

DISCUSSION PAPER SERIES

Discussion paper No. 158

Effect Caregiving on Employment for Retiring Japanese Individuals

Tomoki Kitamura

(Finance Research Group, NLI-Research Institute)

Yoshimi Adachi

(Department of Economics, Konan University)

Toshiyuki Uemura

(School of Economics, Kwansei Gakuin University)

February 2017



SCHOOL OF ECONOMICS

KWANSEI GAKUIN UNIVERSITY

1-155 Uegahara Ichiban-cho
Nishinomiya 662-8501, Japan

Effect of Caregiving on Employment for Retiring Japanese Individuals¹

2017/1/31

Tomoki Kitamura (*)

Graduate School of International Management, Aoyama Gakuin University

4-4-25, Shibuya, Shibuta-ku, Tokyo, 150-8366, Japan, and

Finance Research Group, NLI-Research Institute

4-1-6. Kudan-kita, Chiyoda-ku, Tokyo 102-0073, Japan

Tel: +81-3-3512-1854

E-mail: PXL03406@nifty.ne.jp

Yoshimi Adachi

Department of Economics, Konan University

8-9-1 Okamoto, Higashinada-ku, Kobe 658-8501, Japan

Tel: +81-078-435-2399

E-mail: adachi@center.konan-u.ac.jp

Toshiyuki Uemura

School of Economics, Kwansai Gakuin University, 1-155 Uegahara Ichiban-cho

Nishinomiya, Hyogo 662-8501, Japan

Tel: +81-798-54-6204

E-mail: uemuratoshi@hotmail.com

(*) Corresponding author

¹ We thank Hisahiro Naito, Yoko Yamamoto, Setsuya Fukuda, and participants in 12th WEAI international conference, 2016 Japanese Economic Association spring meeting. This study is financially supported by a Japanese Health and Labour Sciences Research Grant (H27-Statistics-General-004) from the Ministry of Health, Labour and Welfare of Japan.

Effect of Caregiving on Employment for Retiring Japanese Individuals

Abstract

We examined employment and caregiving behavior at retiring age in Japan, considering the marital status, living-with-parent status, spouse employment, spouse income, and net financial assets. We found that the labor participation rate for caregiving married females living with parents was lowest when husbands work full-time, indicating that opportunity cost is an important factor. Net financial assets had a mixed impact. For married female caregivers, a lower amount of net financial assets decreases the labor participation rate. This tendency is reversed for married males. We also found that a flexible work style prevents a fall in labor participation rate due to caregiving. The government should introduce policies for drastic improvement in balancing nursing care and employment.

Keywords Elderly caregiving, labor participation rate, retirement, panel data

JEL code: D12, I10, J14, J26

1. Introduction

1.1. Objective

Over the next 30 years, it is expected that the percentage of Japan's elderly population will increase rapidly to unprecedented levels. Japan's rapidly growing aging population has led to increased demand for elderly nursing care. Elderly care has remained a crucial policy issue in Japan. Another factor contributing to the adversity is the rising population of caregivers over 50 years of age, who now constitute 80% of all caregivers (Statistics Bureau of Japan, 2005). In addition, the services and capacity of formal care facilities are limited. As a result, many older working individuals who need caregiving assistance for their family members, particularly for parents, are faced with the decision to retire early, leave labor participation temporarily, or share roles with the spouse, if any, to continue to work. Thus, the objective of this paper is to investigate the relationship between labor participation and caring for retiring employees. We adopt data from the Longitudinal Survey of Middle-aged and Elderly Persons, a large-scale panel survey conducted by the Ministry of Health, Labour and Welfare (MHLW) of Japan. The contributions of this paper are that, first, we consider the impact of opportunity costs such as spouse employment status and spouse income, in addition to gender, marital status, and living-with-parent status, as in the literature. If the spouse works full-time or the income of the spouse is large, the opportunity cost of discontinuing work for caregiving should be expensive. Second, we consider the impact of net financial assets on the labor participation rate of caregivers. The retirement decision could be affected by the amount of net financial assets. Lastly, we examine gender differences

for the decrease in LPR due to caregiving.

We found that, for married households with parents, married males tend to continue working and females tend to be caregivers. In particular, gender difference for the decrease in LPR due to caregiving was highest when males work full-time, indicating that opportunity cost is an important factor in making caregiving decisions. On the contrary, for married households without parents and unmarried households, the decrease in LPR due to caring was not significantly different between males and females. The impact of net financial assets on the LPR for caregivers showed mixed results for gender, marital status, and living-with-parent status. For married females and unmarried males living with parents, the LPR for caregivers tended to rise as net financial assets increased, indicating that financial assets are a caregiving resource.

The remainder of this paper is organized as follows. The following subsections provide a literature review and a brief overview of the national public long-term care insurance. Section II describes the hypotheses and data, Section III the analysis method, and Section IV the results. Section V offers our concluding remarks.

1.2. Literature Review

Studies have found that the relationship between caregiving and labor participation rate differs by region, gender, and age. For the United States, Pavalko and Artis (1997) found that caregiving negatively affected the female LPR. However, Wolf and Soldo (1994) found no such impact and suggested that both caregivers and non-caregivers have an equal likelihood of being employed. Dentinger and Clarkberg (2002) found that caregiving males were significantly less likely to retire. For the

United Kingdom, Carmichael and Charles (1998) found that caregivers who provided care for more than 20 hours a week exhibited a significantly lower LPR than non-caregivers. However, they also found that caregivers who provided care for less than 20 hours a week were more likely to work than non-caregivers. Carmichael and Charles (2003) found that female caregivers who provided care for at least 10 hours per week were less likely to work than non-caregivers.

Lilly et al. (2007) conducted an extensive survey on the effect of caregiving on labor supply. They evaluated the results of 35 papers published between 1986 and 2006 and found that, in general, the LPR for caregivers were not different from that for non-caregivers until a certain level of caregiving. However, caregivers who were heavily involved in caregiving were less likely to be employed.

Recent studies have suggested that the problem of endogeneity may lead to biased estimations for the relationship between caregiving and labor supply. Individuals who have poor labor market opportunities are more likely to become caregivers, which creates a selection bias in the estimation. Heitmueller (2007) took into account the endogeneity problem and found that LPR of co-residential caregivers in the United Kingdom was significantly lower than that of non-caregivers. However, for those with lower caregiving commitments, no relationship was found between employment and care provision. Bolin et al. (2007), using data for men and women aged 50 years and above in 10 European countries, excluding the United Kingdom, found that informal care reduced the LPR and work hours for both gender groups. As for the endogeneity problem, they could not reject the null hypothesis that caregivers are exogenous, implying that the endogeneity problem is not the driver of their results.

Van Houtven et al. (2013) found that caregiving reduced the LPR for males in the United States and increased the probability of retiring among females. As for the endogeneity problem, they too find no evidence of endogeneity and concluded that selection bias may not be a major concern for labor supply, after controlling for unobserved heterogeneity using fixed-effects regressions.

Several previous studies have analyzed the relationship between caregiving and employment in Japan, and most have found that caregiving females are less likely to be employed. For male employees, however, caregiving tended to have little impact. Iwamoto (2001) found that the female LPR is significantly lower for care-receiving households than that for non-care recipients. Nishimoto and Shichijo (2004) found that the LPR for married females providing elderly care while holding full-time or part-time jobs was significantly lower than that for males and unmarried females. Ikeda (2010) analyzed employees aged 30–59 years who provided elderly care at home and found that individuals who took extended leave for caregiving tended to choose retirement.

Recent Japanese studies also use panel data to examine the relationship between caregiving and employment. Shimizutani and Noguchi (2004) analyzed the relationship between the national long-term care insurance system, which was introduced in 2000, and female employment. Their results revealed that the introduction of the system increased the LPR and work hours for females. Sakai and Sato (2007) examined whether caregiving affects the employment–retirement decision of elderly persons, and found that caregiving restricts males in attaining a full-time job or being self-employed. In contrast, caregiving restricts females in attaining

non-regular employment. Otsu and Komamura (2012) examined whether living with parents needing care influenced the LPR and work hours for married females aged 40–59 years. They found that the LPR significantly decreased when caregiving was required. Otsu (2013) analyzed the unemployment rate of older employees living with parents who needed care in the previous year. He found that the probability of unemployment significantly increases for both married and unmarried females as well as unmarried males providing care to recipients of care levels 4 and 5 according to the national public long-term care insurance’s care-level scale.

1.3. Overview of National Long-Term Care Insurance

In this subsection, we offer a brief overview of Japan’s national public long-term care insurance program, in which the municipalities are insurers and program participation is mandatory.² The primary insured persons are those aged 65 and above (Category I), and secondary insured persons are subscribers of health insurance and aged 40–64 years (Category II). In 2010, about 29 million persons were subscribed under Category I, and about 43 million under Category II (MHLW, 2013a). The premiums differ by insurer and income level, and are deducted from the pension benefits for individuals in Category I and salaries of those in Category II.

When Category I subscribers need long-term care, a certification is required by the municipality. The certification is issued after a two-step evaluation process. The first step is a computer-based evaluation using a questionnaire regarding physical and mental status about daily life and doctor’s diagnoses. The second stage evaluation

² For more details, please see MHLW (2012) and the Institute of Population and Social Security Research (2014).

is conducted by a certification committee. Once the individual receives the certification, he/she is classified under any one of seven categories, support levels 1 and 2 and care-levels 1–5, depending on the level of care needed. The extent of services provided is determined on the basis of these categories. In 2010, the total number of certified individuals was 5 million (MHLW, 2013a). For support levels 1 and 2, the types of care services are home visits, outpatient rehabilitation, and short-term stays at a care facility. For care levels 1–5, care services include in-home services such as home help services and day care; facility services such as intensive care at home, long-term healthcare facilities, sanatorium-type care facilities; and community-based services such as home-visits at night, daycare for dementia patients, and small-scale multifunctional in-home care.

This mandatory insurance, although service levels differ by municipality, covers a certain level of care needs. Of course, not all needs are satisfied, and informal care by family members, beyond the coverage of national insurance, is required. Family members must decide who would mainly engage in caregiving.

2. Hypotheses and Data

2.1. Hypotheses

We propose the following two hypotheses regarding the relationship between the labor participation rate and caregiving.

Opportunity Cost Hypothesis. People who incur a higher opportunity cost for caregiving continue to work, whereas those with a lower opportunity cost tend to be caregivers. For married households, the male is traditionally the main income earner,

whereas the female is a full-time homemaker or earns an income within the spouse's tax deduction limit.³ Against this contextual background, males will expectedly continue working and females engage in parental caregiving. We measure the opportunity cost by spouse employment status (SEMP) and spouse income (SINC). The higher the income, the larger the opportunity cost of quitting. Therefore, the LPR for caregivers is expected to decrease if the spouse works full-time. Similarly, it is expected to decrease as the income of the spouse increases. In addition, the "living-with-parent" status could have an impact on the opportunity cost.⁴ The LPR is expected to be lower for married females living with parents than for married males doing so (Heitmueller, 2007). This hypothesis is irrelevant for unmarried individuals. The decrease in LPR due to caregiving is expected to be the same for unmarried males and females.

