Precautionary Wealth and Single Women in Japan*

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Abstract

Using Japanese panel data, we analyze precautionary wealth due to staying single in the presence of income uncertainty. Our cross-sectional and panel analyses, in which the dependent variable is target wealth, find that young women who get married within three years have 0.62-1.58 million yen less target wealth for precautionary purposes, as well as 1.02-1.53 million yen less target wealth for retirement when the coefficients of these variables are significant. These results suggest that in facing higher risk of income fluctuation due to choosing to marry late or remain unmarried, young women tend to save more to mitigate the income risk inherent in single life. (105 words)

1 Introduction

Marrying later in life and remaining unmarried altogether are broadly observed trends in many developed countries. In Japan, the prevalence of later marriages and of remaining unmarried is noticeable. According to Japan's Vital Statistics, the average age of first marriage for women was 24.4 in 1960, but it rose to 28.2 in 2006. According to the Japanese Population Census, in 1960, only 20.6% of women aged 25–29 remained unmarried; this figure rose to 50.4% in 2000. In addition, the percentage of women who never married during their lifetime (i.e., remained unmarried at the age of 50) was 1.9% in 1960 and rose to 5.8% in 2000. From such trends, we might imagine that many of the current generation of young women will have even less prospect of getting married in their lifetime.

In this paper, we focus on the risk-sharing function of marriage.[1] If a member of the married couple faces a loss of capacity to earn income in the future due to unemployment or illness or living longer than expected, the other spouse will supplement the income loss and cover the costs of the longer lifespan. When an exogenous shock occurs and reduces the husband's income (assuming he is the main breadwinner), it is optimal for a couple to mitigate that income reduction and behave in ways that do not change their consumption levels or leisure time. The risk of living longer than average, too, can be pooled within a marriage. For example, when a wife lives longer than average and her husband dies before her, her consumption following her husband's death can be financed by the money left by her husband. Another way to soften the shock is to increase labor supply. It is well known that the use of a wife's additional labor supply is often induced by a husband's income shock, in what is called the "added worker effect" (Heckman and MacCurdy (1980), Lundberg (1985), and Cullen and Gruber (2000)). In Japan, Kohara (2009), who uses the same survey we use, found that wives' labor supplies were stimulated when their husbands suffered from

[1] As the other economic reasons for marriage, Weiss (1997) mentions increasing returns, an imperfect credit market, and the sharing of collective goods.

involuntary job loss in the 1990s, when unemployment rates skyrocketed. However, we do not explicitly consider this additional labor supply on the part of wives an issue of concern.

When women get married later in life or do not get married at all, they cannot rely upon such risk sharing; this means that young, single women face higher uncertainty regarding future income. Thus, the higher risk due to late or no marriage encourages them to add more wealth than they would when enjoying the lower risk that comes with being married. Such additional wealth that results from future uncertainty is called "precautionary wealth."[2] In fact, whether or not individuals increase their precautionary wealth when they are worried about future labor income has been examined previously, using data pertaining to the United States and European countries (see Dardanoni (1991), Carroll and Samwick (1998), Kazarosian (1997), Dynan (1993), and Lusardi (1998)). Moreover, analyses of Japanese households have been undertaken by Zhou (2003), Murata (2003), and Horioka et al. (2000). Another interesting study was done by Bishop (2005), who uses the same dataset we use in this paper. He examines precautionary saving motives among Japanese households by measuring the effect of income volatility on household assets. However, although many studies on precautionary saving relate to unemployment and labor income risk, none has focused on risk due to marriage versus remaining single.[3]

In this paper, we focus on precautionary wealth due to staying single in the presence of income uncertainty. That is, single women who expect to be married later in life or not to be married at all face higher

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[2] Carroll and Kimball (2008) call attention to a distinction between "precautionary savings" and "precautionary saving": "precautionary savings at any date is the stock of extra wealth that results from the past flow of precautionary saving." In order to avoid confusion, we use the phrase "precautionary wealth" in place of "precautionary savings."

[3] One exception is Murata (2003), who examines the effects of household anxiety about the public pension system on household saving behavior.

risk of income fluctuation, which encourages them to increase wealth for precautionary reasons. Then, we examine the hypothesis that single women who have lower anticipation of getting married in the future have more precautionary wealth than those who have higher anticipation, using Japanese micro-level data from the Japanese Panel Survey of Consumers (JPSC) of the Institute for Research on Household Economics.

The contribution of this paper is that we undertake an original exploration of precautionary wealth highlighting young, single women's anticipation of getting married in the future. With the noticeable prevalence of later marriages and remaining unmarried, whether or not young women will share their risk with spouses in the future may be the primary concern for the women themselves and for policy authorities. Furthermore, we obtain the magnitudes of the impacts of the young women's singlehood on their precautionary wealth. That is, from our cross-sectional and panel analyses, young women who get married within three years have 0.33-0.62 million yen less target wealth to prepare for illness, disaster, and emergency; 1.57 million yen less target wealth for general peace of mind or for no particular purpose; and 1.02-1.53 million yen less target wealth for retirement when these coefficients are significant.

Section 2 presents our empirical hypotheses and the estimation model, and Section 3 introduces the data we use. Section 4 presents the estimation results. Finally, in Section 5, we discuss our results and conclude the paper.

2 The Model

Nordblom (2004) theoretically investigated the relationship between precautionary wealth and the marital status of women (see Appendix A.1 for details). She considered a two-period model, where a single woman receives a certain income in the first period and an uncertain income in the second period, and single women are prudent, $u''' > 0$, that is, they save for precautionary reasons. Then, as Proposition 1, Nordblom (2004)

states, theoretically, that married women save less for precautionary reasons than do single women. From this theoretical result and transitions in marital status, we hypothesize that the greater single women's expectations of getting married in the future, the less they will save for precautionary reasons. Therefore, we obtain the following hypothesis for empirical analysis:

Empirical Hypothesis 1. *Single women who have lower anticipation of getting married in the future have more wealth for precautionary purposes than those who have higher anticipation of getting married in the future.*

However, it must be noted that if a marriage results in a higher expectation regarding the woman's income, then the married woman will have less wealth, even if she is not prudent. If this is the case, wealth is motivated by income smoothing over her lifetime, rather than precautionary reasons. Therefore, we can say that if women have higher expectations regarding their income after marriage, we will empirically observe a decrease in wealth, especially for reasons other than those that are precautionary. Thus, our second empirical hypothesis is as follows:

Empirical Hypothesis 2. *If income smoothing achieved through marriage to a higher-income spouse has an effect on the saving behavior of single women, then those women who have lower anticipation of getting married in the future will be expected to have more wealth for reasons other than those that are precautionary than those who have higher anticipation of getting married in the future.*

To examine these two empirical hypotheses, we present our estimation equation as follows:

$$W_{\mathrm{it}} = \gamma marriage\_anticipation_{\mathrm{it}} + \boldsymbol{Z}_{\mathrm{it}}\boldsymbol{\alpha} + \varepsilon_{\mathrm{it}}.$$

(1)

The dependent variable W_{it} is defined as the amount of targeted wealth, broken down by purpose. For hypothesis 1, we use the following two variables for precautionary purpose: (a) the variable *emergency,* which represents the target wealth to prepare for illness, disaster, and emergency; and (b) the variable *no_purpose,* which represents the target wealth for general peace of mind and for no particular purpose. For hypothesis 2, we use the following three variables. The first is (c), the variable *durables*, which represents the target wealth for purchasing consumer durables. The second is (d), the variable *leisure*, which represents the target wealth for spending on leisure activities. The last is (e), the variable *retirement*, which represents the target wealth for retirement. We can use all five variables as dependent variables. Note that we can obtain data pertaining to these five variables only from the ninth wave onwards.

Note that these five categories of target wealth, (a)–(e), are neither attained nor factual; rather, they are unattainable and ideal figures. Then, we need to grasp that what people intend to save is not necessarily what they will actually save. In fact, people do not manage to save as much as they intend, an aspect on which many researchers of behavioral economics are focusing. For example, Laibson (1997) and Angletos et al. (2001) apply the quasi-hyperbolic discount function to the analysis of saving decisions when people are impatient about actual saving decisions in the short run, but patient when they desire a long-run indented or targeted saving amount. Unfortunately, the survey we use asks about the total amount of actual wealth, but not the amounts of actual wealth for various purposes. Therefore, we cannot clarify how closely the amounts of intended or targeted wealth (a)–(e) trace the amounts of corresponding actual wealth. Instead, we see how closely the total amount of intended or targeted wealth traces the total amount of actual wealth. There is a statistically significant difference between them: the total amount of intended or targeted wealth is ¥8,218,000 (the standard deviation is ¥15,654,400), while the total amount of actual wealth is ¥2,692,900 (the standard deviation is ¥4,728,500). We will see more on this in section 2.1 regarding cross-sectional analysis.

Our main explanatory variable must indicate the anticipation of getting married in the future; we therefore use the dummy variable *marriage_anticipation*$_{it}$, which equals 1 if the woman gets married within three years, and 0 otherwise.

