Living Arrangement and Mothers' Employment in Japan*

Aysenur AYDINBAKAR[1]

ABSTRACT

This paper tests the effect of living arrangement on the probability of mothers' employment status in Japan using micro-data from a household survey. The analysis was conducted for grandmothers by focusing on distinguishing between grandmother and in-law. The father being the eldest son and the mother being the eldest daughter are used as instruments in bivariate probit models. The findings show that co-residing or proximate-residing grandmother (-in-law) increases the probability of mothers being in employment. That being said, Japanese mothers still need to get help from grandmothers to work. Other important findings indicate that mothers whose husbands are the eldest son tend to live with grandmother-in-law. This confirms that the Japanese norm still stands in modern Japan.

Keywords: Living Arrangement, Grandmothers, Childcare, Eldest Daughter, Eldest Son,

Labor Force, Japanese Norm

JEL classification: J08, J21, Z13

Japan is facing a rapidly aging population and falling birthrate. In spite of the fact that these issues shape the future of Japan, sustainable growth in Japan that considerably depends on raising labor productivity and using all human resources efficiently is maintained by improving the working environment for the elderly, the young, and women (Japan Revitalization Strategy, 2014). The Japanese government, aiming to increase female labor participation with the policies of Prime Minister of Japan, Mr. Shinzo Abe in early 2013, increased the support for childcare centers in the mid-1990s to help families balance the responsibility of being a member of the family and an employee as a response to the declining birthrate (Fukai, 2017). Despite these actions, long waiting lists for childcare facilities have not been solved yet. President Abe stated in his speech that childcare arrangements will have been prepared by 2020 to eliminate the wait for childcare (Abe, 2017). In addition to the unsolved childcare problem that causes an increase in the burden of married Japanese women, they are responsible for home production as well. A potential solution for lessening these responsibilities is to apply informal care, which is to receive help from relatives, particularly grandparents or grandparents-in-law.[1]

According to the Sixth Longitudinal Survey of New-borns in the 21st Century, designated by the Ministry of Health, Labour and Welfare in 2006 and 2007, the caregivers of 97% of children in Japan are nurses and kindergarten teachers and 23.7% of children are looked after by their grandparents.[2] Furthermore, as the ratio of children that the grandmother takes care of is 13%, 10.9% of children's caregivers are grandmother-in-law.

Receiving assistance from grandparents (-in-law) or helping them is easy if couples live with or near them. Co-residence with the relatives in Japan is commonly accepted on account of Japanese culture, pointing that the eldest son maintains the family line, takes care of the grandparents and inherits some assets of the family (Wakabayashi & Horioka, 2009). Couples, when sharing their house with the aged, could compensate the majority of childcare expenses, get some financial help as well as housekeeping, and solve other potential problems in modern Japan (Morgan & Hirosima, 1983;

Raymo, Mencarini, Iwasawa, & Moriizum, 2010). Thus, married women's employment status can remain stable, even after having a baby (Morgan & Hirosima, 1983; Retherford & Ogawa, 2006, p. 14).

In addition to the advantages of living with grandparents, there are a few disadvantages, such as a loss of privacy and generational conflict. The norm defined above often affects the happiness of wives and makes them less comfortable. Kumagai (2015) states that the Japanese tradition is a burden on caretakers especially if the elderly are sick, which causes married women to lose their independence. Moreover, a conflict between a married woman and motherin- law may arise (Kumagai, 2015). Oishi and Oshio (2006) address feelings women have about losing privacy when they live with grandparents-in-law, stating that wives often feel more comfortable when living close to their families.

Grandmother and grandmother-in-law are assumed that they tend to generate advantages and disadvantages by playing a dominant role as a helper. This study focuses on the effect of living with or near grandmother and grandmother-in-law on the probability of mothers' employment in Japan using the National Family Survey 2008 (in Japanese, *Kazoku ni tsuiteno Zenkoku Chousa*). This paper contributes to the literature in regards to emphasizing the difference of grandmother and grandmother-in-law. Unlike the previous studies in Japan which is close to this study, the role of grandmothers (-in-law) is compared with formal childcare services by considering only mothers. Further, this paper extends the definition of co-residence by considering close-proximity, which captures the more realistic living arrangement that Japanese couples and relatives adapted.

Moreover, there is much less literature considering potential endogeneity between employment and living arrangement in Japan. Thus, it is addressed that how the Japanese tradition influences couples' lives as well as the working behavior of mothers.

Two studies in Japan, Sasaki (2002) and Oishi and Oshio (2006) have so far considered endogeneity for this topic using instrumental variables, such as being the eldest daughter and eldest son. The father being the eldest son and the mother being the eldest daughter are used as instruments in this study. It is assumed that if a father is the eldest son, the possibility of living with or close to grandmother-in-law will increase because of the tradition. The first-born child (the eldest daughter in this study) moves closer to grandparents to

prevent the second-born child from receiving help in case grandparents would rather help the nearest child (Kureishi & Wakabayashi, 2010).[3] The effect of being eldest daughter on co-residence with her mother is also stated in the study of Kojima (1993).[4] Logically, the probability of getting married and having a child of the eldest daughter is expected to be higher than the second-born child. It is also important to express that individuals tend to choose their families as compared to in-law because of altruistic feelings or being grateful (Yamada, 2006), so couples might avoid living with or near the spouse's mother. Accordingly, living apart might be the best option for couples.

This estimation result shows that co-residing or proximate-living grandmothers help the mother to work. The finding also points out that childcare facilities have a positive effect on the mother's employment status. That is, the grandmother's help is the complement of a nursery school. Other results reveal that living with or close to grandmother-in-law leads to a higher probability of mothers being in employment. Unlike the grandmother, the grandmother-inlaw's help is the only source of the mother for childcare. The estimation results from bivariate probit models indicate that the living arrangement is significantly affected by birth order of the mother and the father. As the grandmother is more likely to live with or close to her eldest daughter, the grandmother-in-law tends to live with or close to her eldest son.

