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Crowding-Out Effect of Publicly Provided Childcare: Why Maternal Employment Did Not Increase

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Why Maternal Employment Did Not Increase*

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Abstract

We estimate the causal effects of childcare availability on the maternal employment rate using prefecture panel data constructed from the Japanese quinquennial census 1990-2010. We find that childcare availability did not increase maternal employment due to the crowding-out effects. Namely, families substituted accredited childcare for informal care by grandparents. We also find evidence that more and more families do not live with grandparents who used to take care of grandchildren, as the availability of accredited childcare increases.

Keywords: childcare; female labor supply; maternal employment; nuclear family; three-generation family

JEL Codes: J13, J21, J22

1 Introduction

Maternal employment hinges on quality, affordability, and availability of childcare. In countries where the childcare market is regulated and heavily subsidized, high quality and affordable childcare service is provided, but the supply often falls short of the demand. Expecting that supporting

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working mothers will raise the low fertility rate, the Japanese government has implemented a series of pro-family policies, including an expansion of capacity of accredited childcare centers since early 1990s. In this paper, we estimate the causal effects of childcare availability on the maternal employment using the prefecture panel data from the Japanese quinquennial census 1990-2010.

Even though mother's employment is a prerequisite for enrollment in an accredited childcare center in Japan, whether childcare availability significantly increases maternal employment is not immediately obvious. If working mothers substitute the accredited childcare service for an informal childcare arrangement such as the one provided by grandparents, the maternal employment rate will remain unchanged. Indeed, Fitzpatrick (2010) and Havnes and Mogstad (2011) find that an expansion of childcare services did not raise the maternal employment rate in the U.S. and Norway, respectively, because the new childcare mostly crowded out informal childcare arrangements.

Most previous studies on Japan that estimate the effect of childcare availability on female labor market outcomes rely on the cross-sectional variation between prefectures.[1][2] Examples include, but are not limited to, Shigeno and Ookusa (1999), Higuchi, Matsuura, and Sato (2007), Unayama (2011), and Abe (2013). While the reported positive correlation is suggestive, it may not necessarily imply the causal effect of childcare availability on the female labor market outcomes. Maternal labor supply is affected not only by childcare availability, but also by the local industry structure, economic conditions, commuting time, traditional family values, and preference for women working. Because traditional family values and preference for women working are unobserved and hard to control for, the observed positive correlation between childcare availability and maternal employment may be driven by the unobserved characteristics, rather than indicating a causal relationship.

This paper departs from the previous studies on Japan's childcare employment effects by controlling for unobserved prefecture fixed effects. Using the ratio of childcare capacity to population of children under 6 as a proxy for childcare availability, we regress the maternal employment rate on the childcare availability index along with year and prefecture dummy variables as well as other observed household and prefecture characteristics. Because the prefecture fixed effects are controlled, the causal effect of childcare availability is identified by within-prefecture variation in the growth of childcare availability. This approach provides more credible evidence for the causal effects than the previous approach that relies on the cross-sectional variations alone. Our approach

[1] A similar approach is also taken by Brilli, Del Boca, and Pronzato (2013) for the study on Italy.

[2] An exception is Lee and Lee (2014). Using aggregate data at the country level on childcare availability, the female labor force participation rate, and the fertility rate from 1971 to 2009, they try to establish Granger-causality using a time-series econometrics technique. Our identification strategy is very different from Lee and Lee (2014) in that we use variations in the growth of childcare availability across prefectures. Moreover, Lee and Lee (2014) do not include the household structure or the nuclear household share in their VAR model. Our analysis shows that the household structure strongly affects the maternal employment rate and has changed over time significantly. Omitting this variable in the VAR model might affect their estimation results.

is essentially the difference-in-differences estimator, which is adopted by Berlinski and Galiani (2007), Baker, Gruber, and Milligan (2008), Lefebvre and Merrigan (2008), Havnes and Mogstad (2011), and Nollenberger and Rodriguez-Planas (2015).[3]

Our results indicated that, contrary to popular belief, childcare availability is *uncorrelated* with the maternal employment rate when prefecture fixed effects are controlled. Because they are strongly and positively correlated without prefecture fixed effects, this result implies that the estimates identified by cross-sectional variations alone are upward-biased. A possible explanation for the uncorrelatedness is substitution of the accredited childcare service for the informal childcare arrangements. Because the childcare provided by grandparents is the most common form of informal childcare arrangement in Japan, we analyze nuclear households and three-generation households separately. This analysis enables us to shed light on the role of informal childcare provided by the grandparents in determining the maternal employment rate. We find that, even when prefecture fixed effects are controlled for, childcare availability is strongly and positively correlated with the maternal employment rate for nuclear households. However, they are uncorrelated for three-generation households when prefecture fixed effects are controlled. The results suggest that the household structure is the key to understanding the relationship between childcare availability and maternal employment.

Although we do not observe the household's choice of childcare mode in the census, households seem to have substituted the accredited childcare service for informal care by grandparents. The key factor behind this substitution is a change in the structure of households. Namely, an increasing number of Japan's households do not include grandparents any more. Our results from a fixed-effect regression indicate that the rise of childcare availability induced the shift from three-generation households to nuclear households for households that included children under 6. Interestingly, we did not find a significant effect on households in which the youngest child is aged 6-14, which suggests that our results for households with children under 6 is not a mere correlation, but a causal relationship.

Fitzpatrick (2010) and Havnes and Mogstad (2011) find a null effect of childcare expansion on maternal employment in the U.S. and Norway because it crowded out informal childcare arrangements. In contrast, **?** find a positive effect of childcare expansion in Spain. They argue that crowding out did not occur in Spain, because the female labor force participation rate was low, the traditional family values were rooted, and the childcare supply was insufficient. The labor market institutions and circumstances surrounding childcare in Japan are more similar to Spain, but our results are more in line with those for the U.S. and Norway, which may seem counterintuitive. The

[3] An alternative approach to avoid an endogeneity bias is based on the Regression Discontinuity Designs. Gelbach (2002), Fitzpatrick (2010), and Goux and Maurin (2010) exploit an age-dependent eligibility rule for childcare enrollment and identify the causal effect.

key to understanding the different results between Japan and Spain is the household structure. In Spain, the share of three-generation households was much lower than that in Japan, and hence, the informal childcare by grandparents was uncommon and not crowded out.

