How Ready Are Households for Their Retirement?
An Empirical Analysis of Saving Behavior

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Preface

   This report presents the results of research conducted as part of the Research Project entitled "How Ready Are Households for Their Retirement? An Analysis of Saving Behavior" during the Fiscal Year 2018. The main objective of this project was to examine the saving behavior of households using micro data from Japanese household surveys. While public pension programs continue to play an important role in people's old age saving in most developed countries, the fiscal sustainability of such programs is increasingly being challenged as a result of population aging, and individuals are increasingly being encouraged to take more responsibility for securing their financial wellbeing in old age. It is therefore important to examine how adequately people are preparing for old age and how the retired elderly are coping financially.

   The report consists of two chapters. The first chapter looks at one of the puzzles about the saving behavior of the elderly identified in empirical studies, which is that the elderly do not decumulate their wealth as rapidly as predicted theoretically. More specifically, it assesses the relative importance of precautionary saving and bequest motives in explaining the lower than expected rates of wealth decumulation of the retired elderly by estimating the determinants of their wealth decumulation behavior in Japan. While both precautionary saving and bequest motives are found to be important drivers behind this puzzle, our analysis suggests that precautionary saving plays a relatively important role in explaining the wealth decumulation behavior of the retired elderly, at least in the case of Japan.

   The second chapter examines the relationship between marriage and wealth with particular focus on women. By exploiting the availability of data on personal wealth, it assesses whether the wealth effect of marriage differs depending on whether we measure wealth in terms of personal wealth or household wealth. If wealth is measured in terms of equivalized household net worth on the assumption that intrahousehold resources are shared equally within married couples, marriage is generally found to help women accumulate wealth. This raises concern about whether never married women, whose number is on the rise in Japan, are accumulating sufficient wealth for old age. By contrast, if wealth is measured in terms of personal net worth based on the actual ownership of assets, marriage is found to be negatively associated with women's wealth holdings. This is largely due to the fact that a relatively small share of household wealth is held in the wife's name in the case of Japan. These findings underscore the fact that women in Japan are potentially in a financially vulnerable position even after they marry.

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Abstract

This report examines the saving behavior of households using micro data from Japanese household surveys. It consists of two chapters. The first chapter analyzes the determinants of the wealth decumulation behavior of the retired elderly in Japan, and by so doing, attempts to assess the relative importance of precautionary saving and bequest motives in explaining the lower than expected rates of wealth decumulation of the retired elderly. Our analyses show that precautionary saving plays a relatively important role in explaining the lower than expected wealth decumulation rate of the retired elderly, at least in the case of Japan, even though both precautionary saving and bequest motives are important drivers behind this puzzle. Our results also suggest the possibility that the financial burden of parental care may also affect the wealth decumulation behavior of the retired elderly in Japan. Given that parental care responsibilities tend to arise relatively late in life, often after retirement, in the case of Japan, our results suggest that the financial burden of parental care may be a relevant issue when analyzing the wealth decumulation behavior of the elderly.

The second chapter examines the relationship between marriage and wealth with particular focus on women. By exploiting the availability of data on personal wealth, it assesses whether the wealth effect of marriage differs depending on whether we measure wealth in terms of personal wealth or household wealth, an issue that very few studies have examined thus far. According to the empirical results, if wealth is measured in terms of equivalized household net worth on the assumption that intrahousehold resources are shared equally within married couples, marriage is generally found to help women accumulate wealth. This raises concern about whether never married women, whose number is on the rise in Japan, are accumulating sufficient wealth for old age. By contrast, if wealth is measured in terms of personal net worth based on the actual ownership of assets, marriage is found to be negatively associated with women's wealth holdings. This is largely due to the fact that a relatively small share of household wealth is held in the wife's name in the case of Japan. These findings underscore the fact that women in Japan are potentially in a financially vulnerable position even after they marry.

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Chapter 1: The Wealth Decumulation Behavior of the Retired Elderly in Japan:

The Relative Importance of Precautionary Saving and Bequest Motives

Yoko Niimi and Charles Yuji Horioka

1. Introduction

Japan had one of the highest household saving rates among the member countries of the Organisation for Economic Co-operation and Development (OECD) until the mid-1980s,[1] but her household saving rate has been declining steadily since the mid-1970s and has been very low (sometimes even negative) during the last 15 years (Horioka, 2017). One of the main driving forces behind this observed trend in the household saving rate is population aging (e.g., Horioka, 1997). According to the simplest version of the life-cycle model, people accumulate wealth during their working lives and decumulate their wealth after retirement in order to smooth consumption over the life cycle. Thus, theory predicts that saving rates should decline as population aging progresses, and Japan's recent experience is fully consistent with this theoretical prediction.

However, what is puzzling is that, although the link between population aging and aggregate trends in household saving rates predicted by the life-cycle model has been verified empirically in the case of Japan (e.g., Horioka, 1997), the wealth decumulation rates (the ratios of dissaving to the stock of wealth) of the retired elderly in Japan are lower than those implied by the basic life-cycle model with no bequest motives and no longevity risk. For example, Horioka (2010) and Horioka and Niimi (2017) find that the wealth decumulation rates of the retired elderly in Japan have been only 1 to 3% per year during the last 15 years when wealth is measured as financial net worth, even though they have shown a slight upward trend over time. These low wealth decumulation rates imply that many die with significant wealth. Moreover, almost 70% of total financial wealth is held by households whose heads are aged 60 or above in Japan,[2] and more than 90% of

financial net worth is held by such households. These figures show that the lion's share of financial assets in Japan is held by the elderly and underscore the importance of understanding the wealth decumulation behavior of this age group.

The wealth decumulation rates of the elderly have been found to be lower than predicted by the basic life-cycle model not only in Japan but in other countries as well, and several alternative explanations have been put forward to explain this puzzle, including precautionary saving and bequest motives. However, the empirical literature has not yet reached a consensus on the relative importance of the different explanations, and there is scope for more work to disentangle precautionary saving motives from other motives, including bequest motives (De Nardi, French, and Jones, 2016). Furthermore, previous work on the wealth decumulation behavior of the elderly has been conducted predominantly using data on the United States (US), and there are only a handful studies that look at the case of Japan.

Using micro data from two household surveys, this paper analyzes the determinants of the wealth decumulation behavior of the retired elderly in Japan with the goal of identifying possible explanations for why their rate of wealth decumulation is lower than predicted by the basic life-cycle model. In so doing, our paper attempts to fill the aforementioned gaps in the literature by making three key contributions. First, it attempts to assess the relative importance of precautionary saving and bequest motives in explaining the wealth decumulation behavior of the retired elderly. Despite growing efforts to overcome the challenge of assessing the relative importance of precautionary saving and bequest motives in recent years, more work remains to be done (De Nardi, French, and Jones, 2016). Moreover, we also examine the implications of different types of bequest motives for the wealth decumulation behavior of the retired elderly by exploiting detailed information on the nature of bequest motives that these households have.

Second, this paper looks at the case of Japan where empirical work on the reasons behind the low wealth decumulation rate of the elderly remains limited. It would be interesting to see whether previous findings obtained mostly for the US and European

Liabilities, 2017 edition (http://www.stat.go.jp/data/sav/2017np/index.html).

countries also hold in the case of Japan where the institutional setting and social norms differ from those in these countries. Japan has a universal mandatory health insurance program[3] and also introduced a mandatory long-term care insurance (LTCI) program[4] with universal and relatively generous coverage in 2000. Another unique feature of Japan is that elderly care has traditionally taken place within the family setting. While there is some evidence that perceived filial obligations have been declining among adult children since the launch of the LTCI program (e.g., Tsutsui, Muramatsu, and Higashino, 2014), some studies find that informal care by adult children continues to be the most common source of caregiving for the elderly in Japan (Hanaoka and Norton, 2008; Long, Campbell, and Nishimura, 2009).

Third, this paper investigates the implications of the financial burden of parental care for the wealth decumulation behavior of the retired elderly. While much attention has so far been paid in the literature to the implications of their own long-term care needs for the wealth decumulation rate of the elderly, there has not been any previous research that takes into account the financial burden of parental care when analyzing the wealth decumulation behavior of the elderly. This is a particularly relevant issue in Japan where parental care needs tend to arise relatively late in people's lives because of the high life expectancy in the country. The share of cases in which both the care recipient and his/her main family caregiver are aged 65 or above is as high as about 55%, and the share of cases in which both are aged 75 or above is about 30%.[5] As far as we know, this is the first paper to analyze the implications of the financial burden of parental care for the

[3] Everyone in Japan is covered by one health insurance program or another, and the health insurance system for the elderly aged 75 or above is especially generous. Under the current health care system for this age group, which was enacted in April 2008, those in this age group can access necessary health care subject to a 10% co-payment (30% in the case of those with an income comparable to the current workforce). By contrast the co-payment rate is, in principle, 20% for those under the age of 6, 30% for those aged 6 to 69, and 20% for those aged 70 to 74 (30% in the case of those with an income comparable to the current workforce).

[4] This program has universal coverage and everyone aged 65 or above as well as those under 65 but with aging-related disabilities are entitled to receive necessary care services regardless of their income level or the availability of family caregivers as long as they are certified as requiring support or long-term care. It does not provide cash allowances to family caregivers, but it covers the cost of services purchased from the formal sector once they are certified as requiring care or support subject to a 10% co-payment (Tsutsui and Muramatsu, 2005). The amount of services for which care recipients are eligible is determined by the degree of their disability. The cost of the services that care recipients receive above this amount must be covered entirely by care recipients themselves.

[5] Based on data from Ministry of Health, Labour and Welfare, *An Overview of the 2016 Comprehensive Survey of Living Conditions* (http://www.mhlw.go.jp/toukei/saikin/hw/k-tyosa/k-tyosa16/index.html).

wealth decumulation behavior of the retired elderly.

We use two different datasets for our empirical analysis—the Survey on Households and Saving conducted by the Yu-cho Foundation and the Preference Parameters Study conducted by Osaka University. Both datasets contain unique information that will allow us to shed light on the relative importance of the alternative explanations for the lower than expected wealth decumulation rate of the retired elderly.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the two datasets used for our empirical analysis. Section 4 explains the estimation strategy as well as the empirical specification. Section 5 presents the estimation results. Section 6 summarizes the main findings and discusses some policy implications.

2. Literature Survey

The life-cycle model, first formalized by Modigliani and Brumberg (1954), still serves as the workhorse for analyzing the saving behavior of households. According to the simplest version of the life-cycle model, people accumulate wealth during their working lives and decumulate their wealth after retirement to smooth consumption over the life cycle. However, such a pattern is often not verified empirically as the elderly are found to decumulate their wealth much more slowly than implied by the basic life-cycle model.

To match the actual behavior of the elderly, a number of factors have been incorporated into the life-cycle model, including bequest motives as well as precautionary saving induced by lifespan uncertainty and/or the possibility of facing high medical expenses in the future.[6] However, the empirical literature has not yet reached a consensus on the relative importance of the different explanations. Hurd (1987, 1989), for instance, shows that the low rate of wealth decumulation by the elderly is likely to be due to mortality risk rather than a bequest motive. Hurd (1989) thus argues that most bequests are accidental bequests arising from lifespan uncertainty.

In a similar vein, Dynan, Skinner, and Zeldes (2002) show that saving for

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[6] De Nardi, French, and Jones (2016) provide a useful summary of potential reasons why the elderly continue to hold onto a relatively large amount of wealth into very old age.

precautionary purposes is bequeathed (i.e., that the bequest motive becomes "operative") if no unforeseen events (e.g., low earnings, living long, or high medical expenses) take place. This may be why many households state that they plan to leave a bequest and a large share of households do receive bequests even though a bequest motive is rarely mentioned as a reason for saving (retirement and precautionary motives are mentioned much more often as motives for saving) (Dynan, Skinner, and Zeldes, 2002). According to Dynan, Skinner, and Zeldes (2002), saving therefore serves, in practice, a dual role and the importance of both motives cannot be distinguished without additional information. They note that this helps explain why adding a bequest motive on top of precautionary saving tends to have only a limited impact on wealth accumulation for nearly all households.

Lockwood (2014) attempts to solve the problem of separately identifying precautionary saving and bequest motives by analyzing saving and long-term care insurance decisions. While the low rate of long-term care insurance coverage is often cited as evidence against bequest motives, he points out that the opportunity cost of precautionary saving is higher for people without a bequest motive, who would like to consume all of their wealth, than for those with a bequest motive, who value the prospect of leaving wealth to their heirs. Hence, Lockwood (2014) argues that the low rate of long-term care insurance coverage, especially among relatively wealthy retirees and especially in combination with the slow decumulation of wealth, is likely to be the evidence in favor of a bequest motive.

By contrast, Dobrescu (2015) develops a life-cycle model that considers the effects of both health and medical spending risks on the insurance and saving decisions of retirees where health insurance can be provided either formally by the market or informally by the family. Given that wealth holdings encourage family members to provide the elderly with informal care, the model allows for a strategic bequest motive. Using data on European countries, her simulation results show that health risks and potentially high medical spending are the main drivers of slow wealth decumulation in old age (and consequently of large bequests). The results suggest that the absence of perfect formal insurance markets coupled with borrowing constraints and health dynamics creates a strong incentive for the elderly to keep wealth for strategic reasons (i.e., to induce family

members to provide care).

Ameriks *et al*. (2015), on the other hand, design survey questions that involve hypothetical trade-offs between consuming long-term care and leaving bequests to shed light on the relative importance of precautionary saving and bequest motives. Their estimation results show that precautionary saving motives associated with long-term care needs are significantly more important than bequest motives as a driver of the saving behavior of the elderly in the US. Using a similar survey instrument to resolve the identification problem, Ameriks *et al*. (2011) also find that precautionary saving in response to public care aversion plays a significant role in explaining the low rate of spending of many middle-class retirees although bequest motives are found to be more prevalent even among the middle class than previously thought.[7]

This is similar to the findings of De Nardi, French, and Jones (2010), who estimate a structural model of life-cycle saving that incorporates heterogeneity in medical expenses and lifespans along with bequest motives. Their estimation results provide limited evidence in favor of a bequest motive while longevity and medical expense risks are found to play a critical role in explaining the saving behavior of the elderly in the case of the US. They find that medical expenses are much higher and more volatile than previously estimated (e.g., Palumbo, 1999) largely because previous work understates the extent to which these expenses rise with both age and permanent income. They thus argue that an important reason why the income-rich elderly decumulate wealth slowly is the high level of medical expenses they are likely to face later in their lives. Indeed, French *et al*. (2006) show, using data for the US, that death is often preceded by a costly illness with a significant increase in out-of-pocket medical expenses. Their findings therefore suggest that end-of-life expenditures such as medical expenses provide an important reason for the elderly to retain their assets into very old age. Kopecky and Koreshkova (2014) extend the work of De Nardi, French, and Jones (2010) by separating nursing home expenses from other medical expenses and find for the US that out-of-pocket nursing home expenses have a disproportionately large effect on wealth decumulation

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[7] Public care aversion refers to the desire to avoid simultaneously running out of wealth and needing long-term care and hence having to rely on (low-quality) publicly provided long-term care at the end of life (Ameriks *et al*., 2011).

late in life.

While existing work on the wealth decumulation behavior of the elderly has been undertaken predominantly for the US, previous studies for countries other than the US find some interesting contrasts. For instance, Spicer, Stavrunova, and Thorp (2016) find that, unlike in the US, the impact of health shocks on the wealth decumulation behavior of retired households is minimal in the case of Australia. While bad health can affect the liquid asset holdings of retired households, poor health and changes in health status are found to have only a limited impact on retirees' wealth levels, decumulation patterns, and portfolio choices in Australia, presumably because Australian retirees are well covered for most medical expenses (Spicer, Stavrunova, and Thorp, 2016).

Similarly, Van Ooijen, Alessie, and Kalwij (2015) find, using data on the Netherlands, that health shocks even result in higher household saving in old age because health care expenditures are almost completely insured (and probably because deteriorating health constrains non-health-care consumption), which makes precautionary saving less necessary in the Netherlands. This is consistent with the findings obtained for Germany by Börsch-Supan (1992). Rather than wondering why the elderly save so much, Börsch-Supan (1992) investigates why the elderly consume so little to explain the U-shaped profile of the wealth accumulation behavior of the elderly—a decline in wealth until about age 70 followed by a strong increase past that age—in Germany. He explains that because of the generous pension system and the almost complete coverage of health expenses by the mandatory health insurance system in Germany, the declining consumption in very old age arises because the elderly cannot consume all of their annuity income, as a result of which wealth is accumulated.

