

# Informal care and employment status of Japanese middle aged women : a study using JSTAR

Karine Ishii <sup>\*†‡</sup>

## Abstract

In April 2000, a new public long-term care insurance (LTCI) system was launched in Japan with the aim of diminishing the burden of care in the household and increasing female labor market participation. This study takes advantage of the microdata files collected by the Japanese Study of Aging and Retirement (JSTAR) since 2007 to analyse whether informal care provided by middle-aged Japanese women to their elderly parents affects their labour force participation. This analysis does not allow us to draw clear conclusions on the effect of long-term care insurance. However, it shows the situation almost a decade after the launch of the LTCI. The analysis compares women who are coliving with their elderly parents and those who are not. The estimations show that under exogeneity assumption, the provision of frequent informal care reduces the probability of labour market participation for both coliving women and not coliving carers. When treated as endogenous, the marginal effect of coresidential caring remains strongly negative while extraresidential caring does not have a significant impact anymore.

---

\*PhD candidate under the supervision of Pierre Ralle and prof. Jérôme Wittwer. Contact : karine.ishii@dauphine.fr

†PSL, Université Paris-Dauphine, LEDa-LEGOS, DIAL UMR 225, F-75016 Paris, France.

‡IRD, LEDa, DIAL UMR 225, F-75010 Paris, France

# 1 Introduction

With the rapidly ageing population, OECD countries are currently facing two major challenges. First, the growing proportion of pensioners raises concerns about the sustainability of the public pensions system. Second, the increase of the population aged 80 and over is likely to increase the demand for caregiving for the elderly. To solve these problems, numbers of countries tend to conduct policies with the aim to increase employment of two particular groups (women and older workers) and simultaneously to promote inhome-care. Since elderly care to those who are not in institution is mainly brought by middle-aged women (spouses and daughters), analysing the relationship between labor supply and caregiving among this group of the population is an important issue.

The issue is particularly interesting for Japan which experienced a far larger increase in its ageing population than any other western country, and implemented a mandatory public long-term care insurance in order to face the growing need for elderly care. The purpose of this article is to provide new evidence on whether informal care provided by middle-aged Japanese women to their frail parents affects their labour force participation, using the recently developed multi-disciplinary micro database Japanese Study of Aging and Retirement (Jstar).

In the post-World War II period, Japan's fertility decline was the earliest to occur in the world and also the greatest among all the industrialized nations (Ogawa et al., 2009). In 2010, Japan had the highest proportion of elderly people in the world<sup>1</sup>. 22.7% of the Japanese people are 65 years or over against an average of 18.3% in Western Europe and 13.1% in the United States. The proportion of those aged 80 or over was also the most important in 2010 with 6.3% and is likely double by 2030 to reach 12.7%.

In response to the rapidly ageing population, the Japanese government conducted two main policies in regards to elderly care during the last two decades. In 1989 a major 10-years projet called the *Golden Plan* was launched in order to promote in-home care for the elderly (Ogawa et al., 2010). The main objective of the *Golden Plan* was to improve services for the elderly who live at home (Ogawa and Retherford, 1997) while long-term care was provided by each municipality as part of the social welfare policy program (Shimizutani et al., 2008). The *Golden Plan* was hugely popular but also created many problems : spending increased rapidly ; local government faced management difficulties ; the definitions of eligibility, the types and the amount of services provided varied largely between localities (Tamiya et al., 2011). In April 2000, a mandatory public long-term care insurance (LTCI) was initiated. Since then, all insured people certified as *needing care* have been entitled to receive care services with 10% of co-insurance payment. The amount of services they can receive depends on the level of certification.

Surprisingly, only few studies analyze the relationship between female labor market behavior and caregiving to elderly parents after the launch of the LTCI in 2000. Two studies focused on the effect of introducing the LTCI on female labor market participation using difference-in-difference approaches.

---

1. World Population Prospects : The 2010 Revision

Taking advantage of data sets of *Survey on Long-term Care Users*, one prior to and two others after April 2000, Shimizutani et al. (2008) showed no effect in 2001 but a large and positive effect in 2002. Using 1998 and 2004 data from the *Comprehensive Survey of People's Living Conditions* (CSPLC), Tamiya et al. (2011) found that time spent on care by family members dropped and that introducing LTCI increased the probability of being employed. But those two effects were mainly observed for high income carers. Finally, to the best of our knowledge, only one forthcoming study analyzes the causal effect between caregiving and labor supply when the LTCI program matured. Yamada and Shimizutani (2014) use micro-level data from the CSPLC to estimate the effect of caring on labour supply for co-resident carers in 2010. They find a negative effect of care provision on labour market outcomes of the main caregivers at home in terms of probability of working, employment status and hours worked. According to their study, LTCI program mitigates partially this negative effect.

The originality of this paper is twofolds. First, we use data from 2007 to 2011 which is almost a decade after the launch of the mandatory Long Terme Care Insurance (LTCI) established in order to face the raising demand for caregiving. Second, in contrast with the work of Yamada and Shimizutani (2014) which focuses only on co-residential care, our paper attempts to analyze the difference between co-residential care and extra-residential care.

According to the seventh round of the International Survey of Lifestyles and Attitudes of the Elderly (Cabinet Office, 2010) the proportion of the elderly aged 60 and older living with a grand-child was 17.7% while it was 8.4% in the United States and 1.7% in Germany. Two reasons may be listed to explain the high frequency of multigenerational households in Japan. First, as documented by Ogawa and Ermisch (1996) and Ogawa et al. (2009), several authors explain the high rate of multigenerational household by a deep rooted Confucian teaching of filial piety which continues to affect various aspects of society. Second, a chronic shortage of licensed daycare centers for children and out-of-school hours care centers make it difficult for women to continue working after giving birth (Oishi and Oshio, 2006). Living with parents may be a strategy to decrease the burden of child rearing and continue to work.

Although multigenerational households are still commonplace and play an important role in Japan in comparison to other industrialized western countries, they are also undeniably declining continuously since several decades. The proportion of three-generation households dropped from 15.3% in 1986 to 7.9% in 2010<sup>2</sup>. Therefore, it seems essential to analyse the impact of caring for both coresident carers and extraresident carers separately.

The paper first performs the analysis using Probit Models on different samples assuming the exogeneity of informal care in respect to labour force participation decision. The estimations show that under the exogeneity assumption, the provision of frequent informal care reduces the probability of labour market participation for both coliving women and not coliving carers. Weekly and daily care decrease greatly the probability for an extra-residential carer to work while only daily care affects co-residential carers' work. As we suspect caring to be endogenous with respect to employment, this

---

2. [mwhl.co.jp](http://mwhl.co.jp), Basic Survey on People's Life (in Japanese)

paper then attempts to address the sources of endogeneity using an instrumental variable method. Parents' age is used as an instrumental variable. When treated as endogenous, the marginal effect of coresidential caring remains strongly negative while extraresidential caring does not have a significant impact anymore.

The remainder of this paper is organized as follows. Section 2 reviews the previous literature. In section 3, we present the description of the data and the variables retained. Section 4 presents the empirical methods and provides the estimation results.

## 2 Literature

### 2.1 Informal care and labor market participation

Caring may affect labor market supply through several channels. Four effects are suggested in the literature (Carmichael and Charles, 1998; Heitmueller, 2007; Fontaine, 2010) : the *substitution effect*, the *discrimination effect*, the *income effect* and the *respite effect*. Among them, the substitution effect is probably the most intuitive effect. Under time constraint, a caregiver has to allocate his time between work, caring or leisure. This effect can be analyzed with a simple model developed by Johnson and Lo Sasso (2000) based on the standard economic assumption that individuals are utility-maximizers. In their model, individuals allocate their time between paid employment, leisure and care of elderly parents under budget and time constraints. Assuming that decisions are made by altruistic adult children and that parents are passive recipients, the model predicts that adult children reduce their labor supply when they increase the number of hours they spend caring for their parents. Working and caregiving appear as two competing activities.

The discrimination effect occurs more indirectly. If we assume as Carmichael and Charles (1998) that caring decreases the wage rate of the carer for being less reliable (higher absence or sickness rate) or taking less responsibilities, the opportunity costs of time, leisure and informal care are less costly. Therefore, with lower expected earnings, carers may be less likely to participate in the labor market. Yet, caregiving may lead to additional costs which would encourage informal carers to increase labor supply. This *income effect* should be more significant in an environment in which formal care services are broadly available. Finally, according to the respite effect, individuals involved in caregiving may desire to take breaks from caring responsibility by working. As documented by Le Bihan-Youinou et al. (2006), working can be a strategy to avoid being fully committed to caring. The respite and income effects impact positively labor supply while the substitution and discrimination effects have a negative impact on labor supply. The net effect of informal care provision on labour market participation is therefore theoretically unknown.

## 2.2 Empirical studies

Untill recently, studies estimating the effect of caring on labor market participation were mainly based on US data (Wolff and Soldo, 1994; Stern, 1995; Ettner, 1995, 1996; Johnson and Lo Sasso, 2000; Wolff, 2006; Van Houtven et al., 2013). Since the 2000s, studies on the relationship between informal care and employment started to be carried out in UK (Carmichael and Charles, 1998, 2003; Heitmueller, 2007; Heitmueller and Inglis, 2007; Michaud et al., 2010) and Europe (Crespo, 2006; Bolin et al., 2008; Casado-Marín et al., 2009; Kotsadam, 2011; Ciani, 2012). The papers focusing on Europe have been particularly expanding since the developpement of the Survey of Health Ageing and Retirement in Europe (SHARE) in the mid-2000s. We can also mention several analyses performed in Australia (Berecki-Gisolf et al., 2008; Leigh, 2010) and in Japan (Shimizutani et al., 2008).

The results obtained from the empirical studies analysing the causal effect of care provision on the labour supply have been mixed. However, when the intensity or the quantity of the caregiving is taken into account, the results are more converging (for women) : high intensity care or caregiving more than a certain amount of hours (e.g. 20 hours a week) seems to have a negative effect on the probability of labour participation.