Financial Asset Hypothesis. A large amount of financial assets implies the ability to purchase expensive care-related services. Financial assets are a resource for parental caregiving. Therefore, caregiving households are expected to have a higher LPR as their financial assets increase. Generally, however, the larger the amount of financial assets, the greater is the tendency of elderly individuals to retire. Therefore, the drop in LPR may be greater for caregiving than non-caregiving households. We will examine which of these contrary theories holds. We use the net financial assets (NFA), that is, the difference between financial assets and liabilities, for the following regression analysis. This hypothesis is applicable to both married and

³ The tax deduction limit is typically 1.03 million JPY annually. According to 2005 data, 65.87% of males are employed full-time, 8.48% part-time, and 5.53% are unemployed. The rates for females are 20.75%, 43.77%, and 29.34%, respectively.

⁴ For example, living costs for households with parents may be higher, and the opportunity cost for the higher earner to quit her/his job is greater.

unmarried individuals.

2.2. Data

The data used in this paper are from the Longitudinal Survey of Middle-aged and Elderly Persons, conducted by MHLW.⁵ The sample comprises male and female respondents drawn from the Japanese population aged 50–59 years as of October 31, 2005. We adopted data from the first survey, conducted in 2005, to the sixth survey, held in 2010. In the original surveys, 26,220 respondents had answered the series of questionnaires from the 2005 to the 2010 survey. We excluded respondents who (or whose spouses) were caregivers in 2005. As a result, the respondents in our analysis numbered 21,214 (10,120 males and 11,094 females). Appendix A1 shows the sample characteristics. Male and female respondents' age transition is shown in Panels A and B, respectively. The transition in male and female respondents' employment status is shown in Panels C and D, respectively. Panels E and F show the simple average labor participation rates for male and female respondents, respectively.

The survey questionnaire queries about the spouse's status, but does not require a detailed answer. However, the questionnaire was independently answered by both principal and spouse for some married households (hereafter referred to as "duplicated married households"). The combined answers of the husband and wife allow us to examine in more detail the relationship between caregiving and family structure (spouse employment status, spouse income, etc.). We use these data to

⁵ The survey aims to understand changes in household behavior and obtains basic data to facilitate MHLW's development, planning, and implementation of its administrative measures for the elderly. The survey was launched in 2005 and is conducted annually. Currently, participants receive the questionnaire by mail, which they answer and mail back.

examine the LPR for married households.

3. Empirical Strategies

To examine the impact of caregiving on labor participation according to the living-with-parent status and marital status, as a base case, we estimate a regression of the form

$$\begin{aligned}
 W_{it} = & \beta_0 + \beta_1 \cdot CG_{it} + \beta_2 \cdot LP_{it} + \beta_3 \cdot MA_{it} \\
 & + \beta_4 \cdot CG_{it} \cdot LP_{it} + \beta_5 \cdot CG_{it} \cdot MA_{it} + \beta_6 \cdot LP_{it} \cdot MA_{it} \\
 & + \beta_7 \cdot CG_{it} \cdot LP_{it} \cdot MA_{it} + \beta_8 \cdot X_{it} + \delta_i + \varepsilon_{it},
 \end{aligned} \tag{1}$$

where i and t are respondent and year indices, respectively. W is a dummy for work, CG a dummy for parental caregiving, LP a dummy for living with at least one parent, and MA a dummy for married. X represents other control variables, including dummies for caring for other than a parent (CG Other), existence of dependent children ($Children$), age more than or equal to 60 years ($Age60$), subjective health condition (HC), and year dummies.⁶ δ represents individual fixed effects.⁷ β represents regression coefficients, and ε indicates residuals. We estimate regressions for males and females separately, and the data are limited to the years 2006 to 2010 (as applied to the following regressions). Standard errors are clustered at the respondent level. We then compute the marginal effect (ME) with respect to caregiving

⁶ $HC = 1$ is very bad, 2 is bad, 3 is rather bad, 4 is rather good, 5 is good, and 6 is very good.

⁷ δ_i represents respondents' time-invariant unobserved heterogeneity. This variable captures individual characteristics such as the tendency to give care and attachment to the labor market. For example, altruistic individuals may prioritize caring for their parents over their jobs.

$$\begin{aligned} \text{ME} &\equiv \text{E}[\widehat{W}_{it} | CG = 0, LP = j, MA = k] - \text{E}[\widehat{W}_{it} | CG = 1, LP = j, MA = k], \\ & j = 0,1, \text{ and } k = 0,1, \end{aligned} \quad (2)$$

where \widehat{W} represents the predicted LPR. The first term of the right-hand side is the average LPR, given the living-with-parent, marital, and no-caregiving statuses, and the second term represents caregiving. The ME is the difference between the two values. Standard errors are computed by the delta method.

To examine the impact of the spouse employment status (SEMP), we estimate a regression of the form

$$\begin{aligned} W_{it} &= \beta_0 + \beta_1 \cdot CG_{it} + \beta_2 \cdot LP_{it} \\ &+ \sum_{k=Part,Self,Unemp} \beta_{3k} \cdot \mathbf{I}\{SEMP_{it} = k\} + \beta_4 \cdot CG_{it} \cdot LP_{it} + \\ &\sum_{k=Part,Self,Unemp} \left[\beta_{5k} \cdot CG_{it} \cdot \mathbf{I}\{SEMP_{it} = k\} + \beta_{6k} \cdot LP_{it} \cdot \mathbf{I}\{SEMP_{it} = k\} \right. \\ &\quad \left. + \beta_{7k} \cdot CG_{it} \cdot LP_{it} \cdot \mathbf{I}\{SEMP_{it} = k\} \right] \\ &+ \beta_8 \cdot Z_{it} + \delta_i + \varepsilon_{it}, \end{aligned}$$

where (SEMP) includes full-time (Full), part-time (Part), self-employed (Self), and unemployed (Unemp).⁸ $\mathbf{I}\{\cdot\}$ is an indicator function. Z represents control variables, including CG Other, Children, Age60, spouse's subjective health condition indicator (SHC), spouse age more than or equal to 60 years (Sage60), and year dummies. We limited the analysis to duplicated married household data. Then, we compute ME:

$$\text{ME} \equiv \left[\text{E}[\widehat{W}_{it} | CG = 0, LP = j] - \text{E}[\widehat{W}_{it} | CG = 1, LP = j] \right] \Big|_{\substack{SEMP=Full, \\ Part,Self,Unemp}}, \quad j = 0,1.$$

⁸ The unemployed includes involuntary unemployment and voluntary unemployment (retirement). Although we can distinguish the two statuses, we pooled the data because of sample limitations for some years.

To examine the effect of spouse income (SINC), we estimate a regression of the form

$$\begin{aligned}
W_{it} = & \beta_0 + \beta_1 \cdot CG_{it} + \beta_2 \cdot LP_{it} + \beta_3 \cdot SINC_{it} \\
& + \beta_4 \cdot CG_{it} \cdot LP_{it} + \beta_5 \cdot CG_{it} \cdot SINC_{it} + \beta_6 \cdot LP_{it} \cdot SINC_{it} \\
& + \beta_7 \cdot CG_{it} \cdot LP_{it} \cdot SINC_{it} + \beta_8 \cdot Z_{it} + \delta_i + \varepsilon_{it},
\end{aligned}$$

We limited the analysis to duplicated married household data. Then, we compute ME:

$$ME \equiv \left[E[\widehat{W}_{it} | CG = 0, LP = j] - E[\widehat{W}_{it} | CG = 1, LP = j] \right] \Big|_{SINC=0,10,\dots,60}, j = 0,1.$$

To examine the effect of the net financial assets of the previous year (NFA), we estimate a regression of the form

$$\begin{aligned}
W_{it} = & \beta_0 + \beta_1 \cdot CG_{it} + \beta_2 \cdot LP_{it} + \beta_3 \cdot NFA_{it-1} \\
& + \beta_4 \cdot CG_{it} \cdot LP_{it} + \beta_5 \cdot CG_{it} \cdot NFA_{it-1} + \beta_6 \cdot LP_{it} \cdot NFA_{it-1} \\
& + \beta_7 \cdot CG_{it} \cdot LP_{it} \cdot NFA_{it-1} + \beta_8 \cdot Z_{it} + \delta_i + \varepsilon_{it},
\end{aligned}$$

where (NFA) is defined as the financial assets of the previous year minus the liabilities of the previous year. Financial assets include bank deposits, stock, and investment trusts. A typical liability is a mortgage. We analyze data for both males and females of duplicated married households, as well as for unmarried males and females, separately. We then compute ME as follows:

$$ME \equiv \left[E[\widehat{W}_{it} | CG = 0, LP = j] - E[\widehat{W}_{it} | CG = 1, LP = j] \right] \Big|_{NFA_{t-1}=-30,-20,\dots,20}, j = 0,1$$

A fixed effect model does not provide gender effects. To estimate the gender effect, we estimate the gender difference for ME:

$$\Delta ME \equiv ME_F - ME_M, \quad (3)$$

where ME_M and ME_F are the MEs of males and females, respectively, defined above. The standard errors of ΔME are computed by 999 bootstrap replications. We test the null hypothesis $\Delta ME = 0$. For example, using male sub-sample data and female sub-sample data separately, we estimate equation (1) by the fixed effect model and compute the MEs by equation (2) separately. Then, we compute the gender difference by equation (3). We repeated this operation 999 times for different sub-samples to estimate the standard errors and confidence intervals.

Heitmueller (2007) discussed the endogeneity problem in the relationship between the decisions to work and to be a caregiver. Both decisions may be interdependent. For example, some individuals who work full-time and earn relatively high wages may opt to not give care but continue working, whereas others who have lesser attachments to the labor market and earn relatively low wages may decide to become caregivers. Thus, the estimation may be biased without considering the endogeneity problem. One way to avoid the endogeneity problem is to use instrumental variables in cross-sectional data or perform fixed-effects regressions on panel data. Van Houtvem et al. (2013) indicated that endogeneity persists as a problem if time-varying heterogeneity exists even after fixed effects are included. They used a set of time-varying instruments that are correlated to caregiving but assumed to be uncorrelated to time-varying error components. The instruments in their study include an indicator variable for an ill mother or mother-in-law. However, these instruments are unavailable in our panel data, and as Lilly et al. (2010) indicated, most previous studies have failed to identify strong instruments for both

cross-sectional and panel studies. Therefore, we use a fixed effect model without instruments in our estimations.

