious of the need for saving for the future, but many of us find difficulties in carrying out saving plans. According to a 1997 survey by Public Agenda, 76% of the surveyed Americans believe, when it comes to putting aside money for retirement, they should be doing more. In addition, 77 percent think that they are at a point where they should be seriously saving already, but only 6 percent of them think they are ahead in saving for retirement and 55 percent are behind. The survey administrated by Choi et al (2002), although the surveyed employees think that they should ideally be saving for retirement 13.9 percent of their income, 67.7 percent of them think that their actual saving rate is too low relative to the ideal saving rate. In Japan, the 2012 Public Opinion Survey on Household Financial Assets and Liabilities, conducted by the Central Council for Financial Services Information shows that, on average, the targeted balance of the financial assets is 22.6 million yen, while the average amount of financial assets per household stands at 11.1 million yen and 26.0 percent of households have no deposits and savings.

As an explanation for why people cannot save as they would like to save, hyperbolic discounting has been recently receiving attention in behavioral economics. Contrary to the traditional exponential discounting, where people discount the future at a constant rate, hyperbolic discounting is characterized as discounting the nearer future at a higher discount rate and the further future at a lower discount rate. Hyperbolic discounting implies that people are impatient for the immediate consumption and become more patient for events a long time into the future. Thus,

hyperbolic discounting leads to a claim that people make saving plans but changes them along the way. That is, people are facing self-control or time inconsistent problem.

One important implication of the hyperbolic discounting is that individuals confronted with self-control or time inconsistent problems demand for commitment devices. For people who recognize that they will fail to follow their saving plan, it is beneficial to pre-commit themselves to save as they think they should save. An example of commitment devices is Save More Tomorrow (SMarT) program of 401(k) plan in the US, which invites employees to pre-commit to increase their saving rate later, each time they get a raise in salary. The average contribution rates for SMarT program participants increased from 3.5 percent to 13.6 percent of their salary (Thaler and Benartzi (2004)). Another example is Save, Earn, Enjoy, Deposits (SEED) accounts in the Philippines, which restricts their access to their funds but has no further benefits (Ashraf et al (2006)). ~~Rotating Savings and Credit Associations (ROSCA) are popular in many developing countries, which are groups of individuals who agree to meet for a regular period in order to save and borrow from one or more of the members in turn (Gugerty (2007)). Even in Japan, Rotating Savings and Credit Associations called Mujin or the Tanomoshi-ko have survived until today from the traditional, pre-Modern era (Dekle and Hamada (2000)).~~(ここいらない？)

Commitment devices are not limited to above- mentioned formal and hard ones accompanying economic penalties. Some of ad hoc arrangements people create spontaneously imposing psychological costs can work as informal and soft commitment devices. Commitments

4

through labeling as mental accounting of Thaler (1985) are an example. Then, in this paper, we focus on soft and informal commitment devices in marriage. For personal and private relationships such as married couples, it may make sense for them to rely first on soft commitment devices, which are more convenient and flexible to changes in circumstances, though more susceptible to temptations. If wives' degree of hyperbolic discounting are higher than husbands', it will be beneficial for the wives to leaving households saving decision in the hand of husbands, though it will deprive from the wives the freedom of discretionary spending. In addition, if hyperbolic discounting husbands get their wives involved in deciding household savings or expose the decision process to their wives, then husbands' yielding to temptation will carry the risk of discrediting or dishonoring themselves. Thus, it may be that for married individuals with hyperbolic discounting putting saving or consumption decisions in the hand of spouses or getting spouses involved into decision makings functions as informal and soft commitment devices. But there is little attention to informal commitment devices in marriage. One exception is Ashraf (2009), who elicit causal effects of spousal observability and communication on financial choices of married individuals in the Philippines.

In this paper, we hypothesize that for married individuals with hyperbolic discounting putting saving or consumption decisions in the hand of spouses or getting spouses involved into decision makings functions as commitment devices, and then we empirically examine the hypothesis. Using the micro-data of married Japanese couple from waves 2008 and 2009 of the

Preference Parameters Study of Osaka University, we conducted a cross-sectional analysis.

This paper is organized as follows. In Section 2, we describe our hypothesis for empirical analysis. In Section 3, we present the data source, sample selection. In Section 4, we explain the estimation model. In Section 5, we present the descriptive statistics. In Section 6 we show our estimation results. Finally, in Section 7, we discuss our results and conclude the paper.

2. Conceptual Framework

This section presents the conceptual framework of our analysis. The hyperbolic discounting models assume that people tend to apply a high discount rate to time periods nearer in the future, but have low discount rates to periods future away, which is the cause of self-control or time inconsistency problems. One important implication of the hyperbolic discounting is that individuals confronted with self-control problems will demand for commitment devices. However, it is only in the case where the individuals are sophisticated or partially naïve (O'Donoghue and Rabin (1999)). The former sophisticated individuals correctly predict how their preference will change over time and the latter partially naïve individuals know that their preference will change over time but underestimate the extent. Practically, in the real world, it is far from realistic to consider that there is no small number of the extreme completely naïve individuals, who believe that their preference will not change over time and thus end up without commitment devices.

In our analysis, we consider married individuals who discount the future hyperbolically

and are completely or partially aware that their preferences will change over time. Then, we focus

on their use of leaving households saving decision in the hand of their spouses or getting their

spouses involved in deciding household savings as soft and informal commitment devices. We

hypothesize that (i) self-aware married individuals with hyperbolic discounting will put household

saving decisions in the hand of their spouse or get their spouses involved in deciding household

savings, and thus they will succeed in saving as they think they should save. In contrast to this,

married individuals with exponential discounting are unmindful of the use of commitment devices.