Our results for Japan suggest that neither the low female labor force participation rate nor the traditional family value themselves are the determinants of a positive causal effect of childcare availability on maternal employment. In Japan, the traditional family values require the eldest son to live with his parents. Even though the traditional family values do not encourage mothers to work outside the home, this requirement eventually makes wives' labor force participation rate high due to the availability of childcare by grandparents. Then, as the traditional family values became less influential, more and more households did not live with grandparents, which in turn lowered the maternal employment rate. This negative effect offset the effect of improved childcare availability during the same period. Note that this offsetting effect was more strongly pronounced in small prefectures where the traditional family value is more rooted. Our analysis indicates that the prevalence of informal childcare is the key determinant of whether maternal employment increases with childcare availability or not.

We address two potential threats to the identification of the causal effects of childcare availability. The first threat comes from households moving between prefectures for better childcare availability on maternal employment. Our evidence from Japanese Panel Survey of Consumers indicates that moving for childcare is very rare: at most 1% of households with children under 6 moved from other prefecture for the reason of better childcare availability at the most recent move. The second threat is prefecture-level shocks such as changes in local labor market conditions and pro-family policies that coincide with the changes of childcare availability. We address this issue by examining the employment rate of mothers whose youngest child is between 6 and 14 because they should not be directly affected by childcare expansion. The result indicates that their employment rate is uncorrelated with childcare availability. We conclude that these two potential threats to identification are negligible.

We examine how effects of childcare availability changed from the 1990's to the 2000's and find that the employment effects turned into positive in the 2000's. The regression result indicates that the share of nuclear household still increases with childcare availability, but the effect became substantially weaker. This implies that the crowding-out effect of accredited childcare became weaker. Consequently, in the 2000's, the maternal employment rate increased with childcare availability.

The rest of the paper is structured as follows. In Section 2 we describe the institutional background and data. Section 3 lays out the econometric model. Section 4 presents our estimation results for the effects on maternal employment. Section 5 shows the results for the effects on the household structure. We discuss how the effects of childcare availability changed from the 1990's

to the 2000's in Section 6. We conclude in Section 7.

2 Background and Data

2.1 Childcare Policies in Japan

Childcare service is strictly regulated in Japan. For a childcare center to be accredited and subsidized by the national and municipal governments it must satisfy the criteria for capacity, area and the number of teachers per pupil, etc. Because accredited childcare centers are subsidized, the average monthly fee for a child is low, at 25,556 JPY (about 250 USD),[4] although different fees are charged depending on regions and the household income. Non-accredited childcare centers satisfy lower quality standards than those for accredited childcare centers. While some municipality governments subsidize non-accredited centers, the national government does not subsidize them, which makes their fee higher. Their average monthly fee for a child age 0 is 46,330 JPY (about 460 USD) and that for child age 5 is 34,161 JPY (about 340 USD).[5]

According to the Comprehensive Survey of Living Conditions, in the period from 1998 to 2010 92-93% of childcare centers were accredited and the remaining 8% were non-accredited.[6] Because non-accredited childcare centers are not subsidized and of lower quality, they are uncommon except for the large prefectures such as Tokyo and Kanagawa where the supply of accredited childcare is far exceeded by the demand. For example, the share of non-accredited childcare centers is 10% in Tokyo and 16% in Kanagawa, while it is nearly zero in small prefectures including Gunma, Toyama, Fukui, Yamanashi, Nagano, Wakayama, and Tottori.

Thanks to regulations, the quality is high and the price is affordable, but the accredited childcare service is not available for all households in need. Insufficient supply of the accredited childcare has been considered an obstacle for mothers' entering the labor market and a cause of the low fertility rate in Japan. The Japanese government implemented a series of policies for raising the fertility rate since the mid 90's. The Angel Plan (1994-1998) and the New Angel Plan (1999-2003) are agreements between ministers and intended to support working mothers. They include an expansion of childcare capacity, extension of childcare service hours including weekends and holidays, and subsidies to promote the take-up of parental leave and shorter working hours. However, these plans do not have legally binding power, and consequently, they failed to increase the capacity of accredited childcare. Indeed, this capacity decreased by 10% from 1990 to 2000, even though the childcare capacity per child population slightly increased due to the low fertility rate.

[4] See Table 7 on page 8 of Ministry of Health and Wealth (2009)

[5] See Table 12 on page 14 of Ministry of Health and Wealth (2009)

[6] See Table 40 in Volume 2 for 1998, Table 24 in Volume 3 for 2001, and Table 18 in Volume 3 for 2004, 2007, and 2010.

In 2003, the Japanese government enacted the Basic Act for Measures to Cope with Society with Declining Birthrate, which is legally binding. Since then, the capacity of the accredited childcare centers increased by a significant 12.2% from 2000 to 2010.

2.2 Measuring Childcare Availability

Our key explanatory variable is an index of childcare availability at the prefecture level, which is defined as the ratio of the capacity of the accredited childcare to the population of children under 6. As mentioned above, the share of accredited childcare centers has been at 92-93%, and hence, the proposed index roughly measures overall availability of center-based childcare. In this paper, childcare capacity and enrollment statistics cover accredited childcare centers only. We draw childcare capacity data from the annual Report on Social Welfare Administration and Services[7] and child population data from the Japanese quinquennial census 1990-2010. We emphasize that our measure of childcare availability is based on capacity, not on enrollment. Because capacity is a supply side factor and does not pick up households' willingness to use, we interpret our index as a measure of childcare supply relative to child population.

An alternative measure of the childcare availability is the number (or proportion) of children on the waiting list for accredited childcare.[8]However, there are two reasons against using the waiting list as a good measure. First, in 2003, the government changed the definition of waitlisted children, which makes the statistics before and after 2003 not comparable. Second, although the size of the excess demand can be useful for measuring availability, the waiting list does not measure the excess demand. If parents expect a very low chance of getting accepted by an accredited childcare center, they are unlikely to submit an application to avoid a time cost of the application. For example, city of Yokohama declared that no child was waitlisted in April 2013, but the application increased by 4,114 or 8% in the following year.[9] This anecdote suggests that the actual excess demand for the accredited childcare is greater than the number of waitlisted children.

As mentioned in the introduction, the causal effect of childcare availability on maternal employment is identified by the variation in the growth (instead of the level) of the childcare availability index across prefectures. It is worth describing how the variation was generated during the sample period. Since early 1990's, a series of policies including The Angel Plan, the New Angel

[7]Childcare capacity data are also available from Survey on Social Welfare, but data are not comparable before and after 2007.

[8]Yet another possible measure of childcare availability is proposed by Unayama (2011) who studies the relationship between childcare availability and job continuity at marriage. His index is the ratio of childcare capacity to the number of women age 20-44. His rationale is that the number of women age 20-44 measures the potential number of children. Our index based on the actual number of children directly measures the current availability, which we think is more relevant for decisions by mothers who currently have children under 6. Despite the differences in concept, the results do not change regardless of whichever measure is used. See Tables for 7 and 8 for evidence.

[9]See Yokohama (2014) for their press release.