4. Estimation Results

Appendix A2 shows the descriptive statistics for the whole sample and for duplicated married households, separately for males and females. These are pooled data for the period 2005–2010. Appendix A3 shows the estimation results based on the fixed effect model. Table 1 shows the average predicted labor participation rate (LPR) and the marginal effect (ME) with respect to caregiving according to the living-with-parent (LP) status and marital status (MA). Panel A shows the LPR and ME for males based on column (1) of Appendix A3. The LPR for males, living without parent (LP = No), unmarried (MA = No), and no caregiving (CG = No) is 87.00%. That for care giving (CG = Yes) is 84.78%. The ME, which is the difference between the two values, is -2.22%, which is not statistically significant. The ME for LP = No and MA = Yes is -2.59%, and that for LP = Yes and MA = No is -8.50%. Both are statistically significant. Unmarried male caregivers living with parents show the largest decrease in LPR. The ME for LP = Yes and MA = Yes is not statistically significant. Regarding marital status, the LPR for LP = Yes is statistically and significantly higher (+7.27%) for married than unmarried caregivers. However, the LPR for LP = No does not statistically and significantly differ between married and unmarried caregivers.

Panel B shows the LPR and ME for females, based on column (6) of Appendix A3. All MEs are negative and statistically significant. Unmarried female caregivers

living with parents show the largest decrease in LPR (-7.40%). The LPR for LP = No is statistically and significantly higher (+6.37%) for married caregivers than unmarried caregivers. However, the LPR for LP = Yes does not statistically and significantly differ between married and unmarried caregivers.

[Insert Table 1 here]

Table 2 shows the impact of spouse employment status (SEMP) on the LPR. Panel A shows the results for males. The ME of SEMP = Unemp for LP = No is -5.56%, which is statistically significant at the 5% level. Married male caregivers who are not living with parents and whose wives are not working have lower LPR. This may be due to the low-income effect: They may not have enough money to purchase care-related services. All other MEs are not significant. For LP = Yes, none of the MEs is statistically significant.

Panel B shows the results for females. The ME for LP = No and SEMP = Full is -3.75%, which is statistically significant at the 5% level. For LP = Yes, the ME is -6.12% with SEMP = Full and -8.65% with SEMP = Part. Both are statistically significant at the 1% level. Other MEs are not statistically significant. The results indicate that the opportunity cost of SMEP is an important factor.

[Insert Table 2 here]

Table 3 shows the estimated marginal effects of LPR with respect to caregiving for SEMP screened by employment status (Full, Part, or Self) in 2005. Panel A shows the results for males. For example, for LP = No, full-time employment status, and SEMP = Full, the decrease in LPR due to caregiving is -8.74%, which is statistically significant at the 10% level. Most MEs for males are insignificant.

Panel B shows the results for females. For full-time employment status and SEMP = Full, ME is -10.08% for LP = No and -8.45% for LP = Yes. Both are statistically significant at the 1% level. For part-time employment status and SEMP = Full, ME for LP = Yes is -7.99%. For both cases, caregiver LPRs drop when the husband works full-time, indicating that the opportunity cost hypothesis applies. For LP = No and part-time employment, the MEs are insignificant regardless of SEMP. For LP = No and self-employment in 2005, the MEs are insignificant except for SEMP = Unemp, indicating that a flexible work style may prevent an LPR decrease due to caregiving.

[Insert Table 3 here]

Table 4 shows the impact of spouse income (SINC) on the LPR. Panel A shows the results for male. For LP = No, the SINC is indifferent to the LPR for CG = No. On the contrary, the SINC has a positive relation for CG = Yes, although the slope with respect to SINC is not statistically significant. The MEs for which the SINC is less than or equal to 30 (10,000 JPY monthly) are negative and statistically significant, indicating low-income effects, as in Panel A of Table 2. MEs for which the SINC is more than 30 are not statistically significant. On the contrary, For LP = Yes, the LPRs of both CG = No and CG = Yes are indifferent to SINC, and none of the MEs is statistically significant.

Panel B shows the results for females. The LPRs with LP = No are indifferent to SINC for both CG = No and CG = Yes. MEs are negative and almost constant around -2.5% to -2.6%. MEs lower than or equal to 20 are not statistically significant due to large standard errors, but those more than 20 are statistically significant at the

10% level. With LP = Yes, the LPRs for both CG = No and CG = Yes are not dependent on SINC. MEs are negative and almost constant around -4.7%, and statistically significant at the 1% level. Results for both males and females indicate that the opportunity cost hypothesis regarding SINC does not apply for LPR reduction.

[Insert Table 4 here]

Table 5 shows the impact of net financial assets (NFA) in the previous year on the LPR. Panel A shows the results for males of duplicated married households. Generally, the LPR is negatively related to the NFA. For LP = No, the larger the NFA, the lower is the LPR (more so for CG = Yes than for CG = No), resulting in more negative MEs. The MEs at NFA = 0, 10, and 20 (million JPY) are statistically significant. However, the ME at NFA = 30 is not statistically significant due to the large standard error. With LP = Yes, the LPSs for both CG = No and CG = Yes decrease in parallel as the NFA increases. None of the MEs is statistically significant.

Panel B shows the results for females of duplicated married households. The MEs tend to be larger (close to zero) as the NFA increases. The ME is most negative (-5.58%), and statistically significant at the 5% level, at NFA = -20. The MEs at NFA = 20 and 30 are not statistically significant. With LP = Yes, the LPRs for both CG = No and CG = Yes are positively related to NFA. All MEs are negative and statistically significant at the 5% level. The MEs tend to be larger (closer to zero) as the NFA increases.

The impact of the NFA on the LPR shows mixed results for married males versus married females. For males, a larger NFA, with LP = No, results in a lower ME.

MEs with LP = Yes are indifferent to the NFA. For females, however, a larger NFA results in a higher ME (closer to zero), indicating that the financial asset hypothesis holds for married females.

Panel C shows the results for unmarried males. With LP = No, LPRs for both CG = No and CG = Yes have almost parallel decreases as NFA increases. Not all MEs are statistically significant. With LP = Yes, the MEs increase (become closer to zero) along with the NFA. The MEs at NFA = -10, 0, and 10 are statistically significant at the 5% level. However, the MEs at NFA = -20, 20, and 30 are not statistically significant due to large standard errors.

Panel D shows the results for unmarried females. Generally, the LPRs are negatively related to NFA. With LP = No, the MEs decrease as the NFA increases. The ME is -6.13% at NFA = 0 and -6.48% at NFA = 10. Both are statistically significant at the 10% level. Other MEs are not statistically significant due to large standard errors. With LP = Yes, the MEs decrease as the NFA increases. The MEs at NFA = 10, 20, and 30 are -7.15%, -8.62%, and -10.10%, respectively, and statistically significant at the 5% level.

The impact of the NFA on the LPR shows mixed results for unmarried males versus unmarried females. For unmarried males, a larger NFA, with LP = Yes, results in a higher ME (closer to zero), supporting the financial assets hypothesis. MEs with LP = No are indifferent to the NFA. For unmarried females, however, a larger NFA results in a lower ME for both LP = Yes and LP = No.

[Insert Table 5 here]

Table 6 shows the gender difference for MEs and their 95% confidence

intervals. The standard errors and 95% confidence intervals are computed by bootstrap replications. Panel A shows the differences for marital and living-with-parent statuses. For example, the ME for males, with LP = No and MA = No, is -2.22%, as shown in Panel A of Table 1; that for females is -6.18%, as shown in Panel B. The difference in MEs (female versus male) is -3.96%, as shown in Panel A of Table 6, which is not statistically significant. The ME difference for LP = Yes and MA = Yes is -3.73%, which is statistically significant at the 1% level. Other ME differences are not statistically significant. Panel B shows the gender difference for ME regarding SEMP. For LP = Yes and SEMP = Full, the difference is -8.74%, which is statistically significant at the 1% level. For LP = Yes and SEMP = Part, the difference is -6.93%, which is statistically significant at the 10% level. Other ME differences are not statistically significant. Panel C shows the ME differences for SINC. For LP = Yes and SINC = 10, 20, 30, and 40, the differences are negative and statistically significant, although the ME differences are close to each other regardless of the SINC. Other differences are not statistically significant. Panel D shows the ME differences regarding NFA for duplicated married households. For LP = Yes and NFA = -10, 0, 10, and 20, the differences are negative and statistically significant, although the ME differences are close to each other regardless of the NFA. Other ME differences are not statistically significant. Panel E shows the ME difference regarding NFA for unmarried households. None of the differences are statistically significant.

In sum, the opportunity cost hypothesis is partially confirmed. Regarding SEMP, opportunity cost is an important factor in deciding between a male and female

caregiver. The LPR for married female caregivers living with parents is significantly lower than that for male caregivers, and is significantly lower when a husband works full-time or part-time. In addition, gender difference is not confirmed for the LPR of unmarried individuals regardless of the living-with-parent status, where the opportunity cost hypothesis is irrelevant. The financial assets hypothesis is also partially confirmed. The hypothesis is supported for married females and unmarried males living with parents. For MEs in both cases, however, the gender difference did not depend on the NFA, indicating that the NFA is not a strong factor for entire households.

[Insert Table 6 here]

5. Conclusion

In this paper, we examined the relationship in Japan between parental caregiving and the labor supply of elderly individuals around retirement age. We used large-scale Japanese government panel data for the period 2005–2010. Our results revealed that, for married households living with parents, the opportunity cost of spouse employment is an important factor to decide the caregiver, meaning that married full-time or part-time employed males tended to continue working and females tended to be caregivers. The gender difference for the decrease in LPR due to caregiving was highest when males work full-time. When both husband and wife work full-time, caregiving decreases female LPR. The results are consistent with the traditional view of family role sharing. On the contrary, for married households living without parents and unmarried households, the decrease in LPR due to caregiving was

not significantly different between males and females, indicating that family roles are complementary. Spouse income includes the opportunity cost for caregiving. However, spouse income was indifferent to the LPR difference between caregivers and non-caregivers. The caregiving decision was expected to be affected by the amount of net financial assets (NFA). However, the impact of NFA on the LPR of caregivers showed mixed results. For married females and unmarried males living with parents, the LPR for caregivers tended to rise as NFA increases, indicating that NFA is a caregiving resource. For others, the NFA was negatively related, or indifferent, to the LPR difference between caregivers and non-caregivers.

The prime minister of Japan announced three new policies (“new three allows”) to realize a society in which all citizens are dynamically engaged. The new third arrow or “social security that provides reassurance” revealed a clear target for nursing care: “eliminating cases in which people have no choice but to leave their jobs to provide nursing care by the beginning of the 2020s” (Prime Minister of Japan and His Cabinet, 2015). According to our results, the LPR for married females decreases due to caregiving when both husband and wife work full-time. We also found that married females with negative net financial assets have a lower LPR due to caregiving. To prevent a decline in LPR for caregivers, the government should intensively promote the current policies to enhance work-life balance for caregiving females, such as paid nursing leave, lower working hours, and restriction on overtime. Furthermore, our results showed that the LPR did not decline as a result of nursing care when the husband or spouse is self-employed. Elderly workers with work styles close to self-employment can check the LPR decline due to nursing care. Therefore,

policies that increase flexibility of working conditions, such as home teleworking, flextime, and further flexible nursing leave, should be implemented to allow caregivers to balance nursing care with employment. Next, we found the low-income effect for those with reduced LPRs due to caregiving. Relaxing the upper limit of nursing care benefits and enriching home-care related services for those individuals should be considered. For individuals with severe liquidity constraints, who tend to have limited knowledge about long-term care insurance and care services, extensive assistance by care providers to establish nursing care plans and a voucher system to use nursing care services can be considered.