If, as hypothesis 1 states, the main purpose of wealth among single women is precautionary, then we expect the coefficient of the dummy variable *marriage_anticipation*$_{it}$ to be negative when the dependent variables are *emergency* and *no_purpose*. Meanwhile, if, as hypothesis 2 states, the main purpose of wealth among single women is to achieve income smoothing by marrying a higher-income spouse, then we expect the coefficient of the dummy variable *marriage_anticipation*$_{it}$ to be negative when the dependent variables are *durables*, *leisure*, and *retirement*.

The rationale for using three years to define the dummy variable *marriage_anticipation*$_{it}$ is as follows. Suppose that instead we used a period (a) shorter than three years or (b) longer than three years. First, if we consider case (a), in which we use one or two years, then there is the fear that we might commit a mistake by considering some of those who have the intention and desire to get married, and will get married, as those who do not or will not. After couples are engaged, it may take more than one or two years to prepare for a wedding or a wedding ceremony. In fact, in our survey, among those who answered "I am engaged and going to get married" in response to a question about their preference for getting married—which we will address in the next section—74.9% of them actually married within a year, while 9.0% and 4.1% of them married in the second and the third years, respectively. Thus, a small, but not insignificant, number of single women with a certain anticipation of getting married stay single for an additional two years. Next, suppose case (b), in which we were to use marriage taken within four or more years, rather than three years. In such a case there would be a fear that we could commit the converse mistake—that is, those who state that they have no intention or desire to marry may happen to get married due to unexpected encounters or changes of mind. In fact, in our survey, among those who answered, "I do not want to get married," 3.2% married in the fourth

year and 5.5% in the fifth year. Therefore, in order to avoid such mistakes, we chose marriage within three years as a proxy for anticipation of getting married. We conducted robustness checks using marriage within two years and marriage within four years. See section 4.2 for details.

$\boldsymbol{Z}_i$ is the set of variables that capture the lifecycle of respondents: age, age squared, dummy variables for working status (full-time worker, part-time worker, and not working), educational attainment (junior high-school graduate, high-school graduate, college graduate, and university graduate or over), father's educational attainment (same as above), resident status (live alone, family of two, family of three, family of four or more), annual income (income from zero to 2 million yen, income from 2 million yen to 4 million yen, income from 4 million to 6 million yen, income from 6 million yen), and wave dummy (ninth wave and eleventh wave).

We outline our cross-sectional analysis methodology in Section 2.1. We then explain our panel analysis in Section 2.2.

2.1 Cross-Sectional Analysis (Instrumental Variables)

In our cross-sectional analysis, we use the ninth and eleventh waves of the survey; thus, in this subsection, we remove the subscript t from the variables we use.

It is difficult to discuss the true impact of $marriage\_anticipation_i$ on W_i due to endogeneity problems. It is highly likely that there are omitted variables, which could bias our estimated coefficients positively or negatively. First, single women with steady character may save more for precautionary reasons, and steady character is attractive to a potential husband; thus, steady character could actually serve as a catalyst for positive bias. Second, we use the amount of intended or target wealth as the dependent variable, which may give the estimated coefficients another omitted variable bias. The intended or target wealth does not

necessarily correspond to the actual wealth, and whether or not a woman achieves her desired level of target wealth may represent her personality. In turn, those who are resolute enough to follow through on their word are more likely to get married. Hence, given the amount of actual wealth, a single woman who has such a personality tends to set humble and realizable targets, which generates a negative bias on the estimated coefficients. Nevertheless, with respect to the gap between the total amounts of target wealth and total amounts of actual wealth, we conduct the t-test to evaluate the differences in the gap between those who get married within three years and those who do not, which does not generate a statistically significant difference: ¥4,927,000 (the standard deviation is ¥19,775,000) for those who get married within three years versus ¥5,592,200 (the standard deviation is ¥13,883,200) for those who do not. There may be a reverse causality. That is, a negative bias is brought about when a woman who saves less but spends more money can be more likely to get married, if extravagant spending creates opportunities to find and meet a potential husband. Note that the former two biases are due to the fixed effect of the individual steady character and personality, so we can mitigate these biases through panel analysis.

In order to resolve these problems, we employ the two-stage least squares method using two instruments for $marriage\_anticipation_i$. One has five dummy variables representing the respondent's preferences for marriage. They are defined using the following survey questionnaire, which asks each respondent single woman about her present situation, that is, preferences, in regard to marriage.

Question: Would you like to get married (based on legal definitions)?

Answer:

1. *I am engaged and going to get married.*
2. *I would like to get married soon.*
3. *I would like to get married – not soon, but eventually.*

4. *It is not necessary to get married.*

5. *I do not want to get married.*

From this questionnaire, we construct five dummy variables: *engaged, hope_to_marry_soon, hope_to_marry_eventually, not_necessary_to_marry, do_not_want_to_marry*. The base category of these variables is those who answer, "*I would like to get married soon*" (*hope_to_marry_soon* = 1).

The other instrument is the percentage of unmarried women aged 24–35, by prefecture (*unmarried_rate*).[4] We obtain from census data the percentage of unmarried women aged 24–35, by prefecture. Since the census is conducted only every five years, we could not obtain the percentage for each year (ninth wave [2001] and eleventh wave [2003]); we therefore use the percentages of the nearest years—that is, 2000, and 2005, respectively.

The validity of the instruments will be formally tested in section 4.1. In addition, see Appendix A.2 for more on the instrument variables.

2.2 Panel Analysis

When it is more likely that an unmarried woman will not marry, how does her saving behavior change over time? To examine this question, we conduct a panel estimation. We expect that, if a woman believes it is unlikely that she will marry, she will save more for precautionary reasons.

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[4] In Japan, "prefecture" is a general term for 47 local public entities. They include cities, towns, and villages. According to the 2005 census, the most populated prefecture is Tokyo (12.5 million), while the least populated is Tottori (0.6 million).

3 The Data

We use panel data from the Japanese Panel Survey of Consumers, provided by the Institute for Research on Household Economics. This panel survey was initiated in October 1993 and has been conducted annually since then.[5] In the panel survey, a stratified, two-stage random sample from throughout Japan was performed, using the drop–off, pick–up method.[6]

In the survey, each female respondent was tracked for multiple years, and so we could gauge her age profile against her marital status. In addition, since the ninth wave (year 2001), the subjects' target wealth has been tracked for various purposes, so our analysis has been performed only with data after the ninth wave.[7]

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[5] The data are released up to 15th wave (1993–2007) at the time of writing. In 1993, the survey started with 1,500 women (1,002 married women and 498 single women) between 24 and 34 years of age as of October 1993 (cohort A). In 1997, 500 women between 24 and 27 years of age as of October 1997 (201 married women and 299 single women) were added (cohort B); in 2003, 836 women between 24 and 29 years of age as of October 2003 (351 married women and 485 single women) were added (cohort C).

[6] 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. According to Sakamoto (2000), 42.2% of respondents in cohort A were lost from cumulative attrition from the first to the eleventh wave, which is larger than the first 11-year cumulative attrition rate of the Panel Study of Income Dynamics (32.2%).

[7] The time frame to which the target wealth variables refer is clear only in the ninth and tenth waves since the survey ascertains the timeframe with the question, "In how many years do you expect to reach your target wealth?" From the answer to the question, the unmarried respondents expected to reach their target wealth

In addition, the survey asks each female respondent about her preference for marriage, which is used as an instrumental variable for $marriage\_anticipation_{it}$; it also asks for information on household demographics, including family size, age, education, income, and occupational status.

3.1 Sample Selection

In the cross-sectional analysis, we use the ninth wave of cohorts A and B (i.e., from 2001) and the eleventh wave of cohort C (i.e., from 2003) of unmarried respondents. Note that the sample includes women who are now single but have been previously married.[8]

There were a total of 817 observations (332 from cohorts A and B, and 485 from cohort C). We restrict the sample to respondents with no children, which reduces the number of observations from 817 to 741 (266 from cohorts A and B, and 475 from cohort C); we also restrict the sample to respondents whose marital status after three years is available, which further reduces the number from 741 to 566 (225 from cohorts A and B, and 341 from cohort C). Therefore, the number of observations we use in the cross-sectional analysis is 566. In addition, for dependent variables (a)–(e), the numbers of observations we use in our estimation were finally reduced to 525, 528, 528, 526, and 525, respectively. We avoid dropping observations by adding a category for "missing observation" for dummy explanatory variables (educational attainment, annual income, father's educational attainment, working status, and the preferences for marriage).

In the panel analysis, there were a total of 438 (N = 1,734 and T = 3.96) observations from the ninth to the twelfth waves of the data we use. We restrict our analysis to the respondents whose marital status after

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level in a shorter period of time than the married respondents. The difference in the time frame is the largest in *no_purpose* (6.3 years for unmarried vs. 10.7 years for married).

[8] Single mothers are not excluded by design, but we dropped them.

three years is available, which reduces the number of observations to 343 (N = 1,305 and T = 3.80). In addition, for dependent variables (a)–(e), the numbers of observations we use in our estimation were finally reduced to 340, 339, 340, 338, and 337, respectively. The data we use in our analysis are from unbalanced panels, on which we conduct both fixed-effects and random-effects regressions.

3.2 Descriptive Statistics

First, in Tables 1-1 and 1-2, we present descriptive statistics of the characteristics of the Japanese unmarried women we use in this analysis. Table 1-1 summarizes the descriptive statistics of continuous variables and of category variables. In the rightmost column, we put the mean values from other nationwide large-scale surveys because the number of observations we use in this analysis is relatively small.