Except for a few exceptions (Carmichael and Charles, 1998, 2003), most of the studies conducted since the middle of the 90s tackle the potential endogeneity of caregiving with respect to employment. Indeed, if we suspect caregiving to affect labour market participation, employment status may also play a role in the care provision leading to reverse causality. As noticed by Fontaine (2011) the most frequently used method in order to treat endogeneity is the instrumental variable method. The model generally contains an equation of the care provision and an equation of the labour supply that includes the instrumented care provision as a regressor. The coefficients can be estimated in two steps or simultaneously by maximum likelihood. Casado-Marín et al. (2009) are one of the few who did not use instruments but opted for matching and difference-in-difference methods.

Carmichael and Charles (1998) investigate the influence of informal care responsibilities on the labour supply of women in the UK using a sample of women aged 21 to 59 from the General Household Survey (GHS). They find that informal carers who care for less than 20 hours per week are more likely to participate in the labour market but tend to work for fewer hours per week than otherwise similar noncarers. Furthermore, informal carers who care for 20 hours or more a week are less likely to participate in the labor market. Using US data from the Health and Retirement Study (HRS), Johnson and Lo Sasso (2000) estimate simultaneous panel data models of annual hours of paid work and the provision of care. They performe their analysis on a sample of men and women aged 53 to 65 and conclude that caring for a frail parent reduces labour supply for both genders. Crespo (2006) estimates the causal effect of providing "intensive" informal care to elderly parents on labour market participation decisions for European women aged between 50 and 60. When she uses a biprobit model and a treated care variable as endogenous in the labour participation equation, she finds a stronger negative effect of caring on labour participation than under exogenous assumptions. Bolin et al. (2008)

also examine the impact of hours of informal care provided on the probability of employment, hours worked and wages using SHARE. They attempt to treat the endogeneity issue with an instrument but can not reject the exogeneity assumption. They find a negative and significant effect of care on the probability of employment but not on working hours. Using longitudinal data from HRS, Van Houtven et al. (2013) examine the relationship between informal care and work. They particularly distinguish the employment status and retirement status. They use a panel dimension in order to control for time-invariant individual heterogeneity, and an instrumental method to control for endogeneity. They find that female caregivers are more likely to be retired, and caring appears to have a negative effect for female care providers who remain working, .

Using the National Survey of Families and Households (NSFH) of 1987, Wolff and Soldo (1994) first simultaneously estimate the probability of providing parent care and of being employed. In a second step, they estimate the effect of caregiving on working hours conditional on being employed. They show no significant relationship between the provision of parental care and female labor supply. Casado-Marín et al. (2009) examine the effect of becoming a caregiver on the probability of employment using matching and difference-in-difference methods on a sample from the European Community Household Panel (1994-2001). Their results suggest that becoming a caregiver does not significantly affect the decision of being employed. Wolff and Soldo (1994) and Casado-Marín et al. (2009) do not take into account the intensity of caring.

Several authors have analysed the effect of caring on employment by distinguishing coresident and extra-resident caregivers (Ettner, 1995, 1996; Heitmueller, 2007; Michaud et al., 2010). They all find stronger negative effects (although not necessarily significant) of co-residential care compared to non-co-residential care. Ettner (1995) estimates a two-part model using data from the Survey of Income and Program Participation (SIPP). She finds a negative and significant effect of coresidential care on female labour but no significant effect for extra-residential caregivers. Using the same method but different data (NSFH 1987), Ettner (1996) finds that the magnitude of the caregiving effect is larger for women than for men and for coresidence than for non-coresidential care. But the effect is significant only for women providing extra-residential care. Using an instrumental variable approach and panel techniques, and employing data from the British Household Panel Study (1991-2002), Heitmueller (2007) highlights the absence of endogeneity for co-residential carers, but indication of endogeneity for extra-residential carers. He finds that providing care within the household significantly reduces the employment probability while extra-residential care has no impact. Finally, Michaud et al. (2010) develop a dynamic model to analyse the pathways through which caregiving and employment interact. Using also data from the British Household Panel Study (2000-2005), they find that co-residential caregiving is negatively associated with future employment while the effect of extra-residential care is smaller and statistically insignificant.

To our knowledge, no study analyses the effect of caregiving in Japan splitting the coresidents and the extra-residents.

### 3 Data

This article uses the Japanese Study of Aging and Retirement (JSTAR) which is a multi-disciplinary micro database including individuals aged 50 and over.

#### 3.1 Structure

The first wave of data was collected in 2007 on individuals aged between 50 and 75 living in five municipalities (Takikawa, Sendai, Adachi, Kanazawa and Shirakawa). Every two years the respondents were followed and the sample increased. Additional individuals were surveyed from two additional municipalities (Tosu and Naha) in 2009 and from three additional municipalities (Chofu, Tondabayashi and Hiroshima) in 2011. Three waves are actually available and the database contains in total around 7,120 individuals and 12,990 observations. Interviewers conducted face-to-face interviews with respondents using computers (CAPI : computer-aided personal interview). Some additional information were collected through a self completed questionnaire.

JSTAR follows the design of the US Health and Retirement Study (HRS), the English Longitudinal Study of Ageing (ELSA) and the Survey of Health, Ageing and Retirement in Europe (SHARE). It contains 8 sections of questions : A. individual and family information, B. Memory, Cognitive Ability and Hypothetical questions, C. Employment, D. Health of respondent and spouse, E. Income and consumption, F. Grip Strength, G. Housing and Assets, H. Use of and Expenditure on Medicare Care and Nursing Care Services.

As for SHARE (Crespo, 2006), JSTAR allows to work on two different but similar samples. Respondants can be considered as the elderly parents or as potential informal carers. When the respondents are considered as the elderly parents, the dataset gives detailed information regarding the parents' health and the family structure (number of siblings among potential carers). However, JSTAR focuses on individuals aged between 50 to 75 when interviewing a respondent for the first time, and respondents in 2011 were only aged between 50 to 79. Since the need for care concerns mainly people aged 80 or over, the sample considering the respondents as the parents contains very little individuals needing care. On the contrary, when the respondents are considered as potential carers, the dataset provides more observations of elderly people needing care but little information on their characteristics. Despite this caveat, this article perform the analysis on this second dataset.

Data from different waves were pooled in order to create a dataset containing all respondents surveyed for the first time (w1-2007, w1-2009 and w1-2011 in table 1).

Japanese traditional family values and practices still prevale and it is more frequent in multigenerational households that the couple takes up residence with the husband's parents. Since this paper analyses the impact of care provided by Japanese women on their labour participation, our sample is made up of women with at least one parent alive, including parents-in-law. Furthermore, in order to focus on care brought to elderly parents, the sample does not consider parents in institutions and ex-

TABLE 1 – Number of observations

Town	2007	2009	2011	Total
5 Cities	(i) <i>w1-2007</i> 3,742	(ii) <i>w2-2009</i> 2,718	(iii) <i>w3-2011</i> 2,185	8,645
2 Cities	-	(i) <i>w1-2009</i> 1,409	(iii) <i>w2-2011</i> 973	2,382
3 Cities	-	-	(i) <i>w1-2011</i> 1,965	1,965
Total	3,742	4,127	5,123	12,992

Source : Jstar

Note (a) : *5 Cities* refers to Adachi, Kanazawa, Shirakawa, Sendai et Takikawa ; *2 Cities* to Tosu et Naha ; and *3 Cities* to Chofu, Tondabayashi and Hiroshima.

Note (b) : The sample *w1-2009* correspond to observations interviewed for the first time in 2009 at Tosu and Naha. It contains 1 409 observations.

clude individuals declaring to have an unhealthy spouse. Finally, this study differs from the literature which usually analyses samples of individuals aged up to 59, 60 or 65 (Crespo, 2006; Heitmueller, 2007; Michaud et al., 2010). The employment rate in Japan at elder age stays relatively high. According to Statistics Japan<sup>3</sup>, employment rate in 2010 was about 48% for men aged between 65 to 69 and about 27% for women of the same age. In comparison, the employment rate in France for men and women of the same age group in 2010 was 5% and 3% respectively<sup>4</sup>. Therefore, our study widens the scope to individuals aged between 50 to 70. Finally the sample contains 1,442 women and observations. In order to check the robustness of the results, we also conduct the regressions on pooled data in which an individual can be observed more than once. This sample contains 1,442 women and 1,761 observations. The results are presented in the appendix (see tables 11 to 14).

### 3.2 Variables

During the interview, individuals were asked whether they provided care or assistance ; the type of care they provided (physical care, household care or administrative help), the frequency of care and the receiver (family member who lives with the respondent, family member who does not live with the respondent, friend or neighbor, other). In this paper individuals are considered as informal carers if they declare providing physical care or household care to a family member regardless of whether they are living with them or not. Indeed, we assume that the burden of providing only administrative help cannot affect labour provision. In the first estimations, we analyse the effect of caring according to the frequency of the care (daily, weekly, less than weekly). In the second step, only care provided on a daily basis and/or weekly basis are considered as informal caring. One may object that household care should not be regarded as care provision if the carer is living with the elderly person. Regardless

3. [stat.go.jp](http://stat.go.jp)

4. [insee.fr](http://insee.fr)

of whether an adult-child is living with an elderly parent who needs care or not, there will always be household tasks to do. This is actually one of the reasons why formal household care are not available through the Japanese LTCI for applicants who are living with individuals who do not need care. On the other hand, household tasks increase with the number of coliving members and may still be a burden for the carers. In order to verify the results, we also proceed to an analysis excluding household care as caring for coresident carers.

The self completed survey contains questions regarding the average time of care per day an individual provides. However, there is no detail on how many days per week the respondent provides care and it is not possible to calculate the caring time per week. We therefore do not use this information.