Thus, we hypothesize that (ii) married individuals with exponential discounting will succeed in

saving as they think they should save, regardless of household saving decisions in the hand of their

spouse and get their spouses involved in deciding household savings or not.

3.   Data & Sample Selection

We use the micro data from the Preference Parameters Study of Osaka University's 21st Century

COE Program 'Behavioral Macrodynamics Based on Surveys and Experiments' and its Global COE

project 'Human Behavior and Socioeconomic Dynamics'. Using two-stage stratified random

sampling, it started in February 2003 (wave 2002 (Note that Japan's fiscal year starts in April)) with

2000 males and females aged from twenty to sixty nine years throughout Japan and has been

carried out every year since then. After that, new individuals were added in waves 2003, 2005, and

2008. In the study the drop–off, pick–up method is used.[4]

Our analysis is cross-sectional using waves 2008 and 2009. Wave 2008 contains the information on who mainly decides on savings and investments for respondent's household and wave 2009 contains the amount of entire household's financial assets the respondent would have wanted to save until now.[5] We use wave 2008 for the other socio-economic and demographic information of the respondents.

We take the following steps in selecting our sample from the Preference Parameters Study. First, in wave 2008 the survey had 6,181 respondents out of 8,683 individuals, made up of 2,683 respondents of prior wave and 6,000 newly added individuals (71.2% response rate). We then select married individuals, which yields a sample of 4,859. Further we eliminate the individuals who did not answer the necessary information, which yields a sample of 2,273. There are 1,125 husbands and 1,148 wives.

4.   Estimation Model

In this paper, we want to examine whether or not letting spouses manage the household finance

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[4] The drop–off, pick–up method is conducted as follows: First, a census taker visits randomly selected households and leaves a hard copy of the questionnaire. Next, the selected households respond to the questionnaire within a given time period, and then the census takers collect the completed questionnaires by visiting the households again at a convenient time.

[5] The decision making on savings and investments was asked also in wave 2007. However, there were 6,000 newly added individuals in wave 2008. Thus, we do not use wave 2007 but wave 2008.

functions as a commitment device for saving. In order to do so, we see whether or not the respondents save as they think they should save. The study we use has asked the balance of financial assets (savings, stocks and insurance etc.) of respondent's entire household as a categorical variable with ten response options, which is defined as a variable W_i for representing household financial assets. In the same way, the study asked only in wave 2010 the amount of entire household's financial assets the respondent would have wanted to save until now. Then, we define a variable T_i for representing the amount that the household would have wanted to save. So we construct an ordered variable for whether or not the respondents save as they would like to save. The variable *save as they should*$_i$ takes the value 2 if household financial assets W_i exceeds the amount that the household would have wanted to save T_i; value 1 if W_i is equal to T_i; value 0 if W_i falls short of T_i. Alternatively, we take the difference between W_i and T_i and take the inverse hyperbolic sine transformation as $\log\left(W_{it} - T_{it} + \frac{\sqrt{(W_{it}-T_{it})^2+1}}{2}\right)$ since wealth data is skewed in many cases.

Then, we conduct ordered probit regressions of the dependent variable *save as they should*$_i$ in which y_i^* is the unobserved or latent variable determined by the following form:

$$y_i^* = \alpha \ hyperbolic_i + \Sigma_{j=2,3,4} \ \beta_j \ D_{ji}^{savings} + \Sigma_{j=2,3,4} \ \gamma_j \ D_{ji}^{savings} \times hyperbolic_i + \mathbf{Z}_i + \varepsilon_i$$

(1)

with ε_i is assumed to be distributed as a standard normal. Instead of y_i^*, we observe

$$save\ as\ they\ should_i = \begin{cases} 2 & \text{if} & y_i^* > \mu^1 \\ 1 & \text{if} & \mu^1 > y_i^* > \mu^0 \\ 0 & \text{if} & \text{if } \mu^0 > y_i^* \end{cases}$$

(2)

The μ^0 and μ^1 are unknown threshold parameters that must be estimated along with parameters in

equation (1). Estimation is undertaken by maximum likelihood. We conduct the above ordered

probit estimation with robust standard errors for husbands and wives separately.

Our main independent variables are as follows: First, we include three binary variables

$D_{ji}^{savings}$ (j = 2, 3, 4), which indicate households' types of decision makings on savings and

investments. In wave 2008 the study asked who mainly decides on savings and investments for

respondent's household with four response options. The options are 1) you decide, 2) your spouse

decides, 3) discuss together but you mainly decide, and 4) discuss together but your spouse mainly

decides. Using this question, we define $D_{ji}^{savings}$. That is, variable $D_{2i}^{savings}$ equals one if a respondent

and his/her spouse discuss together but the respondent mainly decides, and zero otherwise. The

variable $D_{3i}^{savings}$ equals one if a respondent and his/her spouse discuss together but the spouse

mainly decides, and zero otherwise. The variable $D_{4i}^{savings}$ equals one if the spouse decides, and zero

otherwise. The base category is the respondents who decide on savings and investment by

themselves. The survey asked the decision on expenditures in the same way, so we define

$D_{ji}^{expenditures}$ (j = 2, 3, 4) as an alternative variables to $D_{ji}^{savings}$.