Plan, and the Basic Act for Measures to Cope with Society with Declining Birthrate promoted raising the childcare capacity across the country. In large prefectures such as Tokyo, the capacity was increased as intended by the policies, but in small prefectures it remained almost constant, because the child population has been rapidly decreasing. Note that childcare availability improved even in small prefectures, since the child population decreased, but the capacity remained unchanged. The childcare capacity does not decrease proportionately to the child population for two institutional reasons. First, there is a regulation that the minimum capacity of an accredited childcare be 60 children.[10] This minimum capacity requirement directly prevents the operators of the childcare centers from downsizing. Second, the Japanese dismissal law strongly protects workers, which prevents childcare centers from firing them to reduce their capacity.[11]

2.3 Household and Prefecture Characteristics

We draw our data on household and prefecture characteristics from the Japanese quinquennial census from 1990 to 2010.[12] Our analysis focuses on households with two parents and children under age 6. The share of two-parent households among all households with children under 6 is as high as 97-98% from 1995 to 2010, according to the Census. These households are categorized by the census into three groups. The first household type is a nuclear household in which only two parents and children reside. The second household type is a three-generation household that consists of two parents, children, and grandparents. The third household type is other household that consists of two parents, children, and other adults such as relatives. This last type is only about 0.02% of all two-parent household with children under 6.

In the census, employment is identified by whether an individual performed paid work or not from September 24th to 30th of the year. If an individual did not work but was on leave, she/he is considered employed by the census. The fraction of employed individuals and the average age are reported for the husband and wife at the prefecture level. As a measure of local economic condition, we construct an unemployment rate for individuals age 15 and over at the prefecture level.

2.4 Summary Statistics

Table 1 reports the mean of each variable by year and household type, using the number of households as a weight. The unit of observation is prefecture and there are 47 of them. The population is two-parent households with children under 6. Note that the means are different between the house-

[10] Nihon-Jidou-Mondai-Chousakai (1978) documents how the minimum capacity is determined.

[11] See p. 512 in Yamakawa (2007)

[12] All of our data from the census 1990-2010 are publicly available and downloadable from www.e-stat.go.jp.

hold types, because the numbers of nuclear households and three-generation households in a given prefecture are different. Our childcare availability index, which is defined as the ratio of childcare capacity to the population of children under 6, steadily increased over time from 0.248 in 1990 to 0.338 in 2010, on average over all types of households. The average of the capacity-population ratio for nuclear households is lower than that for three-generation households, which reflects the fact that the share of nuclear households is higher in metropolitan areas where childcare services are less available.

The employment rate of mothers with children under 6 rose from 34.1% in 1990 to 41.2% in 2010; a remarkable employment growth given the long-term recession. This increase is largely driven by the growing employment rate of mothers in nuclear households: it increased from 27.4% in 1990 to 39.6% in 2010. Although the employment rate of mothers in three-generation households is as high as 51.1% in 1990, it decreased to 47.8% in 1995 and gradually returned to the 1990 level by 2010.

Husbands' employment rate decreased from 98.8% in 1990 to 94.1% in 2010. In contrast to women, we find little difference in male employment rate across household types.

Mothers' average age increased from 31.580 in 1990 to 33.720 in 2010 while that of husbands increased from 34.454 in 1990 to 35.632 in 2010. The rise in parents' age reflects the fact that men and women delayed childbirth in the past few decades. We find little difference in parents' age across household types.

The average local unemployment rate rose from 3% in 1990 to 6.4% in 2010.[13] Despite nuclear and three-generation households tending to reside in different regions, we find little difference in local unemployment rates faced by the nuclear and three-generation households.

The share of nuclear households dramatically increased from 71.2% in 1990 to 86.5% in 2010. The number of two-parent households decreased from 5.5 million in 1990 to 4.5 million in 2010. Because the share of two-parent households among all households with children under 6 is stable at 97-98%, this trend reflects the declining fertility rate.

3 Econometric Model

We analyze the causal effects of childcare availability using a regression model. Consider the following econometric model

$$Y_{pt} = \beta_0 + \beta_1 CCA_{pt} + \beta_2 X_{pt} + \theta_p + \xi_t + \varepsilon_{pt}, \quad (1)$$

[13] Note that the highest national unemployment rate during this period is 5.5%. The average of local unemployment rate in 2005 and 2010 exceed this number, because we weight by the number of household with children under 6.

Table 1: Characteristics of Prefectures and Two-Parent Households with Children Under 6

	1990	1995	2000	2005	2010
All HH					
Cap./U6-Pop.	0.248	0.265	0.269	0.302	0.338
% Mothers Employed	0.341	0.329	0.334	0.372	0.412
Age	31.580	31.757	32.142	32.883	33.720
Age of Husband	34.454	34.517	34.564	34.953	35.632
% Husband Empl.	0.988	0.985	0.976	0.965	0.941
Unemp. Rate	0.030	0.043	0.048	0.060	0.064
% Nuclear HH	0.712	0.752	0.804	0.837	0.865
Nuclear HH					
Cap./U6-Pop.	0.241	0.258	0.263	0.296	0.332
% Mothers Employed	0.274	0.280	0.300	0.347	0.396
Age	31.560	31.632	32.049	32.886	33.763
Age of Husband	34.373	34.313	34.382	34.879	35.614
% Husband Empl.	0.988	0.984	0.976	0.965	0.941
Unemp. Rate	0.031	0.044	0.048	0.060	0.064
3-Generation HH					
Cap./U6-Pop.	0.266	0.285	0.293	0.331	0.376
% Mothers Employed	0.511	0.478	0.476	0.499	0.517
Age	31.628	32.147	32.537	32.884	33.458
Age of Husband	34.652	35.146	35.327	35.346	35.750
% Husband Empl.	0.990	0.986	0.975	0.968	0.945
Unemp. Rate	0.028	0.039	0.044	0.057	0.064

Source: Census 1990-2010.
Note: Unit of observation is the prefecture, and 47 prefectures exist. The population is two-parent households with children under 6. The number of households is used as weight.

where Y_{pt} is the maternal employment rate in prefecture p in year t, CCA_{pt} is our measure of childcare availability given by the ratio of capacity to child population, X_{pt} is a vector of observed characteristics of household and prefecture, θ_p is prefecture fixed effects, ξ_t is year fixed effects, and ε_{pt} is an error term that is uncorrelated with other variables. The fixed effects θ_p and ξ_t are allowed to be correlated with other variables including CCA_{pt}. The prefecture fixed effects capture unobserved household and prefecture characteristics including the traditional family value and preference for maternal employment. The year fixed effects capture factors that affect maternal employment equally across prefecture. For example, the effects of a nation-wide secular rise in female wages and changes in parental leave and other labor legislation[14] by the national government are included in the year fixed effects. In all our regression models we use the number of households as weights and report standard errors clustered at the prefecture level.