In our analysis, respondent unmarried women were aged 24–35 years (mean 28.7 years). Given that, according to the Vital Statistics of Japan, the average age of first marriage for Japanese women was 26.3 in 1995, 28.0 in 2005, and 28.6 in 2009, we can say that all the respondent women are of marriageable age. In fact, in our sample, of the women unmarried at the starting wave of each cohort, 22.1% were married within three years, as shown in $marriage\_anticipation_{it}$ in Table1-1. With respect to preference for marriage, the proportion of respondents who would like to get married (*hope_to_marry_soon* = 1 or *hope_to_marry_eventually* = 1) is about 67.3%; those who believe it is not necessary to get married (*not_necessary_to_marry* = 1) comprised 23.1%, and those who do not want to get married comprised only 3.2% of the sample. Similar preferences for marriage were observed in the 2002 Japanese National Fertility Survey, conducted by the National Institute of Population and Social Security Research. In the survey, 88.3% of unmarried female respondents aged 18–34 answered "want to get married eventually," while only 5.0% answered "do not have an intention to get married" (6.7% unknown). Thus, the fact that most respondents want to get married in the future is also seen

in a large data source.

One noticeable characteristic of the sample we use is the large proportion therein who live with their parents (79.2%, *live_alone* = 0 in Table 1-1). According to the Japanese National Fertility Survey, the proportion of Japanese unmarried women aged 25–29 who lived with their parents was 79.4% in 1997 and 78.5% in 2002; the numbers in those years fall to 72.1% and 76.1%, respectively, for those aged 30–34 years. Hence, from this perspective, our data resembles that of the national representative survey.[9]

In addition, about 87.8% of our survey respondents work (as full-time employees [61.8%, *work_fulltime* = 1] or part-time employees [26.0%, *work_parttime* = 1]). According to the Labor Force Survey, gathered by the Ministry of Internal Affairs and Communications, in 2002 the labor force participation rate of unmarried women aged 25–34 was 82.5% (70.5% work as full-time employees and 12.0% work as part-time employees).

Next, we examine target wealth with respect to precautionary wealth. On average, the target wealth to prepare for illness, disaster, and emergency is ¥657,100, and that for general peace of mind or for no particular purpose is ¥2,253,400. With respect to lifecycle wealth, the target wealth for purchasing consumer durables is ¥173,500, that for spending on leisure activities is ¥256,800, and that for retirement is ¥1,454,900.

In Figure 1—where we show how target wealth changes as single respondents more closely approach the time of marriage—we can see that *emergency* and *no_purpose* decrease about three years prior to marriage. However, *durables* and *leisure* show little change. In addition, *retirement* rises sharply three years before marriage but overall shows a downward trend. From this figure, there seems to be a relationship between target wealth and the "countdown" to marriage.

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[9] The survey collects information about inheritance. However, more than 99% of the respondents neither received financial or real assets as intervivos and inheritance from their parents in the past nor expected to receive them in the future.

Finally, a note about income: on average, the respondents' annual income (i.e., not only income from work but also that from property, social security, and allowance from parents, etc.) is ¥2.60 million. In addition, according to the National Survey of Family Income and Expenditure, in 1999, young single households (aged under 30) had average earnings of ¥2.88 million annually. Hence, the respondents whose data we use have slightly lower earnings than those in the 1999 National Survey of Family Income and Expenditure.

3.3 Descriptive Statistics by *marriage_anticipation*

In this subsection, we present descriptive statistics on the variables broken down by the respondents who remain unmarried (*marriage_anticipation* = 0), those who eventually get married (*marriage_anticipation* = 1), and those who dropped from the survey (*marriage_anticipation* = n.a.).

First, we see a difference in the target wealth for precautionary reasons between the respondents who remain unmarried and those who eventually get married. That is, the target wealth to prepare for illness, disaster, and emergency for those who remain unmarried is ¥743,900, which is statistically higher than that of those who get married eventually (¥354,700). Moreover, we have a statistical difference in the target wealth for general peace of mind or for no particular purpose (¥2,579,800 vs. ¥1,119,500). However, we do not have a statistical difference in target wealth for *durables*, *leisure*, and, *retirement*.

Second, whether respondents remain unmarried or eventually get married is strongly correlated with preference for marriage. Those who remain unmarried were less likely to answer "engaged and going to get married" or "would like to get married soon" three years before than those who get married eventually, while those who remain unmarried were more likely to answer "hope to get married eventually," "not necessary to get married," or "do not want to get married" three years before than those who get married

eventually.

Finally, we characterize respondents who were dropped from the survey (*marriage_anticipation* = n.a.), compared with those who were not. First, those who were dropped out of the survey set their target wealth for precautionary reasons as ¥318,100 for emergency, and for *no_purpose* as ¥1,543,400, amounts closer to those who get married eventually rather than those who remain unmarried. Second, of the respondents who were dropped from the survey, those who live alone account for 32.57%, which is higher than for respondents who were not dropped from the survey. This may be because it is difficult to trace those who live alone due to employment and change of their jobs. Third, respondents who were dropped from the survey work as full-time employees (59.43%) less than those who remain unmarried (61.45%) and those who get married eventually (63.20%).

4 Estimation Results

In this section, we present our estimation results regarding the true impact of $marriage\_anticipation_{it}$ on W_{it}.

4.1. Results of the First-stage Estimation (Table 2)

We look at the results of the first-stage estimation (Table 2), which regresses $marriage\_anticipation_{i}$ on the four dummy variables on the preferences for marriage and *unmarried_rate*, and the other exogenous variables included in $\boldsymbol{Z}_i$. In five columns, our first-stage estimations are done with different sample selections prepared for the second-stage estimation of the dependent variable: *emergency*, *no_purpose*, *durables*, *leisure*, and *retirement*.

First, we find that for any five specifications in Table 2, all of the coefficients of *engaged* are positive and significant, and all of *hope_to_marry_eventually, not_necessary_to_marry*, and *do_not_want_to_marry* are

negative and significant. (As mentioned, the base category is *hope_to_marry_soon* = 1.) In specification (a), the coefficients of *engaged*, *hope_to_marry_eventually, not_necessary_to_marry*, and *do_not_want_to_marry* are 1.680, -0.655, -1.025, and -1.349, respectively, all of which are significant at the 1% or 5% level. We also calculate the marginal effects, which indicate that single women who are engaged and going to get married are 59.2 percentage points more likely to be married within three years than single women who would like to marry soon; single women who would like to get married but not soon are 17.6 percentage points less likely to do so within three years; and those who answer that it is not necessary to get married are 20.5 percentage points less likely to do so within three years. With respect to single women who do not want to get married, they are 18.0 percentage points less likely to do so. With respect to the other four specifications, we have similar coefficients, all with statistical significance. These results suggest that respondents who have a strong fondness for marriage are more likely to get married within the next three years, whereas those who have less interest in marriage are less likely to do so.

Then, we look at the coefficient of *unmarried_rate*. Unfortunately, for any of the five specifications in Table 2, we have insignificant coefficients for *unmarried_rate*. From these results, we cannot say that the respondents who live in a prefecture where there is a higher percentage of unmarried women aged 24–35 are more or less likely to get married in the next three years.

Finally, we formally test the validity of the instruments. At the rows pertaining to Hansen's J test in Table 2, we investigate the null hypothesis that all excluded instruments are exogenous. As with Table 1, we find that in almost all specifications—except *emergency*—we cannot reject this null hypothesis; this finding suggests that these four dummy variables on the preferences for marriage and *unmarried_rate* are exogenous. As for the second condition, *F*-statistics in the first-stage regression are much greater than 10 for the null hypothesis that the coefficients on the instrumental variables are equal to 0—a condition necessary for the instruments to be valid in all specifications.

4.2. Estimation Results of Cross-Sectional Analysis (Table 3)

In this subsection and Table 3, we present the estimation results of our cross-sectional analysis. Note that we take into account the endogeneity of the variable *marriage_anticipation*$_{\mathrm{i}}$ and adopt the instrumental variable method. Here, we discuss the coefficients of the predicted variable of *marriage_anticipation*$_{\mathrm{i}}$, that is, $\widehat{marriage\_anticipation}_{\mathrm{i}}$.

First of all, in columns (a) and (b)—where the dependent variables are *emergency* and *no_purpose*—$\widehat{marriage\_anticipation}_{\mathrm{i}}$ has negative and significant coefficients. That is, those who get married within three years have a wealth target of approximately ¥622,000 less to prepare for illness, disaster, and emergency, and approximately ¥1,586,000 less for general peace of mind or for no particular purpose than those who do not. These results support hypothesis 1: if single women think it highly likely they will get married in the future, then they will have a lower precautionary wealth target than those who do not.

With respect to the control variable $\boldsymbol{Z}_{\mathrm{it}}$, we have negative and significant coefficients of *income_0_2m* and *income_2m_4m* in both columns (a) and (b)—that is, if the annual income of a single woman ranges from zero to 2 million yen, her wealth targets to prepare for illness, disaster, and emergency and for general peace of mind or for no particular purpose are approximately ¥1,115,000 and ¥2,992,000 lower, respectively, than single women whose annual income ranges from 4 million yen to 6 million yen. Hence, we can say that the higher the annual income of a single woman is, the higher will be her wealth target for precautionary reasons. In addition, *educ_junior* has a negative and significant coefficient in column (b)—that is, a single woman who is a junior high-school graduate has target wealth for general peace of mind or for no particular purpose approximately ¥1,825,000 lower than a single woman who is a high-school graduate. Thus, we can say that single women who are junior high-school graduates have precautionary wealth targets that are lower than those of single women who are high-school graduates.