Second, we include a binary variable *hyperbolic_i*, which indicates whether or not

10

respondents discount hyperbolically. The study asked the respondents to answer several questions, which intend to measure the respondents' discount rates. One of the questions requests the respondents to hypothetically choose to receive 10,000 yen (approximately $100) in two days (hereafter we call this choice "A") or to receive X yen in nine days (hereafter we call this choice "B"). The amount X varies in eight steps from 9,981 yen to 10,574 yen. (Corresponding annual discount rates, from -10 percent to 300 percent, are provided in the question.) At low X, the respondents are expected to choose "A", but, as X increases, they will switch to choose "B" at a certain threshold amount, which is written as X_i^{2v9}. We eliminate the respondents who wavered between to choose "A" and to choose "B". Other question requests them to choose to receive 10,000 yen in ninety days or to choose to receive X yen in ninety seven days in the same way. Then, we write the threshold amount of X in this question as X_i^{90v97}. By comparing short horizon X_i^{2v9} and long horizon X_i^{90v97}, we can judge whether or not the respondents discount hyperbolically. We construct a binary variable *hyperbolic*$_i$, which is equal to one if X_i^{2v9} is larger than X_i^{90v97}, and zero otherwise.

Furthermore, people can have time preferences in the other direction, that is, the discount rate is low in the short horizon, but then is high in the long horizon. This is the situations that people are patient now but are impatient in the future. For the time preferences in this direction, we construct a binary variable *patient now and impatient later*$_i$ to be equal to one if X_i^{2v9} is smaller than X_i^{90v97}, and zero otherwise. As an explanation of this time preferences in the other direction, Loewenstein (1987) proposed individuals who choose to defer consumption repeatedly so as to derive utility from

11

anticipation of future consumption. Also Ashraf et al (2006) gave an explanation that an individual is flush with cash now, but foresees being liquidity constrained in the future. The base category is the respondents with conventional exponential discounting, that is, $X_i^{2v9} = X_i^{90v97}$.

Third, we include interaction terms between households' types of decision makings on savings and investments, $D_{ji}^{savings}$, and hyperbolic discounting, $hyperbolic_i$. These interactive terms are our primary interest and allow us to see the impact of households' types of decision makings on savings and investments on whether or not respondents save as they think they should save to depend on hyperbolic discounting. The base category is the respondents who discount the future exponentially and who decide on savings and investments by themselves ($hyperbolic_i = 0$ and $D_{ji}^{savings} = 0$ for j = 2,3,4).

Finally, $\mathbf{Z}_i$ includes control variables for respondents' and their spouses' annual earned income of before taxes, with bonuses included (and also business income), occupations (full-time employee and part-time employee. The base category is the respondents who are housewives/househusbands, students, retired or unemployed), ages, and years of education, the number of children, and family size. We also include in it respondents' rate of time preference (X_i^{2v9} and X_i^{90v97}) and degree of risk aversion (when you usually go out, how high does the probability of rain have to be before you take an umbrella?).

The expected signs of coefficients are as follows. First, as our hypothesis (i) tells, suppose that married individuals with exponential discounting succeed in saving as they think they should save, irrespective of households' types of decision makings on savings and investments. Then, since

12

hyperbolic$_i$ = 0, we expect the coefficients of zero on $D_{ji}{}^{savings}$, that is, β_j = 0 for j = 2, 3, 4. Second, as

hypothesis (ii) tells, suppose that married individuals with hyperbolic discounting are so self-aware

as to let their spouses manage the household finance and thus they save as they think they should

save. Then, since *hyperbolic*$_i$ = 1, we expect that the sum of the coefficient of $D_{ji}{}^{savings}$ and that of

interactive term $D_{ji}{}^{savings}$ x *hyperbolic*$_i$ is expected to be positive. Because of β_j = 0, we expect that γ_j > 0

for j = 2, 3, 4. In addition to these, it is evident that the coefficient of *hyperbolic*$_i$ is expected to be

negative, that is, α < 0 since married individuals who do not make use of commitment devices are

expected to fail to save as they think they should save when they discount hyperbolically. To

summaries these three expectations, the sign of the coefficients are expected as α < 0, β_j = 0 and γ_j >

0 for j = 2, 3, 4.

5.   Descriptive Statistics

Table 1-1 provides the means of the variables we use. First of all, the average age of the husbands is

51.9 and that of the wives is 49.5. Husbands are, on average, two and a half years older than wives.

The age distribution of the respondents we use is as follows: 2.5 percentage of respondents aged

under 29, 17.1 percentage aged 30 to 39, 27.9 percentage aged 40 to 49, 27.0 percentage aged 50 to 59,

and 25.5 percentage aged over 60. Second, the average years of education are 13.6 and those of

wives are 12.9. Husbands are a half year better educated than wives. Thirdly, the average annual

earned income before taxes, with bonuses included (and also business income) of husbands are 5.5

million yen and that of wives are 1.3 million yen. Finally, on average, the respondents we use have

two children and their family size is 3.7.

Table 1-2 provides the percentage of categorical variables.