Although we could measure childcare availability at the municipality level, we choose to measure it at the prefecture level for two reasons. First, the use of the prefecture level data avoids a potential endogeneity bias due to inter-prefecture migration. Our identification assumption for Equation (1) is that the error term is uncorrelated with the growth of childcare availability CCA_{pt} at the prefecture level. A possible threat to this assumption is migration for the reason of better childcare availability. In Section 4.3.1, we show evidence that inter-prefectural migration for better childcare availability is extremely rare. This exogeneity assumption may be questionable if childcare availability is measured at the municipality level, because intra-prefecture migration is more common.

The second reason is that the use of the prefecture level data minimizes a potential attenuation bias due to the measurement error. This is because there are fewer observations in each municipality-year cell than in each prefecture-year cell. Variables in Equation (1) should be population means, but in practice we have to use sample means as proxies. When the municipality level data is used, the population mean may be imprecisely estimated due to the small sample size.

A potential downside of using observations at the prefecture level, rather than the municipality or individual level, is a lack of variation in the explanatory variables. This lack in variation may result in unstable estimates or large standard errors, but our standard errors are small as shown below.

[14] See Asai (2015) and Yamaguchi (2014) for the employment effects of parental leave legislation.

4 Effects on Maternal Employment

4.1 All Household Types

4.1.1 Overall Effects

Table 2 reports the regression results. All standard errors are clustered at the prefecture level. The population for columns (1) through (3) is mothers of children under 6 in all household types including nuclear, three-generation, and other households.

Without any control, the coefficient for the childcare availability index is 0.686 (column 1). We then include in the regression the average age of mothers, that of fathers, the employment rate of fathers, the local unemployment rate at the prefecture level, and year dummies. When these control variables are included, the coefficient becomes slightly smaller at 0.567, but still strongly positive and significant (column 2). This is consistent with the findings of previous studies on Japan mentioned above. Note that the positive correlation may not be interpreted as a causal effect of childcare availability on the maternal employment rate, because it may be driven by unobserved prefecture characteristics such as the traditional family values, preference for maternal work, industry structure, commuting time, etc.

We control for these prefecture fixed effects by adding prefecture dummies. The coefficient for the childcare availability index in this specification is identified by the variations in the growth (instead of the level) of employment rates and childcare availability across prefecture. The result in column (3) is surprising: the estimated coefficient is -0.147, although it is statistically insignificant. The comparison of columns (2) and (3) warns us that the omitted variable bias is severe enough to change the sign of the estimates. This result indicates that the positive correlation between childcare availability and maternal employment is not a causal relationship, but driven by the prefecture characteristics.

4.1.2 Uncovering The Mechanism

Why doesn't the maternal employment rate respond to childcare availability? Our finding is similar to those of Fitzpatrick (2010) and Havnes and Mogstad (2011). They find that an expansion of childcare did not increase maternal employment in the U.S. and Norway, because it crowded out informal childcare arrangements by unlicensed caregivers such as babysitters. In Japan, childcare by grandparents is the most prevalent form of informal childcare arrangement. Longitudinal Survey of Newborns in the 21st Century asks who is the main caregiver for children under 3.[15] According to the survey, among children who are looked after by someone else but their parents,

[15]The survey collects the information on the main caregiver for children age 3 and above, but it is not comparable to the information for children under 3.

73.3% of the children are enrolled in childcare centers, 25.9% of the children are looked after by grandparents, and only 0.9% of the children are under other informal childcare arrangements including babysitters and nannies.

Hence, we suspect that households substitute the accredited childcare for the care by grandparents. Unfortunately, we do not observe the households' choice of childcare mode in the census, but we can still shed light on the relationship among the accredited childcare, the care by grandparents, and maternal employment. Evidence from the Comprehensive Survey of Living Conditions 2010 indicates that the share of children who are looked after by grandparents[16] tends to be higher in prefectures where the share of three-generation households is high. The correlation coefficient for the two is as high as 0.80, which suggests that children in three-generation households are likely to be looked after by their grandparents.

Childcare availability may affect families' decisions on co-residence with grandparents. Grandparents can domestically produce childcare service, which gives rise to the surplus from forming an extended family household. However, the expansion of publicly-funded childcare service increases its availability and lowers the effective price of childcare service in the market, which reduced the surplus for an extended family. Because young couples value their independence and privacy, they may choose not to live with grandparents when public childcare service is available. Hence, we view co-residence with grandparents is a mediator. Childcare availability affect maternal employment not only directly, but also indirectly through affecting co-residence with grandparents.

To evaluate the direct effect of childcare availability on maternal employment, we include the share of nuclear households in the regression. This approach implies that the household structure is taken as exogenous, but women whose labor force attachment is strong might choose to form a three-generation household, rather than a nuclear household, because informal childcare may be available in three-generation households. Sasaki (2002) addresses this issue and estimates the effect of co-residence with the parents or in-laws on the wife's labor force participation. He instruments co-residence by whether the husband is the eldest son or not, because the traditional Japanese family value obligates the eldest son to reside with his parents. Sasaki (2002) finds that his OLS estimate for the effect of co-residence is not significantly different from the IV estimate. This implies that co-residence can be taken as exogenous to the wife's labor force participation, which justifies our approach.

The model (4) includes the share of nuclear households in addition to all the control variables of model (3). The coefficient for the childcare availability index is 0.117 and statistically significant at the 10% level. Remember that the childcare availability index grew by 0.090 from 1990 to 2010. This implies that the maternal employment rate would have been increased by 1 percentage point (= 0.117 * 0.090) if the share of nuclear households did not change. Given that the maternal

[16] See Table 18 in Volume 3.

employment rate grew from 0.341 in 1990 to 0.412 in 2010, the growth of childcare availability would account for about 15% of the growth of maternal employment rate during the two decade when the nuclear household share was kept at the 1990 level.

Once the share of nuclear households is included in the regression, the sign of the coefficient changes from negative (column 3) to positive (column 4), which implies that the changes of the childcare availability index and the nuclear household share are positively correlated. If the rise in the nuclear household share is a result of better childcare availability, further expansions of childcare will lead only to more nuclear households, without necessarily raising maternal employment. If the increase in the share of nuclear households occurs independently from a change in childcare availability, childcare expansion can raise maternal employment as long as the pace of expansion is fast enough to exceed the negative effect from the increase of the nuclear household share. We address this issue in Section 5.

We also include an interaction term of the childcare availability index and the nuclear household share (column 5) to examine how the treatment effects vary across prefectures with the nuclear household share. The coefficients are insignificant, but the positive sign for the interaction term suggests that the treatment effect is stronger for prefectures where the nuclear household share is high.