The paper is structured as follows: Section 2 is theoretical framework. Section 3 reviews the relevant literature. Estimated methods and models used for the analysis are reported in Section 4. In Section 5, data sources, sample selection, and descriptive statistics are described. Estimation results are discussed in Section 6. Section 7 concludes the paper.

Theoretical Framework

Utility is a function of consumption (C) and leisure (l). Mother maximizes her utility, $U(C, l)$, subject to:

$$C = y + w.t_w \text{ ,} \qquad (1)$$

$$l = T - t_w - t_h \text{ ,} \qquad (2)$$

where y is mother's non-labor income, e.g. husband's income; w is mother's wage if she is employed; T is total time; t_w is the time mother spends at work; t_h" is the time she spends on unpaid work, such as housework, childcare. Consumption (C) depends on non-labor income and income of the mother. Leisure (l) is the

time left after the time spent for a paid work and an unpaid work.

This study assumes that co-residing or proximate-residing grandmother (-in-law) significantly reduces the mother's involvement in household chores and childcare. Thus, mothers who get help from the grandmother or the grandmother-in-law have more time to spend at work. Similar to Albuquerque and Passos (2010), this paper also assumes that mothers with grandmother (-in-law) in close proximity which includes co-residence and proximateresidence are more likely to be part of labor market. As noted before, togetherness and closeness lead to privacy problem, in particular the problem between mothers and grandmothers-in-law, and more frequent contact which might be undesirable for the couple. Accordingly, the higher the privacy problem is, the lower the utility gets, but the important point is that this disadvantage that mothers face might motivate women for working

Literature Review

Various approaches have been proposed to test the effect of living arrangement of the aged parents on women's labor participation in the U.S., Europe, and Asian countries. Some researchers examine the effects of living with the elderly on women's labor supply by ignoring childcare issue while a considerable amount of studies focuses on either the effect of coresiding with grandparents or the impact of having at least one living grandparent on mothers' labor supply.

Ogawa and Ermisch (1996) analyze the crucial factors determining the wage and employment patterns of Japanese married women by survey data in 1990, managed by Mainichi newspapers. Their results indicate the significant effect of co-residence on women's labor force participation. Nagase (1997) sets a logit model with the data of The Occupational History and Mobility Survey 1983 to examine the wage differentials and labor supply of Japanese married women. The finding reveals that the probability of co-residing Japanese women's labor supply with the grandmother is almost 15 percent higher than that without the grandmother. Nakamura and Ueda (1999) examine the labor supply behavior of Japanese married women by Employment Status Survey in 1992. The finding shows that co-residence with grandmothers, which is the alternative option for a nursery school, leads to a higher probability of women being in employment. Tsuya, Bumpass, and Choe (2000) examine employment and housework in the United States, South Korea and Japan on samples

of national family surveys. They found that co-residence or proximate-residence positively affects wives being in employment as well as their working hours per week. Kenjoh (2005) investigates the employment status of mothers after the birth of the first child in the United Kingdom, German, the Netherlands and Japan. The result shows the positive effect of coresiding grandparents on full-time, part-time and family employment of the mothers.

Kumagai and Kato (2007) test prime factors motivating Japanese women to participate in the labor market by the data of the National Family Research of Japan survey data in 1998. They found that co-residing women with grandparents-in-law are 1.5 times more likely to enter into the labor force than those who do not live with any grandparents. Mano and Yamamura (2011) examine the effect of grandmother and grandmother-in-law along with grandfather and grandfather-in-law on Japanese women's labor force participation and earnings. Estimation results, obtained by using the Japanese General Social Survey conducted in every part of Japan between 2000 and 2002, show that co-residence with grandmother and grandmother-in-law has a positive impact on women's labor participation. Asai, Kambayashi, and Yamaguchi (2015) estimate the relationship between childcare availability and mother's employment using the Japanese quinquennial census 1990-2010. The results suggest that any change in formal childcare availability does not affect the mother's employment from three-generation households.

Only two studies about Japan to the best of my knowledge have addressed the endogeneity problem. The first study, Sasaki (2002) estimates the causal effect of co-residence with grandparents (-in-law) on Japanese women's labor force participation by a Japanese microlevel data set from the Panel Study on Consumption and Living 1993. The possible endogeneity due to the interrelation between the decision of labor force participation and the choice of living with the grandparents or in-law is controlled by instrumental variables such as birth order of wife and husband, number of siblings and housing information. The main results of the study show that Japanese married women who live with grandparents (-in-law) have more chances to enter into the labor force. The second study, Oishi and Oshio (2006) analyze the factors affecting married couples to live with husband's parents and wife's parents, and Japanese women's decision to work by using Japanese microdata from Twelfth Japanese National Fertility

Survey in 2002, Part I: Survey on Married Couples, conducted by the National Institute of Population and Social Security Research. The result suggests that living with grandparents and grandparents-in-law leads to a higher probability of women to work.