We now turn to columns (c)–(e), where the dependent variables are *durables*, *leisure*, and *retirement*. There, we find that $\widehat{marriage\_anticipation}_{i}$ has a negative and significant coefficient in column (e)—that is, those who get married within three years have approximately ¥1,526,000 less target wealth for retirement. From this result, we cannot deny the possibility of hypothesis 2 being true—that is, marriage to a higher-income spouse invokes an income-smoothing motive, and, thus, single women who have higher anticipation of getting married in the future have lower wealth targets than those who have lower anticipation of getting married in the future.

With respect to the control variable $\boldsymbol{Z}_{it}$, the effects of education are found to be as follows: *educ_univ* has a positive and significant coefficient in column (c), and *educ_junior* has negative and significant coefficients in columns (c) and (d). That is, if a single woman's educational attainment is a university graduation or more, her target wealth for purchasing consumer durables is approximately ¥170,000 higher than that of a single woman who is a high-school graduate, while if a single woman is a junior high-school graduate, the amounts of target wealth for purchasing consumer durables and for spending on leisure activities are approximately ¥115,000 and ¥180,000 lower, respectively, than those of a single woman who is a high-school graduate. Then, for the other significant coefficients, *work_fulltime* in column (e) is positive, and several *income*s in columns (d) and (e), *live_alone* in column (d), and *f_educ_college* in column (e) are negative.

We did robustness checks with different specifications of the variable *marriage_anticipation*. First, we define the variable *marriage_anticipation* as marriage within two years, which increases the sample size from 566 to 605. Then, in the first stage, we have the same results as explained previously, and in the second stage the coefficient of $\widehat{marriage\_anticipation}_{i}$ is negative and significant only in the case of using the dependent variable *no_purpose*. The absolute value of the coefficient gets smaller. Second, we define the variable *marriage_anticipation* as marriage within four years, which decreases the sample size from 566 to 526. Then, in the first stage, the coefficient of the other instrument *unmarried_rate* (the percentage of unmarried women

aged 24–35, by prefecture) becomes statistically significant, and in the second stage the coefficient of $\widehat{marriage\_anticipation}_i$ is negative and significant in the case of using dependent variables *emergency* and *no_purpose*. The absolute values of the coefficients get larger. Thus, we see consistently that the more years we use for defining *marriage_anticipation*, the larger the impact of singlehood on precautionary wealth. These robustness checks are consistent with Figure 1, which implies that there seems to be a relationship between target wealth and the "countdown" to marriage.

4.3. Estimation Results of Panel Data Analysis

In this subsection and Table 4, we present the estimation results of our panel data analysis.

The first four columns of Table 4 present results of the dependent variables *emergency* and *no_purpose*. There, $marriage\_anticipation_{it}$ has negative and significant coefficients in columns (a-1) and (b-1), where the random-effects method is used—that is, those who get married within three years have approximately ¥338,000 less target wealth to prepare for illness, disaster, and emergency and approximately ¥1,045,000 less target wealth for general peace of mind or for no particular purpose than those who do not get married. $marriage\_anticipation_{it}$ has no significant coefficients when we use the fixed-effect method. With respect to the Sargan-Hansen test, which is a test of fixed versus random effects, we have $p = 0.27$ for the estimation with the dependent variable *emergency* [column (a)], so we cannot reject the null hypothesis; meanwhile, $p = 0.00$ for the estimation with the dependent variable *no_purpose* [column (b)], so we reject it. Hence, we should use a random-effect estimation for *emergency* and a fixed-effect estimation for *no_purpose*. Thus, the anticipation of *not* getting married in the future leads to the accrual of higher amounts of wealth to prepare for illness, disaster, and emergency, which supports our hypothesis 1; this finding is similar to that resulting from the cross-sectional analysis.

With respect to the control variables, we have a negative and significant coefficient of *income_0_2m* in column (a-1)—that is, if the annual income of a single woman ranges from zero to 2 million yen, then her target wealth to prepare for illness, disaster, and emergency is approximately ¥712,000 less than single women whose annual income ranges from 4 million yen to 6 million yen, following the use of the random-effect method. Additionally, *live_alone* has a positive coefficient in column (b-2)—that is, if a single woman lives alone, her target wealth for general peace of mind or for no particular purpose is approximately ¥1,996,000 higher than that of a single woman who lives in a three-person family.

The last six columns of Table 4 present the panel-analysis results, where the dependent variables are *durables*, *leisure*, and *retirement*. There, $marriage\_anticipation_{it}$ has negative and significant coefficients only in columns (e-1) and (e-2)—that is, those who get married within three years have approximately ¥1,015,000 less target wealth for retirement than those who do not with random effects estimation, and ¥1,144,000 less target wealth with fixed effects estimation. Note that the Sargan-Hansen test cannot be rejected ($p = 0.30$), so we use the random-effects estimation. The inclusion of the variable *retirement* in the category of income smoothing by marrying a higher-income spouse can be quite controversial because, as Japan's population ages and its birth rate drops, growing insecurity surrounding Japan's pension system has been generating precautionary wealth. In fact, using the same survey as we use, Murata (2003) points out that precautionary wealth exists in Japan due to uncertainty concerning public pension benefits. She also notes that households begin to accrue precautionary wealth when the respondents are as young as in their 30s. Therefore, we cannot ignore the precautionary aspect of retirement wealth, although in some cases it could be categorized as being part of lifecycle wealth.

In the panel estimations for *durables*, *leisure*, and *retirement*, we have significant control-variable coefficients. Similar to the previous cross-section estimations, we have positive and significant coefficients of *age_sq* and *work_fulltime* in column (e-1); and negative and significant coefficients of *age_sq* and *income_0_2m*

in column (d-1).

5 Discussion and Conclusion

In this paper, we conducted estimations where the dependent variable is target wealth for precautionary purposes. The results of the estimations support our first hypothesis, that single women who anticipate not getting married in the future have a larger amount of precautionary wealth than those who anticipate that they will get married. The explanation for this is as follows.

In our cross-sectional analysis, single women who do not get married within three years have higher target wealth to prepare for illness, disaster, and emergency, as well as for general peace of mind or for no particular purpose, than those who do [columns (a) and (b) of Table 3]. In addition, in our panel analysis [column (a-1) of Table 4], single women who do not get married within three years have higher target wealth to prepare for illness, disaster, and emergency. These findings enable us to advance the possibility that the anticipation of not getting married in the future promotes in women the accrual of precautionary wealth.

Similarly, in our cross-sectional and panel analysis [column (e) of Table 3 and column (e-1) of Table 4], we find that single women tend to have larger target wealth for retirement as a direct result of their anticipation of not getting married in the future. From this result, we cannot deny the possibility that our second hypothesis holds—that is, marriage to a higher-income spouse incurs an income-smoothing motive, and thus single women who have higher anticipation of getting married in the future tend to have less wealth than those with lower anticipation of getting married in the future.

With respect to the magnitude of the coefficients, singlehood has the largest impact on the target wealth for general peace of mind and for no particular purpose in cross-sectional analysis (¥1,586,000), though in panel analysis its impact is not statistically different from zero. Moreover, singlehood has a statistically

significant impact on the target wealth to prepare for illness, disaster, and emergency in both cross-sectional analysis (¥622,000) and panel analysis (¥338,000). Furthermore, it has a statistically significant impact on the target wealth for retirement in both cross-sectional analysis (¥1,526,000) and panel analysis (¥1,015,000).

From these findings and the precautionary aspect of retirement wealth, a number of our results can be explained in terms of our hypothesis that the more a single woman expects to get married, the lower the amount she is likely to save for precautionary reasons, which support hypothesis 1 strongly.

Next, we link the results of our paper to the existing literature in Japan. Although there is no existing literature that explicitly addresses singlehood's impact on precautionary wealth, Bishop (2005), who uses the same dataset we use and runs regressions with attained and factual wealth as the dependent variables, hints that unmarried women in Japan have stronger precautionary saving motives than married women. That is, when the sample includes both married and unmarried women, he finds that a 1% increase in permanent income volatility produces about a 10% increase in wealth, while restricting the sample to continuously married couples does not produce significant estimates for either permanent or transitory income volatility. Moreover, Horioka and Watanabe (1997), using micro data from the Survey on the Financial Asset Choice of Households, find that net saving for the precautionary motive is of dominant importance, as is saving for the retirement motive (net saving for the illness motive and the peace of mind motive accounts for 56.0% of total net saving for all motives). In addition to this, Zhou (2003), using data on 2,441 Japanese households taken from the 1996 Survey on the Financial Asset Choice of Households, concludes that the precautionary saving model is fully accepted and income uncertainty has a statistically significant impact on Japanese household savings. Bessho and Tobita (2008), using the micro data of Nikkei Radar, find that uncertainty has a positive and statistically significant effect on the wealth-to-income ratio. From the linkage of our paper to the existing literature, our results are broadly consistent with a series of findings that precautionary motives play an important role in Japanese saving.