4.2 Nuclear and Three-Generation Households

We report the regression results for mothers from nuclear households in columns 6-8 of Table 2. The size of the coefficient decreases as we add more control variables, which suggests the estimates are upward biased when control variables and prefecture fixed effects are omitted. Nevertheless, the coefficient remains positive and significant 0.322 (column 8) for nuclear households even when the prefecture fixed effects are controlled.[17] The estimate implies that the maternal employment rate for nuclear families increased by 2.90 percentage points (= 0.322 * 0.090) from 1990 to 2010, which accounts for about a quarter of the growth of the maternal employment rate for nuclear families (0.122 = 0.396 - 0.274).

Columns 9-11 show the regression results for mothers from three-generation households that consist of grandparents, parents, and children.[18] The estimated coefficients are positive when no or some observed control variables and year dummies are included (columns 9 and 10), but the coefficient becomes negative once the prefecture fixed effects are added (column 11). The regression results suggest that the employment of mothers from three-generation households does not respond to changes in childcare availability: the estimated treatment effect is -0.243 and statisti-

[17] This result is robust to the inclusion of prefecture-specific trends in the maternal employment rate. See an earlier version of our paper, Asai, Kambayashi, and Yamaguchi (2014).

[18] Other individuals such as relatives may or may not live together.

cally insignificant (column 11). One possible explanation for this result is that three-generation households do not enroll their children in the accredited childcare, because the informal care by grandparents is already available. Another possible explanation is that three-generation households substitute the accredited childcare for the grandparents' care. Either way, childcare availability does not affect the employment rate of mothers from three-generation households.

4.3 Robustness

Although the regression with prefecture dummies controls for prefecture fixed effects, there might be a simultaneity bias. Namely, there may be a correlation between childcare availability and mothers' unobserved willingness to work even when the time-invariant household and prefecture characteristics are controlled.

One possible source of the simultaneity bias is households moving to a prefecture where childcare service is more available. Another possible source is prefecture-level changes in policies and labor demand shocks that affect not only mothers of children under 6, but also similar demographic groups. For example, pro-family policies unrelated to childcare at the prefecture level might increase the employment of mothers of older children. In the following, we show that these two possibilities are negligible.

4.3.1 Inter-Prefecture Migration

Popular narrative says that obtaining a spot in an accredited childcare center is extremely hard in Tokyo and that some people even move to other municipality for childcare. For example, in the article from The New York Times, Tabuchi (2013) reports, "Some families are so anxious to get into public day care that they upend their lives, moving to districts known to have the shortest waiting lists." However, very little statistical evidence on this issue has been reported.

We provide evidence that households do not move for childcare, using information on moving from the Employment Structure Survey (ESS) 2002. ESS is conducted by the Statistics Bureau every three years and covers about 1% of the population. In the 2002 survey, questions about moving are asked in the ESS. We take a sample of mothers of children under 6 and examine their reasons of the most recent move and where they moved from. The sample size is 41,677.

The first key question is, "Why did you move to the current place?" The respondents are asked to choose one of 13 alternatives that includes "for childrearing and education." The second key question is, "Where did you live before the most recent move?" We find that only 0.8% of the mothers moved from "other prefectures" for "childrearing and education," although 7.9% of the mothers moved within the same prefecture for "childrearing and education."

Table 2: Effects of Childcare Availability on Employment Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Household Type	All	All	All	All	All	Nuclear	Nuclear	Nuclear	3-Gen	3-Gen	3-Gen
Cap./U6-Pop.	0.686***	0.567***	−0.147	0.117*	−0.222	0.668***	0.516***	0.322***	0.515***	0.439***	−0.243
	(0.077)	(0.083)	(0.110)	(0.064)	(0.228)	(0.051)	(0.064)	(0.058)	(0.137)	(0.093)	(0.158)
Cap./U6-Pop. × % Nuclear HH					0.396						
					(0.269)						
Age		0.221***	−0.001	0.039	0.025		0.148***	−0.018		0.317***	0.037
		(0.078)	(0.032)	(0.024)	(0.024)		(0.054)	(0.020)		(0.071)	(0.039)
Husband's Age		−0.250***	0.015	−0.034	−0.019		−0.150***	0.013		−0.366***	−0.032
		(0.077)	(0.028)	(0.026)	(0.027)		(0.051)	(0.021)		(0.065)	(0.039)
Husband's % Empl.		−0.685*	0.164	0.462***	0.456***		−0.210	0.250***		−1.313***	−0.324
		(0.355)	(0.144)	(0.107)	(0.102)		(0.262)	(0.087)		(0.287)	(0.341)
Unemp Rate		−2.469*	−0.235	−0.500	−0.313		−0.435	−0.283**		−3.135***	−1.297
		(1.367)	(0.544)	(0.331)	(0.307)		(1.064)	(0.141)		(0.951)	(1.050)
				(0.074)	(0.097)						
(Intercept)	0.162***	2.576***	−0.284	0.127	0.139	0.134***	0.839	0.018	0.342***	4.448***	0.799**
	(0.027)	(0.950)	(0.371)	(0.316)	(0.315)	(0.017)	(0.635)	(0.260)	(0.050)	(0.803)	(0.396)
Year FE		✓	✓	✓	✓		✓	✓		✓	✓
Prefecture FE			✓	✓	✓			✓			✓
R^2	0.493	0.620	0.984	0.992	0.992	0.615	0.771	0.994	0.218	0.651	0.977
Num. obs.	235	235	235	235	235	235	235	235	235	235	235

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 1990-2010

Note: The dependent variable in all models is the maternal employment rate at the prefecture level. The number of households is used as weight. Standard errors are clustered at the prefecture level.

Technical Note: The model is estimated using the R language and the regression tables are prepared using the software by Leifeld (2013).

Our analysis using the ESS suggests that inter-prefecture migration for childcare is quite uncommon. Despite that, the media often reports interviews with parents who are desperate for the accredited childcare service. This might look somewhat surprising to some readers, but we consider this to be reasonable given that the cost of an inter-prefecture move can be high. The cost of inter-prefecture moving includes not only moving expenses but also the loss of social networks, familiarity with the local public services, proximity to the current workplace, etc. Perhaps, moving for childcare is beneficial for the highly skilled women despite the significant cost, but only 21% of married women age 30-34 have a bachelor's degree or higher, according to the Japanese 2010 census. We conclude that inter-prefecture migration for childcare is rare and it would not bias the estimate of the causal effect of childcare availability.