Next, Figure 1 provides the distributions of the balance of financial assets (savings, stocks

and insurance etc.) of entire household, W_i, and the amount of entire household's financial assets

that should have been saved until now, T_i. First, on average, the respondents we use have 13.3

million yen of financial assets of their entire household and 24.8 million yen is the amount of the

total financial assets of their entire household that they should have saved by now. The standard

deviation of W_i is 18.8 million yen and that of T_i is 28.8 million yen. Second, the balance of financial

assets reported by husbands is slightly lower than that by wives, while the financial assets that

should have been saved by now reported by husbands is higher than that by wives. Third, both the

balance of financial assets of entire household and the financial assets that should have been saved

by now increase with age. On average, the respondents aged over 60 have 22.3 million yen of the

balance of financial assets, while those aged 20 to 29 have only 3.5 million yen. The respondents

aged over 60 answer that the amount of the financial assets that should have been saved by now is

40.1 million yen, while those aged 20 to 29 answer only 7.2 million yen. Fourth, with respect to

time-inconsistency, the respondents with hyperbolic discounting have a lower balance of financial

assets and a smaller amount of financial assets that should have been saved by now than those with

non-hyperbolic discounting. Finally, with respect households' types of decision makings on savings

and investments, households where husbands decide on savings and investments have the highest

balance of financial assets and the largest financial assets that should have been saved by now. With

wives' involvement in the decision makings on savings and investments, both balance of financial

assets and financial assets that should have been saved by now decrease.

In Figure 2, we see the distribution of the proportion of respondents where the balance of

financial assets is over or equal to the amount of entire household's financial assets that should have

been saved until now. First, only about a fifth of the respondent households have the balance of

financial assets as they think they should have saved by now. Second, the proportion is slightly

higher for wives than for husbands, though the difference is only 2.1 percentage points. Third, the

proportion falls with age until forties, and after that it rises a bit. Fourth, there is hardly any

difference in proportion between hyperbolic and non-hyperbolic (19.7 percentage versus 21.0

percentage). Finally, with respect to households' types of decision makings on savings and

investments, the proportions are the same for all of the types except 'discuss together but wives

mainly decide.'

Finally, we see how the proportions of the respondents where the balance of financial

assets of entire household is over or equal to the amount of entire household's financial assets that

should have been saved until now differ by respondents time discounting and the types of decision

makings on savings and investments, separating husbands and wives. In the case that the

respondents are husbands (Figure 3-1), when the husbands discount hyperbolically, the proportion

is statistically significantly lower when husbands and wives discuss together but wives decide on savings and investments (6.3 percent) than when husbands decide (20.8 percent) and when husbands and wives discuss together but husbands decide (25.4 percent), respectively. When the husbands discount exponentially, we do not have any statistically significant differences among the types of decision makings. In the cases that the respondents are wives (Figure 3-2), when they discount hyperbolically, the proportions is statistically significantly higher when husbands and wives discuss together but husbands decide on savings and investment (33.3 percent) than when wives decide (18.6 percent) and when husbands and wives discuss together but wives decide (9.8 percent), respectively. In addition, the proportion is statistically significantly higher when husbands decide (27.8 percent) than when husbands and wives discuss together but wives decide. When the wives are discounting exponentially, we do not have any statistically significant differences among the types of decision makings.

From these observations, we find that when wives have hyperbolic time preference, it is likely for the households to save as they think they should save by leaving their saving decisions in the hand of their husbands but that when wives have exponential time preference, it is not likely to do so. This seems to be consistent with our hypothesis in Section 2. However, we do not have a similar finding for husbands. Rather, if husbands with hyperbolic time preference leave their saving decisions in the hand of wives, it may be that their savings does not go as they think they should.

As we saw in Figure 2, whether or not the respondents save as they think they should save is

16

correlated with other factor affecting self-control and households' type of decision making on savings. This fact have to be taken into consider so that we conduct regression analysis in the next section.

6. Results

Table 3 displays the results of our ordered probit regression of the dependent variable *save as they should*$_i$ In column (2), we have a positive and significant coefficient of interactive term of hyperbolic discounting and discuss together but spouses mainly decide, that is, $\gamma_j > 0$ for the wives sample. The estimated marginal effects of the interactive term of *hyperbolic*$_i$ and $D_{4i}^{savings}$ is that wives who discount hyperbolically and discuss together but husbands mainly decide are 5.9 percentage points more likely to save more than they think they should save; 10.7 percentage points more likely to save the same as they think they should save; 16.6 percentage points less likely to save less than they think they should save, compared to wives who discount exponentially and decide by themselves. The coefficient of *hyperbolic*$_i$ and those of $D_{ji}^{savings}$ (j = 1,2,3) do not have statistical significance.

In Table 4, instead, we conduct the same regressions with the decision making on expenditures, $D_{ji}^{expenditures}$, instead of those on savings and investments. In column (2), as in the previous table 3, we have a positive and significant coefficient of interactive term of hyperbolic discounting and discuss together but spouses mainly decide for the wives sample. Its estimated

marginal effects is that wives who discount hyperbolically and discuss together but husbands mainly decide on expenditures are 10.4 percentage points more likely to save more than they think they should save; 15.1 percentage points more likely to save the same as they think they should save; 25.6 percentage points less likely to save less than they think they should save, compared to wives who discount exponentially and decide by themselves. In addition, we have insignificant coefficients of all types of the decision makings on expenditures. Furthermore, we have negative and significant coefficient of hyperbolic discounting. The estimated marginal effects is that wives who discount hyperbolically are 2.5 percentage points less likely to save more than they think they should save; 7.8 percentage points less likely to save the same as they think they should save; 10.3 percentage points more likely to save less than they think they should save, compared to wives who discount exponentially and decide by themselves.

In column (1) for the husband sample, although we do not have significant coefficients of the interactive terms and that of hyperbolic discounting, the coefficient of spouse decides on expenditures is positive and significant. Its estimated marginal effects is that wives who discount exponentially and decide on expenditures are **.* percentage points more likely to save more than they think they should save; **.* percentage points more likely to save the same as they think they should save; **.: percentage points less likely to save less than they think they should save, compared to husbands who discount exponentially and decide by themselves.