Unfortunately, the literature on the wealth decumulation behavior of the elderly in Japan remains relatively limited. Previous studies find, as predicted by the life-cycle model, that the elderly decumulate wealth once they retire/stop working (e.g., Horioka, 2010; Horioka *et al*., 1996; Usuki, Kitamura, and Nakajima, 2016). However, the few studies that look at the wealth decumulation rate of the elderly show that, as in many other countries, the elderly decumulate wealth more slowly than predicted by the basic life-cycle model (e.g., Horioka, 2010; Horioka and Niimi, 2017; Murata, 2018).

Nevertheless, the reasons for the slow decumulation of wealth by the elderly have

been rarely examined with few exceptions. Horioka *et al*. (1996) and Horioka *et al.* (2002) find that households with a bequest motive show a lower rate of wealth decumulation (a higher rate of wealth accumulation) than those without such a motive, indicating the importance of bequest motives in explaining the wealth decumulation behavior of the elderly in Japan. Similarly, Murata (2018) finds that having a bequest motive is an important explanation for why the dissaving rate of the elderly is lower than predicted by the simple life-cycle model. By contrast, she finds that precautionary saving does not play a key role in explaining the dissaving behavior of the elderly except for those without a bequest motive. On the other hand, Horioka and Niimi (2017) find both precautionary saving and bequest motives to be key determinants of the wealth decumulation behavior of the elderly, but their analysis shows that precautionary saving plays a bigger role in explaining the relatively slow decumulation of wealth by the elderly. The limited empirical studies on Japan therefore obtain mixed results regarding the relative importance of precautionary saving and bequest motives in explaining the wealth decumulation behavior of the elderly in Japan, as in other countries.

The main purpose of this paper is to fill these gaps in the literature by making three key contributions. First, it aims to assess the relative importance of precautionary saving and bequest motives in explaining the wealth decumulation behavior of the retired elderly. Second, it looks at the case of Japan, where empirical work on the reasons for the slow decumulation of wealth by the elderly remains limited. Third, it investigates the implications of the financial burden of parental care for the wealth decumulation behavior of the retired elderly, which has not been examined previously.

3. Data

We conduct two separate regression analyses using two different datasets to shed light on the relative importance of precautionary saving and bequest motives in explaining the wealth decumulation behavior of the retired elderly in Japan. These two datasets complement each other well: the first dataset allows us to examine the determinants of the *probability* of decumulating wealth while the second dataset allows us to examine the determinants of the *rate* of wealth decumulation. Both datasets contain unique

information on precautionary saving and bequest motives, which helps us to assess their relative importance for the wealth decumulation behavior of the retired elderly, as explained in detail in Section 4.

3.1 Survey on Households and Saving

The first dataset we use for our analysis is the Survey on Households and Saving (Kakei to Chochiku nikansuru Chousa), which has been conducted biennially since 2013 in Japan by the Yu-cho Foundation. In this survey, a sample of households with two or more persons and with a household head who is 20 years old or above was drawn to be nationally representative using a two-stage stratified random sampling procedure. We use data from the 2013 and 2015 waves of this survey. In 2013 and 2015, 1,734 and 1,691 households completed the questionnaire, respectively. Since the data from this survey are unfortunately not a panel, we pool the data collected in 2013 and 2015 and conduct a cross-sectional analysis using these data.

The Survey on Households and Saving is conducted with the aim of better understanding households' livelihood and saving behavior. It collects detailed information on, among other things, saving, housing, wealth, labor supply, consumption, pensions, and bequests. One of the key questions that the survey asks households is whether they are currently (i) accumulating their financial wealth, (ii) keeping the level of their financial wealth more or less constant, or (iii) decumulating their financial wealth. Using the answers to this question, it is possible to examine the determinants of the probability of decumulating financial wealth. The survey also asks households about the share of saving for different motives, including precautionary motives and bequest motives, in total saving. Another unique piece of information we use for our analysis is the amount of the financial burden of parental care that is borne by households. By exploiting such information, it is possible to shed light on the relevance of competing hypotheses regarding the wealth decumulation behavior of the retired elderly.

Since we would like to analyze the wealth decumulation behavior of the elderly who are retired, we restrict our estimation sample to those households whose household heads and their spouses are both aged 60 or above and are both retired (i.e., neither working nor

looking for work). Given that the data on wealth are collected at the household level and that this survey is conducted only for households with two or more persons, we restrict our estimation sample to couple households only in order to eliminate any possible effects of having other household members on the wealth decumulation pattern of the household.

Applying the above sample restriction rules reduces the number of observations to 364, and excluding households with missing information on key variables reduces the number of observations further to 210. To verify the representativeness of our sample, we compare this estimation sample to the sample of retired couple households from the Family Income and Expenditure Survey, which is conducted annually by the Statistics Bureau, Ministry of Internal Affairs and Communications in Japan. The comparison (shown in the Appendix) confirms that our estimation sample from the Survey on Households and Saving is broadly comparable to the corresponding sample from the Family Income and Expenditure Survey in terms of the homeownership rate and the level of financial liabilities although the level of financial assets (and therefore that of financial net worth) from the Survey on Households and Saving seems somewhat lower than those from the Family Income and Expenditure Survey. Hence, we need to be cautious about making generalizations based on data from the Survey on Households and Saving.

3.2 Preference Parameters Study

The second dataset we use is the Preference Parameters Study (Kurashi no Konomi to Manzokudo nitsuiteno Anketo) of Osaka University. This survey was conducted annually in Japan during the 2003-13 period by the 21st Century Center of Excellence (COE) Program "Behavioral Macrodynamics Based on Surveys and Experiments" and the Global COE Project "Human Behavior and Socioeconomic Dynamics" of Osaka University. A sample of individuals aged 20-69 was drawn to be nationally representative using a two-stage stratified random sampling procedure. The sample has a panel component although fresh observations were added in 2004, 2006, and 2009 to overcome the problem of attrition. The survey was also conducted using the same survey instrument in China, India, and the US though for shorter periods.

Given that not all questions were asked in every year, we have decided to use data

from the 2012 and 2013 waves in order to ensure that we can construct the relevant variables for our empirical analysis. In the case of the 2012 and 2013 waves, 4,588 and 4,321 respondents completed the questionnaire, respectively. In addition to basic information on respondents and their households such as household composition, consumption, income, wealth, and other socioeconomic characteristics, this survey collected information on pensions that respondents receive, the type of bequest motives they have, and their preference for leaving a bequest to their children as opposed to receiving high-quality long-term care based on responses to hypothetical questions *à la* Ameriks *et al*. (2011).

Unlike in the case of the Survey on Households and Saving, the sample for the Preference Parameters Study includes single-person households. We therefore restrict our estimation sample to single-person or couple households in which the respondent and, if married, his/her spouse are aged 60 or above and are retired (i.e., neither working nor looking for work). We also restrict our estimation sample to those respondents who were surveyed in both years. Applying the above restrictions reduces the number of observations to 227, and excluding respondents with missing information on key variables reduces the number of observations further to 137. We also compare this estimation sample to the corresponding sample from the Family Income and Expenditure Survey, and this comparison shows that our estimation sample is comparable to the sample from the Family Income and Expenditure Survey in terms of the key wealth-related variables, as shown in the Appendix.

4. Estimation Strategy and Empirical Specification

4.1 Empirical Analysis Using Data from the Survey on Households and Saving

In the first analysis, we examine the determinants of the probability of decumulating wealth for the retired elderly. The Survey on Households and Saving asks households whether they are currently (i) accumulating their financial wealth, (ii) keeping the level of their financial wealth more or less constant, or (iii) decumulating their financial wealth,

as noted earlier.[8] Based on respondents' responses to this question, we create a binary variable that equals one if the household is currently decumulating its financial wealth and zero otherwise and estimate a probit model for the determinants of the probability of decumulating financial wealth among the retired elderly.[9]

The Survey on Households and Saving also includes a question on the relative shares of saving for different motives. Our main variables of interest are those that indicate the shares of saving for bequests, precautionary purposes, and long-term care in total saving. Note that the share of precautionary saving refers to saving for illness, disasters, and other unexpected events. Other saving motives include children's education expenses, marriage expenses (either the respondent's own marriage or his/her children's marriage), purchase of land/housing (including housing renovations), purchase of durable goods, leisure, retirement, and no reason in particular but for peace in mind. We would expect the shares of saving for bequests, precautionary purposes, and long-term care in total saving to be negatively associated with the probability of decumulating wealth.

Another key explanatory variable is the monthly financial cost of parental care borne by the household. This variable is constructed by aggregating the long-term care expenses that the household pays for the household head's mother, father, mother-in-law, and father-in-law. We would expect this variable to be positively associated with the probability of decumulating wealth since the need to bear the financial burden of parental care will increase the need to decumulate wealth.

Other explanatory variables include the age and educational attainment of the household head,[10] the self-rated health assessment of the household head and his spouse, a dummy variable for having a child (children), a homeownership dummy, and the level

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[8] We should note that the question uses the word "saving" (stock of saving), which some respondents may interpret narrowly as including only bank and postal deposits. Thus, there may be some respondents who reply that they are decumulating their financial wealth because they are decumulating their bank and postal deposits even though their total financial net worth is constant or even increasing.

[9] The behavior of households that are accumulating their financial wealth and that of households that are keeping the level of their financial wealth more or less constant are different in nature, and thus estimating an ordered probit model might be a more suitable estimation strategy. However, since the share of households that are accumulating their wealth is negligible (only 8 out of 210 households) in our estimation sample, we have decided to estimate a probit model instead.

[10] In the case of the Survey on Households and Saving, the respondent himself/herself specifies who is the head of his/her household. The majority of household heads are found to be male (only 3 households in our estimation sample had a female household head).

of financial net worth. Financial wealth is defined as the total amount of wealth in the form of bank and postal deposits, foreign currency-denominated financial products, life insurance, individual pensions, bonds, stocks, investment trusts, payroll saving schemes, and others. Financial net worth is obtained by subtracting the total amount of debt from financial wealth. Unfortunately, because of the absence of data on the value of real assets, we could not construct a variable for net worth, but we partially compensate for this by including a homeownership dummy.

Finally, we include a variable that indicates the share of living expenses that public pensions cover. It is not clear *a priori* whether receiving relatively generous public pensions will increase or decrease the probability of decumulating wealth. On the one hand, the receipt of generous pensions will reduce the need for precautionary saving associated with lifespan uncertainty, which in turn may induce the elderly to decumulate their wealth faster. On the other hand, receiving large pensions relative to their living expenses will reduce the need for the elderly to rely on their own wealth to finance their living expenses, which in turn may induce them to decumulate their wealth more slowly. The effect of public pensions on the wealth decumulation behavior of the retired elderly is therefore an empirical question.

Given that we pool data from the 2013 and 2015 waves, as noted earlier, the values of financial net worth and the financial burden of parental care borne by the household are converted to 2013 prices.

4.2 Empirical Analysis Using Data from the Preference Parameters Study

In the second analysis, we analyze the determinants of changes in the level of wealth by taking advantage of the panel structure of the Preference Parameters Study. Following Spicer, Stavrunova, and Thorp (2016), our dependent variable is the percentage change in financial net worth between 2012 and 2013 expressed as the difference in the logarithm of financial net worth, $100\log(w_{i2013}/w_{i2012})$, for household i. We regress this variable on the values of the explanatory variables at the beginning of the wealth accumulation or decumulation period, i.e., the year 2012, using ordinary least squares (OLS). We use the percentage change in financial net worth rather than that in net worth because the

Japanese tend to live in their own homes until they die and because "reverse mortgages" are not very popular in Japan.[11] We would therefore expect changes in wealth holdings to occur more with respect to financial assets than to non-financial assets in the case of retired households. That is indeed what we find for our estimation sample: the level of financial net worth increased, on average, by 5.1% while that of net worth increased by only 0.4% between 2012 and 2013.

One of our main explanatory variables of interest is a variable that indicates the nature of the bequest motive that each respondent has. The Preference Parameters Study asks respondents about their plans for bequests. Based on responses to this question, we divide our sample into four groups: (i) those who plan to leave bequests no matter what; (ii) those who plan to leave bequests under certain conditions (e.g., if their children provide elderly care, provide financial support, and/or take over the family business); (iii) those who plan to leave bequests only if there is any wealth left over upon their death; and (iv) those who have no plans to leave a bequest. In other words, this variable indicates whether the respondent has a strong (altruistic) bequest motive, a strategic bequest motive, a passive or weak bequest motive (bequests are accidental or unintended in this case), or no bequest motive. The inclusion of this variable allows us to investigate the implications of different types of bequest motives for the wealth decumulation behavior of the retired elderly.

Another key explanatory variable is a variable that indicates the strength of one's bequest motive relative to one's precautionary saving motive. Unfortunately, unlike the Survey of Households and Saving, the Preference Parameters Study did not collect information on saving for different motives, which constitutes a direct measure of respondents' preference for saving for bequests as opposed to precautionary saving. Instead, it included hypothetical questions that sought to capture respondents' preference for leaving a bequest to their children as opposed to receiving high-quality long-term care at the end of their lives. More specifically, the Preference Parameters Study asked respondents the following question:[12]

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[11] Nevertheless, we also tried using the percentage change in the level of net worth as our dependent variable and our key findings remain the same. The regression results are available from the authors upon request.

[12] Given that this question was included only in the 2011 wave, we used information from the 2011 wave

Please answer the following question concerning how you want to spend the final year of your life. Please assume that you are currently 85 years old, have one year left to live, and have total wealth of 20 million yen. Up to how much will you be willing to pay out-of-pocket to live in a private room in a nursing home during your last year of life? Please circle the response that applies to you. Please assume that the rest of the 20 million yen will be left to your children as an inheritance.

(1) I would like to live in a private room if I did not have to pay anything out of my own pocket (i.e., I want to leave all of my wealth (20 million yen) to my children as an inheritance).
(2) I would be willing to pay up to 2.5 million yen out of my own pocket to live in a private room.
(3) I would be willing to pay up to 5 million yen out of my own pocket to live in a private room.
(4) I would be willing to pay up to 10 million yen out of my own pocket to live in a private room.
(5) I would be willing to pay up to 12.5 million yen out of my own pocket to live in a private room.
(6) I would be willing to pay up to 15 million yen out of my own pocket to live in a private room.
(7) I would be willing to pay up to 17.5 million yen out of my own pocket to live in a private room.
(8) I would be willing to pay up to 20 million yen out of my own pocket to live in a private room.

This question is similar to the questions designed by Ameriks *et al*. (2011), who used responses to the questions to distinguish between precautionary saving and bequest motives. Responses to this particular question essentially indicate how much respondents care about their own wellbeing at the end of their lives relative to leaving bequests to their children. Moreover, we would expect those who care more about their own wellbeing to allocate more toward precautionary saving than toward saving for bequests. We therefore believe that responses to the question indicate, at least indirectly, how much respondents value the prospect of leaving bequests to their children relative to saving for precautionary purposes for their own wellbeing.

Accordingly, we construct a variable that measures respondents' preference for bequests versus precautionary saving using their responses to this hypothetical question

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on the assumption that such preferences did not change significantly between 2011 and 2012.

and then examine whether this variable affects their wealth decumulation behavior. We express this variable as the share of end-of-life wealth (i.e., 20 million yen) that the respondent is willing to allocate to bequests. For example, if respondents choose (1), we assume that they are willing to allocate 100% of their wealth (20 million out of 20 million yen) to bequests. If they choose (2), we assume that they are willing to allocate 87.5% of their wealth (17.5 million out of 20 million yen) to bequests, and so on. Hence, we construct this variable by assigning the values 1, 0.875, 0.75, 0.5, 0.375, 0.25, 0.125 and 0 to responses (1) through (8) above, respectively.

