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The Effect of Family-Friendly Policies on Fertility and Maternal Labor Supply

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The Effect of Family-Friendly Policies on Fertility and Maternal Labor Supply

Evidence from Japan Using Natural Experiments

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ABSTRACT

Low fertility is a major policy focus in Japan. Many policies, such as an increase in replacement allowances during parental leave, were rolled out during the 1990s and early 2000s with little evidence that they had any effect on fertility or labor supply. This study assesses the impact of policies designed to promote a family-friendly work culture on childbirth and labor supply from the mid-2000s on. The causal effects are identified by investigating two reform policies targeted at two different sizes of firms. The paper contributes to the literature on laws that impact organizational culture in a society where both gender and organizational norms are strong. The short-hour option in Japan significantly increased childbirth among working women who had been childless. The intent to give birth also increased among childless women at the treated firms, and there was an increased likelihood of women taking up permanent employment at reduced hours following their first childbirth. The policy effect was not significant for second or third births.

Key words: short-hour option mandate, childbirth hazard, labor supply following childbirth

I. Introduction

[1] *Nobuko Nagase, Ph.D., is professor of Labor Economics and Social Policy at Ochanomizu University.* *The author would like to acknowledge that this research is aided by a competitive fund supported by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) and the Japan Society for the Promotion of Science (JSPS), Empirical Social Science Research for the Impending Issue of Japanese Society,* Jenda Kakusa Sensitive na Hatarakikata to Sekatsu no Chowa*" (fiscal years 2008–12, Nobuko Nagase, principal investigator), and the Abe Fellowship (2013–16, , Nobuko Nagase, principal investigator). The use of microdata from the* Japanese Longitudinal Survey of Adults in the 21st Century (2002 Cohort), *collected by the Ministry of Health, Labor, and Welfare (MHLW,) followed the due application process and permissions required by the Japanese Statistics Law. The author would like to thank Francine Blau, Claudia Goldin, David Autor, Hugh Patrick, Takatoshi Ito, Elaine McCrate and also the participants of the National Bureau of Economic Research (NBER) Japan Project Meeting (Tokyo, July 30, 2015), and Karen Eggleston for her helpful comments.*

East Asian economies experienced an ultra low total fertility rate, of around 1.3 or lower, in the 2000s. These economies are therefore in search of policies that can positively affect fertility, even though it may not be easy to impact fertility through policy levers. The Japanese government introduced the Child Care Leave Act in 1991 mandating unpaid parental leave with job protection from 1992. Beginning in 1994, it also introduced a series of five-year plans called the "Angel Plan", "New Angel Plan" and the "Renewed Angel Plan" to increase subsidized day care to increase fertility by reducing the opportunity cost of children for working mothers. Despite the series of leave provision enhancements, the labor participation rate of new mothers in Japan levelled off at around 25 percent after the first childbirth from 1990s to late 2000s, while marriage and fertility was postponed.

Economic theory predicts that when there is no parental leave, more women will exit the workforce, and if parental leave is provided, more women who would have quit will return to their prebirth employer, and thus the labor supply of mothers will increase (Klerman and Leibowits 1997). Evidence confirming this theory was found in empirical studies of different countries (Ruhm 1998; Waldfogel, Higuchi, and Abe 1999; Berger and Waldfogel 2004; Baker and Milligan 2008; Lalive and Zweimuler 2009; Han, Ruhm, and Waldfogel 2009). Some studies found that parental leave and allowance schemes can motivate women to speed up the timing of fertility (Hoem 1993; Walker 1995; Lalive and Zweimuler 2009), and in some cases also the fertility level itself (Averett and Whitingon [2001] for the United States; Rønsen [2004] for Finland and Norway, Bjorklund [2006] for Sweden, and Gauthier [2007]). Results for the United States using the difference-in-difference method, however, showed that, in many cases, parental leave had insignificant results on the labor supply (for example, Klerman and Leibowits 1997; Waldfogel 1999; Baum 2003 and Hashimoto et al 2004). Gordon, Løken, Mogstad and

Salvances (2016) found for the case of Norway using regression discontinuity approach, that leave allow longer parental time with children, but impact on female labor supply nor fertility to be small in the long run. Schonberg and Ludsteck (2014) for Germany also found that the leave allow more parental time with children, but that long term effect on labor supply was small.