4.3.2 Effects of Other Family Policies and Labor Demand Shocks

Childcare expansion is only one of many pro-family policies, and pro-family policies other than childcare expansion are likely to raise the employment of mothers of children under 6. Because childcare expansion and other pro-family policies are developed by the similar value and philosophy, changes of these policies may be correlated, which leads to an upward bias for the estimated effects of childcare availability. We are not aware of any major prefecture-level policies that are likely to affect the maternal employment in general, but several small policies may collectively affect it.[19]

There may also be changes in other prefecture-level labor market conditions that affect maternal employment. For example, some industries that employ many women (e.g. service industries) grew significantly, and the growth of these industries may be correlated with the growth of childcare availability. If this is the case, the estimated effects of childcare availability are upward biased.

To address this issue, we estimate the effects of childcare availability on maternal employment for households with children age 6-14.[20] Family policies other than childcare policies and the labor demand shocks from service industries are likely to affect not only mothers of children under 6, but also mothers of children age 6-14, because their labor market skills are similar. However, the mothers of children age 6-14 are not strongly affected by childcare availability, because these older children are not eligible for the accredited childcare service. If strong positive effects are found for the mothers of older children, our main results above are likely to be driven not by childcare availability, but by an omitted factor that affects all mothers regardless of the age of the youngest child.

Table 3 shows the regression results for the employment rate of mothers with children aged 6 to

[19] Nakajima and Tanaka (forthcoming) report that pronatal policies are considerably different across municipalities.

[20] The employment of parents is reported by a different age-window across census years. The employment variable can be constructed from 1990 to 2010 for 3 age-windows including 0-5, 6-14, and 15-17.

14. When prefecture effects are controlled along with other observed characteristics, the estimated coefficients are either negative or insignificant. These results indicate that maternal employment for households with children age 6-14 does not respond to childcare availability, which in turn supports the claim that our main result in Section 4 is indeed driven by childcare availability.

Although we believe that the two most important sources of an endogeneity bias are ruled out, our estimates may be biased if a supply or demand shock for young mothers is correlated with the childcare availability index. Note that this supply or demand shock must be specific to mothers of children under 6. If a supply or demand shock was correlated with childcare availability and common to young and old mothers, we should have detected it in the exercise in Section 4.3.2.

This endogeneity bias is possible when the local governments increase their childcare capacity in response to the requests from mothers of children under 6 who want to participate in the labor force. Unfortunately, we do not know the extent to which this mechanism biases our estimates.

While that is technically possible, we do not consider the possibility of a demand shock that was specific to mothers of children under 6 and correlated with childcare availability. Employers are unlikely to distinguish young and old mothers, because they are very similar in skills and commitment to work.

Table 3: Effects on the Employment of Mothers of Children Age 6-14

	(1)	(2)	(3)
Household Type	All	Nuclear	3-Gen
Cap./U6-Pop.	-0.090	-0.001	-0.206^{**}
	(0.140)	(0.121)	(0.103)
Age	-0.000	0.016	-0.017
	(0.024)	(0.022)	(0.019)
Husband's Age	-0.030	-0.016	-0.003
	(0.032)	(0.025)	(0.026)
Husband's % Empl.	0.274	0.580^{**}	-0.268
	(0.270)	(0.232)	(0.374)
Unemp Rate	-0.949^{**}	-0.303	-1.762^{***}
	(0.420)	(0.326)	(0.632)
(Intercept)	1.651^{**}	0.048	1.847^{**}
	(0.717)	(0.620)	(0.808)
R^2	0.986	0.985	0.983
Num. obs.	235	235	235
Year FE	✓	✓	✓
Prefecture FE	✓	✓	✓

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 1990-2005
Note: The dependent variable in all models is the maternal employment rate at the prefecture level. The number of households is used as weight. Standard errors are clustered at the prefecture level.

4.3.3 Other Issues

Sample Selection We take the marital status and the presence of children in the family as given. Our results are valid as long as the composition of this selected group is stable, but it may not be invariant to the change of childcare availability. This selection is likely to be positive in the sense that more women are selected into motherhood as childcare becomes more available. We do not know precisely the extent to which this selection affects our argument. However, we did not find evidence for the positive selection, when we regress the fertility rate on childcare availability and other control variables. Even if the selection is a real concern, we consider it informative to examine the responses by those who are likely to be most strongly affected by childcare availability. If they do not respond to childcare availability, effects on other group (e.g. single women) is likely to be null.

Prefecture-Specific Trend Not all of our results are robust to the inclusion of a linear trend. Indeed, only the result for nuclear households is robust. Our preferred choice is without a linear

trend. With only five data points, there is not much nonlinearity in the prefecture-specific growth of childcare availability (remember that we include year dummy to control for nonlinear growth at the national level). It is likely that we pick up noises when the prefecture-specific linear trend is included, rather than the true relationship. The inclusion of a linear trend also makes interpretation very complicated.

The main concern from not using a linear trend is an endogeneity bias. One might argue that our result is driven by a trend, rather than the causal relationship that we claim. We address this concern by taking a control group of families of children 6-14. Our placebo or falsification test indicates that families of children 6-14 did not respond to childcare availability. This success in the placebo test makes our results credible, even though a linear trend is not included.

4.4 Comparison with Estimates From Other Countries

Our results are in line with those by Fitzpatrick (2010) and Havnes and Mogstad (2011) who find that an expansion of childcare crowded out informal childcare arrangements in the U.S. and Norway, respectively. In contrast, **?** report that crowding out did not occur in Spain where some of the labor market institutions are comparable to those of Japan. For example, the gender gap is large, the female labor force participation rate is low, and the traditional family values are rooted in these two countries. Given these similarities, our results may seem somewhat counterintuitive.

The key difference between Japan and Spain, however, is prevalence of three-generation household. Iacovou and Skew (2010) report that, in Spain, only about 6% of children under 18 lived with grandparents in 2007. This number is about the average of the OECD countries, which is 6.6%. Although we cannot construct exactly the same statistic for Japan, we find that 22.6% of children under 20 (instead of 18) live with their grandparents, according to the 2005 census. This number is one of the highest among the OECD countries. The high share of three generation households in Japan explains why the maternal employment rate does not increase with childcare availability, despite the fact that female labor force participation rate is low. The comparison of the results across countries suggests that prevalence of informal childcare arrangement is the major determinant of the effect of childcare availability on maternal employment.

5 Effects on Household Structure

An economic benefit for the parents of forming a three-generation household is the informal childcare provided by the grandparents. However, if quality childcare is provided by the local government at an affordable price, this economic benefit of a three-generation household decreases. As a result of the improved childcare availability, some parents may want to form a nuclear household

for more privacy and independence. Whether childcare expansion affects the household structure or not is an important question for the welfare of families beyond maternal employment.