Other explanatory variables include the age, gender, educational attainment, marital status and self-rated health assessment of the respondent, a dummy variable for having a child (children), a homeownership dummy variable, the level of net worth, the share of living expenses covered by public pensions, and a dummy variable that equals one if the respondent expects to receive bequests and/or *inter vivos* transfers from his/her parents and/or (if married) from his/her parents-in-law. We also include a variable that indicates whether the household has a saving plan for the next one year.

As in the case of the Survey on Households and Saving, we express the value of net worth in 2013 prices. Furthermore, in addition to the above explanatory variables, regional dummies as well as a dummy variable for residing in a major (ordinance-designated) city are included to control for geographical variations.

5. Empirical Results

5.1 Regression Results based on Data from the Survey on Households and Saving

We start by discussing the findings from our empirical analysis based on data from the Survey on Households and Saving. We first report some basic statistics on household wealth holdings. Table 1 summarizes the average level of financial net worth as well as the average homeownership rate by the age, educational attainment, and self-rated health status of household heads.[13] The table shows that the average level of financial net worth

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[13] Note that the number of observations for the 60-69 age group is smaller than that for the 70-79 age group because we include only retired couple-households in the sample and because the employment rate for the

declines as the household head gets older, suggesting that retired households are decumulating their financial wealth over time. This suggests that the life-cycle model holds in the case of Japan, at least if we measure wealth holdings in terms of financial net worth. However, note that we are not taking cohort effects into account here and a more detailed analysis using panel data is needed to reach a definitive conclusion. As expected, households whose heads are university graduates have a significantly larger amount of financial net worth than those whose heads do not have a university degree. In addition, households whose heads are in good health seem to hold a greater amount of financial net worth than those whose heads are in poor health. Table 1 also shows that the majority of households own a house or a condominium in Japan.

Table 1: Wealth Levels of Retired Households (in million yen)

	No. of observations	Financial net worth		Homeownership (%)
		Mean	Standard deviation	
Household heads' characteristics				
Age groups				
60-69	41	34.17	32.45	0.98
70-79	119	16.59	18.95	0.93
80+	50	14.16	19.33	0.84
Education				
University	66	27.43	27.73	0.92
No university	144	15.79	20.13	0.92
Health				
Good, relatively good	141	21.16	25.38	0.96
Not very good, not good	69	15.93	18.25	0.84
Total	210	19.45	23.36	0.92

Source: Calculations based on data from the 2013 and 2015 waves of the Survey on Households and Saving.

We estimate a probit model in order to investigate the determinants of the probability of decumulating financial wealth among the retired elderly, as explained in Section 4.1. Table 2 reports the summary statistics of the dependent and explanatory variables for all households as well as separately for households that are decumulating financial wealth

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60-69 age group is generally higher than that for the 70-79 age group. For example, according to the 2015 Labor Force Survey (available at http://www.stat.go.jp/data/roudou/rireki/nen/ft/pdf/2015.pdf), the employment rates for those aged 60-64, 65-69, 70-74, and 75 or above are 62.2%, 41.5%, 24.9%, and 8.3%, respectively.

and those who are not. This table shows that only about 53% of households in our sample are decumulating their financial wealth, which implies that nearly half of the retired elderly in Japan are continuing to accumulate financial wealth or keeping the level of their financial wealth constant, in violation of the prediction of the basic life-cycle model with no bequest motives or longevity risk.

Table 2: Summary Statistics

	All households		Households decumulating financial wealth		Households not decumulating financial wealth	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Decumulating financial wealth	0.53					
Household head's age	75.20	6.23	74.86	6.56	75.59	5.83
Household head's age^2/100	56.94	9.46	56.46	9.91	57.47	8.94
Child	0.88		0.87		0.88	
University degree (household head)	0.31		0.24**		0.39	
Good health (household head)	0.67		0.57***		0.79	
Good health (spouse)	0.70		0.58***		0.83	
Homeownership	0.92		0.92		0.92	
Financial net worth (million yen)	19.45	23.36	14.30***	17.94	25.22	27.19
Pensions (share of living expenses)	0.92	0.29	0.88**	0.24	0.98	0.33
Share of saving for bequests	0.02	0.08	0.01**	0.04	0.03	0.10
Share of saving for precautionary purposes	0.23	0.23	0.21	0.22	0.25	0.23
Share of saving for long-term care needs	0.15	0.22	0.16	0.21	0.15	0.23
Monthly financial cost of long-term care for parents/parents-in-law (thousand yen)	4.67	23.43	5.57	23.43	3.65	23.52
2015 year dummy	0.47		0.47		0.47	
No. of observations	210		111		99	

Note: *** and ** indicate that the mean value of the variable is statistically different between households that are decumulating financial wealth and those that are not at the 1% and 5% significance levels, respectively.
Source: Calculations based on data from the 2013 and 2015 waves of the Survey on Households and Saving.

Turning to the explanatory variables, Table 2 shows that the average age of the household head is about 75 years old. The majority of households own a house or a condominium (about 92%) and have a child (children) (about 88%). We do not find a significant difference in these characteristics between households that are decumulating financial wealth and those that are not. By contrast, we find that households whose heads are not university graduates or whose members are in poor health are more likely to be decumulating financial wealth than those whose heads are better educated or whose members are in good health. We also find that the level of financial net worth is significantly lower for households that are decumulating financial wealth than for those that are not. While the table shows that public pensions generally cover a relatively large share of living expenses, this share is found to be smaller for households that are decumulating financial wealth than for those that are not.

Table 2 also shows that the share of saving for bequests in total saving is extremely small (about 2%). The average share of saving for bequests is only about 6% of total saving even among the wealthiest quintile (based on financial net worth). In fact, the majority (about 94%) have no saving for bequests. This indicates that relatively few households are saving specifically for bequests. This may not be surprising given that the bequest motive is found to be relatively weak among the Japanese than among, for example, Americans (Horioka, 2014). Nevertheless, the share of saving for bequests in total saving is found to be smaller for households that are decumulating financial wealth than for those that are not. By contrast, the shares of saving for precautionary purposes and long-term care needs in total saving are much larger than that for bequests. Nearly one-quarter of saving is for precautionary purposes while about 15% is for long-term care needs. However, we find no statistically significant difference in these shares between households that are decumulating financial wealth and those that are not.

Finally, while we do not find a statistically significant difference in the monthly financial cost of parental care, it is found to be greater for households that are decumulating financial wealth than for those that are not. Note that the average monthly financial cost of parental care reported in Table 2 does not seem so high, but the mean

figure for non-zero observations is about 75,000 Japanese yen (about US$680).[14] This is a non-trivial amount even though Japan introduced a mandatory LTCI program in Japan,[15] and it would be interesting to see how the financial burden of parental care affects the wealth decumulation behavior of retired elderly households.

Table 3: Regression Results for Probit Model

	Average marginal effect	Standard error
Household head's age	-0.243***	0.093
Household head's age^2/100	0.154**	0.061
Child	-0.061	0.099
University degree (household head)	-0.143**	0.069
Good health (household head)	-0.195***	0.073
Good health (spouse)	-0.163**	0.076
Homeownership	0.085	0.114
Financial net worth (million yen)	-0.005***	0.002
Pensions (share of living expenses)	-0.232**	0.110
Share of saving for bequests	-0.680	0.526
Share of saving for precautionary purposes	-0.287**	0.141
Share of saving for long-term care needs	0.002	0.143
Monthly financial cost of long-term care for parents/parents-in-law (thousand yen)	0.002*	0.014
2015 year dummy	0.032	0.063
No. of observations	210	
Pseudo R^2	0.187	

Note: ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Estimation based on data from the 2013 and 2015 waves of the Survey on Households and Saving.

Table 3 reports the regression results for the probit model for the probability of decumulating financial wealth in terms of average marginal effects. Given that we conduct a cross-sectional analysis, we acknowledge that we can only determine

[14] At the exchange rate of US$1 = 110 Japanese yen.
[15] According to the survey on the cost of at-home care conducted by the Institute for Research on Household Economics in 2016, households, on average, spend about 16,000 Japanese yen (about $145) per month for formal care services (the out-of-pocket portion) and about 34,000 Japanese yen (about $310) per month for caregiving-related expenses (such as the cost of diapers, medical expenses, etc.) other than formal care services (Tanaka, 2017). These figures are costs per care recipient (per elderly parent) that households bear monthly. The results from this survey also suggest that the cost of long-term care is relatively significant despite the existence of the LTCI program in Japan. Note that these figures are just averages and that the cost is likely to increase as the level of disability increases. In addition, the cost of institutional care is likely to be much greater than these figures for the cost of at-home care.

associations between various factors and the probability of decumulating financial wealth and that we will not be able to ascertain their causal effects.

One of the main objectives of this paper is to examine the relative importance of precautionary saving and bequest motives as explanations for the relatively slow decumulation of wealth by the elderly. We find that the marginal effect of the share of saving for precautionary purposes is negative and significant, as expected. More specifically, the results show that a one percentage point increase in the share of saving for precautionary purposes is associated with a 0.3 percentage point decline in the probability of decumulating financial wealth. However, we find that the marginal effect of the share of saving for bequest is negative but insignificant. Hence, the results indicate that precautionary saving seems to play a larger role in explaining the wealth decumulation behavior of the retired elderly than bequest motives, at least in the case of Japan.

We also included the share of saving for long-term care needs, but its marginal effect is not statistically significant either. This may reflect the fact that Japan introduced a mandatory LTCI program in 2000, which is relatively generous in terms of coverage. Table 2 shows that households allocate a relatively large share (about 15%) of their total saving to future long-term care needs, which suggests that the financial burden of long-term care borne by households can be significant despite the introduction of this system.[16] However, the share of saving for long-term care needs may not have a significant effect on the wealth decumulation behavior of the elderly because some parents expect their children to provide care themselves or to provide financial support to pay for professional care when they become in need of care. In the case of Japan, elderly care has traditionally taken place within the family setting. While such traditional norms have been changing in Japan with perceived filial obligation norms declining since the launch of the LTCI program (e.g., Tsutsui, Muramatsu, and Higashino, 2014), some studies find that informal care by adult children continues to be the most common source of caregiving for elderly parents in Japan (Hanaoka and Norton, 2008; Long, Campbell and Nishimura, 2009). As

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[16] Because of the wording of the question, we assume that the saving for long-term care needs here is mainly to cover the long-term care costs of household members, i.e., of either the household head or his spouse in our sample of couple households.

a result, saving for long-term care needs may be less urgent than, say, saving for precautionary purposes.

Indeed, Table 3 shows that the financial burden of parental care has a positive and significant effect on the probability of decumulating financial wealth, suggesting that adult children provide a safety net for their elderly parents in case they require financial support to pay for the cost of long-term care. The regression results indicate that a 1,000-yen (about US$9)[17] increase in the monthly financial cost of parental care is associated with an increase in the probability of decumulating financial wealth of about 0.2 percentage points. This finding suggests that the financial burden that retired households bear for their elderly parents' long-term care might be a relevant issue when analyzing their wealth decumulation behavior, at least in the case of Japan where adult children's obligation to take care of their elderly parents remains relatively strong in comparison to the US and Europe.

As for the other regression results, we find a U-shaped relationship between the age of the household head and the probability of decumulating financial wealth, with a decline in the probability of decumulating financial wealth until the age of about 79, followed by an increase past that age. A possible explanation for this pattern is that, although retired individuals may enjoy travelling and other leisure activities when they first retire, they may become less able to engage in such activities as they age, as a result of which their consumption (and their need to decumulate financial wealth) may decline with age. However, the probability of decumulating wealth might start rising after the age of 79 because medical and long-term care needs are likely to increase prior to death.

Table 3 also shows that households whose heads are better educated or those whose members are in relatively good health are less likely to decumulate financial wealth. The latter result may be because people in good health incur less medical expenses and are thus better able to accumulate wealth or because the life expectancy of people in good health is likely to be longer, meaning that they have a greater need to accumulate wealth.

The level of financial net worth is also negatively associated with the probability of decumulating financial wealth, but its marginal effect is relatively small in magnitude—a

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[17] At the exchange rate of US$1 = 110 Japanese yen.

one million yen (about US\$9,100)[18] increase in financial net worth is associated with only a 0.5 percentage point decline in the probability of decumulating financial wealth. As for the effect of public pensions, a one percentage point increase in the share of living expenses covered by public pensions is associated with a 0.2 percentage point decline in the probability of decumulating financial wealth. This suggests that receiving relatively generous public pensions alleviates the need to decumulate wealth to finance one's living expenses.

5.2 Regression Results based on Data from the Preference Parameters Study

We now turn to our discussion of the regression results based on data from the Preference Parameters Study. As we have done for the Survey of Households and Saving, we summarize in Table 4 the average level of financial net worth as well as the average homeownership rate by the age, educational attainment, and self-rated health status of respondents using data from the Preference Parameters Study.[19] As shown in Table 1, the older, the better educated, and the more healthy the respondent is, the higher is the level of his/her household financial net worth, while the majority of elderly households are found to own a house or a condominium.[20]

In the analysis using data from the Preference Parameters Study, we examine the determinants of the wealth accumulation or decumulation rate (the percentage change in

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[18] At the exchange rate of US\$1 = 110 Japanese yen.

[19] Note that in the case of the Preference Parameters Study, we do not have any observations older than 78 in the 2012 wave of the survey because all respondents were 69 or younger when they were surveyed initially although they became older with each wave of the survey. This is the same reason why the share of respondents in the 60-69 age group is higher in the Preference Parameters Study than in the Survey of Households and Saving (compare Tables 1 and 4).

[20] This survey collected information only on the respondent's own health status. Note that the shares of household heads and their spouses who are in good health were found to be higher in the Survey on Households and Saving than in the Preference Parameters Study. This is due mainly to the fact that the way in which the relevant question was phrased and the reply options were different between the two surveys. In the case of the Survey on Households and Saving, respondents were asked how the household head's health was and how his spouse's health was, and they were asked to choose from among the following options: good, relatively good, not very good, and not good. We constructed a good health variable for the household head (or his spouse) that equals one if the household head's (or his spouse's) health was reported to be good or relatively good and zero otherwise. By contrast, in the case of the Preference Parameters Study, respondents were asked how true the statement "I'm concerned about my health" was for them and they were asked to answer on a scale of 1 to 5 where "1" means "it is particularly true" and "5" means "it is not true at all." We constructed a good health variable that equals one if respondents chose 4 or 5 and zero otherwise.

financial net worth) of the retired elderly, as explained in Section 4.2. Table 5 reports the summary statistics for the dependent and explanatory variables. According to this table, households in Japan increased their financial net worth slightly (by about 5%), on average, between 2012 and 2013. The fact that even retired households in Japan are continuing to accumulate wealth, on average, indicates that the same puzzle that is observed in other countries (viz., the failure to observe a tendency for the retired elderly to decumulate their wealth) is observed in Japan as well.

The average age of respondents is about 69 years old and about 48% of respondents are female. Just over one-fifth of respondents have a university degree. The majority of respondents are married (about 84%), have a child (children) (about 88%), and own a house or a condominium (about 93%). About one quarter of respondents say that they are not concerned about their health. Only about 4% of respondents expect to receive bequests and/or *inter vivos* transfers from their parents and/or parents-in-law. This figure seems somewhat low, but this is presumably because many households in this age group are likely to have already received intergenerational transfers from their own parents and/or parents-in-law. It is interesting to find that about 28% of households have a saving plan for the next year.

Table 4: Wealth Levels of Retired Households (in million yen)

	No. of observations	Financial net worth		Homeownership (%)
		Mean	Standard deviation	
Respondents' characteristics				
Age groups				
60-69	69	26.34	31.04	0.91
70-79	68	21.59	22.39	0.94
Education				
University	29	37.97	40.28	0.93
No university	108	20.23	21.02	0.93
Health				
Good, relatively good	35	29.77	34.08	0.94
Average, not very good, not good	102	22.00	24.14	0.92
Total	137	23.99	27.10	0.93

Source: Calculations based on data from the 2012 wave of the Preference Parameters Study.