Much work on co-residence, childcare and female labor force participation has been carried out outside Japan. Floge (1989) provides evidence for the effect of childcare availability on the employment of mothers with pre-school children in New York. The result indicates that women who live in large households or live with another woman are more likely to be employed. Dale and Holdsworth (1998) test the determinants of working mothers in Britain and Spain. No effect of co-residence with grandparents in both countries was detected, however, the positive effect of proximate-residence in Spain was found by the extended model. Using Chinese population data from 1982 to 2000, Maurer-Fazio, Connelly, Chen, and Tang (2011) estimate the effect of co-residence with grandparents, grandparents-in-law, or a person whose age is more than 75 on prime-aged women's employment. The result shows that co-residence has a positive effect on labor force participation. The study of Compton and Pollak (2014) found that proximate-living grandmother and grandmother-in-law affects the labor force of married women with young children positively in the U.S.. Another study of Compton (2015) tests the determinants of proximity and its effect on women's labor force participation and working hours in Canada. The findings show that co-residing childless women are less likely to work compared to proximate-living women. Further, women with proximate-living grandmothers work 15 percentage points more than those who live farther away. Based on the Chinese Longitudinal Healthy Longevity Survey in 2002, Shen, Yan, and Zeng (2016) analyze the effect of co-residing or proximate-living grandparents on female labor supply in China. By 2SLS estimation, they conclude that either living in the same village or living together influences women's labor supply positively, and the effect of living in the same neighborhood (34.9%) is more than the effect of living with grandparents (27.9%). Yang, Fu, and Li (2016) estimate the effects of family structure on labor force participation using the data set of China Health and Retirement Longitudinal Study in 2011. Interestingly, co-residing or proximateliving grandparents have a negative impact on female labor force participation. Garcia-Moran and Kuehn (2017) analyze the impact of childcare provided by grandparents on mothers' labor force participation and fertility by

pooling data of German Socio-Economic Panel. The estimation result reveals that mothers living close to grandparents (-in-law) tend to work. It is also revealed that proximate-living grandparents (-in-law) decrease the hourly wages women earned. Landmann, Seitz, and Steiner (2017) examine the effect of co-residence on female labor supply in Kyrgyzstan in 2011. Surprisingly, it is found that co-residence affects the labor supply negatively.

Aside from the result of the studies that examine the link between living arrangement and mothers' labor force participation, many studies have been addressed the positive effect of grandparental support on women's employment (Aassve, Arpino, & Goisis 2012; Arpino, Pronzato, & Tavares 2014; Del Boca, 2002; Dimova & Wolff, 2008, 2011; Du, Dong, & Zhang 2019; Li, 2017; Pagani & Marenzi, 2008; Posadas & Vidal-Fernández, 2013). Contrary to the studies above, Abendroth, Van der Lippe, and Maas (2012) who look into 23 European countries show the insignificant effect of family support.

Estimation Model And Method

This study tests how living arrangement affects mothers' employment status by considering potential endogeneity. The following equations are estimated:

$$Y = 1[a_1 x + a_2 L + v_1 > 0] \quad , \qquad (3)$$

$$L = 1[b_1 x + b_2 Z + v_2 > 0] \quad , \qquad (4)$$

where Y represents the outcome variable. The outcome variable is a binary variable taking value 1 if the mother has an income-earning job at the time of the 2008 survey, 0 otherwise. L is treated as a treatment variable which equals 1 if the mother lives with (co-residence) or near (proximate-residence) grandmothers (-in-law).[5] Living with or near covers mothers living with grandmothers (in-law) in the same building (shared or separate front entrances), in the detached house or near 15 minutes. If the mother lives far away from both grandmother and grandmother-in-law, a treatment variable equals 0. x is a vector of control variables. Disturbance terms, v_1 and v_2 are assumed to be distributed as bivariate normal random variables with zero means, unit variances (Wooldridge, 2010, p. 594).

In Equation (3), living with or near grandmother (-in-law) (L) could be correlated by the disturbance term (v_1) because of unobservable factors. Ignoring these factors make coefficients biased and inconsistent because of the correlation between disturbance term and omitted variable (Wooldridge, 2010, p. 513). In this

study, if mothers are highly motivated or have positive preferences to work, having a higher employment status, or in a love match, they will be opposed to sharing their houses with the grandmother (-in-law) (Aassve et al., 2012; Martin & Tsuya, 1991). Formal childcare would be preferred by these mothers instead of informal care. Sasaki (2002) stated that if market alternatives are available and cheap, mothers who want to work will choose to them without sharing their houses with someone.

Mothers fearing the loss of their privacy tend to live far away from any grandmother, especially grandmother-in-law (Oishi & Oshio, 2006).[6] However, if mothers are not eager to work and follow the tradition, they will choose to stay at home and lean towards living with or near grandmother (-in-law) (Sasaki, 2002). Under these circumstances mentioned above, the living arrangement's effect will suffer from a negative bias. On the contrary, if mothers behave like a self-seeker, preferring to work, receiving help from the grandmother (-in-law) for childcare and housework will be preferred in the case of unavailable market alternatives to childcare. Another possibility is that mothers prefer to raise their own children and do housework by themselves without working or living with or near their grandmother (-in-law) (Aassve et al., 2012). In this case, the impact of living arrangements will suffer from a positive bias.

Endogeneity of Y and L is detected by $Corr(v_1, v_2)$ $= \rho$. ρ is the correlation coefficient of error terms. If $\rho \neq 0$, probit estimation is inconsistent for a_1 and a_2 (Baum, 2006, p. 271-272; Greene, 2003, p. 712; Wooldridge, 2010, p. 594-595). In the case of endogeneity, it is better to use a bivariate probit model instead of a probit model. To deal with the endogeneity problem, living arrangement (L) is instrumented by being the eldest daughter and son (Z). The mother being the eldest daughter is a dummy variable, taking value 1 if the mother has only female younger sibling(s) or if she is the only daughter, and the father being eldest son equals 1 if the father does not have any older brother(s) or if he is the only son, 0 otherwise.

Vector of following control variables represented by x is added: mother's age; income of father (in logarithm); the last education level of mother and father; age of the youngest child; city size mother lives in; the ratio of childcare capacity per pre-school child in each prefecture.