References

- Bolin, K., B. Lindgren, and P. Lundbor. "Your Next of Kin or Your Own Career? Caring and Working among the 50+ of Europe," *Journal of Health Economics* 27(3), 2008, 718–38.
- Carmichael, F., and S. Charles. "The Labour Market Costs of Community Care," *Journal of Health Economics*, 17(6), 1998, 747–65.
- Carmichael, F., and S. Charles. "The Opportunity Costs of Informal Care: Does Gender Matter?" *Journal of Health Economics*, 22(5), 2003, 781–803.
- Dentinger, E., and M. Clarkberg. "Informal Caregiving and Retirement Timing among Men and Women." *Journal of Family Issues*, 23(7), 2002, 857–79.
- Heitmueller, A. "The Chicken or the Egg? Endogeneity in Labour Market Participation of Informal Careers in England," *Journal of Health Economics*, 26(3), 2007, 536–59.

- Ikeda, T. “On the Work-Life Balance from the Viewpoint of HRM Study,” *Japanese Journal of Labor Studies* [in Japanese] 6(52), 2010, 89–103.
- Iwamoto, Y. “Yokaigosya no Hassei ni tomonau Kazoku no Syugyoukeitai no Henka [Changes in Employment Type with Caregiving],” in *Syakai Fukushi to Kazoku no Keizaigaku (Economics of Social Security and Family Structure)*, Tokyo Keizai, Tokyo. 2001 (in Japanese).
- Lilly, M. B., A. Laporte, and C. C. Peter. “Labor Market Work and Home Care’s Unpaid Caregivers: A Systematic Review of Labor Force Participation Rates, Predictors of Labor Market Withdrawal, and Hours of Work,” *The Milbank Quarterly*, 85(4), 2007, 641–90.
- Lilly, M. B., A. Laporte, and C. Peter. Coyte “Do They Care Too Much to Work? The Influence of Caregiving Intensity on the Labor Force Participation of Unpaid Caregivers in Canada,” *Journal of Health Economics*, 29, 2010, 895–903.
- Ministry of Health, Labour and Welfare (MHLW). *Health and Welfare Services for the Elderly in Annual Health, Labour, and Welfare Report 2011-2012* (2012). Accessed December 28, 2015, from <http://www.mhlw.go.jp/english/wp/wp-hw6/dl/10e.pdf>
- MHLW. *Status report on the Long-Term Care Insurance Projects (Provisional Report)* (in Japanese), 2013a. Accessed December 28, 2015, from <http://www.mhlw.go.jp/topics/kaigo/osirase/jigyoyo/13/index.html>.
- MHLW. *Comprehensive Survey of Living Conditions* (2013b). Accessed December 28, 2015, from <http://www.mhlw.go.jp/toukei/saikin/hw/k-tyosa/k-tyosa13/dl/05.pdf>

- Mutschler, P. H. “Bearing the Costs of Our Eldercare Policies: Work Constraints among Employed Caregivers,” *Journal of Aging and Social Policy*, 5(4), 1993, 23–49.
- Nishimoto, M., and T. Shichijo. “Oya tonou Doukyo to Kaigo ga Kikon Josei no Syugyou ni oyobosu Eikyo [Employment of Married Females, Living with Parents, and Caregiving],” *Japanese Journal of Research on Household Economics* [in Japanese] 61 (2004), 62–72.
- Otsu, Y., and S. Komamura. “Kaigo no Futan to Syugyo Kodo [Burden of Caregiving and Employment],” in *Oyako Kankei to Kakei Koudo no Dainamizum (Dynamic Behavior of Family Relations in Households)*, edited by Higuchi, Y., T. Miyauchi, and C.R. MacKenzie Editor. Tokyo: Keio University Press Inc., 2012, 143–159 [in Japanese].
- Otsu, Y. “Zaitaku Kaigo ga Risyoku ni Ataeru Eikyo ni tsuiteno Bunseki [Comparative Analysis of Caregiving at Home and at Place of Employment],” Joint Research Center for Panel Studies DP2012-013, Keio University, 2013 [in Japanese].
- Pavalko, E. K., and J. E. Artis. “Women's Caregiving and Paid Work: Causal Relationships in Late Midlife,” *Journal of Gerontology*, 52B(4), 1997, 170–9.
- Prime Minister of Japan and His Cabinet. “Urgent Policies to Realize a Society in Which All Citizens are Dynamically Engaged - Toward a Positive Cycle of Growth and Distribution” (2015), http://www.kantei.go.jp/jp/singi/ichiokusoukatsuyaku/kinkyu_taisaku/hontai

_e.pdf

Sakai, T., and S. “Does Caring for Elderly Parents Affect Their Sons and Daughters’ Decision Retirement? An Analysis Using Japanese Panel Data,” *JCER Economic Journal* [in Japanese], 56, 2007, 1–25.

Shimizutani, S., and H. Noguchi. “Kaigo Hoiku Service no Riyou to Kazoku Futan Roudo Kyokyu (Relation between Nursing Care and Child Care Service, and Burden of Families and Employment),” in *Kaigo Hoiku Service no Shijo no Keizai Bunseki (Economics of Nursing Care and Child Care Markets)*, Tokyo: Toyo Keizai, 2004, 163-216 [in Japanese].

Statistics Bureau of Japan. *Basic Survey on Wage Structure 2005* (2005). Accessed December 28, 2015, from

<http://www.e-stat.go.jp/SG1/estat/NewList.do?tid=000001011429>

Van Houtven, H., C. Harold, B. C. Norma, and M. S. Meghan. “The Effect of Informal Care on Work and Wages,” *Journal of Health Economics*, 32(1), 2013, 240–52.

Wolf, D. A., and B. J. Soldo. “Married Women’s Allocation of Time to Employment and Care of Elderly Parents,” *Journal of Human Resources*, 29(4), 1994, 1259–2176.

Table 1: Marginal Effect of Caregiving for Living-with-Parent (LP) and Marital Statuses (MA)

Panel A: Males

LP	MA	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	MA = No	87.00%	1.69%	84.78%	4.04%	-2.22%	(3.88%)
	MA = Yes	89.69%	0.27%	87.10%	1.12%	-2.59%	(1.12%) **
LP = Yes	MA = No	89.58%	2.03%	81.08%	3.29%	-8.50%	(3.07%) ***
	MA = Yes	89.12%	0.55%	88.35%	0.90%	-0.76%	(0.85%)
LP = No	Diff. (Yes - No)	2.68%	(1.87%)	2.32%	(4.26%)		
LP = Yes	Diff. (Yes - No)	-0.46%	(2.18%)	7.27%	(3.50%) **		

Panel B: Females

LP	MA	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	MA = No	63.67%	1.33%	57.49%	2.86%	-6.18%	(2.75%) **
	MA = Yes	65.59%	0.32%	63.86%	0.93%	-1.73%	(0.93%) *
LP = Yes	MA = No	60.85%	2.38%	53.45%	3.29%	-7.40%	(2.86%) **
	MA = Yes	63.08%	0.98%	58.59%	1.21%	-4.49%	(1.11%) ***
LP = No	Diff. (Yes - No)	1.92%	(1.54%)	6.37%	(3.08%) **		
LP = Yes	Diff. (Yes - No)	2.23%	(2.70%)	5.14%	(3.60%)		

Notes: CG = caregiving, LP = living with parent, ME = marginal effect of caregiving, MA = married. The predicted LPRs and MEs for Panel A are computed from column (1) of Appendix A3, and that of Panel B from column (6). S.E. is computed by the delta method. *** represents statistical significance at 1%, ** at 5%, and * at 10%.

Table 2: Marginal Effect of Caregiving for Spouse Employment (SEMP)

Panel A: Males

LP	SEMP	Average predicted LPR				ME		
		CG = No		CG = Yes		Yes - No		
		Est.	S.E.	Est.	S.E.	Est.	S.E.	
LP = No	Full	91.39%	1.03%	85.37%	3.69%	-6.02%	3.72%	
	Part	90.70%	0.45%	90.02%	2.09%	-0.68%	2.11%	
	Self	89.36%	1.29%	84.53%	6.51%	-4.83%	6.71%	
	Unemp	88.34%	0.64%	82.78%	2.39%	-5.56%	2.37%	**
LP = Yes	Full	89.34%	1.53%	91.97%	2.20%	2.62%	2.04%	
	Part	89.21%	0.94%	87.48%	1.60%	-1.73%	1.50%	
	Self	89.95%	1.64%	92.40%	2.07%	2.45%	2.13%	
	Unemp	87.16%	1.33%	85.67%	2.18%	-1.48%	2.25%	

Panel B: Females

LP	SEMP	Average predicted LPR				ME		
		CG = No		CG = Yes		Yes - No		
		Est.	S.E.	Est.	S.E.	Est.	S.E.	
LP = No	Full	67.29%	0.58%	63.54%	1.57%	-3.75%	1.59%	**
	Part	65.75%	0.82%	68.07%	2.05%	2.32%	2.07%	
	Self	68.46%	1.25%	66.78%	2.56%	-1.68%	2.43%	
	Unemp	63.70%	1.14%	57.71%	3.82%	-5.99%	3.89%	
LP = Yes	Full	64.79%	1.27%	58.67%	1.81%	-6.12%	1.87%	***
	Part	66.00%	1.86%	57.35%	2.97%	-8.65%	3.17%	***
	Self	64.04%	1.54%	62.20%	2.18%	-1.83%	1.89%	
	Unemp	62.46%	2.20%	58.08%	3.68%	-4.38%	3.65%	

Notes: CG = caregiving, LP = living with parent, ME = marginal effect of caregiving, SEMP = spouse employment status. The predicted LPRs and MEs for Panel A are computed from column (2) of Appendix A3, and that of Panel B from column (7). S.E. is computed by the delta method. *** represents statistical significance at 1%, ** at 5%, and * at 10%.