For other control variables, in both tables 3 and 4, for husband sample, we have a positive

18

and significant coefficient of wives' annual earned income and negative and significant coefficients of wives' part-time employment and husbands years of education. For wives sample, we have positive and significant coefficients of husbands' annual earned income and wives' fulltime employment and negative and significant coefficients of the number of children and risk averseness.

Robustness Checks

In Table 6 we estimate using the decision making on expenditures, $D_{ji}^{expentidures}$ rather than $D_{ji}^{savings}$. Then, in column (2) of wife samples we have a negative and significant coefficient of hyperbolic$_i$ (β, -0.085) and positive and significant coefficients of interactive terms (η_3 and η_4, 0.116 and 0.134). Furthermore, we have insignificant coefficients of δ_j. These are exactly as expected in (2).

Next, we define an alternative hyperbolic variable using the following questions on summer assignment in school.

Q1: When you were a child, when did you usually do the summer assignment?

Q2: When you were a child, when did you plan to do your summer assignment?

1. Got it done right away

2. Tended to get it done early, before the due date

3. Worked on it daily up until the due date

4. Tended to get it done toward the end

5. Got it done at the last minute

6. (I didn't make any plans)

We define *summer assignment*$_i$ as a following binary variable which equals one if Q1 is larger than Q2, and zero otherwise. Unfortunately, we do not have expected coefficients in table 7.

Finally we conducted estimations using unmarried individuals, who cannot leave the decisions on savings and investments for respondent's household to their spouses. Then, in table 8we have a negative and significant coefficient of b (-0.149).

7. Discussions and Conclusions

The results of our analysis support our hypotheses for wives sample. First of all, recall that our hypothesis (i) is that wives with hyperbolic discounting will put household saving decisions in the hand of their spouse or get their spouses involved in deciding household savings, and thus they will succeed in saving as they think they should save. The grounds of the argument are given below. For wives with hyperbolic discounting, the probability that the wives save as much as they think they should save is higher when they discuss together but their husbands mainly decide on savings and investments than when they decide by themselves. We have a similar relationship for decision makings on expenditures.

20

Second, recall that our second hypothesis (ii) is that wives with exponential discounting will succeed in saving as they think they should save, regardless of household saving decisions in the hand of their spouse and get their spouses involved in deciding household savings or not. The ground of the argument is that there is no statistically significant difference in the probability that the wives save as much as they think they should save among households' types of decision makings on savings and investments, as well as expenditures. These imply that, for wives who discount hyperbolically, putting household saving decisions in the hand of their husbands or get their husbands involved in deciding household savings functions as commitment devices.

Unlike this, our hypotheses are not supported for husbands sample. That is, for husbands wives with hyperbolic discounting, the probability that the husbands save as much as they think they should save does not differ among households' types of decision makings on savings and investments, as well as expenditures. In addition, for husbands with exponential discounting, the probability that the husbands save as much as they think they should save is higher when their wives decide on expenditures than when they decide by themselves. One explanation for this gender difference may be that it lies upon wives manage family budgeting in Japan. Kimura (1995) reported that, according to the Japanese Panel Survey of Consumers (JPSC) of the Institute for Research on Household Economics, households where husbands hand their salary over to wives account for seventy percent when wives are unemployed and sixty percent when wives are employed. In many Japanese households, wives keep all of husbands' income and   hold the family

purse strings. As a matter of fact, in the study we use, 24.2 percent say that wives mainly decide after discussion with husbands and 30.0 percent say that wives decide. Therefore, we can say that husbands are not in need of finding solutions to the self-control problems as wives are, which leads to the results of insignificant coefficients of households' types of decision makings on savings and investments for husbands sample.

From these it follows that a series of our results can be explained from our hypotheses that putting saving or consumption decisions in the hand of spouses or getting spouses involved into decision makings functions as informal and soft commitment devices for married individuals with hyperbolic discounting.

There are several studies on the use of commitment devices in marriage. Closely connected with our analysis is Ashraf et al (2006). They conducted a natural field experiment in the Philippines and found that women who exhibit hyperbolic preferences were more likely to open a commitment savings product. They found a similar, but insignificant, effect for men. (We have mentioned the feature of the commitment product in Introduction.) They suggest that this is because traditionally women in the Philippines are responsible for household finances, and hence have a preference for commitment. Schaner (2010) studied the problem of commitments when husbands and wives discount not hyperbolically but exponentially. Her idea is that when one household member is impatient so that he may be tempted to spend savings, other household members may resort to saving in a "private" device that cannot be accessed by the less patient individual, which she

concluded is supported by a field experiment in Western Kenya.

Although Kast et al (2012) were not concerned with marriage, they studied the power of self-help peer groups as a commitment device for saving, conducting randomized field experiments among low-income micro-entrepreneurs in Chile. They found that the self-help peer groups have a strong impact on increasing savings. We can only assume that being observed by their spouses or sharing information on their financial situation keeps them away from saving less than they think they should save. However, due to insignificant coefficients of variables regarding decision makings after discussion with spouse ($D_{3i}^{savings}$ and $D_{4i}^{savings}$), we cannot bring ourselves to accept this self-help peer effects.

At this time, it seems reasonable to say that putting saving or consumption decisions in the hand of spouses or getting spouses involved into decision makings functions as informal and soft commitment devices for married individuals.