Tables 2 and 3 report the mean characteristics of the sample used according to the care provision and the residence. Depending on the variable, there are between 1,430 to 1,442 observations. Around 20% of women declare being engaged in informal care (daily or weekly care when caring is defined as household care or physical care). Almost 28% of respondents are coliving with at least one parent. Informal caring is more frequent among individuals coliving with a parent (40% for coliving individuals against 24.5% for the other), and coresidential caring is mainly provided on a daily basis, no matter the type of care.

Labour market participation is defined by whether the respondent declares working at the time of the survey. Overall labour market participation is around 61% but this rate is lower among those who provide care (49%). Although the proportion of carers is more important among those coliving with a parent, the labour market participation is also slightly higher than those who are not coliving with parents.

In all regressions, we control for age (under 60, between 60-64, between 65-70), education (Junior High School, High School or Junior College, University or more), number of children (2 or more children vs. fewer), respondent's health (bad health or not), marital status and the work of the spouse if any (no spouse, working spouse, no working spouse), household pension (whether the household receives a pension or not), the pension type (National Pension Scheme *kokumin nenkin* vs. other) and finally cities<sup>5</sup>.

The pension type refers to the pension scheme the respondent is receiving or is expecting to receive in the future. There are currently six different public pension schemes in Japan but two of them, the National Pension Scheme (NPS or *kokumin nenkin*) and the Employees' Pension Scheme (EPS or *kousei nenkin*) cover approximately 90% of the work force (Ogawa et al., 2009). Farmers, other self-employed workers, employees of small firms with less than five regular workers and certain other categories belong to the NPS. The contributions from the members for the NPS are lower than those from the workers belonging to EPS (employees belonging to a firm with at least five regular workers) and benefits paid to NPS recipients are considerably lower than the benefits paid to EPS recipients.

---

5. Our data set did not have details of the cities but the group of cities (5 cities of the first wave, 2 cities added in the the second wave and finally the 3 cities added in 2011

In this paper we use the pension scheme as a proxy for household income.

TABLE 2 – Statistical descriptions for women according to care decisions

Variable	All			Bring Care			No Care		
	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.
<b>Daily or weekly care</b>	1442	0.202	0.402	292	1.000	0.000	1150	0.000	0.000
<b>Work</b>	1421	0.611	0.488	288	0.490	0.501	1133	0.642	0.480
<b>Living</b>									
CoResident	1442	0.279	0.449	292	0.503	0.501	1150	0.223	0.416
NoCoResident	1442	0.721	0.449	292	0.497	0.501	1150	0.777	0.416
<b>Age</b>									
Under 60	1442	0.646	0.478	292	0.616	0.487	1150	0.653	0.476
60-64	1442	0.272	0.445	292	0.277	0.448	1150	0.270	0.444
65-70	1442	0.083	0.275	292	0.106	0.309	1150	0.077	0.266
<b>Education</b>									
Junior High School	1438	0.145	0.353	292	0.130	0.337	1146	0.149	0.356
High School	1438	0.439	0.496	292	0.421	0.495	1146	0.443	0.497
Junior College	1438	0.298	0.458	292	0.356	0.480	1146	0.284	0.451
University or more	1438	0.118	0.322	292	0.092	0.290	1146	0.124	0.330
<b>Nbr of children</b>	1442	1.944	1.162	292	1.894	1.210	1150	1.957	1.150
<b>2 or more children</b>	1442	0.734	0.442	292	0.726	0.447	1150	0.737	0.441
<b>Nb of living parents</b>	1442	1.608	0.799	292	1.627	0.821	1150	1.603	0.793
<b>Bad health</b>	1442	0.021	0.145	292	0.021	0.142	1150	0.022	0.146
<b>Marital situation</b>									
No spouse	1441	0.185	0.388	292	0.168	0.374	1149	0.189	0.392
Working spouse	1442	0.655	0.476	292	0.654	0.476	1150	0.655	0.476
Not working spouse	1430	0.154	0.361	290	0.172	0.378	1140	0.149	0.356
<b>Household pension</b>									
Receive pension	1442	0.380	0.486	292	0.428	0.496	1150	0.368	0.482
No pension	1442	0.620	0.486	292	0.572	0.496	1150	0.632	0.482
Information missing	1442	0.015	0.120	292	0.007	0.083	1150	0.017	0.128
<b>Pension type</b>									
National Pension Scheme	1442	0.163	0.369	292	0.127	0.333	1150	0.172	0.378
Other	1442	0.733	0.443	292	0.795	0.405	1150	0.717	0.450
Information missing	1442	0.104	0.305	292	0.079	0.270	1150	0.110	0.314
<b>Town</b>									
5 cities	1442	0.468	0.499	292	0.462	0.499	1150	0.470	0.499
2 cities	1442	0.205	0.404	292	0.212	0.410	1150	0.203	0.402
3 cities	1442	0.327	0.469	292	0.325	0.469	1150	0.328	0.470

Source : JSTAR 2007-2009-2011

TABLE 3 – Statistical description for women according to residence

Variable	All			Co Resident			Extra Resident		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
<b>Living</b>									
CoResident	1442	0.279	0.449	403	1.000	0.000	1039	0.000	0.000
NoCoResident	1442	0.721	0.449	403	0.000	0.000	1039	1.000	0.000
<b>Work Care</b>	1421	0.611	0.488	400	0.620	0.486	1021	0.607	0.489
less than once a week	1442	0.086	0.280	403	0.037	0.190	1039	0.105	0.307
weekly care	1442	0.069	0.253	403	0.037	0.190	1039	0.081	0.273
daily care	1442	0.134	0.341	403	0.328	0.470	1039	0.059	0.235
<b>Care Physical</b>									
less than once a week	1442	0.046	0.211	403	0.027	0.163	1039	0.054	0.226
weekly care	1442	0.051	0.219	403	0.035	0.183	1039	0.057	0.232
daily care	1442	0.108	0.311	403	0.261	0.439	1039	0.049	0.216
<b>Age</b>									
Under 60	1442	0.646	0.478	403	0.680	0.467	1039	0.632	0.482
60-64	1442	0.272	0.445	403	0.233	0.423	1039	0.287	0.452
65-70	1442	0.083	0.275	403	0.087	0.282	1039	0.081	0.273
<b>Education</b>									
Junior High School	1438	0.145	0.353	402	0.147	0.354	1036	0.145	0.352
High School	1438	0.439	0.496	402	0.410	0.493	1036	0.450	0.498
Junior College	1438	0.298	0.458	402	0.316	0.465	1036	0.292	0.455
University or more	1438	0.118	0.322	402	0.127	0.333	1036	0.114	0.318
<b>Nbr of children</b>	1442	1.944	1.162	403	1.747	1.244	1039	2.020	1.120
<b>More than 2 children</b>	1442	0.734	0.442	403	0.653	0.477	1039	0.766	0.423
<b>Nb of living parents</b>	1442	1.608	0.799	403	1.754	0.868	1039	1.551	0.763
<b>Bad health</b>	1442	0.021	0.145	403	0.020	0.140	1039	0.022	0.147
<b>Marital situation</b>									
No spouse	1441	0.185	0.388	403	0.243	0.430	1038	0.162	0.368
Working spouse	1442	0.655	0.476	403	0.633	0.483	1039	0.663	0.473
Not working spouse	1430	0.154	0.361	401	0.120	0.325	1029	0.167	0.373
<b>Household pension</b>									
Receive pension	1442	0.380	0.486	403	0.337	0.473	1039	0.397	0.489
No pension	1442	0.620	0.486	403	0.663	0.473	1039	0.603	0.489
Information missing	1442	0.015	0.120	403	0.005	0.070	1039	0.018	0.134
<b>Pension type</b>									
Kokumin nenkin	1442	0.163	0.369	403	0.181	0.386	1039	0.156	0.363
Other	1442	0.733	0.443	403	0.707	0.456	1039	0.743	0.437
Information missing	1442	0.104	0.305	403	0.112	0.315	1039	0.101	0.302
<b>Town</b>									
5 cities	1442	0.468	0.499	403	0.558	0.497	1039	0.433	0.496
2 cities	1442	0.205	0.404	403	0.166	0.373	1039	0.219	0.414
3 cities	1442	0.327	0.469	403	0.275	0.447	1039	0.347	0.476

Source : JSTAR 2007-2009-2011

## 4 Results

The paper first performs the analysis using Probit Models on different samples assuming the exogeneity of informal care in respect to labour force participation decision. In a second phase, the paper treats caregiving as endogenous with respect to employment.

#### 4.1 Estimations results : informal care treated as exogenous

We execute the analysis by splitting the population into two different groups : women not living with their parents and women living with at least an elderly parent. In this estimation, we analysed the effect of caring according to the frequency of care (daily, weekly, less than weekly) in order to define from which frequency it does have an effect. Caring is here defined as physical care and/or household help.

Table 4 shows the marginal effects. Model (1) presents the results for the whole sample, model (2) concerns daughters who are not coliving with their parents and finally, models (3) and (4) daughters who are. The last column of the table (model 4) checks the results of the coresident carers when informal care is defined only as providing physical care. In all models, age, bad health and having a spouse who is not working decrease the probability of work. Receiving or expecting to receive only a national pension scheme, which is an indicator for low income, also increases the probability of working but the significance is not very stable. Besides, when we distinguish coliving daughters and non-coliving daughters, the significance of some controlling variables differ : coliving daughters having 2 or more children are more likely to work compared to other coliving daughters while the number of children does not seem to affect the probability of working among non-coliving daughters. Similarly, low educated women tend to work less among coresidents, while there is no significant impact among non-coliving daughters.

The table 4 also shows that weekly care and daily care both have a strong negative effect on labour participation of extra resident carers, while only daily care has an effect on coresident carers' labour participation. The negative impact of caring seems stronger for those who are not living with an elderly parent. In the other estimations, informal care provided by extra-residentials is defined as frequent care (daily and/or weekly) while coresidential informal care is defined as daily care.