Data Source And Sample Selection

This study uses micro-data from the 2008 "National Family Survey (in Japanese, *Kazoku ni tsuiteno Zenkoku*

Chousa, Japanese Society of Family Sociology)" which was conducted in January 2009 and provided by the Social Science Japan Data Archive, Center for Social Research and Data Archives, Institute of Social Science, The University of Tokyo. 9,400 samples aged between 28 and 72 from all over Japan were selected by stratified two-stage random sampling and the responses were collected by leave and pick-up method. The survey presents detailed responses of 5,203 respondents (response rate is 55.4 percent) about respondents and their families. The number of childcare facilities' capacities in each prefecture in 2008 was obtained from Survey of Social Welfare Institutions, conducted by the Ministry of Health, Labour and Welfare. The number of pre-school population in 2008[7] is taken from current population estimates of Statistics Bureau, Ministry of Internal Affairs and Communications to calculate the ratio of childcare facilities per pre-school child in each prefecture.

The advantages of the data are that it provides all necessary information to get crucial variables. To specify living arrangements, it is necessary to sort the exact distance of houses of both grandmother and grandmother-in-law. Gender and birth order of the siblings are also required to determine whether the mother is the eldest daughter or the father is the eldest son. These information obtained make setting models and estimating them possible. One of the disadvantages of the data might be the date of the survey. Even though it could be claimed that the year, 2008 is old, co-residence or being close to relatives is still a phenomenon even after the date of the survey. More precisely, the report of OECD (2015) indicates that other types of private households such as three-generation households are common in Latvia, Korea, Poland, Japan and the United States. Furthermore, the statistics of Comprehensive Survey of Living Conditions, conducted by Ministry of Health, Labour and Welfare in 2016 show that the ratio of co-residing individuals aged 65 and over with their children was 42.2 in 2010 and 38.4 in 2016. These examples point out that Japan keeps its position among countries where two/threegeneration families are common. Despite the year of the data, the estimation result helps capturing the effect of living arrangement on couples' lives.

The samples are selected as seen in Figure 1. First, married respondents are selected, and couples who are the first spouse of each other are considered to avoid confusion due to the fact that having past marriage experience, being divorced or widowed might affect

couples' decisions in terms of living arrangement and labor participation (Oishi & Oshio, 2006). Second, the data are restricted by selecting women aged between 28 and 50. Third, respondents who have no child are eliminated from the sample as well as those with both dead grandmothers and grandmothers-in-law. Fourth, respondents who live with or near both grandmother and grandmother-in-law are dropped because this paper focuses on the effect of only grandmothers and only grandmothers-in-law on mothers. If the mother lives with or near both grandmothers, her situation will be affected by this closeness of both grandmothers. Lastly, all unavailable information is dropped.[8] After all elimination, 968 respondents remain. Group 1 includes 198 mothers living with or near grandmother only and 406 mothers living far away from both grandmothers (total size of the group 1 is 604). Group 2 consisting of 770 observations includes 364 mothers living with or near grandmother-in-law only and 406 mothers living far away from both grandmothers.

Descriptive statistics of the variables in terms of the living arrangement are shown in Table 1. According to the table, while 68% of co-residing mothers with grandmother or grandmother in-law work, 56% of mothers who live far away from both grandmothers have a job. The percentage of non-working mothers who are away from both grandmothers (44%) is higher

than those living with or near any grandmothers (32%). As most of the mothers living near grandmothers or living away from both grandmothers have graduated from the vocational school, mothers living near grandmother-in-law are the least educated women. The percentage of highly educated mothers living apart from both grandmothers (23.65%) is higher than those living near any grandmothers. Fathers living near any grandmothers (-in-law) are low educated individuals while 53.70% of fathers living apart from both grandmothers have at least a university degree. The child of the couple with co-residing or proximate-living grandmother in-law is older than others. The average of nursery school per pre-school child is high for mothers who live with or close to grandmother-in-law. While most of the mothers living with or near grandmothers dwelt in the city, around 40% of those living with or close to grandmother-in-law live in the city and other areas. The ratio of mothers who are not the eldest daughter is quite high in all types of living arrangements, but 30% of mothers that grandmothers live with or near them are the eldest daughter compared to those living near grandmother-in-law or living apart from both of them. More than half of fathers are the eldest son in all types of living arrangements, but the percentage is high for fathers who live with or near grandmothers-in-law (own mother of husband).
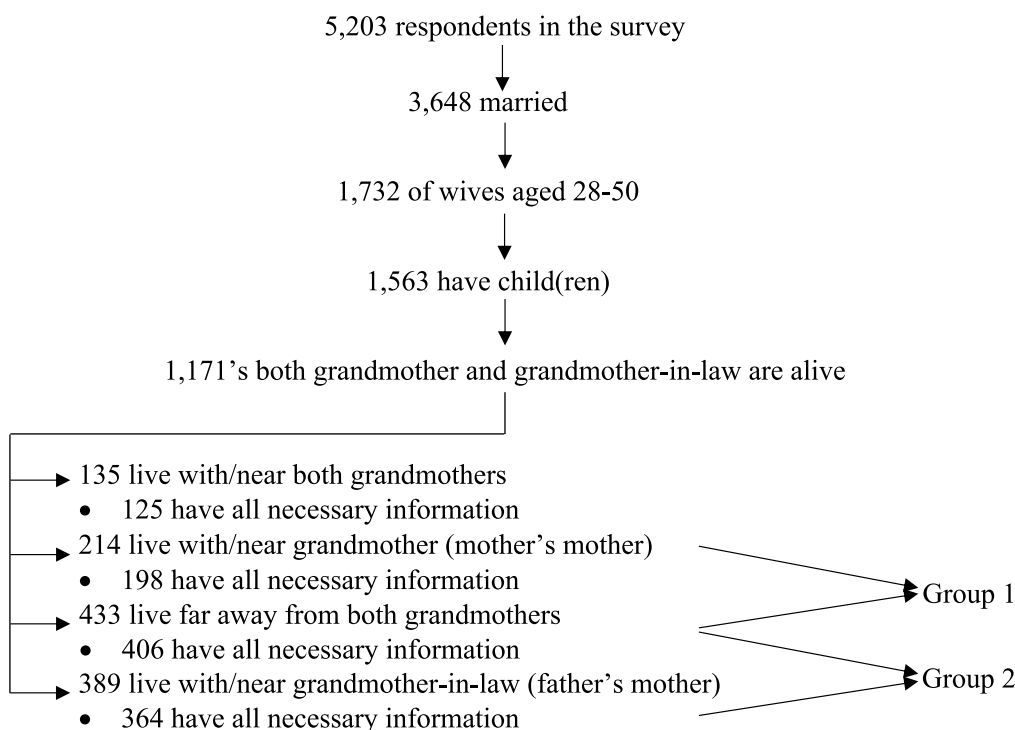