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Table 1-1: Descriptive Statistics (Continuous Variables)

	Mean	S.D.
Husband's annual earned income (10,000 yen)	551.28	331.19
Wife's "	132.64	198.62
Husband's age	51.93	11.82
Wife's "	49.45	11.24
Husband's year of education	13.55	2.43
Wife's "	12.93	1.82
Number of children	2.04	0.87
Family size	3.74	1.35
Risk aversion (Prob. of rain for umbrella, %)	50.10	19.18
Discount rate (2 days v 9 days, %)	78.67	157.72
" (90 days v 97 days, %)	98.49	349.21

Wave 2008, n=2,273

Table 1-2: Descriptive Statistics (Categorical Variables)

	Percentage
Husband's occupation: Fulltime work	85.22
Part-time work	1.80
Househusbands, student, retired or unemployed	12.98
Wife's occupation: Fulltime work	38.45
Part-time work	22.83
Househusbands, student, retired or unemployed	38.72

Wave 2008, n = 2,273

Table 2 : The relative frequencies of each pair of X2v9i and X90v97i.

		X^{2v9}_i and X^{90v97}_i.									
		X < 9981	9981<X <10000	10000< X<10019	10019< X<10038	10038< X<10096	10096< X<10191	10191< X<10383	10383< X<10574	10574< X	total
X^{2v9}_i and X^{90v97}_i.	X < 9981	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.8%
	9981<X <10000	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
	10000<X <10019	0.0%	0.0%	2.9%	1.3%	0.1%	0.0%	0.2%	0.2%	0.0%	4.7%
	10019<X <10038	0.1%	0.0%	0.6%	36.5%	1.5%	1.0%	1.3%	0.8%	0.3%	42.1%
	10038<X <10096	0.0%	0.0%	0.1%	1.0%	3.0%	0.8%	0.5%	0.1%	0.4%	6.0%
	10096<X <10191	0.0%	0.0%	0.1%	1.9%	0.7%	6.7%	2.1%	0.3%	0.3%	12.2%
	10191<X <10383	0.0%	0.0%	0.1%	3.0%	0.5%	1.4%	9.2%	1.7%	0.7%	16.5%
	10383<X <10574	0.0%	0.0%	0.1%	1.3%	0.3%	0.3%	1.4%	5.2%	0.9%	9.5%
	10574<X	0.0%	0.0%	0.0%	1.3%	0.5%	0.3%	0.4%	0.6%	4.9%	7.8%
	total	0.7%	0.4%	4.0%	46.4%	6.6%	10.4%	15.2%	9.0%	7.4%	100.0%

Wave 2008, n = 2,273

Table 3:

	Dependent variable: *save as they should*$_i$	
	(1) husbands	(2) wives
Hyperbolic	-0.009	-0.067*
	(0.222)	(0.037)
Spouse decides	0.108	-0.030
	(0.136)	(0.044)
Discuss but respondent decides	-0.012	-0.054*
	(0.127)	(0.028)
Discuss but spouse decides	-0.227	-0.030
	(0.150)	(0.030)
Hyperbolic × Spouse decides	-0.231	0.060
	(0.325)	(0.058)
Hyperbolic × Discuss but respondent decides	0.227	0.051
	(0.283)	(0.082)
Hyperbolic × Discuss but spouse decides	-0.544	0.116*
	(0.415)	(0.060)
Husband's annual earned income	0.000	0.019***
	(0.043)	(0.007)
Wife's annual earned income	0.065**	-0.001
	(0.027)	(0.006)
Number of children	-0.015	-0.007
	(0.055)	(0.016)
Family size	0.024	0.008
	(0.039)	(0.010)
Husband is a fulltime worker	-0.016	-0.024
	(0.160)	(0.030)
Husband is a part-time worker	-0.273	0.002
	(0.351)	(0.035)
Wife is a fulltime worker	-0.220	-0.020
	(0.163)	(0.033)
Wife is a part-time worker	-0.298*	0.000
	(0.156)	(0.005)
Husband's year of education	-0.057***	0.011
	(0.022)	(0.007)

29

Wife's year of education	0.027	0.001
	(0.029)	(0.003)
Husband's age	-0.003	-0.001
	(0.012)	(0.003)
Wife's age	-0.002	-0.001
	(0.012)	(0.001)
the degree of risk aversion	0.001	-0.012
	(0.002)	(0.011)
Discount rate	0.063	0.011
	(0.072)	(0.029)
Impatient now and patient later	-0.168	0.362***
	(0.109)	(0.122)
cut1	0.310	1148
	(0.578)	1.25
cut2	1.176	0.1979
	(0.578)	0.0172
Number of observations	1125	.34208
Wald chi2(22)	30.92	29.08
Prob >chi2	0.0979	0.1426
Pseudo R2	0.0232	0.0191
Log pseudo likelihood	-662.69675	-707.21179

Notes: the micro data from the Preference Parameters Study. Robust standard errors are in parentheses.
10 thousand yen = 100 dollar. The level of significance at 1% is ***, 5% is **, and 10% is *.