To explore this issue, we regress the nuclear household share on the childcare availability index. Table 4 reports the estimation results. With none or some of the observed control variables including year dummies, the coefficient is negative (columns 1 and 2). When prefecture dummies are added, the coefficient turns positive and significant (column 3) at 0.518. Given that the childcare availability index grew by about 0.1 from 1990 to 2010, the share of nuclear households increased by about 5 percentage points (0.518 * 0.1), which accounts for about a third of the growth in the nuclear household share during the two decades.

Even though the year and prefecture fixed effects are controlled, this conditional correlation between the share of nuclear household and childcare availability may not immediately imply the causal relationship. Given that the increasing share of nuclear household is a secular trend across the country, the co-movement of the two variables may be merely a coincidence. For example, changes in the preference for forming a three-generation family may have affected the demand for accredited childcare.

To address this concern, we estimate the effects on families of which youngest child is aged between 6 and 14. If the change in the preference is the driving factor, the estimated coefficient should be similar to that for families of children under 6. The result in column 4 indicates that the estimate is statistically insignificant at 0.109. Given that the positive significant correlation is found for only families of children under 6, the evidence supports our claim that childcare availability increased the share of nuclear household. Our result is not robust to the inclusion of prefecture-specific linear trends, but, as discussed in 4.3.3, the regression with prefecture-specific trend is unlikely to be informative given that there are only five data points per prefecture. We try to establish the causal relationship by conducting the placebo test in this subsection.

Table 4: Effects of Childcare Availability on Nuclear Household Share

	(1)	(2)	(3)	(4)
Age of the Youngest Child	0-5	0-5	0-5	6-14
Household Type	All	All	All	All
Cap./U6-Pop.	-0.341^{***}	-0.327^{**}	0.518^{***}	0.109
	(0.128)	(0.128)	(0.132)	(0.132)
Age		-0.060	0.080^{*}	0.023
		(0.112)	(0.046)	(0.046)
Husband's Age		0.151	-0.096^{**}	-0.018
		(0.110)	(0.042)	(0.042)
Husband's				
		(0.521)	(0.291)	(0.291)
Unemp Rate		5.077^{***}	-0.521	0.392
		(1.464)	(0.992)	(0.992)
(Intercept)	0.886^{***}	-3.161^{**}	0.807	0.081
	(0.044)	(1.598)	(0.825)	(0.825)
Year FE		✓	✓	✓
Prefecture FE			✓	✓
R^2	0.069	0.560	0.983	0.992
Num. obs.	235	235	235	235

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 1990-2010
Note: The dependent variable is the nuclear household share among all households with children under 6. The number of household is used as weight. Standard errors are clustered at the prefecture level.

6 Changes in Effects of Childcare Availability

We examine if effects of childcare availability on maternal employment change over time. Specifically, we estimate the fixed effect model for the periods 1990-2000 and 2000-2010 separately and compare the results for the two decades. This comparison may provide an insight useful for predicting effects of a further expansion of accredited childcare in the future.

Table 5 shows the results for the period 1990-2000, and Table 6 shows the results for the period 2000-2010. The overall effect on maternal employment is negative, but insignificant in the 1990's, while it is positive significant at the 10% level in the 2000's. Our analysis in the previous section shows that the substitution of accredited childcare for informal care by grandparents offsets positive effects of childcare on maternal employment. To see how the substitution pattern has changed, we estimated the effects of childcare availability on the nuclear household share. The estimated coefficient for childcare availability is 0.535 in the 1990's, but it decreased to about

a half at 0.271 in the 2000's. This indicates that the substitution effect is weakening over time, presumably because the share of nuclear household approaches to the possible highest level.

We also estimate the effects by household type. The estimated coefficients for nuclear households are very similar in two decades: 0.284 in the 1990's and 0.295 in the 2000's. In contrast, there is a notable change in the effect on three-generation families. The estimate increases from -0.272 in 1990's to 0.090 in 2000's. One possible explanation for this rise is that more and more grandparents work in the labor market and do not take care of children even when they live in the same household.

The comparison of the results between 1990's and 2000's indicates that the effects childcare availability on maternal employment increased for two reasons. First, the substitution of accredited childcare for informal care by grandparents is weakening. This is presumably because the nuclear household share is already very high. Second, the effects on three-generation households are increasing. This may be because recent grandparents in the 2000's work in the labor market rather than taking care of the children. If this trend continues, a further expansion of accredited childcare may increase maternal employment in the future.

Table 5: Effects of Childcare Availability in 1990s

	(1)	(2)	(3)	(4)
Dependent Variable	Maternal Emp. Rate			% Nuclear HH
Household Type	All	Nuclear	3-Gen	All
Cap./U6-Pop.	−0.268	0.284**	−0.272	0.535**
	(0.216)	(0.122)	(0.293)	(0.218)
Age	−0.027	−0.050**	0.032	0.048*
	(0.030)	(0.020)	(0.032)	(0.028)
Husband's Age	0.015	0.036*	−0.037	−0.087**
	(0.035)	(0.019)	(0.044)	(0.033)
Husband's % Empl.	−2.072**	1.134	−2.547***	5.307***
	(0.881)	(0.696)	(0.711)	(1.032)
Unemp Rate	−0.895	−0.042	−1.508	−0.087
	(0.859)	(0.440)	(0.932)	(0.843)
(Intercept)	2.795**	−0.643	3.327***	−3.230**
	(1.330)	(0.739)	(0.975)	(1.447)
Year FE	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
R^2	0.990	0.995	0.990	0.995
Num. obs.	141	141	141	141

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 1990-2000

Note: The dependent variable in all models is the maternal employment rate at the prefecture level. The number of households is used as weight. Standard errors are clustered at the prefecture level.

Table 6: Effects of Childcare Availability in 2000s

	(1)	(2)	(3)	(4)
Dependent Variable	Maternal Emp. Rate			% Nuclear HH
Household Type	All	Nuclear	3-Gen	All
Cap./U6-Pop.	0.124*	0.295***	0.090	0.271**
	(0.075)	(0.054)	(0.114)	(0.121)
Age	−0.007	0.023	−0.014	0.120**
	(0.038)	(0.038)	(0.036)	(0.054)
Husband's Age	0.025	−0.017	0.038	−0.112**
	(0.036)	(0.037)	(0.032)	(0.052)
Husband's % Empl.	0.129	0.136	0.159	0.261**
	(0.091)	(0.085)	(0.114)	(0.122)
Unemp Rate	−0.473*	−0.160	−0.669	0.661
	(0.277)	(0.200)	(0.603)	(0.436)
(Intercept)	−0.461	−0.087	−0.660*	0.489
	(0.372)	(0.215)	(0.333)	(0.623)
Year FE	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓
R^2	0.996	0.997	0.994	0.994
Num. obs.	141	141	141	141

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 2000-2010
Note: The dependent variable in all models is the maternal employment rate at the prefecture level. The number of households is used as weight. Standard errors are clustered at the prefecture level.