Table 5 also shows that respondents would allocate, on average, about 62% of their end-of-life wealth to a bequest and the remaining (about 38%) to cover long-term care costs (the cost of a private room in a nursing home). To take a closer look at this, Figure 1 shows the distribution of this share. We find that a relatively large share of respondents would prefer allocating more to bequests rather than to covering long-term care costs. To see whether this preference varies by the nature of the respondent's bequest motive, Table 6 reports the average share of end-of-life wealth allocated to a bequest as well as the average levels of financial net worth and net worth by type of bequest motive.

Table 5: Summary Statistics

	Mean	Standard deviation
Percentage change in financial net worth (100 log(financial net worth for 2013/financial net worth for 2012))	5.09	48.95
Respondent's characteristics		
Age	69.23	4.16
Age^2/100	48.10	5.76
Female	0.48	
Married	0.84	
Good health	0.26	
University degree	0.21	
Child	0.88	
Homeownership	0.93	
Net worth (million yen)	45.88	40.29
Expect to receive bequests and/or *inter vivos* transfers	0.04	
Pensions (share of living expenses)	0.74	0.22
Have a saving plan for the next one year	0.28	
Preference for leaving a bequest (share of end-of-life wealth allocated to bequests)	0.62	0.32
Bequest motives		
No bequest motive	0.15	
Strong (altruistic) bequest motive	0.18	
Strategic bequest motive	0.04	
Weak bequest motive	0.62	
Residing in a major city	0.21	
No. of observations	137	

Source: Calculations based on data from the 2012 and 2013 waves of the Preference Parameters Study.

First of all, Table 5 shows that the majority of respondents (about 62%) have only a weak bequest motive—i.e., they plan to leave a bequest only if they have some wealth left over at death. In other words, bequests are likely to be more accidental or unintended in nature in the case of Japan. This is consistent with the findings of a previous international comparison analysis of bequest motives (Horioka, 2014), which finds that the bequest motive of the Japanese tends to be much weaker than that of Americans. Table 6 then shows that, as expected, the share of end-of-life wealth that respondents allocate to a bequest is highest for those who have a strong (altruistic) or strategic bequest motive, while it is relatively low for those who have a weak or no bequest motive. The same table also shows that relatively well-off households are more likely to have a strong or strategic bequest motive than those who are less well-off. Similar findings are obtained, for instance, by Alessie, Lusardi, and Kapteyn (1999), who find, using data on the Netherlands, that bequest motives are mostly concentrated among rich households and that saving for one's children increases almost monotonically with wealth.

Figure 1: Trade-off between Bequests and Long-term Care at the End of Life

Source: Calculations based on data from the 2011 wave of the Preference Parameters Study.

Table 6: Trade-off between Bequests and Long-term Care and Wealth Levels by Type of Bequest Motive

	Share of end-of-life wealth allocated to a bequest	Financial net worth (million yen)	Net worth (million yen)
Strong (altruistic) bequest motive	0.69	34.95	61.28
Strategic bequest motive	0.69	43.31	72.19
Weak bequest motive	0.62	22.82	45.01
No bequest motive	0.56	10.14	23.57
Total	0.62	23.99	45.88

Source: Calculations based on data from the 2011and 2012 waves of the Preference Parameters Study.

We now turn to the regression results reported in Table 7. We find that having a stronger preference for leaving a bequest to one's children versus receiving more luxurious/comfortable long-term care is negatively associated with the financial wealth accumulation rate. More specifically, if the share of end-of-life wealth allocated to a bequest increases by one percentage point, the wealth accumulation (decumulation) rate is expected to decrease (increase) by about 0.5 percentage points. This can be interpreted as saying that having a strong precautionary saving motive relative to a bequest motive leads to a lower wealth decumulation rate. This is consistent with the conclusion we have reached earlier based on data from the Survey on Households and Saving that precautionary saving plays a more important role in explaining the slow decumulation of wealth by the retired elderly in Japan.

As far as the nature of bequest motives is concerned, we find that every type of bequest motive is significantly and positively associated with the wealth accumulation rate. This suggests that bequest motives also play some role in explaining the wealth decumulation behavior of the retired elderly in Japan. The magnitude of the effect is largest for the strategic bequest motive. In other words, we find that households with a strategic bequest motive accumulate wealth faster (decumulate wealth more slowly) than not only households with no bequest motive but also households with any other type of bequest motive. Given that a strategic bequest motive comes at least partly from the household's desire to induce family members to provide necessary long-term care in old age, this result also suggests that the observed lower than expected wealth decumulation rate of the elderly is driven more by precautionary saving than by (altruistic) bequest

motives, at least in the case of Japan.

<p style="text-align:center">Table 7: OLS Regression Results</p>

	Coefficient	Standard error
Respondents' characteristics		
Age	9.979	29.914
$Age^2/100$	-7.517	21.663
Female	-19.935*	11.805
Married	-8.811	10.707
Good health	16.561	11.952
University degree	-12.935	12.476
Child	10.317	14.477
Homeownership	6.381	18.285
Net worth (million yen)	-0.186	0.131
Expect to receive bequests and/or *inter vivos* transfers	-20.674	23.712
Pensions (share of living expenses)	3.260	20.792
Have a saving plan	-4.709	11.441
Preference for bequests (share of end-of-life wealth allocated to a bequest)	-46.679***	17.535
Bequest motives		
(No bequest motive)		
Strong (altruistic) bequest motive	26.352*	15.419
Strategic bequest motive	46.294**	18.568
Weak bequest motive	24.607*	12.952
Residing in a major city	1.245	9.494
Constant	-316.390	1029.451
R^2	0.209	
No. of observations	137	

Note: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are reported. Regional dummies are included in all regressions.
Source: Estimation based on data from the 2012 and 2013 waves of the Preference Parameters Study.

6. Conclusions

This paper analyzed the determinants of the wealth decumulation behavior of the retired elderly in Japan using unique information from two household surveys (namely, the Survey on Households and Saving and the Preference Parameters Study), and by so doing, attempted to assess the relative importance of precautionary saving and bequest motives in explaining the lower than expected rates of wealth decumulation of the retired elderly in Japan. Taken together, our analyses of these two datasets showed that both precautionary saving and bequest motives are important drivers behind the lower than expected wealth decumulation rates of the retired elderly in Japan.

As for which of the two aforementioned factors is more important as an explanation for the lower than expected wealth decumulation rate of the retired elderly in Japan, both the fact that the elderly who are saving relatively more for precautionary purposes are less likely to decumulate financial wealth than other elderly and the fact that having a preference for leaving a bequest to one's children as opposed to being more concerned about one's own wellbeing at the end of one's life leads to a significant decrease (increase) in the wealth accumulation (decumulation) rate suggest that saving for precautionary purposes is more important as an explanation of the lower than expected wealth decumulation rate of the elderly than saving for bequests, at least in the case of Japan. This may partly reflect the relatively weak bequest motive of the Japanese in comparison with, for example, that of Americans.

Another key finding of our analysis is that, despite the relatively generous coverage of the Japanese LTCI program, the financial burden of parental care that the elderly bear can be significant enough to affect their wealth decumulation behavior. Given that parental care responsibilities tend to arise relatively late in life, often after retirement, in the case of Japan, our results suggest that the financial burden of parental care may be a relevant issue when analyzing the wealth decumulation behavior of the elderly.

An important direction for future work is to extend our analysis using panel data. Panel data analysis will allow us to examine, among other things, the effect of health shocks as well as family status transitions (e.g., widowhood and divorce) on the wealth accumulation/decumulation of the elderly, which the current analysis could not do due to data constraints even though they have been found to be important determinants of the wealth decumulation behavior of the elderly (e.g., Poterba, Venti, and Wise, 2011; Van Ooijen, Alessie, and Kalwij, 2015). Working with a data set with a larger sample size is also on the agenda. Another area that requires more work is to examine why precautionary saving remains so important for the elderly in Japan even though they face, at least objectively, relatively little uncertainty given the comprehensive coverage of the public pension, health insurance, and LTCI programs. The answer to this question is key to understanding why the wealth decumulation rate of the elderly in Japan is so low and what can be done to induce them to decumulate their wealth at a faster rate. Furthermore, given that we could examine the implication of the financial burden of parental care for

the wealth decumulation behavior of the retired elderly using data only from the Survey of Households and Saving due to the absence of relevant data in the Preference Parameters Study, more work certainly needs to be done to determine the importance of the financial burden of parental care for the elderly's wealth decumulation patterns.

Despite these limitations, the findings of this paper have some important policy implications. Reducing gift taxes on *inter vivos* transfers is sometimes considered as a way to encourage the elderly to transfer their wealth to younger generations. Indeed, the Japanese government recently revised the gift tax structure by reducing the tax rate in cases where donees are the children or grandchildren of the donor, as part of the 2013 Tax Reform, which became effective on January 1, 2015. In addition, there are currently various tax exemptions for gifts from parents and grandparents that are used for housing acquisition, education, marriage, and childcare. Our finding that bequest motives are one of the explanations for the slow decumulation of wealth by the retired elderly suggests that such measures might help induce the elderly to decumulate their wealth faster. Nevertheless, we also find that a relatively small percentage of households have a strong (altruistic) bequest motive and that the vast majority do not have saving specifically for bequests in the case of Japan. These findings seem to cast some doubt on how effective such measures would be.

We now turn our attention to the finding that precautionary saving plays a relatively important role in explaining the wealth decumulation behavior of the retired elderly in Japan. This suggests that alleviating the uncertainties that the retired elderly in Japan face would be the most effective way of raising their wealth decumulation rates. The previous literature has shown that the main sources of uncertainty that the retired elderly are likely to face are lifespan uncertainty and the possibility of facing high medical expenses and long-term care expenses in the future. The coverage of Japan's public pension, health insurance, and LTCI programs is relatively comprehensive, but it is possible that there are some lacunae in the current structure of these programs. Identifying the defects of the systems that lead the elderly to retain their wealth into very old age is beyond the scope of this paper, but this is certainly an important agenda for future research.

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**Appendix: Comparison of Estimation Samples with
Data from the Family Income and Expenditure Survey
(in million yen at 2013 prices)**

	2013 Family Income and Expenditure Survey	2013 and 2015 Survey on Households and Saving	2012 Preference Parameters Study
	Retired couple households (husband aged 65 or above and wife aged 60 or above)	Retired couple households (husband and wife aged 60 or above)	Retired couple or single-person households (husband and wife (or the single person) aged 60 or above)
Homeownership (%)	92.6	91.9	92.7
Financial assets	23.64	19.81	24.38
Liabilities	0.33	0.37	0.39
Financial net worth	23.31	19.44	23.99
Number of observations	1,119	210	137

Source: Data from the 2013 and 2015 Survey on Households and Saving; data from the 2012 Preference Parameters Study; and the Statistics Bureau, Ministry of Internal Affairs and Communications, *Annual Report on the Family Income and Expenditure Survey 2013, Volume II: Savings and Liabilities*, 2013 edition (http://www.stat.go.jp/data/sav/2013np/index.htm).

Chapter 2: Does Marriage Really Help Women Accumulate Wealth?
Evidence from Japan

Yoko Niimi

1. Introduction

Family structure has been undergoing significant changes in many, if not all, developed countries. Fewer and fewer people marry today than in the past. At the same time, there has been an increase in the average age at first marriage as well as in the divorce rate. Such trends raise the important question of how singles fare in terms of wealth accumulation in comparison to their married counterparts. Wealth is an important measure of wellbeing as it provides resources to maintain living standards in times of economic hardship. Wealth is also important as a source of funds for living expenses during old age and for intergenerational transfers. There is thus a growing literature that examines the relationship between marriage and wealth, and previous studies predominantly find a positive effect of marriage on wealth (e.g., Lupton and Smith, 2003; Painter, Frech, and Williams, 2015; Ruel and Hauser, 2013; Schmidt and Sevak, 2006; Ulker, 2009; Vespa and Painter, 2011).

One of the key limitations of previous studies is, however, that they typically use household-level wealth as their main variable due largely to the unavailability of data on personal wealth. This is because, unlike information on income, information on wealth is usually collected at the household level in household surveys. If a couple shares intrahousehold resources equally, as commonly assumed, using household wealth to analyze the wealth effect of marriage should not be a problem. Yet, given that an individual's contribution to household wealth is likely to affect his/her access to household wealth, it is possible that wives, who tend to earn less than their husbands, may have less access to it. Moreover, even if a couple fully shares each other's wealth, relying on one's spouse to share personal wealth informally may create undesired economic dependency within the couple (Lersch, 2017). It is therefore important to use personal wealth, in addition to household wealth, when analyzing the relationship between

marriage and wealth.

Another limitation of the literature is that there are hardly any studies that examine the implications of marriage for wealth accumulation outside Australia, Europe, and the United States (US). It is not clear *a priori* whether the findings of previous studies apply to other parts of the world such as Asia, where gender roles within households are more clearly delineated than in Western societies.

The main aim of this paper is to fill the aforementioned gaps in the literature and to enhance our understanding of the way in which people accumulate wealth and how this differs by marital status. In this paper, I focus on the case of women given long-standing concern regarding their financial security as they age, particularly of those who remain single or those who experience such disruptions as marital breakdowns and widowhood. There are legitimate reasons for this concern. Compared to men, women tend not only to be disadvantaged in the labor market in terms of earnings and career advancement but also to have more disruptions in their employment history in order to meet family responsibilities. In addition, women's financial literacy is found to be lower than that of men and they are less likely than men to undertake retirement planning (Lusardi and Mitchell, 2008). These tendencies suggest that marriage is likely to matter more for women than men in terms of wealth accumulation.

The empirical analysis of the relationship between marriage and wealth in this paper will be conducted using data for Japan. Japan provides an interesting case to study for several reasons. As in many other developed countries, Japanese people are getting married later but more of them are getting divorced today than in the past. Moreover, there has been a significant increase in the share of people who never marry, particularly over the last few decades, in the case of Japan. In the meantime, although Japan's female labor force participation rate has been increasing over time, Japanese women continue to fare worse than men in the labor market, probably more so than those in many other developed countries.

The data used for the empirical analysis come from the Japanese Panel Survey of Consumers (JPSC), which has been conducted annually in Japan since 1993 by the

Institute for Research on Household Economics.[21] One of the unique features of this survey is that it focuses on young women and traces the same individuals on a yearly basis. Since both unmarried and married women are included in the sample and the survey collects information on respondents' personal wealth as well as that of their husbands in the case of married respondents, the data are well-suited for examining the relationship between marriage and wealth.

The key contributions of the paper are three-fold. First, by exploiting the availability of data on personal wealth, the paper tries to assess how marriage helps women accumulate wealth and whether the wealth effect of marriage differs depending on whether we measure wealth in terms of personal wealth or household wealth, an issue that very few studies have examined thus far. Second, to the best of the author's knowledge, there are no previous studies that examine the relationship between marriage and wealth in Japan even though Japan has been seeing an increasing number of people who never marry, as a result of which there is growing concern about whether singles are accumulating sufficient wealth for old age. Third, respondents who reside with their parents are typically removed from the estimation sample in previous studies, largely because their wealth accumulation behavior cannot be captured by the usual household surveys inasmuch as wealth data are collected only at the household level in such surveys. However, since unmarried people, particularly unmarried women, tend to live with their parents in the case of Japan, removing them from the estimation sample may result in overlooking the possible inadequacy of the wealth of unmarried people for old age. By exploiting data from the JPSC, I try to open the black box of how unmarried women, including those who reside with their parents, accumulate wealth over time, which has direct implications for their economic wellbeing in retirement.

The rest of the paper is structured as follows. The next section describes the conceptual framework for analyzing the relationship between marriage and wealth. Section 3 reviews the literature with a particular focus on empirical evidence on the relationship between marriage and wealth. Section 4 provides an overview of recent trends in marital behavior in Japan. Section 5 describes the data and estimation methods.

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[21] Since the closure of the Institute for Research on Household Economics in 2017, the survey has been conducted by the Panel Data Research Center at Keio University.

Section 6 presents the estimation results. Section 7 contains some concluding remarks.

2. Conceptual Framework

This section provides a conceptual framework for analyzing the relationship between marriage and wealth for the case of women. It also discusses possible differences in the effect of marriage depending on whether household or personal wealth is considered.