However, as noted by Ettner (1996), informal care can be considered as exogenous only under the following assumptions : firstly, the intrafamily allocation of the caregiving burden does not depend on endogenous characteristics of the children ; secondly, the family does not allow the parent with disabilities to experience unmet needs ; and finally there is no possibility of substitution of formal for informal care. Numbers of reasons could make these assumptions fail : an employed child may be more expected to provide care than an unemployed child ; there may be no required level of care that the child provides ; and a child with a time cost exceeding the costs for formal care may decide to pay for formal care instead of providing informal care (Ettner, 1996; Bolin et al., 2008).

TABLE 4 – Women labour market participation, informal care treated as an exogenous variable.

		(1) Female (n=1407)		(2) Not Coliving (n=986)		(3) Coliving (n=381)		(4) Coliving (n=381)	
		Household Care		Household Care		Household Care		Physical Care only	
		dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Bring Care</b>									
	No Care	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
	Less Care	-0.038	(0.051)	-0.006	(0.056)	-0.209	(0.202)	0.063	(0.187)
	Weekly Care	<b>-0.198***</b>	(0.056)	<b>-0.215***</b>	(0.062)	0.108	(0.157)	0.085	(0.151)
	Daily Care	<b>-0.127***</b>	(0.044)	<b>-0.155*</b>	(0.080)	<b>-0.151***</b>	(0.058)	<b>-0.102*</b>	(0.062)
<b>Living</b>									
	Not CoResident	ref.	ref.						
	CoResident	0.005	(0.033)						
<b>Age</b>									
	under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
	60-64	<b>-0.169***</b>	(0.040)	<b>-0.172***</b>	(0.048)	<b>-0.167**</b>	(0.079)	<b>-0.157**</b>	(0.078)
	65-70	<b>-0.285***</b>	(0.059)	<b>-0.317***</b>	(0.070)	<b>-0.230**</b>	(0.115)	<b>-0.229**</b>	(0.114)
<b>Level of education</b>									
	Elementary/Middle School	-0.045	(0.041)	-0.004	(0.049)	<b>-0.149*</b>	(0.085)	<b>-0.156*</b>	(0.085)
	High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
	University or More	<b>0.088**</b>	(0.042)	<b>0.090*</b>	(0.051)	0.104	(0.075)	0.111	(0.074)
<b>Bad Health</b>									
	<b>2 children or more</b>	<b>-0.361***</b>	(0.086)	<b>-0.373***</b>	(0.100)	<b>-0.461**</b>	(0.180)	<b>-0.465***</b>	(0.173)
<b>Marital Status</b>									
	no spouse	<b>0.152***</b>	(0.035)	<b>0.170***</b>	(0.042)	<b>0.172***</b>	(0.065)	<b>0.155**</b>	(0.066)
	no working spouse	<b>-0.130***</b>	(0.043)	<b>-0.115**</b>	(0.049)	-0.142	(0.096)	-0.155	(0.096)
	working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>									
	No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
	Receiving pension	<b>-0.067*</b>	(0.041)	-0.063	(0.049)	-0.118	(0.079)	-0.112	(0.078)
	Information Missing	-0.044	(0.116)	-0.009	(0.121)	-0.089	(0.399)	-0.085	(0.391)
<b>Pension type</b>									
	Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
	National pension (Kokumin)	<b>0.078**</b>	(0.037)	<b>0.078*</b>	(0.045)	0.102	(0.069)	<b>0.121*</b>	(0.067)
	Information Missing	-0.043	(0.050)	<b>-0.113*</b>	(0.062)	0.067	(0.089)	0.078	(0.088)
<b>Wave dummies</b>		Yes		Yes		Yes		Yes	
Constant		<b>0.696***</b>	(0.036)	<b>0.684***</b>	(0.042)	<b>0.695***</b>	(0.064)	<b>0.679***</b>	(0.064)
	Pseudo R-squared	0.108		0.107		0.164		0.155	

Source : JSTAR 2007-2009-2011

## 4.2 IV estimations

Following the example of Heitmueller (2007), we use an instrumental variables method to address the sources of endogeneity. The endogenous regressor is treated as a linear function of the instrument and the other exogenous variables.

### 4.2.1 The choice of the instruments

The age and the health status of the respondent's parents or parents in law are identified as related with the caring decision but not directly with labour market participation. The health status of the respondent's parent should affect the caring decision but not the labour-market outcomes other than through the effect on informal care-giving by the respondent. It can therefore be considered as an instrument. Furthermore, the regressions include the respondent's health situation and thus any transmissions of health through the generation should be controlled. Initially, four potential instruments were considered : the level of LTCI certification of the parent ; length of care required by the parent and declared by the child ; the death of a parent in  $N+2$  and the age of the eldest parent. For an IV-estimates to be reliable, the instrument should be i) orthogonal to the error process and ii) correlated with the potentially endogenous variable. It has been suggested by Staiger and Stock (1997) that an F-statistic in the first stage equation below 10 is a concern since it signals a problem of weak instruments. Only the age of the eldest parent appeared to full-fill these conditions.

Firstly, LTCI certification is delivered by the municipality to the applicants, generally aged 65 years old or more<sup>6</sup>, who need care. A questionnaire of 74 items is used in order to evaluate an applicant's disability situation which ensure an objective evaluation throughout Japan. There are seven levels of certification that are gathered in two groups : in prevention (the first two levels) and dependant (the five following). The main caveat of this instrument is that the LTCI evaluation is not automatic but is proceeded only on request which may lead to a selection bias. Besides, being certified may be correlated with children's employment. One may say that individuals who are not working may have more time to help their parents for administrative formalities. On the other hand, working children may have bigger incentives to encourage their parents to use formal care. Although it is difficult to identify a clear relationship a priori between children's labour situation and parent's LTCI take up, it is most likely that being certified is not orthogonal with children's employment.

Secondly, the length of care required by the parents is also suspected to be highly correlated with the child's working status. A respondent who does not work may tend to overestimate the time of care required in order to justify why she is not working. On the opposite, a person who works but does not care for a parent may simply underestimate the time of care required.

Thirdly, although the death of a parent in  $N+2$  did not appear to suffer from any selection bias nor direct correlation with children's work, the correlation to informal care was far too small to be used as

---

6. LTCI is generally intended to those aged 65 years and more, but there may be some exception for those afflicted by specifics conditions (such as parkinson disease). They are eligible from the age of 40.

an instrument.

Finally, only the age of the eldest parent appeared to be a relevant instrument. We assume that age captures health characteristics of the elderly parent and thus is associated with the need for informal care. Besides, parents age should not affect the care-givers labour participation other than via the effects of informal care.

Table 5 presents the results of the first stage regressions. All the models are simple OLS. The dependant variable is *frequent care* for the model analysing the whole sample and extra-residential individuals, and *daily care* for the one analysing the sample of co-residential individuals. As predicted, the probability of bringing care increases according to the age of the eldest parent. The instrument is relevant (T-Statistic > 10), but appears to be quite weak according to the R-squared, especially for the sample of non-coliving daughters.

The results show that having no spouse or receiving (or expecting to receive) only National Pension (Kokumin Nenkin) decrease the probability of caring, while having a University degree decreases it. Besides, caring is more frequent among women who are living with an elderly parent compared to those who are not. The probability to provide care increases by about 22% when the daughter is coliving.

TABLE 5 – First stage results, decision of providing informal care

VARIABLES	(1) Female (n=1409)		(2) Not Coliving (n=1012)		(3) Coliving (n=397)	
	Frequent Care		Frequent Care		Daily Care	
	coeff	Std. Err.	coeff	Std. Err.	coeff	Std. Err.
<b>Age of eldest parent</b>	<b>0.010***</b>	(0.002)	<b>0.009***</b>	(0.002)	<b>0.018***</b>	(0.005)
<b>Age</b>						
under 60	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>
60-64	-0.025	(0.032)	-0.062*	(0.034)	0.019	(0.072)
65-70	0.005	(0.048)	-0.042	(0.052)	0.049	(0.104)
<b>Level of education</b>						
Elementary/Middle School	-0.038	(0.031)	-0.044	(0.033)	-0.047	(0.069)
High School/Junior College	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>
University or More	<b>-0.063*</b>	(0.033)	-0.023	(0.035)	<b>-0.149**</b>	(0.072)
<b>2 children or more</b>	-0.006	(0.025)	-0.004	(0.026)	0.049	(0.061)
<b>Bad health</b>	-0.016	(0.071)	-0.042	(0.073)	-0.058	(0.169)
<b>Marital Status</b>						
no spouse	-0.027	(0.029)	<b>-0.056*</b>	(0.031)	<b>0.118*</b>	(0.066)
no working spouse	-0.005	(0.032)	-0.020	(0.033)	0.051	(0.081)
working spouse	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>
<b>Receiving pension or not</b>						
No pension	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>
Receiving pension	-0.008	(0.031)	0.024	(0.033)	-0.052	(0.072)
Information Missing	-0.029	(0.091)	-0.031	(0.087)	0.125	(0.331)
<b>Pension type</b>						
Other Pension	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>	<i>ref.</i>
National pension (Kokumin)	<b>-0.075***</b>	(0.029)	<b>-0.061*</b>	(0.031)	<b>-0.140**</b>	(0.063)
Information Missing	<b>-0.069*</b>	(0.037)	-0.060	(0.040)	-0.056	(0.081)
<b>Living</b>						
CoResident	<b>0.224***</b>	(0.024)				
NoCoResident	<i>ref.</i>	<i>ref.</i>				
<b>Wave dummies</b>		yes		yes		yes
Constant	<b>-0.708***</b>	(0.176)	<b>-0.554***</b>	(0.185)	<b>-1.279***</b>	(0.415)
R-squared	0.095		0.033		0.083	
F-test	26.73		19.40		16,97	

Source : JSTAR 2007-2009-2011

Note : The dependant variable *Fcare* used in the first four models, which are for the full sample and the extrarresident sample, refers to *frequent care* (daily or weekly household care and/or physical care). The dependant variable *Dcare* used for the coresident sample refers to *daily* household and/or physical care.