Table 3: Marginal effect of caregiving regarding spouse employment (SEMP) screened by employment status in 2005

Panel A: Male

LP	SEMP	Employment status in 2005							
		Full		Part		Self			
		ME	S.E.	ME	S.E.	ME	S.E.		
LP = No	Full	-8.74%	5.08%	*	0.89%	4.72%	-1.45%	2.08%	
	Part	0.11%	2.66%		-4.96%	14.27%	-4.32%	2.90%	
	Self	-22.92%	18.70%				1.08%	1.63%	
	Unemp	-3.58%	2.57%		-17.33%	9.49%	*	-5.46%	6.32%
LP = Yes	Full	3.30%	2.20%		-10.67%	14.31%	5.05%	2.86%	*
	Part	-4.32%	2.30%	*	-0.63%	4.29%	2.20%	0.96%	**
	Self	4.09%	3.99%				0.15%	1.03%	
	Unemp	0.99%	2.46%		-17.46%	9.28%	*	-2.71%	4.94%

Panel B: Female

LP	SEMP	Employment status in 2005								
		Full		Part		Self				
		ME	S.E.	ME	S.E.	ME	S.E.			
LP = No	Full	-10.08%	4.53%	**	-4.20%	2.58%	-4.92%	3.35%		
	Part	-5.59%	3.22%	*	5.12%	3.20%	-5.87%	20.94%		
	Self	-7.96%	8.13%		1.32%	2.81%	3.51%	2.65%		
	Unemp	-6.83%	8.46%		-11.00%	6.86%	-77.79%	9.26%	***	
LP = Yes	Full	-8.45%	3.47%	**	-7.99%	3.07%	***	-26.14%	13.54%	*
	Part	-6.00%	5.29%		-13.16%	5.36%	**	-6.22%	11.07%	
	Self	2.90%	4.95%		-1.45%	2.38%		-0.43%	3.87%	
	Unemp	-6.08%	7.98%		-15.19%	5.75%	***	62.61%	22.50%	***

Note: LP represents living with parent, ME represents the marginal effect with respect to caregiving, and SEMP represents spouse employment statuses. The MEs for Panel A are computed from column (1)-(3) of Appendix A4, and that of Panel B from column (4)-(6) of Appendix A4. S.E. is computed by the delta method. *** represents statistical significance at 1% level, ** at 5%, * at 10%.

Table 4: Marginal Effect of Caregiving for Spouse Income (SINC)**Panel A: Males**

LP	SINC	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	0	90.18%	(0.31%)	85.38%	(1.70%)	-4.80%	(1.73%) ***
	10	90.02%	(0.27%)	85.76%	(1.59%)	-4.25%	(1.62%) ***
	20	89.86%	(0.30%)	86.15%	(1.56%)	-3.70%	(1.60%) **
	30	89.70%	(0.38%)	86.54%	(1.61%)	-3.15%	(1.68%) *
	40	89.54%	(0.50%)	86.93%	(1.75%)	-2.60%	(1.85%)
	50	89.38%	(0.63%)	87.32%	(1.95%)	-2.05%	(2.07%)
	60	89.21%	(0.76%)	87.71%	(2.19%)	-1.50%	(2.35%)
LP = Yes	0	88.42%	(0.85%)	87.92%	(1.45%)	-0.50%	(1.44%)
	10	88.35%	(0.81%)	87.90%	(1.27%)	-0.45%	(1.23%)
	20	88.27%	(0.81%)	87.88%	(1.28%)	-0.39%	(1.24%)
	30	88.20%	(0.86%)	87.86%	(1.48%)	-0.34%	(1.47%)
	40	88.12%	(0.94%)	87.84%	(1.80%)	-0.28%	(1.84%)
	50	88.04%	(1.06%)	87.81%	(2.20%)	-0.23%	(2.28%)
	60	87.97%	(1.19%)	87.79%	(2.64%)	-0.18%	(2.76%)

Panel B: Females

LP	SINC	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	0	67.60%	(0.53%)	65.12%	(1.94%)	-2.48%	(1.97%)
	10	67.38%	(0.46%)	64.88%	(1.70%)	-2.50%	(1.73%)
	20	67.16%	(0.41%)	64.64%	(1.50%)	-2.52%	(1.53%)
	30	66.94%	(0.38%)	64.40%	(1.36%)	-2.54%	(1.39%) *
	40	66.72%	(0.38%)	64.16%	(1.30%)	-2.56%	(1.33%) *
	50	66.50%	(0.40%)	63.92%	(1.33%)	-2.58%	(1.36%) *
	60	66.28%	(0.44%)	63.68%	(1.45%)	-2.60%	(1.47%) *
LP = Yes	0	64.57%	(1.27%)	59.83%	(1.93%)	-4.74%	(1.96%) **
	10	64.50%	(1.22%)	59.76%	(1.74%)	-4.74%	(1.77%) ***
	20	64.43%	(1.19%)	59.69%	(1.59%)	-4.74%	(1.61%) ***
	30	64.36%	(1.16%)	59.63%	(1.50%)	-4.74%	(1.51%) ***
	40	64.29%	(1.15%)	59.56%	(1.48%)	-4.73%	(1.47%) ***
	50	64.22%	(1.16%)	59.49%	(1.53%)	-4.73%	(1.50%) ***
	60	64.16%	(1.18%)	59.42%	(1.64%)	-4.73%	(1.59%) ***

Notes: CG = caregiving, LP = living with parent, ME = marginal effect of caregiving, and SINC = spouse income (10,000 JPY monthly). The predicted LPRs and MEs for Panel A are computed from column (3) of Appendix A3, and that of Panel B from column (8). S.E. is computed by the delta method. *** represents statistical significance at 1%, ** at 5%, and * at 10%.

Table 5: Marginal Effect of Caregiving for Net Financial Assets (NFA)

Panel A: Duplicated Married Households (Males)

LP	NFA	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	-20	91.62%	(0.76%)	89.50%	(2.96%)	-2.11%	(2.94%)
	-10	90.90%	(0.50%)	88.21%	(2.09%)	-2.69%	(2.09%)
	0	90.18%	(0.31%)	86.91%	(1.59%)	-3.27%	(1.62%) **
	10	89.46%	(0.34%)	85.62%	(1.80%)	-3.84%	(1.81%) **
	20	88.75%	(0.55%)	84.33%	(2.55%)	-4.42%	(2.53%) *
	30	88.03%	(0.82%)	83.03%	(3.51%)	-5.00%	(3.46%)
LP = Yes	-20	89.73%	(1.35%)	87.94%	(2.23%)	-1.79%	(2.10%)
	-10	88.91%	(1.03%)	87.33%	(1.69%)	-1.58%	(1.56%)
	0	88.09%	(0.86%)	86.73%	(1.35%)	-1.37%	(1.25%)
	10	87.28%	(0.91%)	86.12%	(1.37%)	-1.16%	(1.32%)
	20	86.46%	(1.16%)	85.51%	(1.75%)	-0.95%	(1.72%)
	30	85.65%	(1.51%)	84.91%	(2.31%)	-0.74%	(2.30%)

Panel B: Duplicated Married Households (Females)

LP	NFA	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	-20	68.11%	(0.98%)	62.53%	(2.23%)	-5.58%	(2.20%) **
	-10	67.52%	(0.64%)	63.03%	(1.66%)	-4.49%	(1.66%) ***
	0	66.93%	(0.41%)	63.53%	(1.29%)	-3.40%	(1.32%) **
	10	66.35%	(0.45%)	64.03%	(1.31%)	-2.31%	(1.34%) *
	20	65.76%	(0.73%)	64.53%	(1.69%)	-1.22%	(1.70%)
	30	65.17%	(1.08%)	65.03%	(2.27%)	-0.14%	(2.25%)
LP = Yes	-20	63.82%	(1.81%)	56.99%	(2.58%)	-6.83%	(2.54%) ***
	-10	64.28%	(1.38%)	57.70%	(1.95%)	-6.58%	(1.94%) ***
	0	64.75%	(1.15%)	58.41%	(1.52%)	-6.34%	(1.53%) ***
	10	65.22%	(1.25%)	59.13%	(1.49%)	-6.09%	(1.48%) ***
	20	65.68%	(1.62%)	59.84%	(1.87%)	-5.85%	(1.82%) ***
	30	66.15%	(2.12%)	60.55%	(2.48%)	-5.60%	(2.39%) **

Panel C: Unmarried Males

LP	NFA	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	-20	85.62%	(2.68%)	80.33%	(6.69%)	-5.29%	(6.52%)
	-10	81.85%	(1.76%)	77.24%	(5.38%)	-4.62%	(5.39%)
	0	78.08%	(1.04%)	74.14%	(4.62%)	-3.94%	(4.76%)
	10	74.31%	(1.06%)	71.04%	(4.70%)	-3.27%	(4.82%)
	20	70.54%	(1.79%)	67.95%	(5.58%)	-2.59%	(5.55%)
	30	66.77%	(2.71%)	64.85%	(6.97%)	-1.92%	(6.73%)
LP = Yes	-20	78.06%	(3.68%)	68.95%	(5.81%)	-9.12%	(5.68%)
	-10	78.21%	(2.71%)	69.61%	(4.23%)	-8.60%	(4.37%) **
	0	78.35%	(2.00%)	70.26%	(3.25%)	-8.08%	(3.56%) **
	10	78.49%	(1.89%)	70.92%	(3.44%)	-7.57%	(3.61%) **
	20	78.63%	(2.45%)	71.58%	(4.65%)	-7.05%	(4.48%)
	30	78.77%	(3.36%)	72.24%	(6.33%)	-6.53%	(5.82%)

Panel D: Unmarried Females

LP	NFA	Average predicted LPR				ME	
		CG = No		CG = Yes		Yes - No	
		Est.	S.E.	Est.	S.E.	Est.	S.E.
LP = No	-20	79.72%	(2.20%)	74.28%	(5.76%)	-5.44%	(5.91%)
	-10	77.54%	(1.41%)	71.76%	(4.25%)	-5.79%	(4.36%)
	0	75.36%	(0.72%)	69.23%	(3.18%)	-6.13%	(3.32%) *
	10	73.19%	(0.67%)	66.71%	(3.08%)	-6.48%	(3.31%) *
	20	71.01%	(1.33%)	64.18%	(4.00%)	-6.82%	(4.33%)
	30	68.83%	(2.12%)	61.66%	(5.46%)	-7.17%	(5.87%)
LP = Yes	-20	77.89%	(4.05%)	75.15%	(7.18%)	-2.74%	(6.66%)
	-10	75.91%	(3.00%)	71.70%	(5.26%)	-4.21%	(4.99%)
	0	73.94%	(2.25%)	68.26%	(3.69%)	-5.68%	(3.63%)
	10	71.96%	(2.15%)	64.81%	(3.08%)	-7.15%	(3.01%) **
	20	69.99%	(2.76%)	61.37%	(3.92%)	-8.62%	(3.56%) **
	30	68.01%	(3.76%)	57.92%	(5.58%)	-10.10%	(4.90%) **

Notes: CG = caregiving, LP = living with parent, ME = marginal effect of caregiving, NFA = net financial assets (million JPY). The predicted LPRs and MEs for Panel A are computed from column (4) of Appendix A3, that of Panel B from column (9), that of Panel C from column (5), and that of Panel B from column (10). S.E. is computed by the delta method. *** represents statistical significance at 1%, ** at 5%, and * at 10%.