In a simple framework of wealth accumulation, wealth in period $t + 1$, W_{t+1}, can be expressed as follows:

$$W_{t+1} = (1 + r_t)(W_t + Y_t - C_t) \tag{1}$$

where r_t is the rate of return on assets, and Y_t and C_t are income and consumption in period t, respectively. This suggests that wealth at a point in time may vary across households or individuals mainly for three reasons: namely, differences in the rate of return on assets (r_t), differences in the level of wealth (W_t) upon entering the period, and differences in the level of saving (Y_t - C_t) (Schmidt and Sevak, 2006).

Differences in rates of return on assets largely stem from differences in portfolio allocation, which is, in turn, determined by such factors as the level of financial literacy and/or risk preferences. Given that men are generally found to have a higher level of financial literacy than women (Lusardi and Mitchell, 2008) and that women tend to be more risk averse than men (Croson and Gneezy, 2009), married couples may allocate their wealth in a way that yields a higher return on their assets than single women earn (Bertocchi, Brunetti, and Torricelli, 2011; Christiansen, Joensen, and Rangvid, 2015). Married women may also benefit from the financial knowledge of their husbands[22] as well as from the financial security and resource pooling associated with marriage. As a consequence, portfolio allocation patterns may differ between married and unmarried women even at the personal wealth level.

Households may enter the period with different levels of wealth depending, for

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[22] Christiansen, Joensen, and Rangvid (2008), for example, show that having a spouse with an economics education increases one's stock market participation.

example, on the receipt of intergenerational transfers. The amount of such transfers may be greater for married couples than single women inasmuch as they could in principle receive transfers from either spouse's parents. Moreover, in the case of Japan, sons, particularly those who carry on the family line, are more likely to receive an inheritance than daughters (Hamaaki, Hori, and Murata, 2018). In addition, given that men tend to get married later than women and to earn more than women, they may have accumulated more wealth and may bring more assets to the household upon marriage. This may help married couples accumulate more wealth than single women. However, such advantages of marriage may not be evident at the personal wealth level if we relax the assumption of the full sharing of intrahousehold resources within married couples.

As far as saving patterns are concerned, the life-cycle model, first formalized by Modigliani and Brumberg (1954), still serves as the workhorse for analyzing the saving behavior of households. According to the simplest version of the life-cycle model, people accumulate wealth during their working years and decumulate wealth after retirement to smooth consumption over the life cycle. This suggests that saving behavior is determined largely by a household's position in the life cycle. If we allow for the presence of uncertainties and imperfect capital markets, households may also save for precautionary purposes. Marriage may act as a risk-reducing institution because individual members insure each other against unforeseen events, and precautionary saving may thus be lower for married couples than for single women (Fehr, Kallweit, and Kindermann, 2016; Kureishi and Wakabayashi, 2013). This may be true both at the household and personal wealth levels.

Marriage may also serve as a wealth-enhancing institution by changing total household production and consumption. Efficiency gains from the division of labor could increase the total output of married couples relative to the aggregation of outputs produced separately by each partner (Becker, 1981). Married couples may also benefit from economies of scale in consumption, especially in housing consumption, which may translate into additional wealth (or additional consumption). These advantages associated with marriage are likely to allow married couples to accumulate wealth, possibly including personal wealth, at a faster rate than they would as two single persons.

Note, however, that even with the same saving rate, households with higher incomes

will be able to accumulate more wealth than lower income households. Given that men generally have higher earnings than women, as shown in Section 4, and that there is the possibility of dual incomes, married couples may accumulate more wealth than single women over time. On the other hand, marriage may reduce married women's labor force participation and/or earnings due to family responsibilities such as childbearing and childrearing, and as a result, their personal wealth level might end up being lower than that of their unmarried counterparts.

Other explanations for the possible effect of marriage on wealth accumulation include the presence of children. While children can increase parents' motivation to save, for example to leave a bequest, children can also depress parents' ability to save because of the high cost of raising and educating them. Hence, the effect of children on wealth accumulation is likely to be an empirical question and may vary depending on the age of children, as shown by Schmidt and Sevak (2006). Furthermore, marriage usually implies a long-term commitment. Such a commitment may help married couples to purchase a house (Grinstein-Weiss et al., 2011; Hendershott et al., 2009), which is shown to contribute to greater wealth accumulation (Di, Belsky, and Liu, 2007; Turner and Luea, 2009). It may also prompt a longer-term time horizon and induce married couples to plan and save more for retirement than single women.

In sum, there are a number of channels through which marriage can affect wealth, but the overall effect of marriage on wealth is likely to be positive as far as its effect on household wealth is concerned. Nevertheless, the effect of marriage on personal wealth is likely to be different from that on household wealth and calls for a careful empirical analysis, which this paper tries to conduct.

3. Literature Review

Given the important implications of marriage for wealth accumulation, as illustrated in the above conceptual framework, there is a growing literature that examines the relationship between marriage and wealth.

Previous studies generally seem to show a positive relationship between marriage and wealth, as expected (e.g., Lupton and Smith, 2003; Painter, Frech, and Williams, 2015;

Ruel and Hauser, 2013; Schmidt and Sevak, 2006; Ulker, 2009; Vespa and Painter, 2011). Using data on the US, Lupton and Smith (2003), for example, show that married couples tend to save significantly more than other types of households (separated, divorced, widowed, or never married). They note that this wealth-enhancing effect of marriage is not solely related to married couples' higher income or to the simple aggregation of two individuals' wealth. Schmidt and Sevak (2006) also find large wealth gaps between married couples and single-female-headed households in the US even after controlling for such characteristics as position in the life cycle, education, and household income. In terms of the effect of the duration of marriage, Ulker (2009) finds that the length of longest marriage is positively associated with current household wealth in the US. Painter, Frech, and Williams (2015) also find that single mothers who subsequently formed long-lasting marriages are more likely to experience improved wealth accumulation, even after controlling for the unequal selection of more-advantaged women into marriage.

At the same time, there seems to be a marital disruption cost to wealth accumulation (Ruel and Hauser, 2013; Sharma, 2015; Ulker, 2009). This cost seems particularly large for women (Ulker, 2009) and/or if marital disruption occurs relatively late in life (Sharma, 2015). Given the implicit insurance provision of marriage, there is also evidence that rising divorce risk increases married individuals' saving (González and Özcan, 2013; Pericoli and Ventura, 2012), while the declining prospect of marrying induces singles to increase precautionary saving to insure against life-cycle risks (Fehr, Kallweit, and Kindermann, 2016; Kureishi and Wakabayashi, 2013).

In addition to empirical work on the relationship between marriage and wealth, some studies examine the effect of marriage on homeownership and portfolio allocation. Using data for Australia, Hendershott et al. (2009), for example, show that marital history matters for homeownership as marriage relaxes borrowing constraints as a result of resource pooling and a faster rate of wealth accumulation made possible by economies of scale in consumption, whereas divorce and separation have the opposite effect. The positive effect of marriage on homeownership is also found for the US (Grinstein-Weiss et al., 2011).

As far as the effect of marriage on portfolio allocation is concerned, Love (2010) shows, using data on the US, that marital-status transitions can have important effects on

household decisions concerning asset allocation, particularly in the case of widowhood and divorce, which are found to make women reduce the share of risky assets. Christiansen, Joensen, and Rangvid (2015) also investigate how changes in marital status affect financial investments using data on Denmark and find that marriage makes both men and women increase stock market participation. They point out that it is not changes in the level of individual income but the freeing up of economic resources due to economies of scale in consumption during marriage that helps married people to participate more in the stock market. Similarly, Bertocchi, Brunetti, and Torricelli (2011) show, for the case of Italy, that married women have a higher propensity to invest in risky assets than unmarried women, while such a marital status gap is not observed for men. They suggest that marriage functions as a sort of safe asset for women when they make portfolio decisions. Moreover, their analysis shows empirically that the differential behavior of married versus single women has evolved over time. Possible explanations for the observed evolution include the increasing incidence of divorce and the expansion of female labor market participation. These changes have transformed the structure of family and society, which has, in turn, shaped women's perception of marriage as a safe asset (Bertocchi, Brunetti, and Torricelli, 2011).

Despite a growing number of studies that investigate the relationship between marriage and wealth, one of the limitations of previous studies is that they predominantly use household-level wealth as the main outcome variable. The few exceptions include Lersch (2017) and Sierminska, Frick, and Grabka (2010), who make use of data on personal wealth for Germany. Sierminska, Frick, and Grabka (2010), for instance, show a significant gender gap in personal wealth within married couples, with married women having about 47,000 euros less than their spouses. This certainly challenges the traditional assumption of the equal sharing of household wealth within married couples.

As for Lersch (2017), he examines the association between marriage and wealth using both personal and household wealth data. He finds that both women and men experience substantial marriage wealth premiums not only in household wealth but also in personal wealth. However, for women, marriage is found to be wealth-enhancing largely through joint investment in housing with their spouses while such an effect of marriage is not observed in the case of nonhousing wealth. By contrast, in the case of men, marriage

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seems to be additionally beneficial for personal wealth accumulation in types of assets other than housing (Lersch, 2017). This may be explained by the fact that housing wealth tends to be shared within married couples more than nonhousing wealth (Sierminska, Frick, and Grabka, 2010) and that men may be able to use their increased earnings in marriage to accumulate financial wealth but may not share their enhanced wealth fully with their spouses during marriage (Lersch, 2017). These findings underscore the importance of analyzing the effect of wealth on personal wealth, in addition to household wealth, for a comprehensive understanding of the relationship between marriage and wealth.
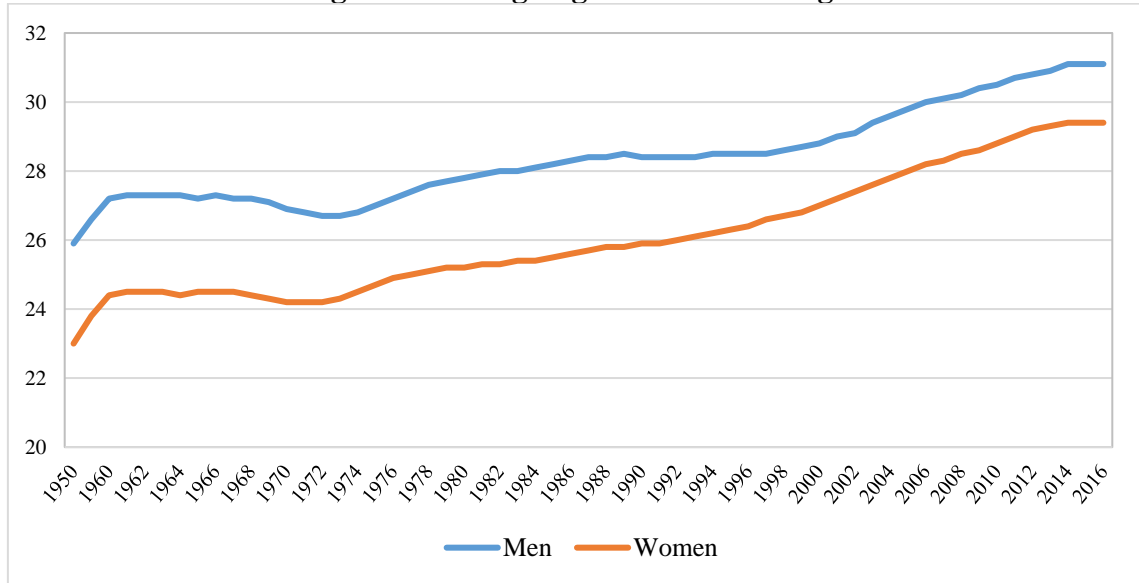
Another limitation of previous studies is that most studies are conducted using data on Australia, Europe, or the US. To the best of the author's knowledge, there are no previous studies that examine the relationship between marriage and wealth in Japan even though Japan has been observing an increase in the number of unmarried people, as a result of which there is growing concern about whether singles are accumulating sufficient wealth for old age. There are a few exceptions that are somewhat related to the issues examined in this paper. Kureishi and Wakabayashi (2013), for example, investigate whether single women with less prospect of marrying are more likely to save for precautionary purposes than those with a greater prospect of marrying. Using the same data that I use for the present study, they find that single women who expect to remain single do plan to do more precautionary saving than those who expect to get married, given that single women are more likely to face greater uncertainty about future income than their married counterparts.

4. Recent Trends in Marital Behavior in Japan

There have been a number of significant changes in marital behavior in Japan, as in many other developed countries. Both men and women are delaying their first marriage, particularly since the early 1970s, as shown in Figure 1. For example, the average age at first marriage for women was 24.2 in 1970, but it rose gradually to 29.4 in 2016. In the case of men, it rose from 26.9 to 31.1 during the same period. Japan also experienced a significant reduction in the marriage rate from 10.0 per 1,000 people in 1970 to 5.0 in

2016 while the divorce rate has increased steadily since 1960 (see Figure 2), although these are crude rates. Note that the 2016 figures for Japan seem comparable to the average figures for the member countries of the Organisation for Economic Co-operation and Development (OECD).[23]

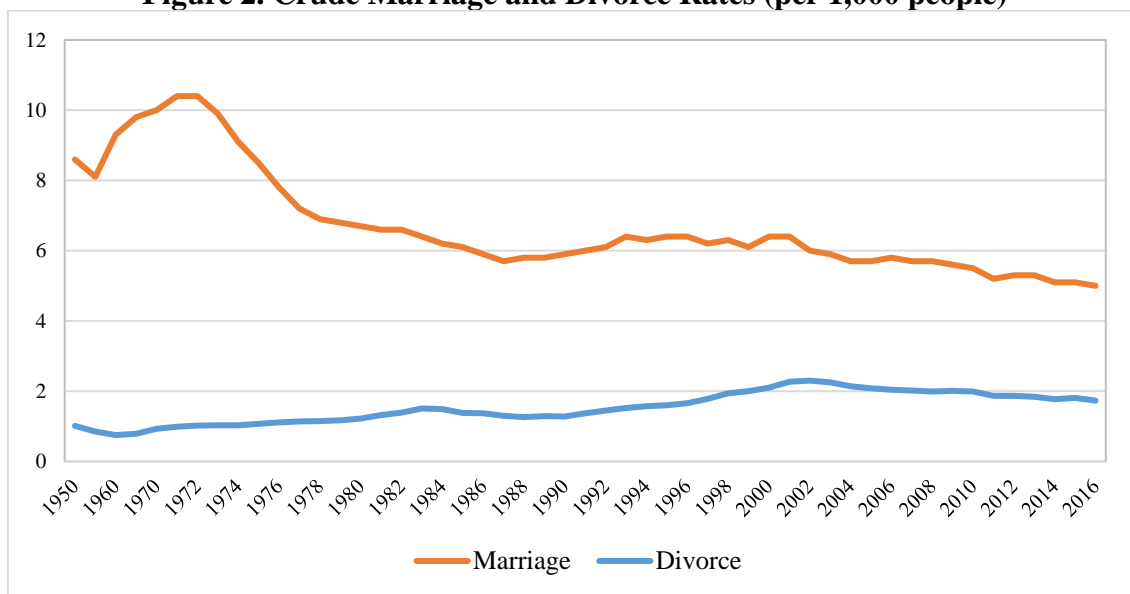**Figure 1. Average Age at First Marriage**

Source: Population Statistics 2018
(available at http://www.ipss.go.jp/syoushika/tohkei/Popular/Popular2018.asp?chap=0)

Another interesting trend observed in Japan is that there has been an increase in the share of people who had never gotten married at the age of 50, which is sometimes regarded as the share of people who never marry in their lifetime. As Figure 3 shows, this share has been increasing sharply, particularly since 1990, for both men and women. Only about 1.3% and 1.9% of men and women had never gotten married at the age of 50 in 1960. However, these shares increased significantly to 23.4% and 14.1%, respectively, in 2015, and they are expected to increase further to 29.5% and 18.7%, respectively, in 2040. In other words, almost one-third of men and one-fifth of women may never marry in their lifetime in the foreseeable future in Japan.

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[23] The average age at first marriage for the OECD countries was 32.3 and 30.0 for men and women, respectively, in 2016. In addition, the average marriage and divorce rates for the OECD countries were 4.8 and 1.9 per 1,000 people, respectively, in 2016 (OECD Family Database, available at http://www.oecd.org/els/family/database.htm).