### 4.2.2 Estimation results

Tables 6 and 7 present respectively the results for daughters coliving with the parents and the daughters who are not coliving. Models (1) and (3) are OLS and probit regressions, models (2) and (4) adjust for potential endogeneity bias using an instrument. Informal care for coresidents is defined as daily physical care and/or household care while frequent (daily or weekly) physical care and/or household care are considered as extra coresident informal caring.

The negative impact of caring on labour participation increases for coliving daughters when endogeneity is treated, while it is cancelled for non-coliving daughters. According to table 6, if we assume exogeneity of informal care, coresidential care decreases the probability of labour participation by more than 10%. When informal care is treated as endogenous, the magnitude of the coefficient amplifies but with the sharp increase of the standard errors, the coefficient is not significant anymore. We tested to see if we could treat the suspected endogenous regressor as exogenous using the Wu-Hausman test. Under the null hypothesis that informal care can actually be treated as exogenous, the test statistic is distributed as chi-squared (Baum et al., 2003). The Wu-Hausman test could not reject the null hypothesis of exogeneity ( $p=0,89$ ) (see table 6), indicating clearly that we should not treat for endogeneity. This result is in line with the results observed by Heitmueller (2007) in his cross-sectional analysis. Endogeneity is likely to vary with the degree of freedom in the care decision. We can reasonably assume that women co-living with their parents feel more obligation to provide care, especially if we consider that many of the multigenerational households are initially a solution adopted in order to decrease the burdens of child rearing. Under stronger family constraints for coresident daughters, it is therefore not surprising to find coresidential caring as exogenous.

Interpretation of the results regarding daughters who are not coliving is less straightforward. As for coliving daughters care, if informal caring is assumed to be exogenous, providing care should have a strong negative impact on labour participation. However, when endogeneity is treated, extra-residential care no longer impacts the labour market participation decision. The coefficient is positive though not significant. As discussed earlier, caring can have both positive and negative effects. The *substitution effect* or the *discrimination effect* lead to a negative correlation between care and employment while the *income effect* and the *respite effect* lead to a positive relationship. Several studies have shown that caregiving would have a negative effect only when it exceeds a certain threshold (Carmichael and Charles, 1998, 2003; Heitmueller, 2007). Our results indicate that among extra-residential women, positive and negative caring effects on employment cancel each other. We can however expect to see negative effects for intensive care or negative effects on the hours of working.

One of the flaws of our analysis lies on the fact that the variable of interest does not include any information regarding caring intensity.

However, we have information about the frequency but no indication of intensity, and it is reasonable to think that coresident caregivers tend to bring more intensive care than extra-resident caregivers. Firstly, coresident daughters can be asked for care at any time they are home which should automa-

tically lead to more intense care for coresident. Secondly, the definition of caregiving may be different for coresidents and extra-coresidents. Some coresident caregivers may not realize and not define themselves as caregivers. As a consequence, coresidents who declare themselves as caregivers are generally more intensive caregivers than extra-resident caregivers. Therefore, it is not surprising to have a strong negative effect for coresidents, but not necessarily of extra-residents.

These results should be treated with caution however. Surprisingly, the Wu-Hausman test does not reject the hypothesis of exogeneity ( $p=0,24$ ) of extra-resident caregiving. As it is shown in table 4, if both types of caring are assumed to be exogenous, extraresidential care appears to have a stronger negative effect than coresidential effect, which should be a concern for the Japanese government. As discussed earlier, multigenerational households are decreasing rapidly. Extra-residential caregiving should therefore increase. If extra-residential caregiving has a stronger negative effect on employment, the population of senior women working is more likely drop with the increase of elderly people needing care. But the test may fail to reject the exogeneity assumption due to the lack of observation and the weakness of the instrument. The first stage F-test indicates that the instrument is relevant, but the R-squared shows that the capacity of the first stage equation in predicting care remains low.

Although there is no indication of endogeneity, the significance level of the coefficient is far smaller than the one for the coresidential caring and we tend to believe that a larger sample or a stronger instrument would result in rejecting the exogeneity assumption for extra-residential care. Future studies should perform exogeneity test on a larger sample.

TABLE 6 – Labour market participation for women in coresidence (Daily care)

Pooled sample CoResident	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=381)		Max Age (n=378)		(n=381)		Max Age (n=378)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Daily Care</b>	<b>-0.134***</b>	(0.049)	-0.160	(0.228)	<b>-0.148***</b>	(0.057)	-0.521	(0.721)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.143**</b>	(0.067)	<b>-0.162**</b>	(0.069)	<b>-0.156**</b>	(0.078)	<b>-0.460**</b>	(0.216)
65-70	<b>-0.196**</b>	(0.096)	<b>-0.207**</b>	(0.100)	<b>-0.218*</b>	(0.115)	<b>-0.583*</b>	(0.318)
<b>Level of education</b>								
Elementary/Middle School	<b>-0.136*</b>	(0.070)	<b>-0.134*</b>	(0.069)	<b>-0.155*</b>	(0.084)	<b>-0.395*</b>	(0.214)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	0.086	(0.070)	0.084	(0.077)	0.101	(0.075)	0.272	(0.256)
<b>2 children or more</b>	<b>0.159***</b>	(0.059)	<b>0.160***</b>	(0.059)	<b>0.186***</b>	(0.070)	<b>0.498***</b>	(0.188)
<b>Bad Health</b>	<b>-0.382**</b>	(0.172)	<b>-0.390**</b>	(0.169)	<b>-0.445**</b>	(0.177)	<b>-1.243**</b>	(0.616)
<b>Marital Status</b>								
no spouse	<b>0.155**</b>	(0.064)	<b>0.152**</b>	(0.066)	<b>0.163**</b>	(0.065)	<b>0.458**</b>	(0.208)
no working spouse	<b>-0.138*</b>	(0.079)	<b>-0.134*</b>	(0.079)	-0.151	(0.096)	-0.376	(0.251)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.108	(0.068)	-0.095	(0.067)	-0.120	(0.078)	-0.279	(0.209)
Information Missing	-0.089	(0.317)	-0.089	(0.312)	-0.092	(0.398)	-0.232	(1.015)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension	0.085	(0.062)	0.097	(0.068)	0.107	(0.068)	0.337	(0.228)
Information Missing	0.055	(0.080)	0.065	(0.078)	0.071	(0.089)	0.227	(0.257)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	<b>0.695***</b>	(0.063)	<b>0.699***</b>	(0.087)				
Wu-Hausmann			0.016	(p=0.89)				

Source : JSTAR 2007-2009-2011

Note : Daily care is defined as daily household help and/or physical care

TABLE 7 – Labour market participation for women not in coresidence (Frequent care)

Pooled sample Not CoResident	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=986)		Max Age (n=973)		(n=986)		Max Age (n=973)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Frequent Care</b>	<b>-0.173***</b>	(0.045)	0.190	(0.325)	<b>-0.192***</b>	(0.050)	0.484	(0.860)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.157***</b>	(0.044)	<b>-0.154***</b>	(0.046)	<b>-0.171***</b>	(0.048)	<b>-0.410***</b>	(0.139)
65-70	<b>-0.291***</b>	(0.066)	<b>-0.314***</b>	(0.070)	<b>-0.315***</b>	(0.070)	<b>-0.835***</b>	(0.197)
<b>Level of education</b>								
Elementary/Middle School	-0.001	(0.045)	0.012	(0.048)	-0.003	(0.049)	0.025	(0.130)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	0.078	(0.048)	<b>0.086*</b>	(0.049)	<b>0.091*</b>	(0.051)	<b>0.252*</b>	(0.141)
<b>Bad health</b>	<b>-0.348***</b>	(0.102)	<b>-0.322***</b>	(0.107)	<b>-0.374***</b>	(0.100)	<b>-0.877***</b>	(0.339)
<b>2 children or more</b>	0.046	(0.035)	0.042	(0.037)	0.053	(0.040)	0.119	(0.102)
<b>Marital Status</b>								
no spouse	<b>0.153***</b>	(0.042)	<b>0.177***</b>	(0.048)	<b>0.171***</b>	(0.042)	<b>0.516***</b>	(0.127)
no working spouse	<b>-0.110**</b>	(0.044)	<b>-0.112**</b>	(0.046)	<b>-0.115**</b>	(0.049)	<b>-0.285**</b>	(0.129)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.060	(0.044)	-0.053	(0.047)	-0.063	(0.049)	-0.137	(0.127)
Information Missing	-0.010	(0.110)	-0.002	(0.119)	-0.007	(0.121)	0.008	(0.325)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	0.068	(0.042)	<b>0.103**</b>	(0.048)	<b>0.078*</b>	(0.045)	<b>0.293**</b>	(0.127)
Information Missing	<b>-0.097*</b>	(0.054)	-0.061	(0.058)	<b>-0.112*</b>	(0.062)	-0.178	(0.165)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	<b>0.683***</b>	(0.042)	<b>0.628***</b>	(0.062)				
Wu-Hausmann			1.369	(p=0.24)				

Source : JSTAR 2007-2009-2011

Note : Frequent care is defined as daily or weekly household help and/or physical care

## 5 Conclusion

In response to the rapidly ageing population, the Japanese government initiated a new mandatory public long-term insurance with the official aim to diminish the burden of care in the household (?). On the other hand, by implementing the LTCI, the government promoted home-care, and therefore increased the family responsibility in elderly care. Although, this study does not allow us to draw conclusion on the effect of the LTCI, it brings some elements about the impact of elderly caregiving on the middle-aged women employment in Japan, ten years after the launch of the program.

This analysis utilized the survey Japanese Study of Aging and Retirement (JSTAR) in order to perform an analysis distinguishing the co-resident caregivers from the extra-resident caregivers, while other studies on Japanese data have focused on co-resident caregivers. Multigenerational households in Japan are still commonplace in comparison to other industrialized western countries, however, the proportion of three-generation households has also been declining since several decades. It is therefore legitimate to ask whether caring has the same impact on employment of co-resident caregiver and extra-residential caregivers.