In the case of Japan, despite the introduction of parental leave (in 1992) and the increasingly generous replacement allowance for parental leave (from 1995), even in the short term the labor supply of new mothers showed no significant increase up to the first half of the 2000s. Also, fertility continued to decline until it hit a historic low of 1.26 in 2005.

That Japan's labor force participation and fertility rate appear unresponsive to these policy initiatives is baffling, especially since many studies using Japanese microdata show that the full-time employment of women with children increased when companies provided leave (Higuchi 1994; Morita and Kaneko 1998; Shigeno and Ohkusa 1998; Higuchi and Abe 1999; Waldfogel, Higuchi, and Abe 1999; Suruga and Cho 2003; Nagase 2003a; Takeishi 2011; Sato and Ma 2008). Some results also found that fertility rose for the working population when parental leave was provided (Morita and Kaneko 1998; Ministry of Health, Labor, and Welfare 2013).

Most Japanese research analyzed only working women and the provision of leave by companies, and, as a result, could have a potential bias based on the unobserved differences of the women who were hired at firms that did provide leave and those that did not. Research on fertility also might have been biased as it analyzed mostly the working population using retrospective questions. Studies of working mothers (who were asked about the ease of taking parental leave in retrospect) may have serious selection issues, since many women who quit

work to have a child are not included in the analysis. The difference-in-difference method may, however, be able to overcome the selection problem. Asai (2015) used this method for Japan, and her focus was on the 2001 increase in leave allowance from 25 percent of the salary to 40 percent; however, she found no significant effect of the policy on maternal labor supply.

Even though women's entitlement to take leave with job protection is an important incentive for their continued employment, this paper hypothesizes that for women to choose to work after childbirth, and for employed women to be able to have children, the policy must be accompanied by a family-friendly workplace culture. This is especially true for a country in which group norms and group cultures are strong. Akerlof and Kranton (2000) stated that norms are important determinants of the utility one derives from one's own actions and also from the actions of others. Japanese firms have a strong organizational culture requiring the high commitment of full-time regular workers. At the same time, Japanese society has also placed strong emphasis on motherhood. Unless the norms at the workplace and at home are changed to recognize mothers as legitimate members of the work team, they will feel penalized at work. Therefore, the introduction of parental leave alone may not be effective.

To verify the effect of a family-friendly policy, I will use the *difference-in-difference* method. In an attempt to change work cultures that are not sympathetic to workers with families, the government announced that firms with more than 300 employees would be required to set up action plans to better the work-life balance of their employees. The schemes, of no shorter than two and no longer than five years duration, had to be registered by 2005 with the local office of the Ministry of Health, Labor, and Welfare (MHLW). In 2009, the government announced that workers with children under three could request shorter work hours (*e.g.,* six hours a day), and

that the company could not reject this request without legitimate reasons. This mandate was applied to firms with 100 and more employees in 2010, and to all other firms from 2012. This was a welcome change for full-time mothers who wished for flexible work hours. This paper will empirically estimate, through natural experiments, the effects of these two policies on the fertility and labor supply of mothers. It will also see whether childless women's intention to give birth increased as a consequence of the improved feasibility of balancing work and family.

The remainder of the paper is as follows. Section 2 begin with background information on the change in law, previous research results and the meaning the law have had against the long term employment labor market in Japan. Section 3 discusses the estimation methodology and section 4 describes the data. Section 5 presents the results. The first part of Section 5 deals with the effects of the two policies on the first childbirth as well as marriage, and then on the second and third childbirths. The second part deals with the effect of the short-hour option mandate on the continuation of work and the weekly work hours following the first childbirth, and the third part on how strong an effect the two policies have had on women's intention to have a child. Section 6 discusses the results and concludes the paper.

II. Background

After the total fertility rate drop to 1.57 in 1989, the Japanese government passed the Child Care and Family Care Leave Act in 1991, hoping to reduce the opportunity cost of children for female workers, and thus encourage women to have both children and careers. This law applied to *seishain*, full-time employees without termination of contract (called full-time, permanent employees from hereon), and to those with more than one year tenure. It protected

their job during parental leave, which could last till their child reached one year of age. It applied to both mothers and fathers, though the take-up rate of fathers was near zero. It did not apply to employees with a fixed-term contract—*e.g.*, of one or two years. The mandate had a grace period until 1995, when it was extended to smaller enterprises with fewer than 29 employees. Maternity leave with job security has been available to employees in Japan (including fixed-term employees) since 1956. Female employees are eligible to take six weeks off before and six weeks (later extended to eight weeks) after childbirth. The drop in fertility initiated the passage of a law in 1991 that granted job-protected leave for a maximum period of one year after birth. Figure 1 shows that the average number of children of married women declined by cohort, especially for those born after 1963.