Figure 1: Sample Selection

Estimation Results

Table 2 shows the marginal effects of living with or near grandmother and -in-law on mothers' employment status. Marginal effects from the probit model in column (1) provide a positive effect of the grandmother who lives with or close to the mother. In other words, mothers living with or near grandmothers typically work more by 7% compared to those who do not live with or near any grandmothers. In addition, the higher education level and income fathers receive, the lower probability mothers work. The child getting older affects mothers to work positively. Furthermore, an increase in the percentage of childcare facilities has a positive impact on the probability of mothers being in employment. The results from the probit model in column (1) show that grandmothers are a complement to the nursery school because the marginal effect of the nursery school is higher than the effect of grandmothers who live with or near their daughters.

In column (2), grandmothers who live with or close to the daughter affect her employment positively, but the effect is not significant. Moreover, it is found that an increase in income of fathers leads to a lower probability of mothers to work. The positive effects of the age of the youngest child and the ratio of childcare facilities per pre-school child on mother's employment are found. Considering the results from the bivariate probit model in column (2), only childcare facilities have an impact on the mother's employment status unlike the findings from the probit model in column (1). ρ value from the bivariate probit model is insignificant, as seen in the bottom of column (2). Endogeneity in bivariate probit estimation could not be found, so the results of the probit model are considered. Equation 4's result listed in column (2) shows that if mothers are the eldest daughter, the probability of living with or near grandmother increases. On the other hand, the marginal effect of the father being the eldest son is negative. Moreover, the increased level of income husbands earn and the higher education mothers receive decrease the probability of living with or near the grandmother. The marginal effects of living with or near the grandmother-in-law on the mother's employment status are reported in columns (3)-(4) of Table 2. In column (3), the effect of the grandmother-in-law on the probability of mothers being in employment is positive, but the effect is insignificant.

Table 1: Descriptive Statistics

	Living together/ near grandmother	Living together/near grandmother-in-law	Living far away from both grandmothers
	Percentage	Percentage	Percentage
Working mother	67.17	68.41	55.67
Non-working mother	32.83	31.59	44.33
Mother's age*	39.37 (6.07)	40.21 (6.01)	39 (6.32)
Education level of mother Mother's high school or lower (ref.)	39.39	46.70	31.28
Mother's vocational school	46.47	40.93	45.07
Mother's university or higher	14.14	12.36	23.65
Education level of father Father's high school or lower (ref.)	42.42	42.58	33.25
Father's vocational school	17.68	18.13	13.05
Father's university or higher	39.90	39.29	53.70
Father's income (ten thousand Yen)*	567.60 (272.71)	534.71 (239.68)	649.48 (298.33)
Age of the youngest child	7.94 (6.11)	9.52 (6.61)	7.71 (6.16)
% of childcare facility per pre-school child*	0.21 (0.10)	0.24 (0.11)	0.21 (0.09)
City size Large city (ref.)	24.77	19.51	33.99
City	43.94	39.84	41.38
Other area	31.31	40.66	24.63
Mother is the eldest daughter	30.30	17.03	21.68

Table 1: (Cont'd). Descriptive Statistics

	Living together/ near grandmother	Living together/near grandmother-in-law	Living far away from both grandmothers
	Percentage	Percentage	Percentage
Mother is not the eldest daughter	69.70	82.97	78.32
Father is the eldest son	53.54	81.32	67.24
Father is not the eldest son	46.46	18.68	32.76
Number of observation	198	364	406
(%)	32.78		67.22[1]
(%)		47.27	52.73[2]

Source: National Family Survey 2008 (Kazoku ni tsuiteno Zenkoku Chousa)
Notes: * shows the mean of the variables. Standard deviations are shown in parentheses.
[1] In group 1, 67 percent of mothers live far away from both grandmothers and also grandmothers-in-law.
[2] In group 2, 53 percent of mothers live far away from both grandmothers and also grandmothers-in-law.

As the higher education fathers receive and the increased amount of income they earn negatively affect mothers' employment, kids becoming older and the increased ratio of childcare facilities affect working mothers positively. In column (4), the marginal effect of the grandmother-in-law is positive and statistically significant in the bivariate probit model with instrumental variables. The probability of being employed increases by 37% in the case that mothers live with or near grandmothers-in-law. Additionally, the higher education mothers receive, the more likely they are to work. Other findings suggest that an increase in educational level and the amount of fathers' income lead to a lower probability of mothers being in employment. The age of the youngest child has a positive impact on the probability of mothers working. The positive and significant effect of childcare facilities on the mother's employment is observed in the results from the probit model in column (3) while grandmother-in-law is the only source of the mother to work as seen in column (4). This result is consistent with the finding of Asai et al. (2015) suggesting that the employment of mothers living in the threegeneration household is not affected by any changes in childcare availability since the grandparent's care is used as a substitute for formal childcare services.