Table 4

	Dependent variable: *save as they should*$_i$	
	(1) husbands	(2) wives
Hyperbolic	-0.086	-0.403**
	(0.384)	(0.191)
Spouse decides expenditures	0.353*	-0.060
	(0.203)	(0.187)
Discuss but respondent decides expenditures	0.278	-0.083
	(0.200)	(0.099)
Discuss but spouse decides expenditures	0.154	-0.136
	(0.209)	(0.137)
Hyperbolic × Spouse decides expenditures	-0.084	0.474
	(0.425)	(0.498)
Hyperbolic × Discuss but respondent decides expenditures	0.234	0.349
	(0.429)	(0.258)
Hyperbolic × Discuss but spouse decides expenditures	0.089	0.721**
	(0.457)	(0.334)
Husband's annual earned income	0.003	0.068*
	(0.043)	(0.036)
Wife's annual earned income	0.057**	0.000
	(0.027)	(0.024)
Number of children	-0.008	-0.120**
	(0.055)	(0.060)
Family size	0.022	0.056
	(0.039)	(0.041)
Husband is a fulltime worker	-0.040	-0.116
	(0.157)	(0.143)
Husband is a part-time worker	-0.170	0.220
	(0.160)	(0.142)
Wife is a fulltime worker	-0.271	0.025
	(0.354)	(0.351)
Wife is a part-time worker	-0.269*	-0.040
	(0.154)	(0.140)
Husband's year of education	-0.056***	-0.005
	(0.022)	(0.020)
Wife's year of education	0.033	0.006

	(0.029)	(0.028)
Husband's age	-0.002	0.010
	(0.012)	(0.010)
Wife's age	-0.002	-0.004
	(0.012)	(0.011)
the degree of risk aversion	0.001	-0.005**
	(0.002)	(0.002)
Discount rate	0.062	-0.072
	(0.075)	(0.066)
Patient now and impatient later	-0.156	0.057
	(0.110)	(0.107)
cut1	0.683	1.212
	(0.584)	(0.505)
cut2	1.545	2.204
	(0.586)	(0.508)
Number of observations	1125	1148
Wald chi2(22)	22.78	27.73
Prob >chi2	0.4141	0.1848
Pseudo R2	0.0186	0.0178
Log pseudo likelihood	-665.76933	-708.16127

Notes: the micro data from the Preference Parameters Study. Robust standard errors are in parentheses.

10 thousand yen = 100 dollar. The level of significance at 1% is ***, 5% is **, and 10% is *.
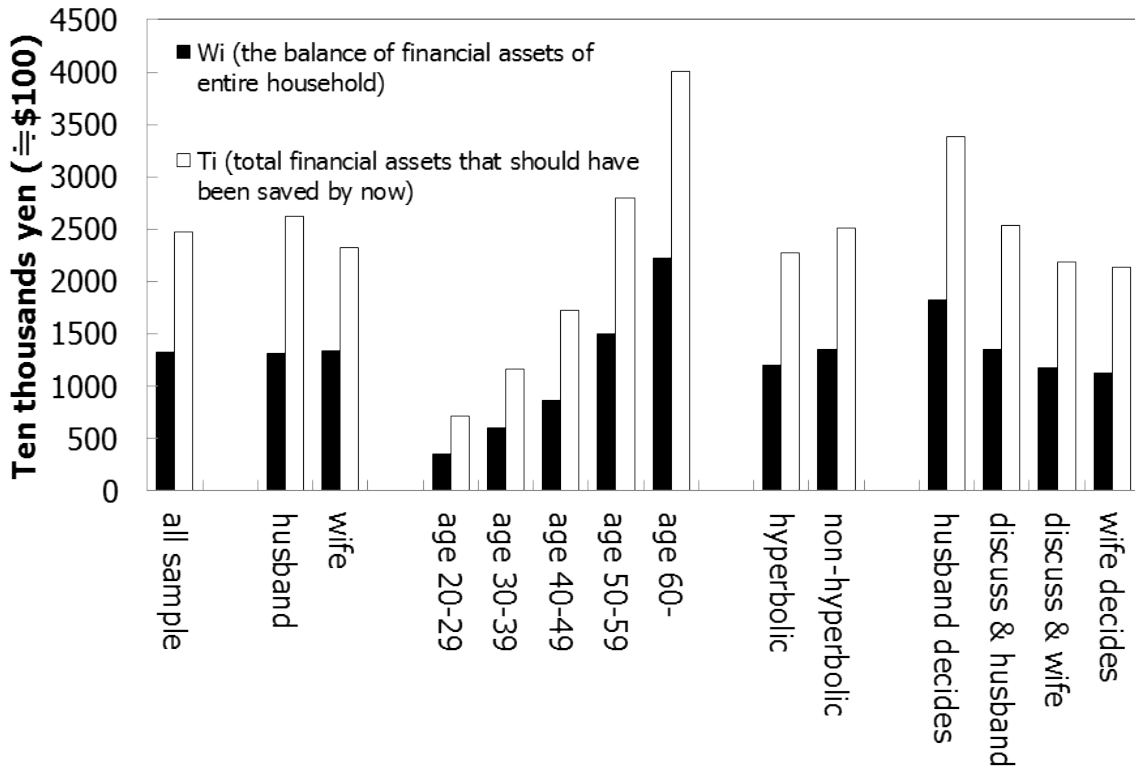
Figure 1. The Distribution of W_i and T_i

Legend:
- ■ Wi (the balance of financial assets of entire household)
- □ Ti (total financial assets that should have been saved by now)

Y-axis: Ten thousands yen ($\fallingdotseq$ $100)

X-axis categories: all sample, husband, wife, age 20-29, age 30-39, age 40-49, age 50-59, age 60-, hyperbolic, non-hyperbolic, husband decides, discuss & husband, discuss & wife, wife decides