According to our results, there is an important difference between the two populations, which highlights the importance of exclusive analysis therein. Our findings confirm the results of previous studies indicating that co-resident caregiving has a stronger impact on employment than extra-resident caregiving (Stern, 1995; Ettner, 1995; Heitmueller, 2007; Michaud et al., 2010). Co-resident caregiving significantly reduces the probability of employment, while this study does not show a significant effect of extra-resident caregiving. For caregivers who are not coliving with their frail parents, caring does not have any negative extensive effect.

One interpretation is that elderly population in co-resident and extra-resident scenarios have different ways of using LTCI services. First, the two populations have different preferences that affect the amount and the type of formal care they use. Second, although the Japanese government projects the willingness to bring the same rights to all with the motto "equal services for equal needs", some services are not usable by co-resident caregivers. For instance, housekeeping is a daily life activity a caregiver is likely to do whether or not he is living with an elderly who needs care. Activities of this sort are therefore not provided to multigenerational households. Elderly populations who require care and are not living with children may be using services in a more efficient way that diminish the burden on informal caregivers, while elderly living with a child depend more on the family caregivers. In such case, the decline of multigenerational households will not necessarily lead to a negative situation : elderly populations requiring care will tend to use formal care in an efficient way, alleviating the burden on adult children and therefore reducing the impact on their employment. But on the other hand, extra-resident caregivers may provide less care than coresident caregivers, without regard to the amount and the quality of formal care received by the elderly. If it is the case, the evolution of the Japanese society towards less multigenerational households would lead to a deterioration of quality of life for elderly population.

Further studies are necessary in order to (i) take into account the hours of work and examine the intensive effects of extra-residential caregiving, and (ii) analyse the relationship between formal care provided by LTCI and extraresident informal care.

## 6 Appendix

TABLE 8 – Labour market participation for all women

Pooled sample Female	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=1407)		Max Age (n=1390)		(n=1407)		Max Age (n=1390)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Frequent Care</b>	<b>-0.134***</b>	(0.031)	0.017	(0.228)	<b>-0.148***</b>	(0.036)	0.001	(0.668)
<b>Living</b>								
Not CoResident	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
CoResident	0.013	(0.029)	-0.022	(0.060)	0.015	(0.032)	-0.049	(0.175)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.154***</b>	(0.036)	<b>-0.167***</b>	(0.037)	<b>-0.167***</b>	(0.040)	<b>-0.460***</b>	(0.105)
65-70	<b>-0.261***</b>	(0.054)	<b>-0.283***</b>	(0.057)	<b>-0.281***</b>	(0.059)	<b>-0.772***</b>	(0.160)
<b>Level of education</b>								
Elementary/Middle School	-0.040	(0.037)	-0.033	(0.038)	-0.046	(0.041)	-0.101	(0.110)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	<b>0.076*</b>	(0.039)	<b>0.087**</b>	(0.041)	<b>0.088**</b>	(0.042)	<b>0.265**</b>	(0.121)
<b>Bad health</b>	<b>-0.337***</b>	(0.086)	<b>-0.332***</b>	(0.086)	<b>-0.362***</b>	(0.086)	<b>-0.931***</b>	(0.267)
<b>2 children or more</b>	<b>0.072**</b>	(0.029)	<b>0.071**</b>	(0.030)	<b>0.082**</b>	(0.033)	<b>0.207**</b>	(0.086)
<b>Marital Status</b>								
no spouse	<b>0.139***</b>	(0.034)	<b>0.144***</b>	(0.035)	<b>0.154***</b>	(0.034)	<b>0.434***</b>	(0.104)
no working spouse	<b>-0.125***</b>	(0.038)	<b>-0.131***</b>	(0.038)	<b>-0.130***</b>	(0.043)	<b>-0.347***</b>	(0.109)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.063*	(0.037)	-0.048	(0.037)	-0.066	(0.041)	-0.130	(0.106)
Information Missing	-0.038	(0.103)	-0.037	(0.108)	-0.037	(0.116)	-0.092	(0.311)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	<b>0.067*</b>	(0.034)	<b>0.090**</b>	(0.038)	<b>0.077**</b>	(0.037)	<b>0.271**</b>	(0.110)
Information Missing	-0.034	(0.044)	-0.010	(0.046)	-0.040	(0.050)	-0.038	(0.134)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	0.690***	(0.036)	0.663***	(0.049)				
Wu-Hausmann			0.471	(p=0.49)				

Source : JSTAR 2007-2009-2011 (pooled) Note : *Frequent care* refers to daily or weekly household care and/or physical care.

TABLE 9 – Labour market participation for women in coresidence (Frequent care)

Pooled sample CoResident	OLS		2SLS		PROBIT		IVPROBIT	
	(n=381)		Max Age (n=378)		(n=381)		Max Age (n=378)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Frequent Care</b>	<b>-0.116**</b>	(0.048)	-0.184	(0.262)	<b>-0.126**</b>	(0.056)	-0.580	(0.809)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.143**</b>	(0.067)	<b>-0.158**</b>	(0.071)	<b>-0.155**</b>	(0.078)	<b>-0.442*</b>	(0.226)
65-70	<b>-0.193**</b>	(0.096)	<b>-0.195*</b>	(0.108)	<b>-0.215*</b>	(0.115)	-0.542	(0.351)
<b>Level of education</b>								
Elementary/Middle School	<b>-0.131*</b>	(0.070)	<b>-0.128*</b>	(0.068)	<b>-0.149*</b>	(0.084)	<b>-0.373*</b>	(0.213)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	0.089	(0.070)	0.080	(0.080)	0.104	(0.075)	0.258	(0.267)
<b>2 children or more</b>	<b>0.156***</b>	(0.060)	<b>0.157***</b>	(0.059)	<b>0.182***</b>	(0.070)	<b>0.484***</b>	(0.187)
<b>Bad Health</b>	<b>-0.367**</b>	(0.173)	<b>-0.370**</b>	(0.170)	<b>-0.420**</b>	(0.183)	<b>-1.137*</b>	(0.603)
<b>Marital Status</b>								
no spouse	<b>0.151**</b>	(0.064)	<b>0.150**</b>	(0.065)	<b>0.158**</b>	(0.065)	<b>0.445**</b>	(0.202)
no working spouse	<b>-0.141*</b>	(0.079)	<b>-0.136*</b>	(0.079)	<b>-0.157*</b>	(0.095)	-0.386	(0.250)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.111	(0.069)	-0.099	(0.068)	-0.122	(0.078)	-0.285	(0.208)
Information Missing	-0.095	(0.318)	-0.090	(0.313)	-0.099	(0.396)	-0.235	(1.003)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	0.089	(0.062)	0.097	(0.068)	0.111	(0.068)	0.335	(0.232)
Information Missing	0.055	(0.080)	0.064	(0.079)	0.071	(0.088)	0.223	(0.257)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	<b>0.694***</b>	(0.064)	<b>0.711***</b>	(0.101)				
Wu-Hausmann			0.072	(p=0.78)				

Source : JSTAR 2007-2009-2011

Note : Daily care is defined as daily or weekly household help and/or physical care

TABLE 10 – Labour market participation for women in coresidence (Frequent Physical care)

Pooled sample CoResident	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=381)		(n=378)		(n=381)		(n=378)	
	coeff	<i>Std. Err.</i>	coeff	<i>Std. Err.</i>	dy/dx	<i>Std. Err.</i>	dy/dx	<i>Std. Err.</i>
<b>Frequent Care</b>	-0.081	(0.051)	-0.185	(0.266)	-0.087	(0.059)	-0.579	(0.803)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.144**</b>	(0.068)	<b>-0.156**</b>	(0.073)	<b>-0.157**</b>	(0.078)	<b>-0.435*</b>	(0.232)
65-70	<b>-0.202**</b>	(0.097)	<b>-0.199*</b>	(0.106)	<b>-0.226**</b>	(0.114)	-0.555	(0.343)
<b>Level of education</b>								
Elementary/Middle School	<b>-0.129*</b>	(0.070)	<b>-0.123*</b>	(0.069)	<b>-0.143*</b>	(0.083)	-0.348	(0.215)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	0.100	(0.070)	0.092	(0.073)	0.114	(0.073)	0.293	(0.242)
<b>2 children or more</b>	<b>0.150**</b>	(0.060)	<b>0.146**</b>	(0.060)	<b>0.174**</b>	(0.070)	<b>0.444**</b>	(0.195)
<b>Bad Health</b>	<b>-0.366**</b>	(0.173)	<b>-0.362**</b>	(0.172)	<b>-0.426**</b>	(0.182)	<b>-1.132*</b>	(0.615)
<b>Marital Status</b>								
no spouse	<b>0.142**</b>	(0.064)	<b>0.135**</b>	(0.064)	<b>0.151**</b>	(0.066)	<b>0.399**</b>	(0.202)
no working spouse	<b>-0.146*</b>	(0.079)	<b>-0.142*</b>	(0.078)	<b>-0.162*</b>	(0.095)	-0.399	(0.244)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.104	(0.069)	-0.084	(0.070)	-0.112	(0.078)	-0.231	(0.217)
Information Missing	-0.094	(0.319)	-0.076	(0.319)	-0.096	(0.391)	-0.183	(0.997)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	0.094	(0.062)	0.099	(0.067)	<b>0.117*</b>	(0.067)	0.343	(0.228)
Information Missing	0.061	(0.080)	0.075	(0.080)	0.078	(0.088)	0.264	(0.255)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	<b>0.682***</b>	(0.064)	<b>0.706***</b>	(0.095)				
Wu-Hausmann			0.161	(p=0.68)				

Source : JSTAR 2007-2009-2011

Note : Daily care is defined as daily or weekly physical care

TABLE 11 – Women labour market participation, informal care treated as an exogenous variable.