In column (4), ρ is found significant, showing that endogeneity appears. The instruments (being the eldest daughter and the eldest son) produced expected signs. The mother being the eldest daughter affects on living with or close to grandmother-in-law negatively in contrast with the father being the eldest son. The higher level of education mothers receive and the salary husbands earn decrease the probability of living with or near grandmother-in-law. The positive and significant marginal effect of the age of the youngest child and the ratio of childcare facilities on living with or near grandmother-in-law are observed. Another important finding is that mothers living in other areas tend to live with or near grandmother-in-law. The positive effect of the ratio of childcare facilities on living near grandmother-in-law might be sourced by living in rural, referred by other areas, because individuals in rural have already decided their living arrangement through the Japanese norm, and the ratio of childcare facilitates are high in rural.[9] Asai et al. (2015) state that even though childcare facilities are available in both large and small prefectures, the growth of them is slow in the large prefecture.

Table 2: Marginal Effects of Living Arrangement on Mother's Employment

Outcome variable: Y	Group 1		Group 2	
Mother's employment=1	**Probit (1)**	**Bivariate (2)**	**Probit (3)**	**Bivariate (4)**
Living together/near	0.068*	0.029	0.024	0.374***
	(0.040)	(0.25)	(0.032)	(0.049)
Mother's age	0.004	0.004	0.005	0.004
	(0.005)	(0.005)	(0.005)	(0.004)
Mother's vocational school (=1)	0.015	0.014	-0.031	0.004
	(0.044)	(0.044)	(0.037)	(0.031)
Mother's university or higher (=1)	0.062	0.059	0.039	0.079*
	(0.058)	(0.063)	(0.048)	(0.041)
Father's vocational school (=1)	-0.043	-0.042	-0.089*	-0.096**
	(0.059)	(0.059)	(0.051)	(0.044)
Father's university or higher (=1)	-0.078*	-0.080	-0.110***	-0.081**
	(0.047)	(0.049)	(0.040)	(0.035)
Father's income(log)	-0.197***	-0.201***	-0.169***	-0.083*
	(0.046)	(0.048)	(0.043)	(0.043)
Age of the youngest child	0.023***	0.023***	0.023***	0.014***
	(0.005)	(0.005)	(0.005)	(0.005)
% of childcare facility per pre-school child	0.679***	0.677***	0.391**	0.168
	(0.206)	(0.208)	(0.169)	(0.152)
City (=1)	0.015	0.018	0.020	-0.009
	(0.044)	(0.049)	(0.040)	(0.034)
Other area (=1)	0.014	0.017	0.031	-0.039
	(0.053)	(0.058)	(0.044)	(0.039)
Outcome variable: L		(2)		(4)
Group 1: Living with/near grandmother=1	-0.111***			0.130***
Group 2: Living with/near grandmother-in-law=1	(0.037)			(0.039)
Father being the eldest son (=1)				
Mother being the eldest daughter (=1)	0.097**			-0.078**
	(0.042)			(0.036)
Mother's age	0.007			0.003
	(0.005)			(0.005)
Mother's vocational school (=1)	-0.021			-0.067*
	(0.045)			(0.039)
Mother's university or higher (=1)	-0.101*			-0.123**
	(0.058)			(0.056)
Father's vocational school (=1)	0.021			0.100*
	(0.060)			(0.053)
Father's university or higher (=1)	-0.040			0.003
	(0.048)			(0.043)
Father's income(log)	-0.085*			-0.150***
	(0.044)			(0.039)
Age of the youngest child	-0.004			0.008*
	(0.005)			(0.005)
% of childcare facility per pre-school child	-0.019			0.343**
	(0.218)			(0.175)
City (=1)	0.071			0.062
	(0.045)			(0.043)
Other area (=1)	0.085			0.161***
	(0.053)			(0.049)
Number of observation	604	604	770	770

Table 2: (Cont'd). Marginal effects of living arrangement on mother's employment

Outcome variable: Y	Group 1		Group 2	
Mother's employment=1	**Probit (1)**	**Bivariate (2)**	**Probit (3)**	**Bivariate (4)**
ρ		0.072		-0.774***
Log likelihood	-355.285	-717.456	-426.066	-901.914
Pseudo R-squared	0.129		0.169	

Notes: Marginal effects are calculated on average. Delta-method standard errors are shown in parentheses. *, ** and *** are statistical significance of the variables at the 10%, 5% and 1% levels, respectively. Reference level of variables related to education is a high school or lower. Large city is taken as a reference level of city size.

Conclusion

This study examines the effect of living arrangement on mothers' employment in Japan. Living arrangements are analyzed with regard to living with or near grandmother and grandmother-in-law separately. Following the Japanese norm, the father being the eldest son is used as the first instrument in the bivariate probit model. The mother being the eldest daughter, who exploits her age priority, is chosen as the second instrument. The estimation results show that living with or near grandmother and grandmother-in-law has a positive impact on mothers' employment. In light of the results, the general findings of this study are consistent with other studies in Japan. Apart from the main result, the increase in the ratio of childcare facilities per pre-school child increases the probability of mothers being in employment even in the case of having a co-residing or proximate-living grandmother. In other words, grandmothers provide a complement to childcare facilities. It can be said that an altruistic grandmother gives a chance to her daughter to decide how to raise a kid and support her doing other duties, such as picking up grandchildren from school, preparing meals, shopping. The effects of both co-residing or proximate-residing grandmother-in-law and childcare facilities are positive, but the impact of facilities is insignificant. In contrast with grandmother's case, it seems likely that grandmothers-in-law are one of the key decision-makers in raising grandchildren as long as they live with or close to their daughters-in-law, and formal childcare services are substituted by grandmothers-in-law. Furthermore, the considerable effect of living with grandmothers-in-law could be attributed to the difference between mothers and grandmothers-in-law in terms of ideas. Mothers may choose to avoid generational conflict by working and taking advantage of the grandmother-in-law's availability to care for their children.