Appendix

A.1. Hypotheses

We utilize a two-period model based on Nordblom (2004). In this model, we do not consider the possibility that women could pool their risk with their parents. This is because, even though many Japanese single women live with their parents, the parents will retire or pass away earlier than the women, and thus they cannot rely on the income of their parents in the future. First, we considered a single woman who receives a certain income, y_1, in the first period and an uncertain income, y_2, in the second period. Then, y_2 is a random variable. For simplicity, the interest and discount rates are assumed to be zero. Further, we simplified that the woman receives a low income $y_2 = y_l$ with probability p_1 and receives a high income $y_2 = y_h$ with probability $p_2 = 1 - p_1$. Thus, the mean of y_2 is $p_1 y_l + (1 - p_1) y_h$. Then, her budget constraint is

$$c_2 = y_1 - c_1 + y_2,$$

where c_t is consumption in period t. If we represent the single woman's wealth by

$$s_\mathrm{s} = y_1 - c_1,$$

then the Euler equation is

$$u'(y_1 - s_\mathrm{s}) = p_1 u'(s_\mathrm{s} + y_\mathrm{l}) + p_2 u'(s_\mathrm{s} + y_\mathrm{h}).$$

We assume that the utility function u satisfies $u' > 0$, $u'' < 0$, and $u''' > 0$, that is, women are prudent, they save for precautionary reasons.

Next, we characterized marriage in this model by making the following assumptions. The first assumption is that men face the same income risk as women in the second period. More specifically, with $p_{11} > 0$, both the woman and her husband receive a low income, y_l. With $p_{12} > 0$, she receives a high income, y_h, while her husband receives a low income, y_l. Moreover, with p_{21}, she receives a low income, y_l, while her husband receives a high income, y_h. With $p_{22} > 0$, both she and her husband receive a high income, y_h. Note that $p_{12}, p_{21} > 0$ shows, for that period, the two spouses' incomes do not perfectly correlate.

The second assumption is that the spouses had the same level of consumption—that is, $c_t^{\text{wife}} = c_t^{\text{husband}}$ with $t = 1,2$, which makes the married couple maximize utility in a cooperative way, with their total income being pooled. Furthermore, we assume that married women do not share their savings with their husbands. Thus, which of the two spouses earns the income is irrelevant to this analysis.

Then, the Euler equation of a married woman becomes

$$u'(y_1 - s_m) = p_{11}u'(s_m + y_l) + (p_{12} + p_{21})u'\left(s_m + \frac{y_l + y_h}{2}\right) + p_{22}u'(s_m + y_h),$$

where S_m is the married woman's wealth. If we assume the probabilities above, $p_1 = p_{11} + p_{12}$ and $p_2 = p_{22} + p_{21}$ as well as $p_{12} = p_{21}$, the income structure of a married couple implies that the expectation for a married woman's income is the same as that of single woman's, while the variance of a married woman's income is smaller than that of a single woman. Thus, due to the assumption that there is prudence and income pooling between a wife and her husband, the marginal utility of consumption in the second period is greater for single women than for married women. Hence, we see that married women save less for precautionary reasons than do single women, which leads to our first hypothesis.

Of course, our assumption that wives and husbands have the same average income is not the case in Japan. In fact, according to the Basic Survey on Wage Structure, in Japan the wage level of regular female workers was 0.668 times that of regular male workers in 2003. Therefore, we have to consider the case that a marriage results in a higher expectation regarding the spouses' future pooled income. Let $d > 0$ be the expected income difference between women and men. Then, the Euler equations of a single woman and a married woman when $u''' = 0$ are, respectively,

$$u'(y_1 - s_s) = u'(s_s + p_1 y_l + p_2 y_h)$$

and

$$u'(y_1 - s_m) = u'\left(s_m + p_1 y_l + p_2 y_h + \frac{d}{2}\right).$$

Thus, we have $s_m < s_s$. If this is the case, wealth is motivated by income smoothing over a woman's lifetime,

but not for precautionary reasons. Therefore, we can say that if women have higher expectations regarding their income after marriage, we will empirically observe a decrease in wealth, especially for non-precautionary reasons, which leads to our second hypothesis.

A.2. The Validity of the Instrumental Variables

We need to check the validity of the five dummy variables on the preferences for marriage and *unmarried_rate* as instruments. First, these variables should not correlate with the error term of estimation equation (1)—that is, the unobservable determinants of wealth for precautionary reasons. Second, these variables should partially correlate with $marriage\_anticipation_i$, once the impact of the other exogenous variables has been netted out.

Variables on the Preferences for Marriage

We discuss whether the five dummy variables on the preferences for marriage are valid as an instrument. We consider the first condition. We can say that marriage preference, represented by the five dummy variables on the preferences for marriage, is not related to precautionary saving behavior, though it is likely that marriage preference does affect target wealth for "marriage." Those who have a strong preference for marriage need to set aside a large amount of wealth for marriage expenditures, such as the wedding ceremony, honeymoon, and married life. As noted in Section 2, in this survey, questions on target wealth are segmented so as to include target wealth for reasons of marriage, as well as target wealth for precautionary reasons and for smoothing income over life. We can therefore say that these five dummy variables on the preferences for marriage may correlate with unobservable determinants of wealth for marriage reasons, while they do not

correlate with those of wealth for precautionary reasons.[10]

Next, we examine the second condition. We can anticipate that respondents who are very fond of the idea of marriage are more likely to get married. In the survey questionnaire we use, the survey asks, "Did you engage in some activities related to marriage during the last year?"; multiple answers were allowed.[11] The answers from our 590 respondents indicate that those who have a strong preference for marriage are more likely to undertake more than one activity related to getting married. In fact, 81.8% of those who answered "I am engaged and going to get married" (*engaged* = 1) undertook more than one activity related to marriage, while 70.5% of those who answered "I would like to get married soon" (*hope_to_marry_soon* = 1) and 35.7% of those who answered "I would like to get married, not soon, but eventually" (*hope_to_marry_eventually* = 1) did so. These findings imply that those with a strong preference for marriage are active with regard to getting married, and such activities provide them with greater chances of meeting a marriage partner and getting married in the future.

unmarried_rate_j

Next, we examine whether the percentage of unmarried women aged 24–35 by prefecture (*unmarried_rate_j*) is valid as an instrument. We needed to ascertain that the first condition—that interprefectural variations in the

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[10] The instrument could be invalid if these five dummy variables on the preferences for marriage have direct effects on target wealth, whereas if we regress target wealth on these five dummy variables on the preferences for marriage, these five dummies have insignificant coefficients.

[11] The options are as follows: (1) a meeting arranged by relatives and families, (2)a meeting arranged by friends, (3) asked friends and relatives to introduce a male marriage partner, (4) joined a matrimonial agency in the last year, (5) continued to be part of a matrimonial agency over the year, (6) read a bridal magazine, (7) talked about marriage with a boyfriend, (8) got engaged, (9) other, and (10) did nothing.

ratio of the unmarried women are unlikely to correlate with unobservable determinants of saving behavior—is reasonable. It is obvious that the ratio of unmarried women by prefecture does not affect individual-level saving behavior.

We consider the second condition—that is, whether or not this ratio correlates with $\widehat{marriage\_anticipation}_i$. It is reasonable that in a prefecture where the ratio of unmarried women is high, it is more likely that the respondents will remain unmarried. This is because of a specific feature of the mobility of women in Japan. That is, there is a gender gap: women leave home for marriage, while men leave home before marriage. Actually, Suzuki (2003), who uses the Fourth National Survey on Household Changes, shows that in Japan the proportions of home leaving associated with marriage are 20.5% for males and 52.9% for females, which is in sharp contrast to Western countries. From this immobility of unmarried women in Japan, we can say that a higher share of unmarried women in a prefecture implies that there are many marriage competitors, and thus it is difficult to find a marriage partner in the prefecture. Therefore, the percentage of unmarried women by prefecture will be a good indicator of their ability to get married. In addition, this can be understood to mean that in an environment with a large number of unmarried women, being unmarried becomes a norm of sorts, and unmarried women therefore may not feel anxious about being single.

A.3. Fuller Regression Tables

We include the fuller regression results of Tables 3 and 4 here.

Table 5 around here.

Table 6 around here.

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Table 1-1: Descriptive Statistics

Variables (Continuous)	Obs	Mean	Std. Dev.	A Comparison with Other Large-scale Surveys (%)
age (year)	566	28.74	4.16	
educ (year)	562	13.93	1.68	12.54*
income +	547	260.39	143.23	288.00**
n_family	566	3.14	1.53	
father_educ (year)	552	12.34	2.47	11.69*
emergency +	525	65.71	193.14	
no_purpose +	528	225.34	425.94	
durables +	528	17.35	64.93	
leisure +	526	25.68	62.54	
retirement +	525	145.49	541.90	

Variables (Categorical)		Freq.	Percent	
wave = 9		225	39.75	
11		341	60.25	
	Total	566	100.00	
marriage_anticipation = 0		441	77.92	
1		125	22.08	
	Total	566	100.00	
engaged = 1		35	6.18	
hope_to_marry_soon = 1		79	13.96	88.3***
hope_to_marry_eventually = 1		302	53.36	
not_necessary_to_marry = 1		131	23.14	
do_not_want_to_marry = 1		18	3.18	5.0***
no_res = 1		1	0.18	6.7***
	Total	566	100.00	
live_alone = 0		448	79.15	78.5***
1		118	20.85	
	Total	566	100.00	
work_fulltime = 1		350	61.84	70.49#
work_parttime = 1		147	25.97	12.01#
no_work = 1		61	10.78	
no_res = 1		8	1.41	
	Total	566	100.00	

Notes: Japanese Panel Survey of Consumers, 9th wave of the cohort of A and B and 11th wave of the cohort of C. In order to define *marriage_anticipation* , we use the 12th and 14th wave respectively. +: 10 thousand yen. On annual average one US dollar is 125 yen in 2001 (9th wave) and 113 yen in 2003 (11th wave) from the Bank of Japan.