Figure 2. Crude Marriage and Divorce Rates (per 1,000 people)

Source: Population Statistics 2018
(available at http://www.ipss.go.jp/syoushika/tohkei/Popular/Popular2018.asp?chap=0)

Figure 3. Share of People Who Had Never Gotten Married at Age 50 (actual and projected, %)
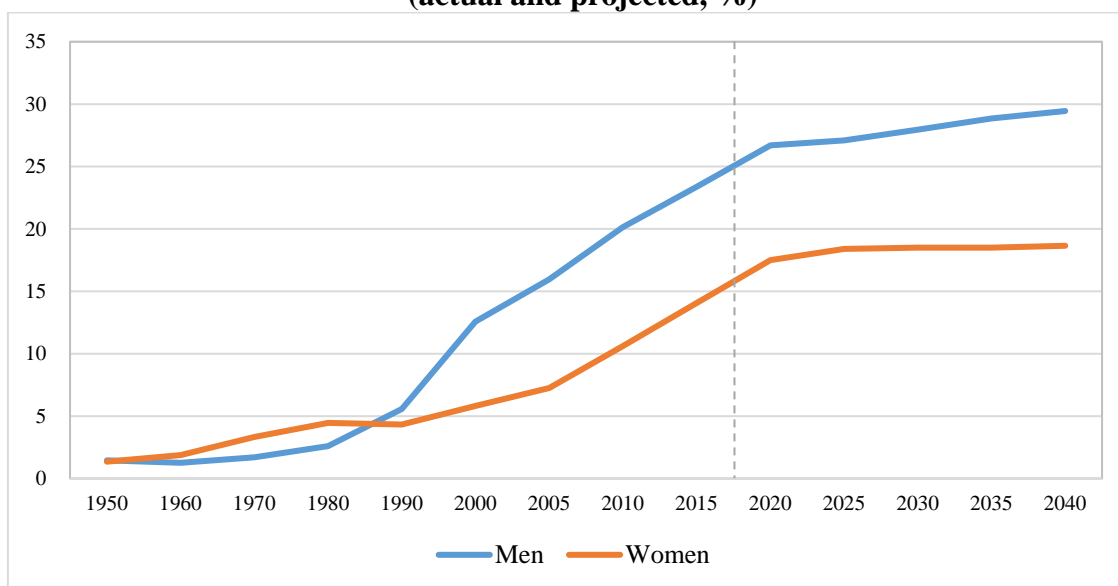
Note: These shares are calculated as the average share of people who have never gotten married for the 45-49 and 50-54 age groups.
Source: The shares for the 1950-2015 period are actual figures and obtained from Population Statistics 2018 (available at http://www.ipss.go.jp/syoushika/tohkei/Popular/Popular2018.asp?chap=0). The shares for the period 2020-2040 are projected figures and calculated based on data from Household Projections for Japan 2015-2040 (available at http://www.ipss.go.jp/pp-ajsetai/j/HPRJ2018/t-page.asp).

Figure 4. Female Labor Force Participation Rate (age 15-64, %)
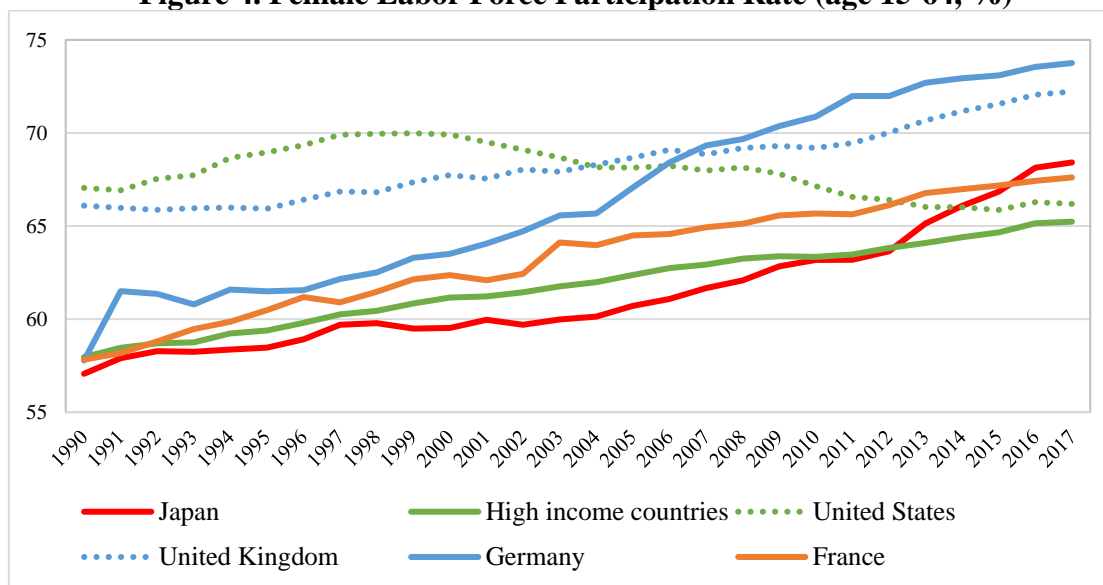
The increasing number of unmarried women resulting from the above changes in marital behavior raises concern about their financial security, including the adequacy of their wealth for old age. While Japan's female labor force participation rate has been increasing over time and has become more comparable with that of other developed countries (see Figure 4), women in Japan still have a tendency to face more disadvantages in the labor market than those in many other developed countries. Despite a steady increase in the female labor force participation rate in Japan, a larger share of women still faces disruptions in their careers due to childbearing and childrearing in Japan than in other developed countries. This is shown by a larger drop in the labor force participation rate of women in their 30s in Japan than in other countries (see Figure 5). Moreover, compared with men, women are much more likely to be engaged in irregular employment,[24] which tends to be low paid and insecure in comparison with regular employment, in the case of Japan. The share of female employees engaged in irregular employment was 55.5% in 2017 while that of their male counterparts was only 21.9%.[25]

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[24] Irregular employees include those who work as a part-time worker, temporary worker, fixed-term worker, or dispatched worker from a temporary agency.

[25] The shares of irregular employment are calculated based on data from the 2017 Labor Force Survey (available at http://www.stat.go.jp/data/roudou/sokuhou/nen/ft/pdf/index1.pdf).

Furthermore, the gender wage gap for Japan was 24.6% of the male median wage, significantly higher than the average figure of 13.8% for the OECD countries.[26]

Figure 5. Female Labor Force Participation Rate by Age Group (2017, %)
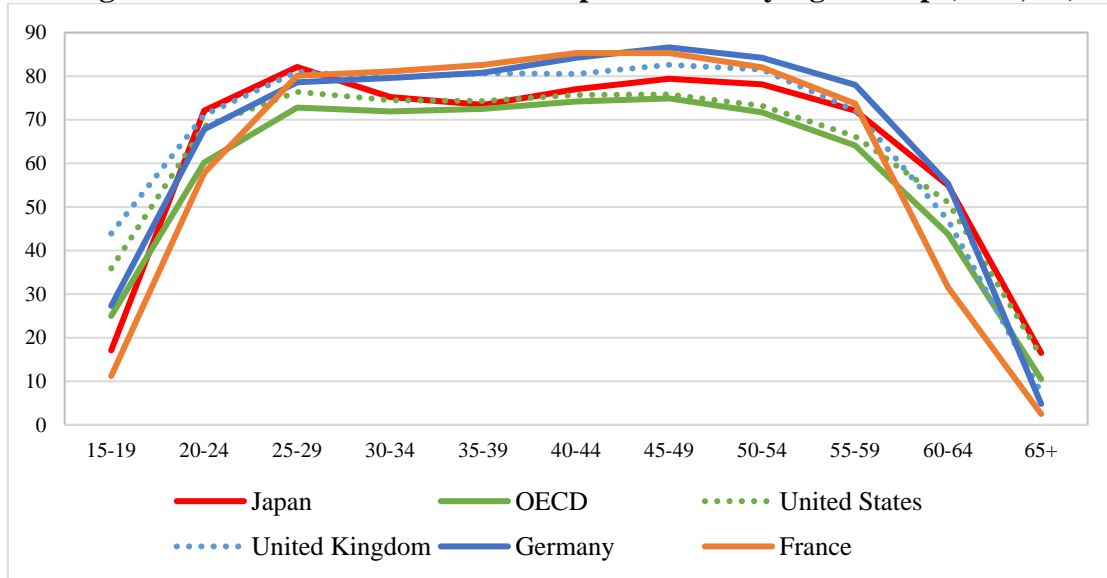
Source: OECD Stats (available at https://stats.oecd.org/)

Women's relatively low earnings as well as their shorter length of employment not only lower their ability to accumulate wealth during their working years but also negatively affect the amount of the public pension that they can receive in old age. Because of the disadvantaged position of women in the labor market and the increasing number of unmarried women in Japan, it is important to investigate how women's wealth accumulation differs depending on their marital status in order to shed light on their economic wellbeing as well as on their preparation for old age.

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[26] The gender wage gap is defined as the difference between male and female median earnings relative to male median earnings for full-time employees. The data are taken from OECD Data (available at https://data.oecd.org/earnwage/gender-wage-gap.htm).

5. Data and Estimation Methods

5.1 Data

The data used for the empirical analysis come from the Japanese Panel Survey of Consumers (JPSC), which has been conducted annually in Japan since 1993 by the Institute for Research on Household Economics. One of the unique features of this survey is that it focuses on young women and traces the same individuals on a yearly basis. More specifically, the initial sample at the start of the survey in 1993 comprised 1,500 women aged 24-34. Subsequently, 500 women aged 24-27 in 1997, 836 women aged 24-29 in 2003, 636 women aged 24-28 in 2008, and 625 women aged 24-28 in 2013 were added to the sample. The sample was drawn each time to be nationally representative using two-stage stratified random sampling.

The objective of this survey is to examine a wide range of aspects of women's lives, such as income, expenditures, saving, employment, and family relationships, over their life cycle. The sample consists of both unmarried and married women, and once respondents get married, the survey also starts collecting detailed information on their husbands each year. Another advantage of this survey is that it collects information on respondents' personal wealth as well as that of their husbands in the case of married respondents. The data are therefore well-suited for examining the relationship between marriage and wealth.

The availability of information on personal wealth in the JPSC also makes it possible to include in the estimation sample respondents who reside with their parents without conflating their wealth with that of their parents. This is an important issue in the case of Japan as a large share of unmarried people reside with their parents. For example, according to the 15th Japanese National Fertility Survey conducted in 2015, [27] the percentage of never married women who reside with their parents was 74.1% and 76.4% for those aged 25-29 and 30-35, respectively. Similarly, according to the JPSC data used for the present analysis, the percentage of never married women aged 25-34 who reside

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[27] Available at http://www.ipss.go.jp/ps-doukou/j/doukou15/doukou15_gaiyo.asp

with their parents was 73.5% in 2016, which is comparable to the figures from the 15th Japanese National Fertility Survey. This suggests that excluding single women who reside with their parents from the estimation sample is likely to impose a serious limitation on the analysis.

For the present analysis, I use mainly data from the 11th to the 24th waves of the survey, which were conducted annually during the 2003-2016 period, to ensure that I obtain the required information for the entire study period. I also make use of data from earlier waves to obtain information on respondents' marital and homeownership history.

5.2 Empirical Methods

To investigate the relationship between marriage and wealth, I estimate the following fixed-effects regression model:

$$w_{it} = \alpha + \beta M_{it} + \gamma X_{it} + v_i + \varepsilon_{it} \tag{2}$$

where w_i is the wealth level of respondent i in year t, M_{it} contains variables that capture the respondent's marital status, X_{it} contains variables pertaining to the time-variant socioeconomic characteristics of the respondent, v_i captures individual time-invariant unobservables, and ε_{it} is an error term.

One of the issues that could arise when estimating the relationship between marriage and wealth is the non-random sorting of individuals into marriage. It is possible that some characteristics distinguishing married women from unmarried women are associated with their respective wealth accumulation capacity. Estimating a fixed-effects regression model eliminates selection bias due to time-invariant unobservable characteristics, though the estimates are still potentially subject to bias due to time-variant unobservable characteristics.

Dependent variables

As indicated in equation (2), the dependent variable in this analysis is the level of

wealth (net worth). Since the data from the JPSC allow us to calculate both personal and household wealth, we use wealth information at both the individual and household levels to examine whether the marriage wealth premium differs depending on how we measure wealth. Moreover, since Lersch (2017) finds the effect of marriage to differ between financial and nonfinancial wealth, I use both types of wealth as dependent variables in addition to using total wealth.

In the present analysis, financial wealth is defined as the total value of wealth in the form of various types of saving accounts in post offices, banks, and shinkin banks (credit unions), payroll saving, gold investment/saving accounts, life insurance, bonds, stocks, investment trusts, loan and money trusts, and others. Nonfinancial wealth is defined as the present value of respondents' primary residence (house/condominium including land, if applicable). Respondents are asked to indicate the present value of their primary residence if they live in a house/condominium owned by family members. Respondents are also asked to indicate the ownership of the property. I thus use the total value or part of the value of the property, depending on its ownership, as nonfinancial wealth. Financial and nonfinancial net worth are calculated by subtracting the total value of nonhousing and housing loans from the total value of financial and nonfinancial wealth, respectively, and total net worth is calculated as the sum of financial and nonfinancial net worth.[28]

In sum, I construct six dependent variables—namely, personal net worth and equivalized household net worth for total wealth, financial wealth, and nonfinancial wealth, respectively. A detailed description of how these wealth variables are constructed is provided in the Appendix. Personal net worth basically includes assets that are solely owned by respondents and their own share of joint assets. I also use household net worth as an alternative dependent variable, in addition to using personal net worth, given that married women potentially have access to all or part of the wealth owned by their husbands. To account for economies of scale in consumption, I express it as equivalized household net worth.[29] In the case of unmarried respondents, equivalized household net worth is the same as personal net worth. For married respondents, it is obtained by

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[28] Due to the unavailability of data, the wealth variables in this analysis do not include the value of second homes, vehicles, consumer durables, or pension wealth.

[29] I also conducted the regression analysis using household net worth as the dependent variable and obtained results similar to those obtained using equivalized household net worth as the dependent variable.

summing respondents' own personal net worth and that of their husbands and dividing the total value by the square root of two (i.e., the respondent and her husband). I do not use total household size to make this adjustment but control for the number of children in the regression analysis instead.[30] To correct for the skewness of the wealth distribution, the value of the wealth-related variables is transformed using the inverse hyperbolic sine (IHS) function, which allows us to retain negative and zero values, unlike a log transformation.

Explanatory variables

The main explanatory variables of interest in the present analysis are respondents' marital status variables. I include a dummy variable that equals one if the respondent is married and another that equals one if she is divorced or widowed.[31] In fixed-effects regression models, the coefficient on the married variable essentially captures the effect of marriage, one of the most important life course transitions, on wealth. I expect it to have a positive effect on equivalized household net worth, but its effect on personal net worth is an empirical question, as discussed in Section 2.

As for the rest of the explanatory variables, I include in the regression the number of children as well as a variable for residing with parents/parents-in-law. The latter variable equals one only if the respondent resides with her parents/parents-in-law and shares living expenses with them. I also control for income: in the case of unmarried respondents, I use their personal income, and for married respondents, I use the sum of their personal income and that of their husbands and adjust it for economies of scale by dividing it by the square root of two, as I do for the wealth variables. In addition, I include in the regression the total amount of bequests and/or *inter vivos* transfers received from the respondent's parents/parents-in-law during the past year. Since income and intergenerational transfers

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[30] I also tried constructing the equivalized household net worth variable by dividing the value of total household net worth by the square root of the number of household (i.e., the respondent (and her husband if married) plus the number of children) and using it as the dependent variable. The results are similar to those obtained using the equivalized household net worth variable that is calculated by dividing the value of total household net worth by the square root of two.

[31] Given that the sample comprises relatively young women, I had very few observations on widows. I therefore do not include a separate dummy for being widowed.

tend to be skewed, I use the log transformation of the income and intergenerational transfer variables. Note that all of the wealth, income, and intergenerational transfer variables are expressed in 2016 prices.