Table 6: Gender Difference for Marginal Effect of Caregiving

Panel A: For Marital and Living-with-Parent Statuses

LP	MA	Diff.	S.E.	95% conf. interval	
LP = No	MA = No	-3.96%	(4.98%)	-13.73%	5.81%
	MA = Yes	0.86%	(1.51%)	-2.11%	3.82%
LP = Yes	MA = No	1.11%	(4.10%)	-6.94%	9.15%
	MA = Yes	-3.73%	(1.40%)	*** -6.46%	-0.99%

Panel B: Spouse Employment (SEMP)

LP	SEMP	Diff.	S.E.	95% conf. interval	
LP = No	Full	2.27%	(4.24%)	-6.04%	10.57%
	Part	3.00%	(3.01%)	-2.90%	8.91%
	Self	3.15%	(7.65%)	-11.85%	18.15%
	Unemp	-0.43%	(4.39%)	-9.03%	8.18%
LP = Yes	Full	-8.74%	(3.10%)	*** -14.82%	-2.66%
	Part	-6.93%	(3.62%)	* -14.02%	0.17%
	Self	-4.28%	(3.50%)	-11.14%	2.58%
	Unemp	-2.90%	(4.48%)	-11.68%	5.88%

Panel C: Spouse Income (SINC)

LP	SINC	Diff.	S.E.	95% conf. interval	
LP = No	0	2.32%	(2.70%)	-2.97%	7.61%
	10	1.75%	(2.42%)	-2.98%	6.49%
	20	1.18%	(2.35%)	-3.42%	5.78%
	30	0.61%	(2.50%)	-4.29%	5.52%
	40	0.04%	(2.85%)	-5.55%	5.63%
	50	-0.53%	(3.33%)	-7.06%	6.01%
	60	-1.10%	(3.90%)	-8.73%	6.54%
LP = Yes	0	-4.24%	(2.64%)	-9.42%	0.94%
	10	-4.29%	(2.32%)	* -8.84%	0.25%
	20	-4.35%	(2.15%)	** -8.57%	-0.13%
	30	-4.40%	(2.18%)	** -8.67%	-0.12%
	40	-4.45%	(2.40%)	* -9.15%	0.25%
	50	-4.50%	(2.76%)	-9.91%	0.90%
	60	-4.55%	(3.21%)	-10.85%	1.74%

Panel D: Net Financial Assets (NFA) of Duplicated Married Households

LP	NFA	Diff.	S.E.	95% conf. interval	
LP = No	-20	-3.46%	(3.72%)	-10.76%	3.83%
	-10	-1.80%	(2.71%)	-7.10%	3.51%
	0	-0.13%	(2.13%)	-4.31%	4.04%
	10	1.53%	(2.35%)	-3.07%	6.14%
	20	3.20%	(3.20%)	-3.08%	9.47%
	30	4.86%	(4.33%)	-3.62%	13.35%
LP = Yes	-20	-5.04%	(3.30%)	-11.51%	1.43%
	-10	-5.00%	(2.45%)	** -9.81%	-0.20%
	0	-4.97%	(1.92%)	** -8.74%	-1.20%
	10	-4.94%	(1.98%)	** -8.82%	-1.05%
	20	-4.90%	(2.59%)	* -9.98%	0.17%
	30	-4.87%	(3.47%)	-11.67%	1.94%

Panel E: Net Financial Assets (NFA) of Unmarried Households

LP	NFA	Diff.	S.E.	95% conf. interval	
LP = No	-20	-0.15%	(10.39%)	-20.51%	20.22%
	-10	-1.17%	(7.85%)	-16.55%	14.21%
	0	-2.19%	(6.27%)	-14.48%	10.11%
	10	-3.21%	(6.43%)	-15.81%	9.39%
	20	-4.23%	(8.21%)	-20.33%	11.87%
	30	-5.25%	(10.85%)	-26.52%	16.02%
LP = Yes	-20	6.38%	(9.71%)	-12.65%	25.42%
	-10	4.39%	(7.29%)	-9.90%	18.69%
	0	2.40%	(5.52%)	-8.41%	13.22%
	10	0.41%	(5.11%)	-9.61%	10.44%
	20	-1.58%	(6.35%)	-14.02%	10.87%
	30	-3.57%	(8.54%)	-20.30%	13.17%

Notes: LP = living with parent, SEMP = spouse employment, SINC = spouse income (10,000 JPY monthly), NFA = net financial assets (million JPY). *** represents statistical significance at 1%, ** at 5%, and * at 10%. Gender difference is defined as the ME for females minus that for males. Standard errors and 95% confidence intervals are computed by bootstrap replications.

Appendix A1: Characteristics of Samples

Panel A: Transition of Age for Males

	Year = 2005	2006	2007	2008	2009	2010	Total
50 years old	870	0	0	0	0	0	870
51	838	870	0	0	0	0	1,708
52	935	838	870	0	0	0	2,643
53	965	935	838	870	0	0	3,608
54	1,056	965	935	838	870	0	4,664
55	1,061	1,056	965	935	838	870	5,725
56	1,268	1,061	1,056	965	935	838	6,123
57	1,153	1,268	1,061	1,056	965	935	6,438
58	1,189	1,153	1,268	1,061	1,056	965	6,692
59	785	1,189	1,153	1,268	1,061	1,056	6,512
60	0	785	1,189	1,153	1,268	1,061	5,456
61	0	0	785	1,189	1,153	1,268	4,395
62	0	0	0	785	1,189	1,153	3,127
63	0	0	0	0	785	1,189	1,974
64	0	0	0	0	0	785	785
Total	10,120	10,120	10,120	10,120	10,120	10,120	60,720

Notes: The table shows the number of respondents.

Panel B: Transition of Age for Females

	Year = 2005	2006	2007	2008	2009	2010	Total
50 years old	924	0	0	0	0	0	924
51	958	924	0	0	0	0	1,882
52	986	958	924	0	0	0	2,868
53	1,102	986	958	924	0	0	3,970
54	1,119	1,102	986	958	924	0	5,089
55	1,123	1,119	1,102	986	958	924	6,212
56	1,372	1,123	1,119	1,102	986	958	6,660
57	1,376	1,372	1,123	1,119	1,102	986	7,078
58	1,295	1,376	1,372	1,123	1,119	1,102	7,387
59	839	1,295	1,376	1,372	1,123	1,119	7,124
60	0	839	1,295	1,376	1,372	1,123	6,005
61	0	0	839	1,295	1,376	1,372	4,882
62	0	0	0	839	1,295	1,376	3,510
63	0	0	0	0	839	1,295	2,134
64	0	0	0	0	0	839	839
Total	11,094	11,094	11,094	11,094	11,094	11,094	66,564

Notes: The table shows the number of respondents.

Panel C: Transition of Employment Status for Males

	2005	2006	2007	2008	2009	2010	Total
Full	6,748	6,377	5,879	5,420	4,815	4,286	33,525
Unreg	847	1,079	1,386	1,682	1,940	2,216	9,150
Self	1,962	1,940	1,954	1,999	1,977	1,977	11,809
Unemp	530	650	787	965	1,325	1,580	5,837
No data	33	74	114	54	63	61	399
Total	10,120	10,120	10,120	10,120	10,120	10,120	60,720

Notes: The table shows the number of respondents.

Panel D: Transition of Employment Status for Females

	2005	2006	2007	2008	2009	2010	Total
Full	2,317	2,178	2,007	1,798	1,590	1,412	11,302
Unreg	4,950	5,017	4,890	4,838	4,612	4,479	28,786
Self	553	526	552	556	583	517	3,287
Unemp	3,166	3,262	3,515	3,768	4,177	4,537	22,425
No data	108	111	130	134	132	149	764
Total	11,094	11,094	11,094	11,094	11,094	11,094	66,564

Notes: The table shows the number of respondents.

Panel E: Transition of Labor Participation Rate for Males

		2005	2006	2007	2008	2009	2010	Total
Caregiving (CG) = 0	Avg.	94.7%	93.3%	92.1%	90.3%	86.8%	84.5%	90.4%
	Std.	(22.5%)	(25.0%)	(27.0%)	(29.6%)	(33.9%)	(36.2%)	(29.5%)
	N	10,117	9,529	8,980	8,716	8,792	8,988	55,122
Caregiving (CG) = 1	Avg.		92.2%	89.1%	88.3%	83.7%	80.7%	85.7%
	Std.		(26.9%)	(31.1%)	(32.2%)	(36.9%)	(39.5%)	(35.0%)
	N		346	470	614	695	810	2,935
Total	Avg.	94.7%	93.2%	91.9%	90.2%	86.6%	84.2%	90.2%
	Std.	(22.5%)	(25.1%)	(27.3%)	(29.8%)	(34.1%)	(36.5%)	(29.8%)
	N	10,117	9,875	9,450	9,330	9,487	9,798	58,057

Notes: The table shows the simple average of labor participation rate, its standard deviation, and the number of respondents.

Panel F: Transition of Labor Participation Rate for Females

		2005	2006	2007	2008	2009	2010	Total
Caregiving (CG) = 0	Avg.	70.7%	70.2%	68.4%	65.7%	62.4%	58.6%	66.2%
	Std.	(45.5%)	(45.7%)	(46.5%)	(47.5%)	(48.4%)	(49.3%)	(47.3%)
	N	11,085	10,127	9,230	8,874	8,929	9,381	57,626
Caregiving (CG) = 1	Avg.		64.7%	61.4%	60.7%	54.9%	54.0%	58.3%
	Std.		(47.8%)	(48.7%)	(48.9%)	(49.8%)	(49.9%)	(49.3%)
	N		666	862	1,100	1,192	1,330	5,150
Total	Avg.	70.7%	69.9%	67.8%	65.2%	61.5%	58.1%	65.6%
	Std.	(45.5%)	(45.9%)	(46.7%)	(47.6%)	(48.7%)	(49.3%)	(47.5%)
	N	11,085	10,793	10,092	9,974	10,121	10,711	62,776

Notes: The table shows the simple average of labor participation rate, its standard deviation, and the number of respondents.