*: All in this column are from authors' calculation. From the 2000 Population Census. The averages of school attendance and type of last school completed of never married females aged 25 to 34 and married males aged 45 to 74, respectively. **: From the 1999 National Survey of Family Income and Expenditure. The average income of never married females aged under 30. ***: From the National Fertility Survey conduced by the Institute of Population and Social Security Research in 2002. #: From the 2002 Labour Force Survey. Never married females aged 25 to 34.

Table 1-2: Descriptive Statistics by *marriage_anticipation*

	remain unmarried (*marriage_anticipation* = 0)			eventually marry (*marriage_anticipation* = 1)				attrition (*marriage_anticipation* = n.a.)			
Variables (Continuous)	Obs	Mean	S. D.	Obs	Mean		S. D.	Obs	Mean		S. D.
age (year)	441	29.03	4.36	125	27.73	***	3.17	175	27.07	***	2.84
educ (year)	439	14.00	1.70	123	13.69	*	1.59	171	13.77		1.69
income +	426	260.59	149.81	121	259.68		117.71	163	252.42		128.19
n_family	441	3.09	1.50	125	3.32		1.63	175	2.99		1.67
father_educ (year)	430	12.36	2.48	122	12.26		2.42	172	12.73	*	2.57
emergency +	408	74.39	213.85	117	35.47	*	82.89	160	31.81	**	83.42
no_purpose +	410	257.98	465.63	118	111.95	***	206.41	159	154.34	**	259.06
durables +	409	17.07	65.26	119	18.32		64.04	164	11.95		51.78
leisure +	408	27.33	68.33	118	20.00		35.61	164	24.82		56.51
retirement +	407	165.31	588.01	118	77.12		330.61	159	114.97		608.30

Variables (Categorical)		Freq.	Percent	Freq.	Percent	Freq.	Percent
wave = 9		185	41.95	40	32.00	41	23.43
11		256	58.05	85	68.00	134	76.57
	Total	441	100.00	125	100.00	175	100.00
marriage_anticipation = 0		441	100.00	0	0.00		
1		0	0.00	125	100.00		
	Total	441	100.00	125	100.00		
engaged = 1		4	0.91	31	24.80	11	6.29
hope_to_marry_soon = 1		52	11.79	27	21.60	24	13.71
hope_to_marry_eventually = 1		248	56.24	54	43.20	109	62.29
not_necessary_to_marry = 1		120	27.21	11	8.80	23	13.14
do_not_want_to_marry = 1		17	3.85	1	0.80	8	4.57
no_res = 1		0	0.00	1	0.80	0	0.00
	Total	441	100.00	125	100.00	175	100.00
live_alone = 0	0	351	79.59	97	77.60	118	67.43
1	1	90	20.41	28	22.40	57	32.57
	Total	441	100.00	125	100.00	175	100.00
work_fulltime = 1		271	61.45	79	63.20	104	59.43
work_parttime = 1		114	25.85	33	26.40	48	27.43
no_work = 1		50	11.34	11	8.80	21	12.00
no_res = 1		6	1.36	2	1.60	2	1.14
	Total	441	100.00	125	100.00	175	100.00

Notes: Japanese Panel Survey of Consumers, 9th wave of the cohort of A and B and 11th wave of the cohort of C. In order to define *marriage_anticipation* , we use the 12th and 14th wave respectively. +: 10 thousand yen. With the level of significance at 1% by ***, 5% by **, and 10% by *, there are significant differences in group means between respondents who remain unmarried and those who eventually marry in the second column as well as between respondents who were dropped and those who were not in the third column . On annual average one US dollar is 125 yen in 2001 (9th wave) and 113 yen in 2003 (11th wave) from the Bank of Japan.

Table 2: First Stage (Two Stage Estimation, Coefficients)
dependent variable: *marriage_anticipation*

sample selection	(a) emergency	(b) no_purpose	(c) durables	(d) leisure	(e) retirement
engaged	1.680 ***	1.741 ***	1.735 ***	1.689 ***	1.691 ***
	(0.368)	(0.371)	(0.366)	(0.366)	(0.365)
hope_to_marry_eventually	-0.655 ***	-0.632 ***	-0.646 ***	-0.660 ***	-0.659 ***
	(0.183)	(0.183)	(0.185)	(0.183)	(0.183)
not_necessary_to_marry	-1.025 ***	-1.025 ***	-1.031 ***	-1.040 ***	-1.034 ***
	(0.237)	(0.235)	(0.238)	(0.237)	(0.238)
do_not_want_to_marry	-1.349 **	-1.271 **	-1.327 **	-1.350 ***	-1.339 **
	(0.530)	(0.541)	(0.525)	(0.527)	(0.527)
unmarried_rate	-1.565	-1.518	-1.470	-1.136	-1.732
	(1.496)	(1.487)	(1.494)	(1.500)	(1.491)
Log likelihood	-214.972	-216.325	-216.096	-214.475	-216.229
LR chi2(26) (p-value)	127.08 (0.000)	128.39 (0.000)	131.32 (0.000)	131.07 (0.000)	127.05 (0.000)
Pseudo R2	0.228	0.229	0.233	0.234	0.227
Number of obs	525	528	528	526	525
Hansen's J chi2 (4) (p-value)	12.13 (0.016)	1.48 (0.830)	5.55 (0.235)	4.71 (0.319)	6.47 (0.167)
F test (p-value)	33.41 (0.000)	36.48 (0.000)	37.46 (0.000)	35.26 (0.000)	36.48 (0.000)

Notes: Japanese Panel Survey of Consumers, 9th wave of the cohort of A and B and 11th wave of the cohort of C. In order to define *marriage_anticipation* , we use the 12th and 14th wave respectively. Probit models are used. Robust standard errors are in parentheses. The level of significance at 1% is ***, 5% is **, and 10% is *. Control variables in Z_i are included in all the specifications, but suppressed. Z_i includes *age* , *age_sq* , *work_fulltime* , *work_parttime* , *work_no_res* , *educ_junior* , *educ_college* , *educ_univ* , *educ_no_res* , *f_educ_junior* , *f_educ_college* , *f_educ_univ* , *f_educ_no_res* , *live_alone* , *family_of_two* , *family_of_four* , *income_0_2m* , *income_2m_4m* , *income_6m_over* , *income_no_res* , and *wave_11* . On annual average one US dollar is 125 yen in 2001 (9th wave) and 113 yen in 2003 (11th wave) from the Bank of Japan.

Table 4: Panel Analysis (Coefficients)