Even though the reason for no endogeneity between living with or near the grandmother and the decision to work has been a puzzle, a potential explanation is that mother has already adapted to the grandmother's support if she has been receiving it for a long time. This study also suggests that the Japanese norm must be considered to understand the reasoning behind living with or near grandmothers-in-law.

Needless to say, mothers need formal or informal support to go to school, look for a job, or work. Japanese policymakers have implemented constructive policies that encourage mothers to work. The main solution is to deal with the insufficient childcare facility problem. Thus, mothers do not have to take many years off or quit their jobs to raise their kids. Even though informal help seems to be a decent alternative to a nursery school, mothers may not have the option to receive help from grandparents or grandparents-in-law, especially grandmothers (-in-law). Moreover, many grandparents (-in-law) still want to work. Considering the population and life expectancy in Japan, the number of elderly cannot be underestimated; if they provide care for their grandchildren or housework, they are not able to keep working. This study suggests that policymakers should support grandparents (-in-law) who are eager to assist their children and provide a way for mothers to work.

NOTES

[1] In this study, the mother and the father refer to the wife and the husband. The grandparent and the grandparent-in-law refer to the parent of the wife and the husband, respectively.

[2] Respondents were allowed to select as many answers as they like.

[3] Daughters without sibling(s) are assumed as the eldest daughter in this study. Kureishi and Wakabayashi (2010) found that the only son is more likely to be close to grandparents but the coefficient of the only daughter is not significant. However, their t-tests show that there is no significant difference between the first son with only younger sibling(s) and the only son and the first-born daughter with only younger sister(s) and the only daughter.

[4] In the study of Kojima (1993), it is assumed that only married child lives with grandparents.

[5] Residence place of grandfather and grandfather-in-law and whether they are dead or alive are completely ignored in this paper. Grandmother and grandmother-in-law are assumed as a primary helper.

[6] It is mentioned as "grandparents" and "grandparents-in-law" in the study of Oishi and Oshio (2006).

[7] Following Kureishi and Wakabayashi (2010, p. 165), the sum of children whose ages are between 0 and 5 and one-half of the number of 6-year-old children are used for the number of pre-school population in 2008.

[8] Respondents defining the last school they or their spouses attended as "other" are dropped because this response does not specify any education level.

[9] The survey used in this study also shows that the percentage of childcare facilities in the rural area are 26% as this ratio is 17% and 23% in large cities and cities, respectively. The calculation is done after the sample selection.

References

Aassve, A., Arpino, B., & Goisis, A. (2012). Grandparenting and mothers' labour force participation: A comparative analysis using the generations and gender survey. *Demographic Research*, 27:53.

Abe, S. (2017). Policy speech by Prime Minister Shinzo Abe to the 195th session of the diet. Retrieved from The Government of Japan, https://japan.kantei.go.jp/98_abe/statement/201711/ _00006.html.

Abendroth, A.K., Van der Lippe, T., & Maas, I. (2012). Social support and the working hours of employed mothers in Europe: The relevance of the state, the workplace, and the family. *Social Science Research*, 41(3), 581–597.

Albuquerque, P. & Passos, J. (2010). Grandparents and women's participation in the labor market. Working Paper No.16, School of Economics, Technical University of Lisbon.

Arpino, B., Pronzato, C. D., & Tavares, L. P. (2014). The effect of grandparental support on mothers' labour market participation: An instrumental variable approach. *European Journal of Population*, 30(4), 369–390.

Asai, Y., Kambayashi, R., & Yamaguchi, S. (2015). Childcare availability, household structure, and maternal employment. *Journal of the Japanese and International Economies*, 38, 172–192.

Baum, C. F. (2006). An introduction to modern econometrics using Stata. Stata press.

Compton, J. (2015). Family proximity and the labor force status of women in Canada. *Review of Economics of the Household*, 13(2), 323–358.

Compton, J. & Pollak, R. A. (2014). Family proximity, childcare, and women's labor force attachment. *Journal of Urban Economics*, 79, 72–90.

Dale, C. & Holdsworth, A. (1998). *Working mothers in Great Britain and Spain: A preliminary analysis*. Cathie Marsh Centre for Census and Survey Research.

Del Boca, D. (2002). The effect of child care and part time opportunities on participation and fertility decisions in Italy. *Journal of Population Economics*, 15(3), 549–573.

Dimova, R., & Wolff, F. C. (2008). Grandchild care transfers by ageing immigrants in France: Intra- household allocation and labour market implications. *European Journal of Population/Revue européenne de Démographie*, 24(3), 315–340.

Dimova, R., & Wolff, F. C. (2011). Do downward private transfers enhance maternal labor supply? Evidence from around Europe. *Journal of Population Economics*, 24(3), 911– 933.

Du, F., Dong, X. Y., & Zhang, Y. (2019). grandparent-provided childcare and labor force participation of mothers with preschool children in urban China. *China Population and Development Studies*, 2(4), 347-368.

Floge, L. (1989). Changing household structure, child-care availability, and employment among mothers of pre-school children. *Journal of Marriage and the Family*, 51(1), 51– 63.