	(1) Female (n=1761)		(2) Not Coliving (n=1202)		(3) Coliving (n=500)		(4) Coliving (n=500)		
	Household Care		Household Care		Household Care		Physical Care only		
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.	
<b>Bring Care</b>									
No Care	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
Less Care	-0.040	(0.045)	-0.011	(0.051)	-0.149	(0.141)	0.058	(0.119)	
Weekly Care	<b>-0.183***</b>	(0.047)	<b>-0.182***</b>	(0.050)	-0.025	(0.167)	0.027	(0.156)	
Daily Care	<b>-0.145***</b>	(0.038)	<b>-0.197***</b>	(0.072)	<b>-0.151***</b>	(0.049)	<b>-0.111**</b>	(0.052)	
<b>Living</b>									
Not CoResident	ref.	ref.							
CoResident	0.035	(0.029)							
<b>Age</b>									
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
60-64	<b>-0.155***</b>	(0.035)	<b>-0.150***</b>	(0.043)	<b>-0.155**</b>	(0.066)	<b>-0.148**</b>	(0.066)	
65-70	<b>-0.233***</b>	(0.054)	<b>-0.277***</b>	(0.065)	-0.127	(0.098)	-0.125	(0.098)	
<b>Level of education</b>									
Elementary/Middle School	-0.057	(0.036)	-0.014	(0.044)	<b>-0.177***</b>	(0.068)	<b>-0.184***</b>	(0.068)	
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
University or More	0.060	(0.038)	<b>0.075*</b>	(0.045)	0.066	(0.069)	0.072	(0.069)	
<b>Bad Health</b>	<b>-0.323***</b>	(0.092)	<b>-0.397***</b>	(0.099)	-0.213	(0.180)	-0.231	(0.178)	
<b>2 children or more</b>	<b>0.087***</b>	(0.030)	<b>0.066*</b>	(0.037)	<b>0.153**</b>	(0.063)	<b>0.138**</b>	(0.064)	
<b>Marital Status</b>									
no spouse	<b>0.147***</b>	(0.030)	<b>0.172***</b>	(0.037)	<b>0.143**</b>	(0.057)	<b>0.129**</b>	(0.059)	
no working spouse	<b>-0.172***</b>	(0.038)	<b>-0.135***</b>	(0.045)	<b>-0.239***</b>	(0.081)	<b>-0.249***</b>	(0.080)	
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
<b>Receiving pension or not</b>									
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
Receiving pension	-0.061	(0.037)	-0.070	(0.045)	-0.079	(0.069)	-0.073	(0.069)	
Information Missing	-0.087	(0.107)	-0.080	(0.116)	-0.094	(0.290)	-0.084	(0.299)	
<b>Pension type</b>									
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
National pension (Kokumin)	<b>0.055*</b>	(0.033)	<b>0.068*</b>	(0.041)	0.040	(0.060)	<b>0.051</b>	(0.059)	
Information Missing	-0.020	(0.036)	-0.038	(0.045)	0.030	(0.066)	0.031	(0.065)	
<b>Wave dummies</b>									
	Yes		Yes		Yes		Yes		
Constant	<b>0.696***</b>	(0.036)	<b>0.684***</b>	(0.042)	<b>0.695***</b>	(0.064)	<b>0.679***</b>	(0.064)	
Pseudo R-squared	0.102		0.101		0.149		0.142		

Source : JSTAR 2007-2009-2011 (pooled)

TABLE 12 – Labour market participation for all women

Pooled sample Female	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=1761)		Max Age (n=1741)		(n=1761)		Max Age (n=1741)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Frequent Care</b>	<b>-0.139***</b>	(0.027)	-0.006	(0.205)	<b>-0.153***</b>	(0.030)	-0.087	(0.601)
<b>Living</b>								
Not CoResident	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
CoResident	0.036	(0.024)	0.007	(0.053)	0.041	(0.027)	0.043	(0.156)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.143***</b>	(0.033)	<b>-0.155***</b>	(0.034)	<b>-0.153***</b>	(0.036)	<b>-0.426***</b>	(0.093)
65-70	<b>-0.211***</b>	(0.050)	<b>-0.228***</b>	(0.052)	<b>-0.231***</b>	(0.054)	<b>-0.627***</b>	(0.143)
<b>Level of education</b>								
Elementary/Middle School	-0.052	(0.033)	-0.046	(0.035)	-0.057	(0.036)	-0.133	(0.099)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	<b>0.050</b>	(0.034)	<b>0.059</b>	(0.036)	<b>0.060</b>	(0.037)	<b>0.181*</b>	(0.108)
<b>Bad health</b>	<b>-0.300***</b>	(0.085)	<b>-0.293***</b>	(0.084)	<b>-0.322***</b>	(0.092)	<b>-0.812***</b>	(0.261)
<b>2 children or more</b>	<b>0.076***</b>	(0.027)	<b>0.074***</b>	(0.027)	<b>0.086***</b>	(0.030)	<b>0.215***</b>	(0.079)
<b>Marital Status</b>								
no spouse	<b>0.134***</b>	(0.028)	<b>0.137***</b>	(0.029)	<b>0.147***</b>	(0.030)	<b>0.412***</b>	(0.091)
no working spouse	<b>-0.167***</b>	(0.036)	<b>-0.175***</b>	(0.036)	<b>-0.173***</b>	(0.038)	<b>-0.459***</b>	(0.098)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.056	(0.034)	-0.044	(0.035)	-0.061	(0.037)	-0.123	(0.098)
Information Missing	-0.077	(0.099)	-0.073	(0.104)	-0.081	(0.107)	-0.199	(0.284)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	<b>0.050*</b>	(0.030)	<b>0.066**</b>	(0.032)	<b>0.055*</b>	(0.033)	<b>0.192**</b>	(0.095)
Information Missing	-0.016	(0.032)	-0.005	(0.032)	-0.019	(0.036)	-0.019	(0.096)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	0.691***	(0.034)	0.666***	(0.047)				
Wu-Hausmann			0.448	(p=0.50)				

Source : JSTAR 2007-2009-2011 (pooled) Note : *Frequent care* refers to daily or weekly household care and/or physical care.

TABLE 13 – Labour market participation for women in coresidence (Daily care)

Pooled sample CoResident	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=500)		Max Age (n=497)		(n=500)		Max Age (n=497)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Daily Care</b>	<b>-0.130***</b>	(0.044)	-0.171	(0.183)	<b>-0.144***</b>	(0.049)	-0.561	(0.570)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.138**</b>	(0.060)	<b>-0.149**</b>	(0.061)	<b>-0.149**</b>	(0.066)	<b>-0.423**</b>	(0.183)
65-70	<b>-0.109</b>	(0.088)	<b>-0.115</b>	(0.090)	<b>-0.120</b>	(0.098)	<b>-0.322</b>	(0.268)
<b>Level of education</b>								
Elementary/Middle School	<b>-0.164***</b>	(0.059)	<b>-0.163***</b>	(0.059)	<b>-0.185***</b>	(0.068)	<b>-0.477***</b>	(0.173)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	0.056	(0.061)	0.050	(0.067)	0.067	(0.068)	0.161	(0.223)
<b>2 children or more</b>	<b>0.132**</b>	(0.055)	<b>0.134**</b>	(0.056)	<b>0.150**</b>	(0.064)	<b>0.409**</b>	(0.170)
<b>Bad Health</b>	<b>-0.201</b>	(0.154)	<b>-0.205</b>	(0.152)	<b>-0.225</b>	(0.179)	<b>-0.596</b>	(0.455)
<b>Marital Status</b>								
no spouse	<b>0.134**</b>	(0.059)	<b>0.134**</b>	(0.062)	<b>0.140**</b>	(0.058)	<b>0.411**</b>	(0.190)
no working spouse	<b>-0.232***</b>	(0.071)	<b>-0.226***</b>	(0.072)	-0.244***	(0.081)	-0.608***	(0.220)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.073	(0.063)	-0.064	(0.063)	-0.081	(0.070)	-0.193	(0.188)
Information Missing	-0.092	(0.265)	-0.087	(0.248)	-0.093	(0.292)	-0.220	(0.684)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	0.039	(0.053)	0.049	(0.053)	0.042	(0.059)	0.146	(0.174)
Information Missing	0.024	(0.054)	0.031	(0.054)	0.030	(0.065)	0.105	(0.184)
<b>Wave dummies</b>		Yes		Yes		Yes		Yes
Constant	<b>0.734***</b>	(0.059)	<b>0.743***</b>	(0.074)				
Wu-Hausmann			0.110	(p=0.73)				

Source : JSTAR 2007-2009-2011 (pooled)

Note : Daily care is defined as daily household help and/or physical care

TABLE 14 – Labour market participation for women not in coresidence (Frequent care)