	emergency		no_purpose		durables		leisure		retirement	
	(a-1) random effects	(a-2) fixed effects	(b-1) random effects	(b-2) fixed effects	(c-1) random effects	(c-2) fixed effects	(d-1) random effects	(d-2) fixed effects	(e-1) random effects	(e-2) fixed effects
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
marriage_anticipation	-33.821 **	2.061	-104.491 ***	-49.529	10.028	23.351	-7.484	0.823	-101.502 ***	-114.446 *
	(14.605)	(34.498)	(37.530)	(91.846)	(8.943)	(16.430)	(4.772)	(11.087)	(36.747)	(68.153)
age_sq	0.089	-0.013	-0.742	-0.115	0.082	-0.009	-0.136 *	-0.027	3.071 **	1.199 ***
	(0.358)	(0.136)	(0.649)	(0.224)	(0.169)	(0.039)	(0.074)	(0.035)	(1.204)	(0.309)
work_fulltime	22.177	2.150	20.271	-68.895	0.212	-5.732	-11.502	-10.958	100.655 *	-13.996
	(17.765)	(22.219)	(64.121)	(82.722)	(7.495)	(10.611)	(10.703)	(18.298)	(56.595)	(77.888)
work_parttime	2.391	14.021	-85.008	-108.176	-9.049	-10.773	-15.195	-17.714	68.866	26.616
	(17.870)	(22.129)	(54.301)	(74.061)	(6.900)	(8.612)	(9.926)	(17.692)	(43.435)	(56.781)
live_alone	9.309	22.682	-9.589	199.601 *	-7.401	-14.647 *	-10.145	-5.492	79.303	-63.891
	(23.447)	(31.698)	(53.433)	(108.324)	(10.481)	(7.685)	(8.124)	(13.917)	(84.709)	(142.576)
family_of_two	70.835	69.716	-82.763	-78.201	-16.235	-4.868	-2.635	-2.880	28.398	-8.868
	(48.123)	(68.913)	(70.944)	(136.492)	(10.631)	(9.979)	(8.189)	(11.623)	(120.668)	(87.032)
family_of_four	-9.087	17.804	7.894	27.220	-9.655	-10.767	5.490	20.758	-54.915	-46.556
	(18.368)	(39.438)	(42.949)	(81.858)	(7.741)	(12.321)	(6.293)	(13.043)	(61.586)	(112.550)
income_0_2m	-71.178 **	-30.259	-151.190 *	-15.773	-6.985	0.710	-26.686 **	-32.603 **	-101.937	37.799
	(31.410)	(23.895)	(78.138)	(63.021)	(8.155)	(6.914)	(11.244)	(15.811)	(89.069)	(88.915)
income_2m_4m	-43.964	-7.495	-135.162 *	-43.713	-5.680	-1.788	-10.091	-6.183	-98.168	-8.950
	(28.589)	(16.067)	(75.571)	(53.465)	(7.545)	(6.871)	(7.164)	(6.878)	(74.934)	(73.932)
income_6m_over	-75.387 **	-114.591 *	-2.520	-106.434	1.978	24.355	54.420	134.304	-73.349	-77.404
	(34.180)	(67.063)	(105.604)	(79.025)	(25.273)	(30.175)	(51.723)	(103.420)	(147.467)	(186.183)
sigma_u	132.863	183.239	283.204	398.337	65.418	74.642	27.677	49.531	534.157	651.579
sigma_e	150.711	150.639	301.235	302.841	43.377	43.378	46.803	46.777	377.758	378.329
rho	0.437	0.597	0.469	0.634	0.695	0.748	0.259	0.529	0.667	0.748
Number of obs	1248	1248	1247	1247	1253	1253	1253	1253	1245	1245
Number of groups	340	340	339	339	340	340	338	338	337	337
Wald chi2 (p-value)	58.65 (0.000)		57.21 (0.000)		40.25 (0.007)		39.96 (0.008)		63.31 (0.000)	
F(8) (p-value)		0.98 (0.469)		0.91 (0.542)		1.26 (0.244)		1.19 (0.287)		1.9 (0.034)
Sargan-Hansen (p-value)	15.68 (0.267)		42.55 (0.000)		15.39 (0.284)		15.72 (0.265)		15.18 (0.296)	

Notes: Japanese Panel Survey of Consumers, from 9th wave to 12th wave. Random effects method and fixed effects method are used. Robust standard errors are in parenthesis. The level of significance at 1% is ***, 5% is **, and 10% is *. Time invariant variables such as *age*, *educ*, and *f_educ* are included in the random effects, but suppressed. The other control variables in Z_i are *work_no_res*, *educ_no_res*, *f_educ_no_res*, *income_no_res*, *wave_11*, and *cons*. On annual average one US dollar is 125 yen in 2001 (9th wave), 122 yen in 2002 (10th wave), 113 yen in 2003 (11th wave) and 107 yen in 2004 (12th wave) from the Bank of Japan.The table of fuller regression results is included in Appendix.

Table 3: Second Stage (Two Stage Estimation, Coefficients)

dependent variable	(a) emergency	(b) no_purpose	(c) durables	(d) leisure	(e) retirement
marriage_anticipation_hat	-62.155 *	-158.620 **	19.932	-10.985	-152.633 *
	(33.364)	(68.246)	(15.600)	(8.616)	(92.359)
age	-9.893	21.790	-6.729	-4.239	-109.062
	(21.444)	(68.710)	(10.979)	(9.630)	(107.266)
age_sq	0.315	0.012	0.097	0.068	2.114
	(0.359)	(1.088)	(0.181)	(0.160)	(1.670)
work_fulltime	18.530	-1.410	-0.912	-18.124	230.518 **
	(26.818)	(53.363)	(9.022)	(13.932)	(97.600)
work_parttime	-11.267	2.156	-6.693	-16.704	36.721
	(21.550)	(57.755)	(7.441)	(13.204)	(42.889)
educ_junior	-23.212	-182.458 ***	-11.520 *	-18.027 ***	-101.870
	(25.564)	(61.680)	(6.501)	(5.106)	(95.130)
educ_college	-39.364	-52.962	-1.196	8.878	-83.403
	(27.504)	(39.676)	(6.547)	(6.255)	(71.587)
educ_univ	-41.510	-87.079	16.978 **	5.659	-70.527
	(28.865)	(56.565)	(8.100)	(7.725)	(89.460)
f_educ_junior	38.365	-10.239	3.462	1.184	-59.488
	(25.010)	(39.931)	(6.989)	(5.989)	(81.347)
f_educ_college	-17.542	87.735	-4.773	8.671	-124.155 *
	(24.534)	(68.132)	(9.694)	(10.600)	(71.732)
f_educ_univ	15.920	63.088	-3.840	7.146	-4.025
	(15.645)	(55.824)	(7.595)	(7.120)	(70.202)
live_alone	-1.192	-24.473	0.361	-17.230 ***	106.906
	(19.615)	(38.017)	(7.235)	(6.529)	(86.502)
family_of_two	78.095	5.190	2.274	-2.959	112.446
	(59.618)	(83.927)	(14.661)	(13.241)	(92.441)
family_of_four	-1.788	49.941	4.523	-7.087	15.800
	(14.913)	(47.206)	(6.107)	(6.961)	(48.226)
income_0_2m	-111.460 **	-299.208 ***	-9.513	-36.035 **	3.014
	(54.605)	(81.460)	(13.904)	(15.622)	(133.537)
income_2m_4m	-89.146 *	-168.216 **	-7.539	-29.211 **	-146.621 *
	(52.067)	(77.376)	(14.690)	(13.741)	(84.514)
income_6m_over	-83.546	-49.209	19.492	-29.095 *	-98.476
	(76.440)	(192.448)	(44.162)	(16.106)	(174.590)
F-value (p-value)	2.18 (0.002)	2.85 (0.000)	1.47 (0.077)	2.74 (0.000)	1.4 (0.106)
R-squared	0.145	0.119	0.039	0.058	0.084
Root MSE	182.430	408.360	65.011	62.004	529.950
Number of obs	525	528	528	526	525

Notes: Japanese Panel Survey of Consumers, 9th wave of the cohort of A and B and 11th wave of the cohort of C. In order to define *marriage_anticipation* , we use the 12th and 14th wave respectively. Two stage least squares methods are used. Robust standard errors are in parentheses. The level of significance at 1% is ***, 5% is **, and 10% is *. The other control variables in Z_i are *work_no_res* , *educ_no_res* , *f_educ_no_res* , *income_no_res* , *wave_11* , and *cons* .On annual average one US dollar is 125 yen in 2001 (9th wave) and 113 yen in 2003 (11th wave) from the Bank of Japan. The table of fuller regression results is included in Appendix.

Table 5: Second Stage (Two Stage Estimation, coefficients, fuller)

dependent variable	(a) emergency	(b) no_purpose	(c) durables	(d) leisure	(e) retirement
marriage_anticipation_hat	-62.155 *	-158.620 **	19.932	-10.985	-152.633 *
	(33.364)	(68.246)	(15.600)	(8.616)	(92.359)
age	-9.893	21.790	-6.729	-4.239	-109.062
	(21.444)	(68.710)	(10.979)	(9.630)	(107.266)
age_sq	0.315	0.012	0.097	0.068	2.114
	(0.359)	(1.088)	(0.181)	(0.160)	(1.670)
work_fulltime	18.530	-1.410	-0.912	-18.124	230.518 **
	(26.818)	(53.363)	(9.022)	(13.932)	(97.600)
work_parttime	-11.267	2.156	-6.693	-16.704	36.721
	(21.550)	(57.755)	(7.441)	(13.204)	(42.889)
work_no_res	85.213	196.417	-9.660	-21.321	190.785
	(95.256)	(275.045)	(20.897)	(21.411)	(327.563)
educ_junior	-23.212	-182.458 ***	-11.520 *	-18.027 ***	-101.870
	(25.564)	(61.680)	(6.501)	(5.106)	(95.130)
educ_college	-39.364	-52.962	-1.196	8.878	-83.403
	(27.504)	(39.676)	(6.547)	(6.255)	(71.587)
educ_univ	-41.510	-87.079	16.978 **	5.659	-70.527
	(28.865)	(56.565)	(8.100)	(7.725)	(89.460)
educ_no_res	115.236	81.110	-16.628 *	5.672	-148.253
	(177.218)	(209.038)	(9.291)	(15.350)	(136.847)
f_educ_junior	38.365	-10.239	3.462	1.184	-59.488
	(25.010)	(39.931)	(6.989)	(5.989)	(81.347)
f_educ_college	-17.542	87.735	-4.773	8.671	-124.155 *
	(24.534)	(68.132)	(9.694)	(10.600)	(71.732)
f_educ_univ	15.920	63.088	-3.840	7.146	-4.025
	(15.645)	(55.824)	(7.595)	(7.120)	(70.202)
f_educ_no_res	-64.419 **	-46.680	-11.196	-0.151	-95.319
	(31.303)	(60.747)	(7.091)	(11.290)	(83.028)
live_alone	-1.192	-24.473	0.361	-17.230 ***	106.906
	(19.615)	(38.017)	(7.235)	(6.529)	(86.502)
family_of_two	78.095	5.190	2.274	-2.959	112.446
	(59.618)	(83.927)	(14.661)	(13.241)	(92.441)
family_of_four	-1.788	49.941	4.523	-7.087	15.800
	(14.913)	(47.206)	(6.107)	(6.961)	(48.226)
income_0_2m	-111.460 **	-299.208 ***	-9.513	-36.035 **	3.014
	(54.605)	(81.460)	(13.904)	(15.622)	(133.537)
income_2m_4m	-89.146 *	-168.216 **	-7.539	-29.211 **	-146.621 *
	(52.067)	(77.376)	(14.690)	(13.741)	(84.514)
income_6m_over	-83.546	-49.209	19.492	-29.095 *	-98.476
	(76.440)	(192.448)	(44.162)	(16.106)	(174.590)
income_no_res	-138.609 **	-216.436 *	-4.954	-39.686 ***	231.044
	(55.309)	(127.517)	(16.381)	(15.325)	(357.742)
wave_11	21.152	124.345 **	-25.017 ***	-4.482	26.575
	(23.758)	(57.573)	(9.702)	(8.220)	(69.179)
_cons	177.629	-237.456	143.598	138.132	1475.237
	(335.407)	(1100.287)	(166.570)	(146.483)	(1764.479)
F-value (p-value)	2.18 (0.002)	2.85 (0.000)	1.47 (0.077)	2.74 (0.000)	1.4 (0.106)
R-squared	0.145	0.119	0.039	0.058	0.084
Root MSE	182.430	408.360	65.011	62.004	529.950
Number of obs	525	528	528	526	525