Fukai, T. (2017). Childcare availability and fertility: Evidence from municipalities in Japan. *Journal of the Japanese and International Economies*, 43, 1–18.

Garcia-Moran, E., & Kuehn, Z. (2017). With strings attached: Grandparent-provided child care and female labor market outcomes. *Review of Economic Dynamics*, 23, 80–98.

Greene, W. H. (2003). Econometric analysis. Pearson Education India.

Japan Revitalization Strategy (2014). Japan revitalization strategy (revised in 2014)- Japan's challenge for the future. Retrieved from The Government of Japan, http://www.kantei.go. jp/jp/singi/keizaisaisei/pdf/honbunEN.pdf.

Kenjoh, E. (2005). New mothers' employment and public policy in the UK, Germany, the Netherlands, Sweden, and Japan. *Labour*, 19, 5–49.

Kojima, H. (1993). Sibling configuration and coresidence of married couples with an older mother in Japan. *International Journal of Japanese Sociology*, 2(1),1–16.

Kumagai, F. (2015). *Demographic changes in japan. In Family Issues on Marriage, Divorce, and Older Adults in Japan*, 11–38. Springer.

Kumagai, F., & Kato, A. (2007). Factors facilitating Japanese married women entering the labour force. *Current Sociology*, 55(4), 561–577.

Kureishi, W. and Wakabayashi, M. (2010). Why do first-born children live together with parents? *Japan and the World Economy*, 22(3), 159–172.

Landmann, A., Seitz, H., & Steiner, S. (2017). *Patrilocal residence and female labour supply* (No. 10890). Institute for the Study of Labor (IZA).

Li, Y. (2017). The effects of formal and informal child care on the mother's labor supply— Evidence from urban China. *China Economic Review*, 44, 227-240.

Mano, Y., & Yamamura, E. (2011). Effects of husband's education and family structure on labor force participation and married Japanese women's earnings. *Japanese Economy*, 38(3), 71–91.

Martin, L. G., & Tsuya, N. O. (1991). Interactions of middle-aged Japanese with their parents. *Population Studies*, 45(2), 299–311.

Maurer-Fazio, M., Connelly, R., Chen, L., & Tang, L. (2011). Childcare, eldercare, and labor force participation of married women in urban China, 1982–2000. *Journal of Human Resources*, 46(2), 261–294.

Ministry of Health, Labour and Welfare (2007). Sixth Longitudinal Survey of Newborns in the 21st Century. https://www.mhlw.go.jp/english/database/db-hw/newborns6th/index.html

Ministry of Health, Labour and Welfare (2016). Comprehensive Survey of Living Conditions. https://www.mhlw.go.jp/english/database/db-hss-cslc-report2016.html

Morgan, S. P., & Hirosima, K. (1983). The persistence of extended family residence in Japan: Anachronism or alternative strategy? *American Sociological Review*, 269–281.

Nagase, N. (1997). Wage differentials and labour supply of married women in Japan: Part-time and informal sector work opportunities. *The Japanese Economic Review*, 48(1), 29–42.

Nakamura, J., & Ueda, A. (1999). On the determinants of career interruption by childbirth among married women in Japan. *Journal of the Japanese and International Economies*, 13(1), 73–89.

OECD (2015). OECD Family Database. https://www.oecd.org/els/family/SF_1_1_Family_ size_and_composition.pdf

Ogawa, N., & Ermisch, J. F. (1996). Family structure, home time demands, and the employment patterns of japanese married women. *Journal of Labor Economics*, 14(4), 677–702.

Oishi, A. S., & 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.

Pagani, L., & Marenzi, A. (2008). The labor market participation of sandwich generation Italian women. *Journal of Family and Economic Issues*, 29(3), 427–444.

Posadas, J., & Vidal-Fernández, M. (2013). Grandparents' childcare and female labor force participation. *IZA Journal of Labor Policy*, 2(1), 1-14.

Raymo, J. M., Mencarini, L., Iwasawa, M., & Moriizumi, R. (2010). Intergenerational proximity and the fertility intentions of married women: A Japan-Italy comparison. *Asian Population Studies*, 6(2), 193–214.

Retherford, R., & Ogawa, N. (2006). "Japan's baby bust: Causes, implications, and policy responses," in F. R. Harris (ed.), *The Baby Bust. Who Will Do the Work? Who Will Pay the Taxes?* Lanham, MD: Rowman & Littlefield Publishers, 5–47.

Sasaki, M. (2002). The causal effect of family structure on labor force participation among Japanese married women. *Journal of Human Resources*, 37(2), 429–440.

Shen, K., Yan, P., & Zeng, Y. (2016). Coresidence with elderly parents and female labor supply in China. *Demographic Research*, 35(23), 645–670.

Tsuya, N. O., Bumpass, L. L., & Choe, M. K. (2000). Gender, employment, and housework in Japan, South Korea, and the United States. *Review of Population and Social Policy*, 9, 195–220.

Wakabayashi, M., & Horioka, C. Y. (2009). Is the eldest son different? The residential choice of siblings in Japan. *Japan and the World Economy*, 21(4), 337–348.

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. The MIT Press.

Yamada, K. (2006). Intra-family transfers in japan: Intergenerational co-residence, distance, and contact. *Applied Economics*, 38(16), 1839–1861.

Yang, C., Fu, H., & Li, L. (2016). The effect of family structure on female labor participation: Empirical analysis based on the 2011 China health and retirement longitudinal study. *Asian Social Work and Policy Review*, 10, 21–33.

Zamarro, G. (2011). *Family labor participation and child care decisions: The role of grannies*. RAND Working Paper Series WR- 833.