Appendix A2: Descriptive Statistics

	All data					All data					Duplicated married households					Duplicated married households				
	Male					Female					Male					Female				
	N	Avg.	Std.	Max.	Min.	N	Avg.	Std.	Max.	Min.	N	Avg.	Std.	Max.	Min.	N	Avg.	Std.	Max.	Min.
Work (W)	60,701	0.90	(0.30)	0	1	66,522	0.65	(0.48)	0	1	34,454	0.90	(0.29)	0	1	34,440	0.67	(0.47)	0	1
Living with parent (LP)	60,645	0.28	(0.45)	0	1	66,443	0.21	(0.41)	0	1	34,456	0.26	(0.44)	0	1	34,458	0.26	(0.44)	0	1
Caregiving (CG)	58,072	0.04	(0.21)	0	1	62,809	0.07	(0.25)	0	1	32,947	0.04	(0.20)	0	1	32,730	0.08	(0.27)	0	1
Married (MA)	60,668	0.89	(0.31)	0	1	66,489	0.85	(0.35)	0	1	34,464	1.00	(0.00)	1	1	34,464	1.00	(0.00)	1	1
LP×CG	58,010	0.03	(0.16)	0	1	62,706	0.03	(0.18)	0	1	32,941	0.02	(0.16)	0	1	32,724	0.04	(0.20)	0	1
LP×MA	60,594	0.24	(0.43)	0	1	66,370	0.18	(0.39)	0	1										
CG×MA	58,028	0.04	(0.19)	0	1	62,749	0.06	(0.24)	0	1										
CG×MA×LP	57,967	0.02	(0.15)	0	1	62,647	0.03	(0.17)	0	1										
Employment (EMP) Full	60,321	0.56	(0.50)	0	1	65,800	0.17	(0.38)	0	1	34,249	0.54	(0.50)	0	1	34,090	0.17	(0.37)	0	1
EMP Unreg	60,321	0.15	(0.36)	0	1	65,800	0.44	(0.50)	0	1	34,249	0.17	(0.37)	0	1	34,090	0.47	(0.50)	0	1
EMP Self	60,321	0.20	(0.40)	0	1	65,800	0.05	(0.22)	0	1	34,249	0.20	(0.40)	0	1	34,090	0.04	(0.19)	0	1
EMP Unemp	60,321	0.10	(0.30)	0	1	65,800	0.34	(0.47)	0	1	34,249	0.09	(0.29)	0	1	34,090	0.33	(0.47)	0	1
Spouse employment (SEMP) Full											34,090	0.17	(0.37)	0	1	34,249	0.54	(0.50)	0	1
SEMP Unreg											34,090	0.47	(0.50)	0	1	34,249	0.17	(0.37)	0	1
SEMP Self											34,090	0.04	(0.19)	0	1	34,249	0.20	(0.40)	0	1
SEMP Unemp											34,090	0.33	(0.47)	0	1	34,249	0.09	(0.29)	0	1
Income (10,000 JPY Monthly)	52,650	37.5	(34.5)	0	362.5	60,636	12.3	(20.7)	0	361	30,138	37.4	(33.1)	0	360	31,394	11.0	(18.7)	0	360
Spouse income (SINC, 10,000 JPY Monthly)											31,394	11.0	(18.7)	0	360	30,138	37.4	(33.1)	0	360
Saving amount (Million JPY)	57,406	7.91	(12.0)	0	85.8	61,978	8.92	(13.0)	0	85.8	32,516	8.56	(12.2)	0	85.8	32,516	8.56	(12.2)	0	85.8
Loan Amount (Million JPY)	57,480	4.30	(9.12)	0	101.4	62,881	3.30	(8.18)	0	103.8	32,763	4.23	(8.93)	0	100.0	32,763	4.23	(8.93)	0	100.0
Net financial assets (NFA, Million JPY)	54,543	3.62	(14.2)	-58.0	68.1	58,702	5.54	(14.5)	-58.0	68.0	31,014	4.33	(14.4)	-58.0	68.0	31,014	4.33	(14.4)	-58.0	68.0
CG other	58,072	0.01	(0.08)	0	1	62,809	0.01	(0.11)	0	1	32,947	0.01	(0.08)	0	1	32,730	0.01	(0.10)	0	1
Children	60,720	0.19	(0.39)	0	1	66,564	0.09	(0.28)	0	1	34,464	0.11	(0.32)	0	1	34,464	0.11	(0.32)	0	1
Health condition (HC) 1	60,265	0.01	(0.09)	0	1	66,063	0.01	(0.07)	0	1	34,219	0.01	(0.09)	0	1	34,274	0.01	(0.07)	0	1
HC 2	60,265	0.03	(0.17)	0	1	66,063	0.03	(0.16)	0	1	34,219	0.03	(0.18)	0	1	34,274	0.03	(0.16)	0	1
HC 3	60,265	0.14	(0.35)	0	1	66,063	0.13	(0.34)	0	1	34,219	0.14	(0.35)	0	1	34,274	0.13	(0.34)	0	1
HC 4	60,265	0.42	(0.49)	0	1	66,063	0.45	(0.50)	0	1	34,219	0.42	(0.49)	0	1	34,274	0.46	(0.50)	0	1
HC 5	60,265	0.33	(0.47)	0	1	66,063	0.33	(0.47)	0	1	34,219	0.33	(0.47)	0	1	34,274	0.33	(0.47)	0	1
HC 6	60,265	0.07	(0.25)	0	1	66,063	0.06	(0.24)	0	1	34,219	0.07	(0.25)	0	1	34,274	0.06	(0.23)	0	1
Spouse health condition (SHC) 1											34,270	0.00	(0.07)	0	1	34,216	0.01	(0.09)	0	1
SHC 2											34,270	0.03	(0.16)	0	1	34,216	0.03	(0.17)	0	1
SHC 3											34,270	0.13	(0.33)	0	1	34,216	0.14	(0.35)	0	1
SHC 4											34,270	0.45	(0.50)	0	1	34,216	0.43	(0.49)	0	1
SHC 5											34,270	0.33	(0.47)	0	1	34,216	0.33	(0.47)	0	1
SHC 6											34,270	0.06	(0.24)	0	1	34,216	0.07	(0.25)	0	1
Age over 60 (Age60)	60,720	0.26	(0.44)	0	1	66,564	0.26	(0.44)	0	1	34,464	0.33	(0.47)	0	1	34,464	0.16	(0.36)	0	1
Spouse age over 60 (Sage60)	60,720	0.26	(0.44)	0	1	66,564	0.61	(0.49)	0	1	34,464	0.16	(0.37)	0	1	34,464	0.34	(0.47)	0	1
Duplicated married households (DMH)	60,582	0.57	(0.50)	0	1	66,450	0.52	(0.50)	0	1										

Appendix A3: Estimation Result of Fixed Effect Regression Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Male	Male	Male	Male	Male	Female	Female	Female	Female	Female
		DMH	DMH	DMH	Unmarried		DMH	DMH	DMH	Unmarried
LP	0.026 (0.021)	-0.020 (0.017)	-0.018 (0.011)	-0.021 * (0.011)	0.003 (0.029)	-0.028 (0.023)	-0.025 (0.016)	-0.030 * (0.016)	-0.022 (0.015)	-0.014 (0.027)
CG	-0.022 (0.039)	-0.060 (0.037)	-0.048 *** (0.017)	-0.033 ** (0.016)	-0.039 (0.048)	-0.062 ** (0.027)	-0.038 ** (0.016)	-0.025 (0.020)	-0.034 ** (0.013)	-0.061 * (0.033)
LP×CG	-0.063 (0.047)	0.086 ** (0.041)	0.043 ** (0.022)	0.019 (0.019)	-0.041 (0.058)	-0.012 (0.038)	-0.024 (0.024)	-0.023 (0.027)	-0.029 (0.020)	0.005 (0.046)
MA	0.027 (0.019)					0.019 (0.015)				
LP×MA	-0.031 (0.022)					0.003 (0.025)				
CG×MA	-0.004 (0.040)					0.045 (0.029)				
CG×LP×MA	0.081 (0.049)					-0.015 (0.040)				
(SEMP) Part		-0.007 (0.012)					-0.015 (0.010)			
(SEMP) Self		-0.020 (0.016)					0.012 (0.016)			
(SEMP) Unemp		-0.031 ** (0.014)					-0.036 *** (0.012)			
LP×Part		0.006 (0.019)					0.028 (0.020)			
LP×Self		0.026 (0.024)					-0.019 (0.020)			
LP×Unemp		0.009 (0.021)					0.013 (0.024)			
CG×Part		0.053 (0.042)					0.061 ** (0.024)			
CG×Self		0.012 (0.075)					0.021 (0.029)			
CG×Unemp		0.005 (0.043)					-0.022 (0.041)			
CG×LP×Part		-0.097 ** (0.048)					-0.086 ** (0.041)			
CG×LP×Self		-0.014 (0.079)					0.022 (0.039)			
CG×LP×Unemp		-0.046 (0.051)					0.040 (0.056)			
SINC			-0.0002 (0.0001)					-0.0002 ** (0.0001)		
LP×SINC			0.0001 (0.0002)					0.0002 (0.0002)		
CG×SINC			0.0005 (0.0004)					-0.00002 (0.0003)		
CG×LP×SINC			-0.0005 (0.0007)					0.00002 (0.0005)		
NFA				-0.001 ** (0.0003)	-0.004 *** (0.001)				-0.001 (0.0004)	-0.002 *** (0.001)
LP×NFA				-0.000 (0.001)	0.004 *** (0.001)				0.001 (0.001)	0.0002 (0.001)
CG×NFA				-0.001 (0.001)	0.001 (0.002)				0.001 (0.001)	-0.0003 (0.002)
CG×LP×NFA				0.001 (0.001)	-0.000 (0.003)				-0.001 (0.001)	-0.001 (0.003)

CG Other	-0.027 (0.016)	-0.040 * (0.022)	-0.038 * (0.023)	-0.021 (0.022)	-0.133 (0.088)	-0.037 ** (0.014)	-0.028 (0.022)	-0.033 (0.023)	-0.026 (0.023)	0.031 (0.047)
Children	-0.011 ** (0.005)	-0.010 (0.007)	-0.013 * (0.008)	-0.011 (0.007)	-0.007 (0.053)	-0.012 * (0.007)	-0.009 (0.009)	-0.004 (0.010)	-0.009 (0.010)	0.037 (0.029)
HC 2	-0.127 *** (0.024)	-0.140 *** (0.033)	-0.128 *** (0.034)	-0.143 *** (0.034)	-0.054 (0.067)	-0.059 ** (0.023)	-0.072 ** (0.033)	-0.074 ** (0.036)	-0.087 ** (0.035)	-0.090 (0.062)
HC 3	-0.054 *** (0.012)	-0.042 *** (0.016)	-0.036 ** (0.017)	-0.044 *** (0.017)	-0.063 (0.045)	-0.029 ** (0.013)	-0.040 ** (0.019)	-0.044 ** (0.021)	-0.051 ** (0.020)	-0.031 (0.034)
HC 4	-0.004 (0.008)	0.000 (0.011)	-0.004 (0.011)	-0.000 (0.012)	-0.006 (0.030)	0.003 (0.009)	-0.009 (0.013)	-0.001 (0.014)	-0.017 (0.013)	-0.009 (0.025)
HC 5	0.011 * (0.006)	0.015 * (0.009)	0.015 (0.009)	0.015 (0.010)	0.007 (0.025)	0.010 (0.008)	0.002 (0.011)	0.007 (0.011)	-0.005 (0.011)	0.016 (0.020)
HC 6	0.007 (0.006)	0.010 (0.009)	0.009 (0.009)	0.008 (0.010)	0.010 (0.023)	0.013 * (0.007)	0.003 (0.010)	0.010 (0.011)	-0.001 (0.011)	0.025 (0.019)
Age 60	-0.076 *** (0.005)	-0.059 *** (0.006)	-0.063 *** (0.007)	-0.062 *** (0.007)	-0.090 *** (0.020)	-0.053 *** (0.005)	-0.041 *** (0.008)	-0.045 *** (0.009)	-0.048 *** (0.009)	-0.067 *** (0.013)
SHC 2		-0.004 (0.030)	-0.008 (0.031)	-0.008 (0.033)			0.001 (0.028)	0.009 (0.029)	-0.001 (0.029)	
SHC 3		0.030 * (0.015)	0.030 * (0.016)	0.031 * (0.016)			0.006 (0.016)	0.004 (0.017)	0.005 (0.017)	
SHC 4		-0.007 (0.010)	-0.010 (0.011)	-0.007 (0.012)			0.002 (0.011)	0.001 (0.012)	-0.002 (0.012)	
SHC 5		-0.008 (0.009)	-0.011 (0.010)	-0.008 (0.010)			0.011 (0.010)	0.014 (0.010)	0.008 (0.011)	
SHC 6		-0.009 (0.009)	-0.011 (0.009)	-0.009 (0.009)			0.013 (0.009)	0.017 * (0.010)	0.014 (0.010)	
Sage 60		-0.029 *** (0.007)	-0.030 *** (0.008)	-0.032 *** (0.008)			0.001 (0.006)	-0.001 (0.007)	-0.002 (0.007)	
Year 2007	-0.006 *** (0.002)	-0.005 (0.003)	-0.006 * (0.004)	-0.006 (0.004)	-0.013 (0.010)	-0.015 *** (0.003)	-0.008 * (0.004)	-0.010 ** (0.005)	-0.004 (0.005)	-0.020 ** (0.009)
Year 2008	-0.014 *** (0.003)	-0.013 *** (0.004)	-0.014 *** (0.004)	-0.013 *** (0.004)	-0.020 * (0.011)	-0.032 *** (0.004)	-0.025 *** (0.005)	-0.029 *** (0.006)	-0.023 *** (0.006)	-0.043 *** (0.011)
Year 2009	-0.040 *** (0.003)	-0.039 *** (0.005)	-0.040 *** (0.005)	-0.039 *** (0.005)	-0.049 *** (0.014)	-0.062 *** (0.004)	-0.058 *** (0.006)	-0.063 *** (0.007)	-0.058 *** (0.007)	-0.070 *** (0.012)
Year 2010	-0.057 *** (0.004)	-0.060 *** (0.006)	-0.062 *** (0.006)	-0.063 *** (0.006)	-0.071 *** (0.015)	-0.092 *** (0.005)	-0.084 *** (0.007)	-0.086 *** (0.007)	-0.084 *** (0.008)	-0.096 *** (0.012)
Constant	0.915 *** (0.018)	0.967 *** (0.015)	0.961 *** (0.012)	0.959 *** (0.013)	0.837 *** (0.028)	0.687 *** (0.015)	0.708 *** (0.014)	0.706 *** (0.014)	0.713 *** (0.015)	0.810 *** (0.020)
N	47,489	26,552	24,477	24,071	4,656	51,195	26,439	23,336	23,858	6,651
#Respondents	10,115	5,742	5,706	5,604	1,219	11,085	5,738	5,661	5,602	1,820
F	41.41 ***	17.01 ***	21.18 ***	20.95 ***	5.32 ***	50.24 ***	13.62 ***	15.56 ***	16.22 ***	9.35 ***