<Figure 1>

Despite their entitlement to parental leave from 1992 and the passage of Gender Equal Employment Opportunity Law of 1985, many mothers continued to quit work at marriage or the birth of their first child, and marriage and birth rates continued to decline. Returning to full-time work with a one-year-old was not easy, especially since full-time workers are expected to take on many workplace responsibilities. In interviews of workers at large enterprises in the Tokyo metropolitan and nonurban areas in 1997, Nagase (2006) found that many women were skeptical of taking leave—especially those in the Tokyo area, who do not expect to live with extended families where parents-in-law can help with child rearing. Some women without children described how women who returned after parental leave had to apologize to their colleagues before dashing to daycare centers after work; these childless women did not want to lead that kind of life. Another woman said she would prefer to be a full-time mother and take good care of

any future children, even though she was not yet ready to leave the workforce because she enjoyed her single life. In the Japanese long-term employment setting, one is often hired not for a *specific* job, but rather for the long term and assigned by managerial initiative to a team. The job description of an individual worker, therefore, is not clear, and workers who can flexibly cover a wide range of work within a given team gain high evaluations (Ishida 1989). The workplace, backed by court law, also expects employees to work overtime whenever required.[2] In the 2008 interviews, Nagase and Yamaya (2011) found that because they must put in long hours of teamwork as well as keep up their homemaking role, many childless women are skeptical of the feasibility of balancing work and family responsibilities despite the governmental policies introduced in the early 2000s. The opportunity cost of having children was therefore still high for many women despite the introduction of parental leave. When their children grew older, many mothers who had left the labor market reentered it as "part-time" workers who were paid by the hour and at a much lower rate (Yu 2002; Nagase 1997, 2003b). Therefore, the opportunity cost of leaving full-time regular work was high, and women increasingly postponed marriage and childbirth in the 1990s and 2000s.

One line of reform designed to encourage the use of parental leave was to increase the monetary allowance given during leave. In April 1995, the government started granting a leave allowance equivalent to 25 percent (5 percent withheld) of the daily salary from employment insurance. This was increased to 40 percent (10 percent withheld) in January 2001, and to 50 percent (20 percent withheld) from October 2007 to 2010. To incentivize mothers to return to their prebirth employers, the withheld portion of the allowance was refunded six months after

[2] Supreme Court cases on overtime work ruled that long term employees are to work overtime when required. The effect of such rule on workplace norm and household division of labor is discussed in Nagase and Brinton (2017).

they returned to their original workplace.[3] Because the birth rate continued to stagnate, from April 2010 the government abolished the withheld portion, and after April 2014, the monthly replacement became 67 percent until a child reached six months and 50 percent thereafter.

The percentage of new mothers in the labor force, however, did not increase despite this policy. Figure 2 shows the long-term trend of new mothers in the labor force when their children turned one. The repeated cross-sectional Japanese National Fertility Survey (1992, 1997, 2002, 2005, and 2010) shows the longest time trend for a five-year average. The percentage of first-time mothers in the labor force was 23 percent for first births in the late 1980s, 23 percent in the early 1990s after the introduction of the parental leave, 24 percent in the late 1990s, and 26 percent in the first half of the 2000s. We see that the yearly labor participation average of mothers with newborns in the Japanese Longitudinal Survey of Adults in the 21st Century (2002 Cohort) (JLSA), followed the trend of the Japanese National Fertility Survey, but the ratio of mothers in labor force jumped in 2009 and 2010 and further in 2011 and 2012. The 2015 Japanese National Fertility Survey confirmed this upward trend. The percentage of mothers who had work when their first child turned age one increased from 27.4 percent for births in 2000–04 to 29.1 percent in 2005–09, but jumped to 38.3 percent in 2010–14.