Finally, I control for the key characteristics of the respondent, including her age, age squared, health condition, and employment status. The health variable equals one if the respondent thinks that her health condition is very good. For the employment status variable, I distinguish whether the respondent is a regular worker, is an irregular worker, is self-employed (or a family employee in a self-employed business), or is not in the labor force. I also include regional dummies and a dummy variable for residing in a major city to control for geographical variation as well as year dummies.

6. Empirical Results

6.1 Descriptive Statistics

Table 1 shows summary statistics for the dependent and explanatory variables separately for all women, married women, and unmarried women. Note that the estimation sample comprises 18,114 observations after removing observations with missing information.[32] About 37% of the sample are currently unmarried, among whom about 78% are never married and about 22% are divorced/widowed. The average number of children that respondents have is about 1.2, but married women tend to have a larger number of children than their unmarried counterparts, as expected.

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[32] To minimize the influence of outliers, the top and bottom 0.25% of the distribution of wealth were removed from the sample based on the value of household total net worth.

Table 1: Summary Statistics

	All		Unmarried		Married	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Personal total net worth	4.28	5.93	5.59	5.21	3.50	6.19
Untransformed value ('000 yen)	2,912	6,748	3,953	8,161	2,294	5,654
Personal financial net worth	4.35	5.61	5.56	5.14	3.63	5.76
Untransformed value ('000 yen)	2,446	5,461	3,460	6,765	1,844	4,404
Personal nonfinancial net worth	0.41	2.96	0.34	2.11	0.45	3.37
Untransformed value ('000 yen)	466	3,318	494	3,863	450	2,946
Equivalized household total net worth	5.55	6.36	5.59	5.21	5.53	6.96
Untransformed value ('000 yen)	5,906	10,912	3,953	8,161	7,066	12,110
Equivalized household financial net worth	6.23	5.24	5.56	5.14	6.63	5.26
Untransformed value ('000 yen)	4,610	7,782	3,460	6,765	5,293	8,253
Equivalized household nonfinancial net worth	0.91	5.20	0.34	2.11	1.25	6.34
Untransformed value ('000 yen)	1,296	5,981	494	3,863	1,773	6,896
Marital status						
Never married	0.29		0.78		-	
Married	0.63		-		1.00	
Divorced/widowed	0.08		0.22		-	
Number of children	1.23	1.17	0.35	0.83	1.75	1.02
Log of (equivalized) annual income	7.99	1.22	7.40	1.71	8.34	0.55
Log of intergenerational transfers received during the past year	0.18	1.17	0.08	0.76	0.23	1.35
Co-residing with parents/parents-in-law	0.30		0.56		0.14	
Respondents' characteristics						
Age	37.26	7.77	34.35	7.70	38.98	7.28
Age squared/100	14.48	6.03	12.39	5.79	15.73	5.83
Very good health	0.49		0.48		0.50	
Employment status						
Regular worker	0.31		0.52		0.18	
Irregular worker	0.35		0.32		0.37	
Self-employed	0.06		0.04		0.07	
Not in labor force	0.28		0.12		0.38	
Residing in a major city	0.29		0.32		0.28	
No. of observations	18,114		6,753		11,361	
No. of individuals	2,902		1,428		1,915	

S.D. = standard deviation
Source: Calculations based on data from the JPSC.

The average level of personal total net worth (before the IHS transformation) for the full sample is about 2.9 million yen (about US$ 26,500),[33] whereas the average figure for the unmarried sample (4.0 million yen) is found to be significantly greater than that for the married sample (2.3 million yen). Similar trends are observed for personal

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[33] Based on an exchange rate of US$1 = 110 yen.

financial and nonfinancial net worth. These figures suggest that marriage does not necessarily help women to accumulate wealth and could, instead, have an adverse effect on their wealth accumulation if wealth is measured as personal wealth. However, if wealth is measured in terms of household-level wealth (i.e., equivalized household net worth) on the assumption that intrahousehold resources are shared equally within married couples, married women are found to have a higher level of wealth than their unmarried counterparts for total wealth, financial wealth, and nonfinancial wealth, particularly for nonfinancial wealth. The significant difference between personal net worth and equivalized household net worth in the size of the gap between married women's wealth holdings and that of never married women or divorced/widowed women is also clearly shown in Figure 6. This underscores the importance of examining the wealth effect of marriage using both personal and household wealth.

Figure 6. The Average Level of Total Net Worth by Marital Status ('000 yen)
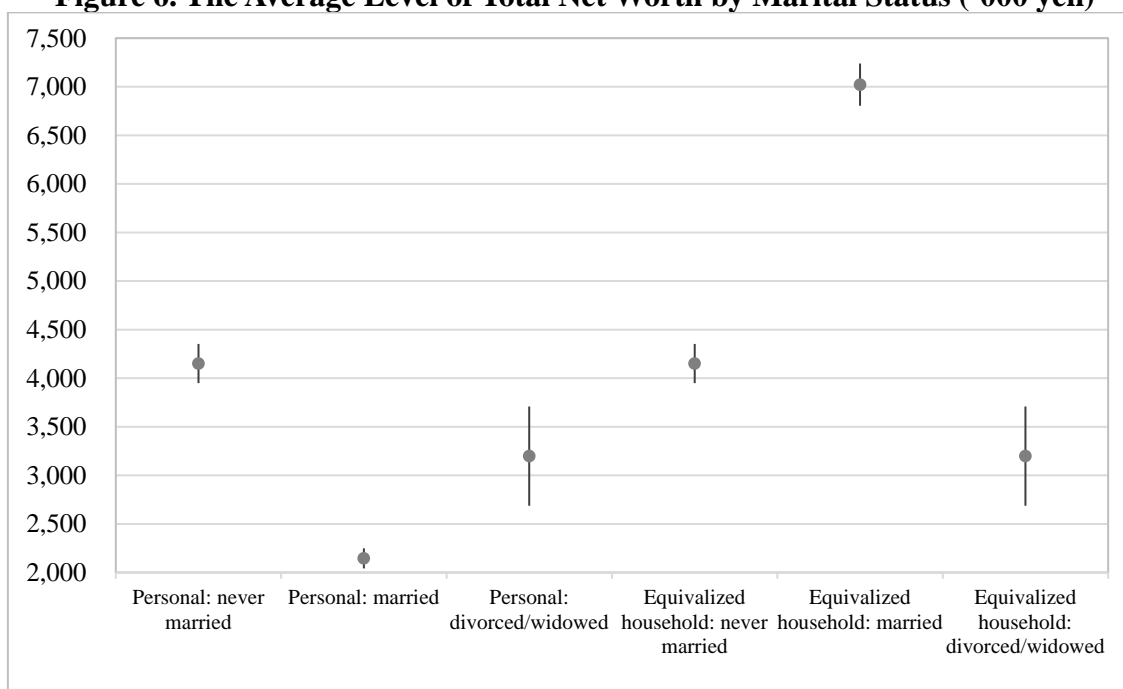
Note: Spikes indicate the 95% confidence interval.
Source: Calculations based on data from the JPSC.

As for the rest of the explanatory variables, the average age of the sample is about 37 years old, with unmarried women being younger than married women. It is interesting to find that unmarried women are more likely to work as a regular worker than married women while married women are more likely to be out of the labor force than unmarried women. This reflects the fact that women tend to leave the labor market for childbearing and childrearing in the case of Japan, as described in Section 4. The level of income and the amount of bequests and/or *inter vivos* transfers received in the past year are both found to be greater for married women than for unmarried women, as expected, while unmarried women are more likely to reside with their parents than their married counterparts.

6.2 Regression Results

To examine the relationship between marriage and wealth, I conduct a regression analysis, as explained in Section 5.2. I use personal net worth and equivalized household net worth as dependent variables and run separate regressions for total wealth, financial wealth, and nonfinancial wealth. Table 2 shows the estimation results for the fixed-effects regression models. Note that the results of Hausman tests suggest the use of fixed-effects models rather than random-effects models for all regressions presented in this paper.

	Personal total net worth		Personal financial net worth		Personal nonfinancial net worth		Equivalized household total net worth		Equivalized household financial net worth		Equivalized household nonfinancial net worth	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Marital status (Never married)												
Married	-0.636**	0.301	-0.575**	0.287	0.049	0.137	0.614*	0.340	1.015***	0.278	0.177	0.236
Divorced/widowed	1.061*	0.544	1.066**	0.504	0.031	0.299	1.118*	0.625	0.612	0.540	-0.098	0.521
Number of children	-0.475***	0.118	-0.447***	0.107	0.020	0.088	-0.539***	0.131	-0.345***	0.099	0.152	0.125
Log of (equivalized) annual income	0.109***	0.040	0.099**	0.040	-0.010	0.013	0.077*	0.042	0.095**	0.040	-0.006	0.024
Log of intergenerational transfers	0.056**	0.025	0.026	0.023	0.063***	0.022	0.060***	0.026	0.024	0.020	0.095***	0.031
Co-residing with parents/parents-in-law	0.428**	0.192	0.353**	0.179	0.059	0.105	0.376*	0.205	0.393**	0.175	0.174	0.161
Age	0.267***	0.085	0.348***	0.077	-0.065	0.046	0.284***	0.088	0.554***	0.073	-0.230***	0.079
Age squared/100	-0.216**	0.106	-0.342***	0.094	0.138**	0.059	-0.240**	0.108	-0.614***	0.089	0.439***	0.101
Very good health	0.210**	0.086	0.194**	0.078	0.025	0.049	0.254***	0.094	0.211***	0.073	0.110	0.085
Employment status (Not in labor force)												
Regular worker	0.239	0.186	0.313*	0.171	0.010	0.108	-0.045	0.194	0.003	0.162	0.009	0.170
Irregular worker	-0.097	0.141	-0.024	0.124	0.019	0.078	-0.244	0.155	-0.162	0.122	0.036	0.149
Self-employed	-0.354	0.382	-0.312	0.356	0.179	0.213	-0.412	0.379	-0.691**	0.342	0.310	0.373
Residing in a major city	0.011	0.275	0.030	0.238	0.108	0.167	0.023	0.330	-0.032	0.221	-0.342	0.305
Constant	-1.565	2.128	-2.676	2.005	0.751	0.895	-0.862	2.236	-5.850***	1.891	3.214*	1.565
F-value (p-value)	3.83 (0.000)		3.59 (0.000)		1.82 (0.003)		3.10 (0.000)		5.21 (0.000)		3.68 (0.000)	
R-sq: Within	0.0176		0.0172		0.0105		0.0119		0.0250		0.0220	
Between	0.0701		0.0655		0.0152		0.0375		0.0510		0.0383	
Overall	0.0495		0.0454		0.0115		0.0218		0.0327		0.0310	
No. of observations	18,114		18,114		18,114		18,114		18,114		18,114	
No. of individuals	2,902		2,902		2,902		2,902		2,902		2,902	

Coef. = coefficient, S.E. = standard error

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Regional and year dummies are included in all regressions. Standard errors are clustered at the individual level.

Source: Estimation based on data from the JPSC.

Table 2 shows that the effect of marriage on wealth differs depending on whether we measure wealth as personal or equivalized household wealth. In the case of total net worth, marriage is associated with a 47% decline in personal wealth while it is associated with an 85% increase in equivalized household wealth.[34] This result seems to be driven largely by the effect of marriage on financial wealth as marriage does not seem to have a significant effect on nonfinancial wealth for both personal and equivalized household wealth. These estimation results therefore suggest that as long as intrahousehold resources are shared equally within married couples, as commonly assumed, married women are in a better position than unmarried women in terms of wealth accumulation. However, if the assumption of the equal sharing of intrahousehold resources is violated, marriage does not necessarily help women accumulate wealth and instead could put them in a financially vulnerable position, at least in the case of Japan.

One of the reasons why marriage does not contribute to increasing women's personal wealth is that married women own, on average, only about 23% of household net worth. Moreover, among married couples who own their primary residence, only about 16% of married women own all or part of their property in the case of Japan. This is in sharp contrast to what Lersch (2017) finds for Germany. Lersch (2017) shows that, in the case of Germany, married women are able to accumulate more wealth mainly through their joint investment in housing with their husbands. Sierminska, Frick, and Grabka (2010) also find for Germany that housing wealth tends to be shared more than nonhousing wealth within married couples.

It is true that married women potentially have access to all or part of the assets owned by their husbands. Nevertheless, sharing intrahousehold resources on an informal basis is likely to make married women highly dependent on their husbands and, as a result, make them financially vulnerable in the event of marital disruptions. This potential issue seems particularly relevant in the case of Japan where married women generally own a relatively small share of household wealth. The results presented in Table 2 thus highlight the importance of using personal wealth, in addition to household wealth, to examine the effect of marriage on women's wealth accumulation patterns.

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[34] The percent change in net worth for a unit change in each explanatory variable is calculated as %Δ(w) = $100*(e^b - 1)$, where b is the estimated coefficient.

Note that Table 2 shows that marriage does not have a significant effect on nonfinancial net worth regardless of how we measure nonfinancial wealth, which is rather puzzling. Since people tend to purchase their primary residence after they get married in Japan, we would expect marriage to have a positive effect on nonfinancial wealth, at least when we measure nonfinancial wealth as equivalized household nonfinancial wealth. However, since the coefficient on the marriage dummy essentially captures the short-term effect of marriage on wealth, it is possible that marriage may affect nonfinancial wealth accumulation only on a longer-term basis. Moreover, since we measure wealth in terms of net worth and many married respondents may still be in the midst of repaying their housing loans even if they have already purchased their primary residence, the positive effect of marriage on nonfinancial wealth may not get captured by the coefficient on the simple marriage dummy.

To investigate these possibilities, I examine the effect of marriage on wealth in each separate year after the marriage by replacing the aforementioned dummy variable for being married with a dummy variable that equals one if the respondent gets married and is in this transition year, a dummy variable that equals one if she is married and is in the year after the transition year, a dummy variable that equals one if she is married and is in the second year after the transition year, and so forth, up to 29 years after the transition year. Given the relatively small number of respondents who have been married for more than 30 years, for longer marriage durations, I include a dummy variable that equals one if the respondent is married and is in the 30th year or later after the transition year. Note that the average duration of marriage is about 13.5 years among married respondents.

Figure 7 shows the estimated coefficients on the marriage duration dummies separately for personal and equivalized household nonfinancial net worth.[35] Note that only the estimated effects that are shown in blue or orange are statistically significant. As expected, Figure 7 shows that marriage starts having a consistently positive and significant effect on equivalized household nonfinancial net worth only when respondents have been married for 12 years or longer and that the size of the effect tends to increase

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[35] Since the rest of the regression results are very close to those reported in Table 2, I do not report the full regression results, but they are available from the author upon request. This also applies to the regression results for financial net worth.

as marriage duration increases, as expected. The results therefore seem to suggest that marriage does not appear to increase the nonfinancial wealth of married couples until they have paid off a certain amount of their housing loans because of the way I measure wealth in this analysis (i.e., in terms of net worth). On the other hand, since relatively few married women own all or part of their primary residence, as noted earlier, marriage hardly has a significant effect on nonfinancial wealth even on a longer-term basis if I measure wealth as personal wealth.