Pooled sample Not CoResident	(1) OLS		(2) 2SLS		(3) PROBIT		(4) IVPROBIT	
	(n=1202)		(n=1186)		(n=1202)		(n=1186)	
	coeff	Std. Err.	coeff	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
<b>Frequent Care</b>	<b>-0.167***</b>	(0.039)	0.178	(0.331)	<b>-0.185***</b>	(0.043)	0.427	(0.880)
<b>Age</b>								
under 60	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
60-64	<b>-0.138***</b>	(0.041)	<b>-0.145***</b>	(0.042)	<b>-0.150***</b>	(0.043)	<b>-0.385***</b>	(0.116)
65-70	<b>-0.253***</b>	(0.060)	<b>-0.277***</b>	(0.065)	<b>-0.277***</b>	(0.065)	<b>-0.741***</b>	(0.174)
<b>Level of education</b>								
Elementary/Middle School	-0.012	(0.041)	0.001	(0.044)	-0.014	(0.044)	-0.000	(0.120)
High School/Junior College	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
University or More	0.064	(0.041)	<b>0.062</b>	(0.043)	<b>0.075*</b>	(0.045)	<b>0.186</b>	(0.126)
<b>Bad health</b>	<b>-0.373***</b>	(0.096)	<b>-0.343***</b>	(0.103)	<b>-0.397***</b>	(0.099)	<b>-0.946**</b>	(0.368)
<b>2 children or more</b>	0.057*	(0.033)	0.051	(0.034)	0.066*	(0.037)	0.148	(0.094)
<b>Marital Status</b>								
no spouse	<b>0.155***</b>	(0.035)	<b>0.177***</b>	(0.041)	<b>0.172***</b>	(0.037)	<b>0.516***</b>	(0.111)
no working spouse	<b>-0.130***</b>	(0.042)	<b>-0.134***</b>	(0.044)	<b>-0.135***</b>	(0.045)	<b>-0.342***</b>	(0.121)
working spouse	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
<b>Receiving pension or not</b>								
No pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Receiving pension	-0.066	(0.042)	-0.058	(0.043)	-0.071	(0.045)	-0.155	(0.116)
Information Missing	-0.076	(0.106)	-0.058	(0.110)	-0.080	(0.116)	-0.150	(0.293)
<b>Pension type</b>								
Other Pension	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
National pension (Kokumin)	0.061	(0.037)	<b>0.090**</b>	(0.043)	<b>0.068*</b>	(0.041)	<b>0.252**</b>	(0.115)
Information Missing	<b>-0.032</b>	(0.040)	-0.023	(0.042)	<b>-0.038</b>	(0.045)	-0.068	(0.115)
<b>Wave dummies</b>	Yes		Yes		Yes		Yes	
Constant	<b>0.680***</b>	(0.040)	<b>0.627***</b>	(0.061)				
Wu-Hausmann			1.235	(p=0.27)				

Source : JSTAR 2007-2009-2011 (pooled)

Note : Frequent care is defined as daily or weekly household help and/or physical care

## Bibliographie

- Baum, C. F., Schaffer, M. E., and Stillman, S. (2003). Instrumental variables and gmm : Estimation and testing. *Stata journal*, 3(1) :1–31.
- Berecki-Gisolf, J., Lucke, J., Hockey, R., and Dobson, A. (2008). Transitions into informal caregiving and out of paid employment of women in their 50s. *Social Science & Medicine*, 67(1) :122–127.
- Bolin, K., Lindgren, B., and Lundborg, P. (2008). Your next of kin or your own career ? : Caring and working among the 50+ of europe. *Journal of Health Economics*, 27(3) :718–738.
- Cabinet Office (2010). *The seventh round of the international survey of lifestyles and attitudes of the elderly*. Gyousei, Tokyo.
- Campbell, J. C. and Ikegami, N. (2000). Long-term care insurance comes to japan. *Health Affairs*, 19(3) :26–39.
- Campbell, J. C. and Ikegami, N. (2009). Les enseignements politiques tirés de l’expérience d’entraide et des échanges internationaux en matière d’assurance sociale des soins de santé de longue durée : Allemagne , Japon et République de Corée. *Revue Internationale de Sécurité Sociale*, 62 :73–94.
- Carmichael, F. and Charles, S. (1998). The labour market costs of community care. *Journal of Health Economics*, 17(6) :747–765.
- Carmichael, F. and Charles, S. (2003). The opportunity costs of informal care : does gender matter ? *Journal of health economics*, 22(5) :781–803.
- Carmichael, F., Charles, S., and Hulme, C. (2010). Who will care ? employment participation and willingness to supply informal care. *Journal of Health Economics*, 29(1) :182–190.
- Casado-Marín, D., García-Gómez, P., and López-Nicolás, Á. (2009). Labour and income effects of caregiving across europe : an evaluation using matching techniques. *Moneda y Credito*, (228) :197.
- Casado-Marín, D., García-Gómez, P., and López-Nicolás, Á. (2011). Informal care and labour force participation among middle-aged women in spain. *SERIEs*, 2(1) :1–29.
- Ciani, E. (2012). Informal adult care and caregivers’ employment in europe. *Labour Economics*, 19(2) :155–164.
- Crespo, L. (2006). Caring for parents and employment status of european mid-life women. In *Second Workshop Economics of the Family at the University of Zaragoza*, pages 9–10.

- Ettner, S. L. (1995). The impact of parent care on female labor supply decisions. *Demography*, 32(1) :63–80.
- Ettner, S. L. (1996). The opportunity costs of elder care. *Journal of Human Resources*, pages 189–205.
- Fontaine, R. (2010). Aider un parent âgé se fait-il au détriment de l’emploi? *Retraite et société*, (2) :31–61.
- Fontaine, R. (2011). *Le soutien familial aux personnes âgées dépendante : Analyses micro-économétriques des comportements individuels et familiaux de prise en charge*. PhD thesis, Université Paris-Dauphine.
- Fukahori, R., Sato, K., Sakai, T., Oishi, A. S., Nakajima, R., Tanaka, R., Hayashi, M., Kureishi, W., Wakabayashi, M., Uzuki, Y., et al. (2013). Ipsr discussion paper series.
- Heitmueller, A. (2007). The chicken or the egg? : Endogeneity in labour market participation of informal carers in england. *Journal of health economics*, 26(3) :536–559.
- Heitmueller, A. and Inglis, K. (2007). The earnings of informal carers : Wage differentials and opportunity costs. *Journal of health economics*, 26(4) :821–841.
- Ichimura, H., Shimizutani, S., and Hideki, H. (2009). Jstar first results 2009 report. Technical report, Research Institute of Economy, Trade and Industry (RIETI).
- Johnson, R. W. and Lo Sasso, A. T. (2000). The trade-off between hours of paid employment and time assistance to elderly parents at midlife.
- Kotsadam, A. (2011). Does informal eldercare impede women’s employment? the case of european welfare states. *Feminist Economics*, 17(2) :121–144.
- Le Bihan-Youinou, B., Martin, C., et al. (2006). Travailler et prendre soin d’un parent âgé dépendant. *Travail, genre et sociétés*, (2) :77–96.
- Leigh, A. (2010). Informal care and labor market participation. *Labour Economics*, 17(1) :140–149.
- Lilly, M. B., Laporte, A., and Coyte, P. C. (2010). Do they care too much to work? the influence of caregiving intensity on the labour force participation of unpaid caregivers in canada. *Journal of Health Economics*, 29(6) :895–903.
- Martin, C. (2006). Prendre soin des personnes âgées dépendantes : le défi européen et le modèle français. *Schweizerische Zeitschrift für Soziologie*, 32(3) :495–509.
- Michaud, P.-C., Heitmueller, A., and Nazarov, Z. (2010). A dynamic analysis of informal care and employment in england. *Labour Economics*, 17(3) :455–465.

- Nguyen, H. T. and Connelly, L. B. (2014). The effect of unpaid caregiving intensity on labour force participation : Results from a multinomial endogenous treatment model. *Social Science & Medicine*, 100 :115–122.
- Ogawa, N. and Ermisch, J. F. (1996). Family structure, home time demands, and the employment patterns of japanese married women. *Journal of Labor Economics*, pages 677–702.
- Ogawa, N., Matsukura, R., and Maliki (2009). Rapid population aging and changing intergenerational transfers in japan. In Uhlenberg, P., editor, *International Handbook of Population Aging*, volume 1 of *International Handbooks of Population*, pages 133–156. Springer Netherlands.
- Ogawa, N., Retherford, R., and Saito, Y. (2010). Care of the elderly and women’s labour force participation in japan. In Tuljapurkar, S., Ogawa, N., and Gauthier, A. H., editors, *Ageing in Advanced Industrial States*, volume 8 of *International Studies in Population*, pages 223–261. Springer Netherlands.
- Ogawa, N. and Retherford, R. D. (1997). Shifting costs of caring for the elderly back to families in japan : will it work? *Population and Development Review*, pages 59–94.
- Oishi, S. A. and Oshio, T. (2006). Coresidence with parents and a wife’s decision to work in japan. *The Japanese Journal of Social Security Policy*, 5(1) :35–48.
- Shimizutani, S., Suzuki, W., and Noguchi, H. (2008). The socialization of at-home elderly care and female labor market participation : Micro-level evidence from japan. *Japan and the World Economy*, 20(1) :82–96.
- Staiger, D. and Stock, J. H. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65(3) :557–586.
- Stern, S. (1995). Estimating family long-term care decisions in the presence of endogenous child characteristics. *Journal of human Resources*, pages 551–580.
- Sugawara, S. and Nakamura, J. (2013). Is elderly care socialized in japan? analyzing the effects of the 2006 amendment to the ltc on the female labor supply. Technical report, CIRJE, Faculty of Economics, University of Tokyo.
- Tamiya, N., Noguchi, H., Nishi, A., Reich, M. R., Ikegami, N., Hashimoto, H., Shibuya, K., Kawachi, I., and Campbell, J. C. (2011). Population ageing and wellbeing : lessons from japan’s long-term care insurance policy. *The Lancet*, 378(9797) :1183–1192.
- Tamiya, N., Yamaoka, K., and Yano, E. (2002). Use of home health services covered by new public long-term care insurance in japan : impact of the presence and kinship of family caregivers. *International Journal for Quality in Health Care*, 14(4) :295–303.

- Van Houtven, C. H., Coe, N. B., and Skira, M. M. (2013). The effect of informal care on work and wages. *Journal of health economics*, 32(1) :240–252.
- Wolff, D. A. and Soldo, B. J. (1994). Married women’s allocation of time to employment and care of elderly parents. *Journal of Human Resources*, 29(4).
- Wolff, F.-C. (2006). Parental transfers and the labor supply of children. *Journal of Population Economics*, 19(4) :853–877.
- Yamada, H. and Shimizutani, S. (2014). Labor market outcomes of informal care provision in japan. Technical report, Osaka School of International Public Policy, Osaka University.

## **Acknowledgement**

JSTAR datasets, produced by the Research Institute of Economy, Trade and Industry (RIETI), Hitotsubashi University, and the University of Tokyo, are distributed by RIETI in Tokyo, Japan.