Notes: LP = living with parent, CG = caregiving, MA = married, SINC = spouse income, SEMP = spouse employment status, NFA = net financial assets, HC = health condition, SHC = spouse health condition, DMH = duplicated married households. Standard errors are clustered at the level of respondent's ID. #Respondents represents the number of respondents. *** represents statistical significance at 1%, ** at 5%, and * at 10%.

Appendix A4: Estimation Results Screened by Employment Status in 2005

	(1)	(2)	(3)	(4)	(5)	(6)
Gender	Male	Male	Male	Female	Female	Female
Employment in 2005	Full	Part	Self	Full	Part	Self
LP	-0.017 (0.020)	-0.005 (0.098)	-0.048 * (0.028)	0.025 (0.034)	-0.082 *** (0.025)	0.190 ** (0.083)
CG	-0.087 * (0.051)	0.009 (0.047)	-0.014 (0.021)	-0.101 ** (0.045)	-0.042 (0.026)	-0.049 (0.034)
LP×CG	0.120 ** (0.054)	-0.116 (0.150)	0.065 ** (0.033)	0.016 (0.052)	-0.038 (0.040)	-0.212 * (0.125)
(SEMP) Part	-0.010 (0.015)	0.080 (0.056)	-0.024 (0.017)	-0.023 (0.023)	-0.041 *** (0.015)	-0.049 (0.037)
(SEMP) Self	-0.001 (0.025)	-0.045 (0.068)	-0.045 ** (0.021)	-0.010 (0.033)	0.002 (0.022)	0.080 * (0.042)
(SEMP) Unemp	-0.023 (0.017)	0.010 (0.058)	-0.036 * (0.022)	-0.073 ** (0.032)	-0.068 *** (0.020)	-0.137 ** (0.059)
LP×Part	-0.003 (0.023)	-0.031 (0.112)	0.058 * (0.031)	0.043 (0.037)	0.040 (0.032)	-0.075 (0.100)
LP×Self	0.012 (0.044)	0.107 (0.123)	0.079 ** (0.032)	0.029 (0.039)	-0.013 (0.029)	-0.191 ** (0.079)
LP×Unemp	-0.010 (0.025)	0.082 (0.102)	0.063 * (0.037)	0.063 (0.052)	0.041 (0.036)	-0.009 (0.228)
CG×Part	0.088 (0.057)	-0.058 (0.148)	-0.029 (0.035)	0.045 (0.051)	0.093 ** (0.040)	-0.010 (0.205)
CG×Self	-0.142 (0.188)		0.025 (0.024)	0.021 (0.092)	0.055 (0.038)	0.084 ** (0.040)
CG×Unemp	0.052 (0.057)	-0.182 * (0.103)	-0.040 (0.059)	0.032 (0.094)	-0.068 (0.071)	-0.729 *** (0.102)
CG×LP×Part	-0.165 ** (0.064)	0.159 (0.208)	0.000 (0.046)	-0.020 (0.075)	-0.145 ** (0.071)	0.209 (0.226)
CG×LP×Self	0.150 (0.193)		-0.074 ** (0.036)	0.092 (0.106)	0.010 (0.054)	0.173 (0.123)
CG×LP×Unemp	-0.075 (0.063)	0.114 (0.195)	-0.037 (0.084)	-0.009 (0.123)	-0.004 (0.096)	1.616 *** (0.270)
CG Other	-0.028 (0.027)	-0.121 * (0.070)	-0.009 (0.010)	-0.058 (0.047)	-0.003 (0.032)	-0.086 (0.116)
Children	-0.014 (0.009)	-0.009 (0.026)	-0.006 (0.014)	-0.012 (0.016)	-0.003 (0.013)	-0.079 (0.054)
HC 2	-0.119 *** (0.043)	-0.263 (0.161)	-0.179 *** (0.060)	-0.114 (0.091)	-0.141 (0.090)	-0.160 (0.099)
HC 3	-0.032 (0.021)	-0.058 (0.066)	-0.035 (0.025)	0.043 (0.048)	-0.085 ** (0.034)	-0.112 * (0.066)
HC 4	0.008 (0.014)	-0.028 (0.054)	-0.015 (0.013)	0.046 (0.028)	-0.024 (0.020)	0.041 (0.040)
HC 5	0.022 * (0.012)	-0.014 (0.048)	0.002 (0.009)	0.042 * (0.024)	-0.006 (0.016)	0.024 (0.027)
HC 6	0.018 (0.011)	-0.024 (0.048)	-0.000 (0.009)	0.023 (0.023)	-0.003 (0.015)	0.011 (0.029)
Age 60	-0.085 *** (0.008)	-0.014 (0.020)	-0.005 (0.008)	-0.177 *** (0.024)	-0.038 *** (0.012)	-0.026 (0.022)
SHC 2	-0.018 (0.035)	0.109 (0.103)	-0.009 (0.027)	0.035 (0.066)	-0.028 (0.037)	-0.141 (0.129)
SHC 3	0.035 * (0.019)	0.081 (0.050)	-0.019 (0.020)	0.008 (0.036)	-0.005 (0.024)	-0.029 (0.052)
SHC 4	-0.011 (0.013)	0.051 (0.041)	-0.019 (0.016)	0.012 (0.026)	-0.003 (0.017)	-0.029 (0.052)
SHC 5	-0.011 (0.011)	0.029 (0.034)	-0.014 (0.015)	0.000 (0.024)	0.009 (0.014)	-0.063 (0.045)
SHC 6	-0.018 * (0.010)	0.025 (0.031)	0.006 (0.014)	0.009 (0.023)	0.006 (0.013)	-0.057 (0.047)
Sage 60	-0.035 *** (0.010)	-0.086 *** (0.029)	-0.002 (0.008)	0.007 (0.014)	0.000 (0.010)	0.009 (0.023)
Year 2007	-0.010 ** (0.004)	-0.031 ** (0.015)	0.002 (0.005)	-0.007 (0.009)	-0.029 *** (0.006)	-0.053 *** (0.019)
Year 2008	-0.015 *** (0.005)	-0.051 *** (0.019)	-0.006 (0.006)	-0.046 *** (0.011)	-0.053 *** (0.008)	-0.032 (0.020)
Year 2009	-0.048 *** (0.006)	-0.062 *** (0.022)	-0.013 ** (0.007)	-0.078 *** (0.013)	-0.102 *** (0.009)	-0.024 (0.021)
Year 2010	-0.072 *** (0.007)	-0.106 *** (0.025)	-0.020 ** (0.008)	-0.097 *** (0.014)	-0.139 *** (0.011)	-0.058 ** (0.026)
Constant	0.990 *** (0.019)	0.908 *** (0.065)	1.018 *** (0.022)	0.919 *** (0.031)	0.958 *** (0.021)	0.942 *** (0.058)
N	18,063	2,094	5,264	5,153	12,621	987
#Respondent	3,877	460	1,156	1,113	2,736	223
F	15.71 ***	2.89 ***	1.55 **	6.85 ***	14.12 ***	

Notes: Sample data for each regression are broken down by employment status (Full, Part, or Self) in 2005. LP = living with parent, CG = caregiving, SEMP = spouse employment status, HC = health condition, SHC = spouse health condition. Standard errors are clustered at the level of respondent. #Respondents represents the number of respondents. *** represents statistical significance at 1%, ** at 5%, and * at 10%.

Supplementary Online Appendix: About Data

The data we used is the Longitudinal Survey of Middle-aged and Elderly Persons, conducted by the Ministry of Health, Labour and Welfare (MHLW) of Japan.⁹ According to the MHLW, the objective of the survey is to collect data continuously from a nationally representative sample of middle-aged and elderly men and women who were 50–59 years old at the end of October 2005.¹⁰ The survey gathers information on the sample's family situations, health status, and work status annually to help inform policy. The survey cycle is once a year and the survey date is the first Wednesday of November. The MHLW sends the questionnaires to the respondents via mail. The subjects returned the responded questionnaires to the MHLW.

The access to this data is regulated according to the conditions set forth in Chapter III (Utilization and Provision of Questionnaire Information) of the Statistics Act of Japan. The access may be granted as part of a competitive process for studies that are funded partly or wholly by a public institution, including the MHLW.

⁹ <http://www.mhlw.go.jp/english/database/db-ls/lis.html>

¹⁰ See http://www.mhlw.go.jp/english/database/db-ls/dl/7th_Survey_Outline.pdf

Abbreviations

CG: Caregiving

LP: Living with parent

LPR: Labor participation rate

MA: Married

ME: Marginal effects

MHLW: Ministry of Health, Labour and Welfare of Japan

NFA: Net financial assets

SEMP: Spouse employment status

SINC: Spouse income