**Figure 7. The Effect of Marriage on Nonfinancial Net Worth
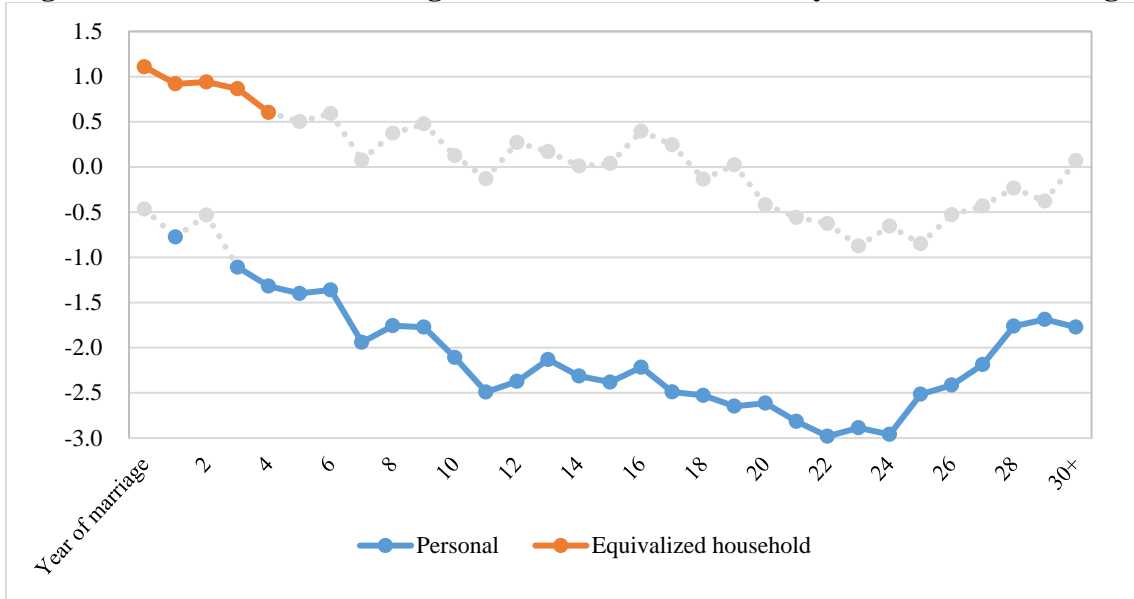by Duration of Marriage**
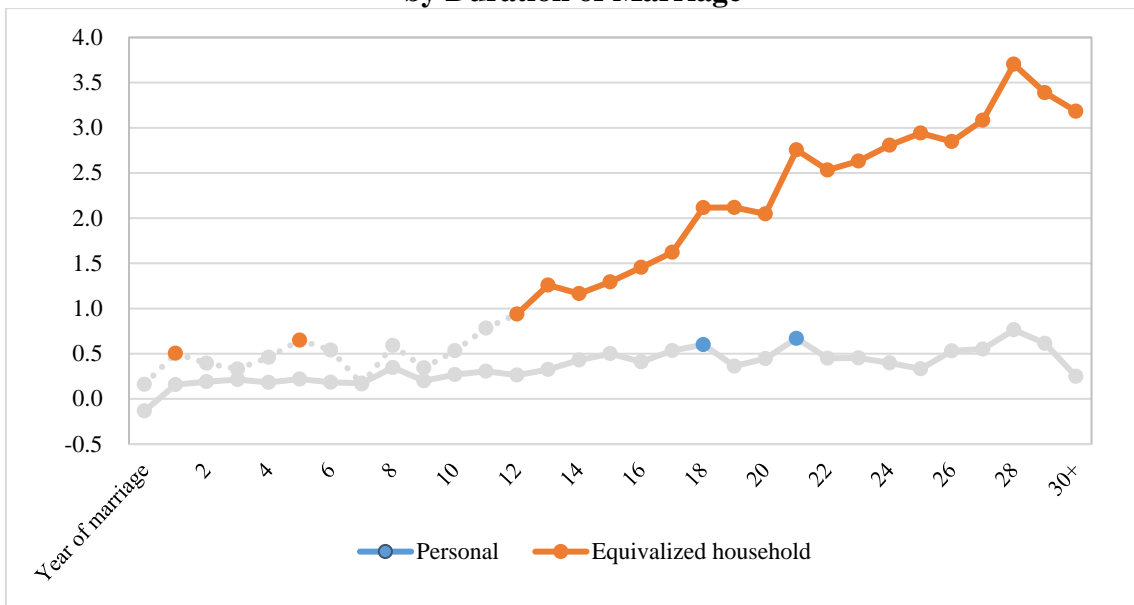
Note: Only the effects in blue or orange (i.e., not in grey) are statistically significant at least at the 10% level.
Source: Estimation based on data from the JPSC.

I estimate a similar fixed-effects regression model using financial net worth as the dependent variable, and the results are shown in Figure 8. The way in which marriage affects financial wealth seems very different from the way in which it affects nonfinancial wealth. In the case of financial wealth, marriage is found to have a consistently negative and significant effect on personal financial net worth after a few years of marriage. This may be driven by the fact that married women tend to leave the labor force or shorten their working hours for childbearing and childrearing, as a result of which their personal financial wealth declines. By contrast, if we measure financial net worth as equivalized

household net worth, marriage seems to increase married women's wealth until at least 4 years after the marriage. A possible reason why marriage does not have a positive and significant effect thereafter is that married couples may use part of their accumulated financial wealth to pay the down payment on their primary residence and/or may need to start repaying their housing loans and may therefore not be able to accumulate as much financial wealth as they had prior to the purchase of the property.

Figure 8. The Effect of Marriage on Financial Net Worth by Duration of Marriage

Note: Only the effects in blue or orange (i.e., not in grey) are statistically significant at least at the 10% level.
Source: Estimation based on data from the JPSC.

For the rest of the regression results, similar findings are obtained regardless of whether I use personal net worth or equivalized household net worth (see Table 2). Being divorced/widowed is found to be positively and significantly associated with total net worth (and financial net worth only in the case of personal financial net worth). This suggests that women receive compensation in the event of marital disruptions.[36] The number of children is negatively and significantly associated with total net worth and financial net worth, which suggests that the cost of raising children outweighs the positive

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[36] A comparison of the level of the total net worth before and after marital disruptions also suggests that, after disruptions, such respondents seem to have received, on average, about 62% of the total net worth that was held in their own or their husbands' names prior to such events.

effect of having children on wealth, for instance, in terms of creating an incentive to accumulate wealth in order to leave a bequest. As for the receipt of intergenerational transfers, it is found to be positively and significantly associated with total net worth and nonfinancial net worth, as expected. Finally, the regression results suggest that co-residing with and sharing living expenses with parents/parents-in-law seems to help respondents accumulate wealth.

The regression results presented so far are based on the current level of wealth holdings, and because the sample consists of relatively young women, it does not include any respondents who are 60 years old or older. Hence, it is difficult to discuss possible differences in the adequacy of saving for old age between married and unmarried women based on the above findings. However, the JPSC data contain information on the amount of the saving target for different purposes including old age. Although this amount indicates only how much wealth respondents (respondents and their husbands in the case of the married sample) are aiming to accumulate for old age, it does provide an indication of how well they are preparing for their retirement. I therefore construct a variable for the amount of the saving target for old age as the dependent variable and examine its determinants using the same explanatory variables I used for the earlier analysis. In the case of married respondents, the dependent variable is converted to an equivalized amount by dividing the amount of the saving target for old age by the square root of two (I use the actual amount of the saving target in the case of unmarried respondents) and express it in logarithmic form. I analyze the determinants of old-age saving by estimating a fixed-effects regression model, and the results are shown in Table 3.

Note that, according to the data, unmarried respondents aim to save about 3.2 million yen for old age while married respondents aim to save a greater amount—about 4.7 million yen when converted to an equivalized amount. Table 3 also confirms that marriage is positively and significantly associated with the amount of the saving target for old age. In other words, married women are likely to be better prepared for retirement than never married women. The earlier regression results for the determinants of wealth holdings also suggest that, as long as household wealth is shared equally within married couples, the economic wellbeing of married women in old age is likely to be higher than that of their unmarried counterparts, and this raises concern about the adequacy of retirement

saving among unmarried women.

Table 3. Estimation Results for Determinants of Saving Target for Old Age
(Fixed-effects Model)

	Coefficient	Standard error
Marital status		
(Never married)		
Married	1.385***	0.222
Divorced/widowed	0.741**	0.367
Number of children	-0.079	0.096
Log of (equivalized) annual income	0.085**	0.034
Log of intergenerational transfers	0.049*	0.025
Co-residing with parents/parents-in-law	0.274*	0.142
Age	0.360***	0.062
Age squared/100	-0.242***	0.075
Very good health	0.108*	0.065
Employment status		
(Not in labor force)		
Regular worker	-0.037	0.141
Irregular worker	-0.033	0.106
Self-employed	0.401*	0.224
Residing in a major city	0.251	0.192
Constant	-7.241***	1.442
F-value (p-value)	14.87 (0.000)	
R-sq: Within	0.0570	
Between	0.1399	
Overall	0.1084	
No. of observations	18,114	
No. of individuals	2,902	

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Regional and year dummies are included in all regressions. Standard errors are clustered at the individual level.
Source: Estimation based on data from the JPSC.

7. Conclusions

Using data from the JPSC, this paper examined the relationship between marriage and wealth for the case of Japan. By exploiting the availability of data on personal wealth, it investigated whether the effect of marriage on wealth differs depending on whether wealth is measured in terms of household wealth or personal wealth.

According to the regression results, if wealth is measured in terms of equivalized household net worth on the assumption that intrahousehold resources are shared equally within married couples, marriage is found to contribute to women's wealth accumulation. This may partly reflect women's relatively disadvantaged position in the Japanese labor

market and the fact that women may be able to overcome their disadvantaged position for wealth accumulation, at least partly, by getting married. On the other hand, if wealth is measured in terms of personal net worth based on the actual ownership of assets, marriage is found to be negatively associated with women's wealth holdings.

The observed negative effect of marriage on personal wealth for Japan is in contrast to the positive effect found for Germany (Lersch, 2017). In the case of Germany, married women are found to be able to accumulate more wealth largely through joint investment in housing with their husbands (Lersch, 2017). By contrast, joint ownership of housing does not seem common in Japan and only a relatively small share of married women own housing wealth. Moreover, given that women in Japan are more likely than those in other developed countries to leave the labor market or to reduce their working hours for childbearing and childrearing, marriage is likely to have a dampening effect on married women's own financial wealth as well. Unlike in some other countries, married couples are not allowed to have a joint bank account in Japan, and this may partly explain Japanese wives' relatively small share of household financial wealth. The fact that monetary transfers within married couples are subject to gift taxes in Japan may also create another obstacle for wives, particularly those without their own income/wealth, who wish to own a house jointly with their husbands.

The findings obtained by the present analysis underscore the financially vulnerable position of married women in the case of Japan, which I would not have uncovered if I had examined the effect of marriage on wealth using data on household wealth only. When wealth is measured in terms of household wealth, married women appear to fare significantly better than unmarried women with respect to wealth accumulation. Marriage therefore seems to help women enhance their economic wellbeing as long as intrahousehold resources are shared equally within married couples. Nevertheless, if we relax the assumption of the equal sharing of intrahousehold resources and examine how these resources are shared within married couples, we soon notice that married women are potentially in a financially vulnerable position even after they marry in the case of Japan. It is true that married women potentially have access to all or part of the assets owned by their husbands, but sharing each other's wealth informally may create undesired economic dependency within the couple (Lersch, 2017). Indeed, Lee and Ono (2008) find

that Japanese women's happiness is not related to their own income but to their husbands' income and their overall household income. This is in sharp contrast to the case of US women whose happiness is less tied to their husband's income (Lee and Ono, 2008).

The important policy implication of the above findings is to further promote gender equality in the labor market so that women will be able to enhance their economic wellbeing and accumulate sufficient wealth for old age regardless of their marital status. It is equally important to create an environment where married women can continue working even after getting married or bearing a child so that they would not have to rely so heavily on their husbands for their economic wellbeing.

The empirical analysis conducted in this paper is, however, not without caveats. While estimating fixed-effects models helps eliminate selection bias due to time-invariant unobservable characteristics, the estimates are still potentially subject to possible bias due to time-variant unobservable characteristics. The difficulty of identifying appropriate time-variant instruments did not allow me to fully address this issue, but it is certainly left as an important agenda for future research.

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Appendix: Construction of Wealth Variables

For the present analysis, I construct six dependent variables, namely personal net worth and equivalized household net worth for total wealth, financial wealth, and nonfinancial wealth, respectively.

Personal net worth

Personal net worth essentially includes assets that are owned solely by respondents as well as respondents' share of joint assets. Personal financial and nonfinancial net worth are calculated by subtracting the total value of nonhousing and housing loans taken out in their own names from the total value of financial and nonfinancial wealth held in their own names, respectively. Total net worth is the sum of financial and nonfinancial net worth.

Unmarried respondents:
In the case of unmarried respondents, the values of financial wealth, housing loans, and nonhousing loans are available in the data at the individual level. More specifically, unmarried respondents are asked to indicate the total value of financial wealth held in their own names as well as the total value of housing and nonhousing loans taken out in their own names. However, since the value of nonfinancial wealth is not readily available at the individual level, I calculate the value of personal nonfinancial wealth based on information on the ownership of respondents' primary residence. If unmarried respondents own it by themselves, I use the total value of the property as their nonfinancial wealth. If they own the property jointly with their parent(s), I assume that respondents own half of the property and use half of its value as their nonfinancial wealth.

Married respondents:
In the case of married respondents, the total value of financial wealth held in their own names is readily available in the data. By contrast, the data do not contain information on how much nonhousing loans married respondents have taken out in their own names.

Instead, they are asked to indicate the total value of nonhousing loans taken out in their own or their husbands' names. I therefore assume that respondents are responsible for half of nonhousing loans and subtract half of the value from the total value of respondents' own financial wealth to calculate personal financial net worth.

As for personal nonfinancial net worth, I also make use of information on the ownership of respondents' primary residence to make some assumptions about the values of nonfinancial wealth and housing loans, as the data do not provide information on these values at the individual level. In the case of married respondents, they are asked to indicate whether their primary residence is owned in the name of (i) the wife (i.e., the respondent), (ii) the husband, (iii) the wife and the husband, (iv) the wife or the husband and his or her parent(s,) (v) the wife's parent(s), (vi) the husband's parent(s), (vii) others, and (viii) don't know. If the married respondent's answer to this question is (ii), (v), (vi), (vii), or (viii), this implies that the respondent does not own her primary residence, and I thus assign a value of zero to the personal nonfinancial wealth variable in this case. If her answer is (i), this implies that the respondent owns the entire property by herself, and I thus use its total value as her personal nonfinancial wealth. If her answer is (iii), this implies that the respondent owns her primary residence jointly with her husband, and I thus assume that she owns half of the property and use half of its value as her personal nonfinancial wealth. If the respondent's answer is (iv), she is also asked to indicate whose parent(s) owns part of the property. If it is the respondent's own parent(s), I assume that she owns the property jointly with her parent(s) and that she owns half of the property. If it is the parent(s) of the respondent's husband, I assume that her husband owns the property jointly with his parent(s), and I assume that the respondent does not own the property in this case. If it is the parent(s) of both the respondent and her husband, I assume that the couple owns the property jointly with their respective parent(s) and that the respondent owns one quarter of the property and use one-fourth of its value. As far as housing loans are concerned, I assume that the respondent is responsible for the same share of the housing loans taken out by the couple as her own share of the nonfinancial

wealth held by the couple.[37]

Equivalized household net worth

For unmarried respondents, the value of equivalized household net worth is essentially the same as the value of personal net worth for total wealth, financial wealth, and nonfinancial wealth. In the case of married respondents, I first calculate household net worth and divide the value of household net worth by the square root of two (i.e., the respondent and her husband). Household financial net worth is the sum of respondents' own personal financial net worth and that of their husbands. It is calculated by subtracting the total value of nonhousing loans held by the couple from the total value of the couple's financial wealth,[38] both of which are readily available in the data. As for the value of nonfinancial wealth, I again make some assumptions based on the ownership of their primary residence. If respondents and/or their husbands own their primary residence, I use the total value of the property as their nonfinancial wealth. If respondents and/or their husbands own the property jointly with their parent(s), I assume that the couple owns half of the property and use half of its value. Since the data contain information on the total amount of housing loans taken out in the names of respondents or their husbands, I subtract this value from the total value of nonfinancial wealth held by the couple to obtain the value of their nonfinancial net worth.

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[37] Note that whether respondents own the property jointly with their parent(s)/parent(s)-in-law is irrelevant here as the survey collects information on the total value of housing loans taken out in their own or their husbands' names only. Note also that I removed from the estimation sample respondents who reported a positive amount of housing loans taken out in their own or their husbands' names but reported a zero value for housing wealth. It is possible that some respondents live in a house that does not belong to them but that they own a second house for which they have taken out a loan. Since I do not have information on the value of the second or other properties owned by respondents, I decided to remove such respondents from the estimation sample.

[38] To be more precise, because of the wording of the question, financial wealth also includes the value of wealth held in respondents' children's names. However, I expect its value to be relatively small.