Notes: Japanese Panel Survey of Consumers, 9th wave of the cohort of A and B and 11th wave of the cohort of C. In order to define *marriage_anticipation* , we use the 12th and 14th wave respectively. Two stage least squares methods are used. Robust standard errors are in parentheses. The level of significance at 1% is ***, 5% is **, and 10% is *. On annual average one US dollar is 125 yen in 2001 (9th wave) and 113 yen in 2003 (11th wave) from the Bank of Japan.

Table 6: Panel Analysis (Coefficients, Fuller)

	emergency		no_purpose		durables		leisure		retirement	
	(a-1) random effects	(a-2) fixed effects	(b-1) random effects	(b-2) fixed effects	(c-1) random effects	(c-2) fixed effects	(d-1) random effects	(d-2) fixed effects	(e-1) random effects	(e-2) fixed effects
marriage_anticipation	-33.821 **	2.061	-104.491 ***	-49.529	10.028	23.351	-7.484	0.823	-101.502 ***	-114.446 *
	(14.605)	(34.498)	(37.530)	(91.846)	(8.943)	(16.430)	(4.772)	(11.087)	(36.747)	(68.153)
age	1.729		53.982		-3.420		9.018 *		-152.496 **	
	(22.795)		(42.179)		(10.657)		(4.983)		(76.699)	
age_sq	0.089	-0.013	-0.742	-0.115	0.082	-0.009	-0.136 *	-0.027	3.071 **	1.199 ***
	(0.358)	(0.136)	(0.649)	(0.224)	(0.169)	(0.039)	(0.074)	(0.035)	(1.204)	(0.309)
work_fulltime	22.177	2.150	20.271	-68.895	0.212	-5.732	-11.502	-10.958	100.655 *	-13.996
	(17.765)	(22.219)	(64.121)	(82.722)	(7.495)	(10.611)	(10.703)	(18.298)	(56.595)	(77.888)
work_parttime	2.391	14.021	-85.008	-108.176	-9.049	-10.773	-15.195	-17.714	68.866	26.616
	(17.870)	(22.129)	(54.301)	(74.061)	(6.900)	(8.612)	(9.926)	(17.692)	(43.435)	(56.781)
work_no_res	138.732 *	120.006	157.773	211.384	34.812 **	28.061 **	-11.456	-24.854	473.802 *	471.001 *
	(75.203)	(90.962)	(216.798)	(246.441)	(14.928)	(12.471)	(11.591)	(21.078)	(268.768)	(283.588)
educ_junior	-94.046 ***		-153.263 **		-20.182 **		-17.931 **		-263.492 *	
	(27.706)		(60.778)		(8.332)		(7.559)		(154.698)	
educ_college	-45.459		21.990		-4.900		6.410		-109.442	
	(28.806)		(52.893)		(7.933)		(5.898)		(94.983)	
educ_univ	-16.326		-90.830		14.532		3.854		86.752	
	(34.103)		(59.872)		(12.320)		(6.898)		(116.385)	
educ_no_res	-90.609 *		110.857		-9.283		-28.700		-383.654	
	(47.269)		(196.823)		(13.989)		(23.496)		(260.520)	
f_educ_junior	30.151		13.170		7.441		5.323		-177.724 *	
	(30.495)		(51.796)		(9.434)		(6.239)		(104.265)	
f_educ_college	5.777		120.726 *		-2.969		11.927 *		-198.307 **	
	(27.949)		(70.747)		(12.101)		(7.121)		(97.734)	
f_educ_univ	21.145		-9.305		13.472		13.396 *		-23.053	
	(19.847)		(45.528)		(10.714)		(7.253)		(74.245)	
f_educ_no_res	-42.136		-121.464 **		-7.994		31.826		-40.040	
	(29.044)		(55.636)		(7.622)		(20.108)		(143.855)	
live_alone	9.309	22.682	-9.589	199.601 *	-7.401	-14.647 *	-10.145	-5.492	79.303	-63.891
	(23.447)	(31.698)	(53.433)	(108.324)	(10.481)	(7.685)	(8.124)	(13.917)	(84.709)	(142.576)
family_of_two	70.835	69.716	-82.763	-78.201	-16.235	-4.868	-2.635	-2.880	28.398	-8.868
	(48.123)	(68.913)	(70.944)	(136.492)	(10.631)	(9.979)	(8.189)	(11.623)	(120.668)	(87.032)
family_of_four	-9.087	17.804	7.894	27.220	-9.655	-10.767	5.490	20.758	-54.915	-46.556
	(18.368)	(39.438)	(42.949)	(81.858)	(7.741)	(12.321)	(6.293)	(13.043)	(61.586)	(112.550)
income_0_2m	-71.178 **	-30.259	-151.190 *	-15.773	-6.985	0.710	-26.686 **	-32.603 **	-101.937	37.799
	(31.410)	(23.895)	(78.138)	(63.021)	(8.155)	(6.914)	(11.244)	(15.811)	(89.069)	(88.915)
income_2m_4m	-43.964	-7.495	-135.162 *	-43.713	-5.680	-1.788	-10.091	-6.183	-98.168	-8.950
	(28.589)	(16.067)	(75.571)	(53.465)	(7.545)	(6.871)	(7.164)	(6.878)	(74.934)	(73.932)
income_6m_over	-75.387 **	-114.591 *	-2.520	-106.434	1.978	24.355	54.420	134.304	-73.349	-77.404
	(34.180)	(67.063)	(105.604)	(79.025)	(25.273)	(30.175)	(51.723)	(103.420)	(147.467)	(186.183)
income_no_res	-94.571 **	-24.092	-114.655	-45.375	-25.638 *	-25.179	-4.127	3.458	-355.533 **	-300.481
	(37.354)	(34.057)	(122.306)	(108.253)	(15.163)	(18.929)	(13.802)	(19.295)	(152.597)	(202.302)
_cons	-6.406	93.110	-539.400	388.198	53.729	34.711	-103.915	62.998	2081.847 *	-890.892 ***
	(349.825)	(137.692)	(716.009)	(238.219)	(169.658)	(35.503)	(83.769)	(42.075)	(1233.535)	(322.260)
sigma_u	132.863	183.239	283.204	398.337	65.418	74.642	27.677	49.531	534.157	651.579
sigma_e	150.711	150.639	301.235	302.841	43.377	43.378	46.803	46.777	377.758	378.329
rho	0.437	0.597	0.469	0.634	0.695	0.748	0.259	0.529	0.667	0.748
Number of obs	1248	1248	1247	1247	1253	1253	1253	1253	1245	1245
Number of groups	340	340	339	339	340	340	338	338	337	337
Wald chi2 (p-value)	58.65 (0.000)		57.21 (0.000)		40.25 (0.007)		39.96 (0.008)		63.31 (0.000)	
F(8) (p-value)		0.98 (0.469)		0.91 (0.542)		1.26 (0.244)		1.19 (0.287)		1.9 (0.034)
Sargan-Hansen (p-value)	15.68 (0.267)		42.55 (0.000)		15.39 (0.284)		15.72 (0.265)		15.18 (0.296)	

Notes: Japanese Panel Survey of Consumers, from 9th wave to 12th wave. Random effects method and fixed effects method are used. Robust standard errors are in parenthesis. The level of significance at 1% is ***, 5% is **, and 10% is *. On annual average one US dollar is 125 yen in 2001 (9th wave), 122 yen in 2002 (10th wave), 113 yen in 2003 (11th wave) and 107 yen in 2004 (12th wave) from the Bank of Japan.

Figure 1. Target savings and years before marriage

Notes: On annual average one US dollar is 125 yen in 2001 (9th wave), 122 yen in 2002 (10th wave), 113 yen in 2003 (11th wave) and 107 yen in 2004 (12th wave) from the Bank of Japan.