Figure 2: Proportion of respondents with W $\geqq$ T by demographic characteristics, time discounting, and saving management type.
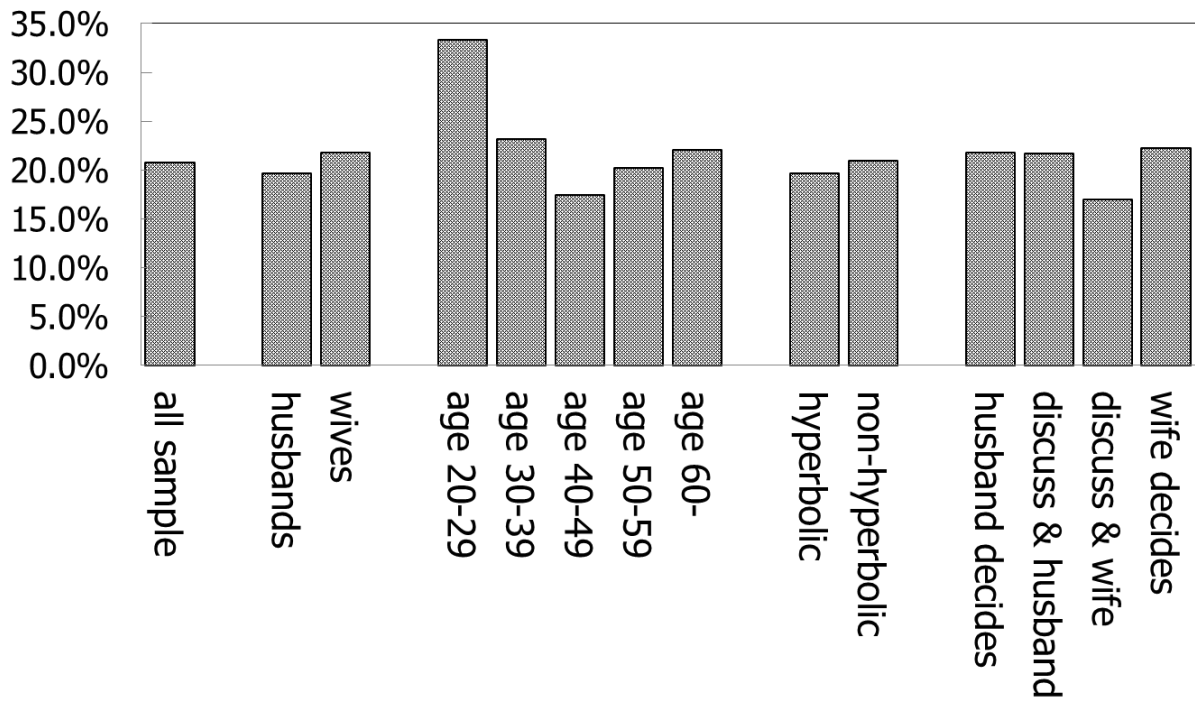
Figure 3-1: Does the proportion of respondents with W $\geqq$ T differ by saving decision type? (husband)
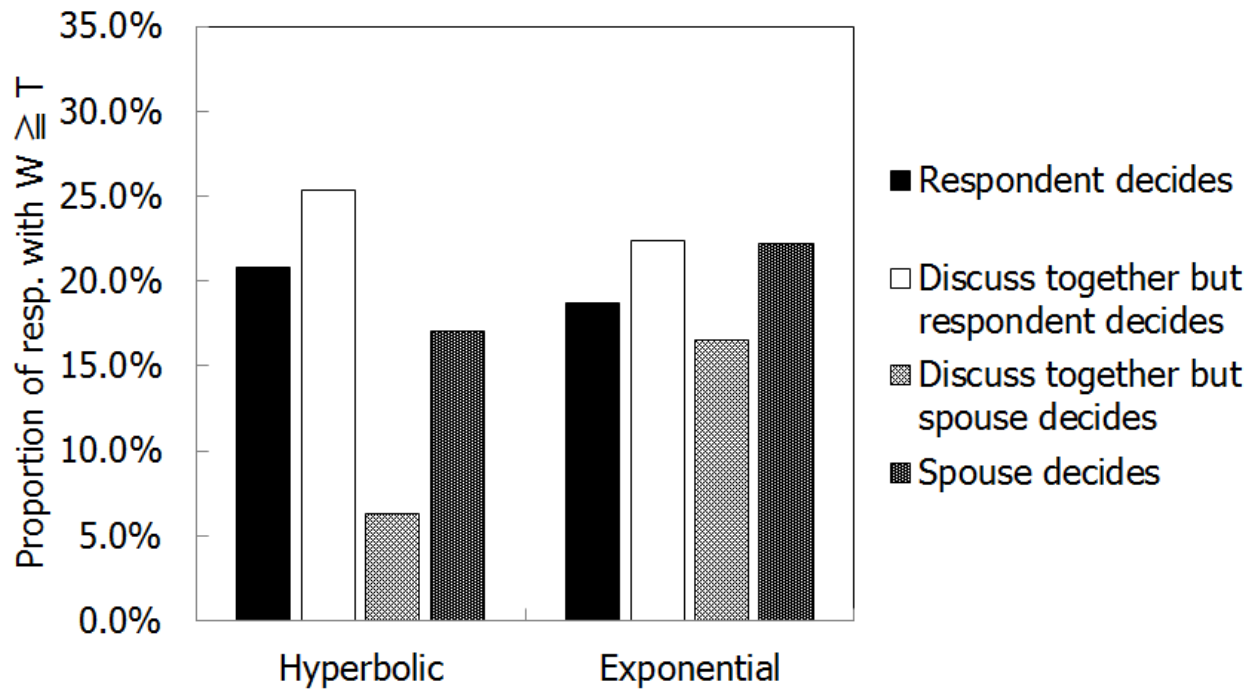
Figure 3-2: Does the proportion of respondents with W $\geqq$ T differ by saving decision type? (wife)