7 Conclusion

Using prefecture panel data from the Japanese quinquennial census from 1990 to 2010, we estimate the effects of childcare availability on maternal employment. We depart from previous papers on Japan by controlling for prefecture fixed effects and find that the estimates identified by cross-sectional variations alone can be severely biased. Indeed, contrary to popular belief, childcare availability is uncorrelated with maternal employment when prefecture fixed effects are controlled. Evidence suggests that this is because households substitute the accredited childcare service for informal childcare by grandparents, as more and more households choose not to live with grandparents.

We also analyze nuclear and three-generation households separately. The estimation result shows that the employment rate of mothers from nuclear households increases with childcare availability, whereas that of mothers from three-generation households does not. We address two potential sources of a simultaneity bias and find them negligible. First, we show evidence that inter-

prefecture migration for childcare is rare. Second, we show that the employment rate of mothers of children 6-14 does not change with childcare availability. These results implies that prefecture-level policy changes and other shocks common to young and old mothers are not correlated with the changes of childcare availability.

Can further expansions of childcare raise the maternal employment rate? The answer to this question is not immediately obvious, but our analysis in Section 6 shows some promise. The key reason for the null effect is the substitution of accredited childcare for informal care by grandparents, but this crowding-out effect is weakening over time. We estimate effects of childcare availability separately for the 1990's and the 2000's, and find that the employment effect became positive in the 2000's, although it is modest. Given that the share of three-generation households was already at a low 13.5% in 2010, the overall effect of childcare availability on maternal employment may be getting stronger. Moreover, even three-generation families may positively respond to the expansion of childcare, because recent grandparents may work in the labor market rather than to take care of children.

A catch is that the pace of childcare expansion has to exceed the child population growth in order to keep childcare availability improving. More than 70% of the growth of childcare availability in 1990-2010 is explained by the decreasing child population. If the fertility rate starts to increase due to pro-family policies and other factors, childcare availability will not improve unless the pace of expansion is fast enough. Even larger government expenditure than the current one may be necessary to expand the supply of accredited childcare service.

The main limitation of the current paper is that we cannot examine detailed labor market outcomes such as wage, earnings, hours of work, and job type, due to lack of data. Understanding the effects of childcare availability on these outcomes will shed light on welfare consequences and open the door to a cost-benefit analysis. We leave these interesting issues for future research.

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A Additional Table

We show evidence that whether the actual or potential capacity rate is used does not change our results. The actual capacity rate is defined as the ratio of capacity to population of children under 6 and used in the body of the paper. The potential capacity rate is proposed by Unayama (2011) and defined as the ratio of capacity to population of women aged between 20 to 44. Table 7 is comparable to Table 2, while Table 8 is comparable to Table 4. The coefficients and standard errors become about three times greater when the potential capacity rate is used, but they are very similar otherwise.

We also regress the actual and potential capacity rates on the year and prefecture dummies. The correlation coefficient of the two vectors of residuals is 0.92, which accounts for why results are not very different.

Table 7: Effects of *Potential* Childcare Availability on Employment Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Household Type	All	All	All	All	All	Nuclear	Nuclear	Nuclear	3-Gen	3-Gen	3-Gen
Cap./Female-Pop.	1.912***	1.644***	−0.379	0.327	−0.193	1.714***	1.495***	0.915***	1.617***	1.170***	−0.637
	(0.185)	(0.237)	(0.349)	(0.208)	(0.443)	(0.145)	(0.194)	(0.214)	(0.336)	(0.245)	(0.482)
Cap./Female-Pop. × % Nuclear HH					0.232						
					(0.166)						
Age		0.195***	0.003	0.035	0.034		0.121***	−0.028		0.297***	0.040
		(0.069)	(0.032)	(0.024)	(0.023)		(0.044)	(0.021)		(0.073)	(0.041)
Husband's Age		−0.204***	0.010	−0.029	−0.029		−0.107**	0.024		−0.342***	−0.036
		(0.071)	(0.029)	(0.027)	(0.026)		(0.045)	(0.021)		(0.068)	(0.041)
Husband's % Empl.		−0.789**	0.146	0.464***	0.454***		−0.300	0.269***		−1.268***	−0.357
		(0.349)	(0.149)	(0.109)	(0.104)		(0.252)	(0.093)		(0.324)	(0.367)
Unemp Rate		−2.139*	−0.275	−0.472	−0.417		−0.272	−0.233		−2.888***	−1.376
		(1.090)	(0.550)	(0.327)	(0.289)		(0.789)	(0.177)		(0.919)	(1.047)
				(0.071)	(0.091)						
(Intercept)	0.171***	1.923*	−0.237	0.077	0.165	0.158***	0.285	−0.064	0.323***	4.168***	0.864**
	(0.020)	(1.102)	(0.379)	(0.322)	(0.326)	(0.015)	(0.784)	(0.270)	(0.043)	(0.865)	(0.429)
R^2	0.578	0.674	0.984	0.992	0.992	0.609	0.809	0.994	0.314	0.657	0.977
Num. obs.	235	235	235	235	235	235	235	235	235	235	235
Year FE		✓	✓	✓	✓		✓	✓		✓	✓
Prefecture FE			✓	✓	✓			✓			✓

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 1990-2010

Note: The *potential* childcare availability is measured by the ratio of capacity to the population of women aged between 20 and 44. The dependent variable in all models is the maternal employment rate at the prefecture level. The number of households is used as weight. Standard errors are clustered at the prefecture level.

Table 8: Effects of *Potential* Childcare Availability on Nuclear Household Share

	(1)	(2)	(3)
Cap./Female-Pop.	-1.438^{***}	-1.111^{***}	1.412^{***}
	(0.311)	(0.324)	(0.459)
Age		−0.042	0.064
		(0.106)	(0.047)
Husband's Age		0.116	-0.078^{*}
		(0.105)	(0.044)
Husband's			
		(0.494)	(0.291)
Unemp Rate		4.728^{***}	−0.395
		(1.292)	(1.071)
(Intercept)	0.929^{***}	-2.544^{*}	0.627
	(0.038)	(1.537)	(0.857)
Year FE		✓	✓
Prefecture FE			✓
R^2	0.186	0.592	0.983
Num. obs.	235	235	235

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: Census 1990-2010

Note: The *potential* childcare availability is measured by the ratio of capacity to the population of women aged between 20 and 44. The dependent variable is the nuclear household share among all households with children under 6. The number of household is used as weight. Standard errors are clustered at the prefecture level.