<Figure 2 >

Another line of government reform was to offer flexible work hours and encourage a supportive culture within firms to balance work and family. *Plus One Measure to Halt the Declining Birth Rate* announced by the MHLW in 2002, pointed out that the "revision of

[3]About 85 percent of the leave-takers received the withheld portion, meaning about 15 percent quit work after taking the leave.

working patterns, including men's" was important. Changing men's work patterns of putting in long hours would make it easier for families to have children. When the legislature passed the *Act on Advancement of Measures to Support Raising Next-Generation Children of 2003*, the government mandated firms with more than 300 employees to plan their work and family policies to meet their employee needs and to register a two-to-five-year action plan at local MHLW offices by 2005. Firms with good practices would be awarded a "*kurumin* seal" that could be printed on their products. In late 2007, the government, the main employers' organization, and the National Center of Labor Unions adopted "The Work and Life Balance Charter."

The reform, proposed in December 2008 and passed in June 2009, was another large amendment to introduce flexible work hours for working parents. It mandated a short-hour option for workers with children under the age of three. Sick leave to care for children, introduced in 2005, was doubled to ten days for parents with more than one preschool child. In addition, to encourage fathers to use the parental leave benefit, leave was extended by two months for fathers.[4] After 2009, fathers were also allowed to take leave during the first eight weeks after a child's birth and again sometime later. In December 2008, the action plan mandate for firms was also expanded to companies with more than 100 employees.

With the short-hour option legislated, starting in June 2010, companies with more than 100 employees were mandated to offer workers a six-hour-a-day working option until their child reached age three, and were barred from assigning overtime work to parents of preschool

[4] This increase in length may not have had much impact in major urban cities, since the law already had a clause extending the leave period by six months in 2005 if it was verified that government-approved childcare facilities were full, which was often the case in urban centers.

children. Firms with fewer than 100 employees were given a two-year grace period until July 2012. Therefore, if women working at firms with more than 100 employees had a child in 2009 or 2010, they could return to work with the short-hour option and not have to work overtime, whereas women at firms with fewer than 101 employees would have the same benefits if they waited until 2011 to have a child.

The action plan register of 2005 and the short-hour option of 2009 were aimed at easing child rearing for those working full time. These changes might increase marriage and childbirth among working women if the policy really eases the option of having both a full-time regular job and a child.

This paper will look at the effects of policies to increase work flexibility on fertility and work continuation. Our model predicts that the leave policy will have a positive impact on fertility only when females see that having both a job and a family improves their utility. We will utilize the "registration mandate" (introduced in 2005) for those employed at firms with 301 or more employees, and the "short-hour option" (introduced in 2009) for firms with 101 or more employees.

III. Conceptual Framework and Estimation Strategy

A. Policy Change

We will use the *difference-in-difference* method to compare workers at firms with 101 (or 301) or more employees and those at firms with 100 (or 300) and fewer employees, and see if fertility or work continuation changed before and after the regulatory changes, controlling for other factors such as the mother's age and educational level.

It is important to establish the causal effect of the policy on fertility, in light of the fact that leave policy enhancements intending to reduce the cost of quitting work after childbirth have seemed to exert little influence on labor supply or fertility in the past, and that policymakers as well as the media are becoming skeptical of the policy's effectiveness.

By using these policy changes as natural experiments, and by estimating whether a significant change in birth and labor supply was evident right after the implementation of the policy among workers at mandated firms, compared with those at nonmandated firms, we can identify the causal effect of the policy. Workers at mandated firms (the larger enterprises) may, in their unobservables, be more qualified than workers at smaller firms. Yet, if the change in fertility behavior in workers at the larger firms, as compared to those at smaller firms, is evident right after the implementation of the reform, the change must be due to the policy—not the result of the self-selection of employees at the mandated firms.

It is important, then, to identify when the employees knew about the reform. Discussion of the short-hour mandate reform started in August 2008, the MHLW announced the policy proposal in December 2008,[5] and the law was passed in June 2009. According to Google trends, *ikuji tanjikan* (the short-hour option for childcare) was first discussed as a new term in May 2007, when the short-hour option for public servants was mandated. Use of the term increased

[5] The MHLW states that the revision of the leave law was discussed starting with the Cabinet's adoption of the New Measure against the Declining Fertility in June 2006, and following the *Expert Group Report on Supporting the Work and Family Life for the Future*, which was released in August 2007. The Labor Policy Council Employment Equality Subgroup discussed leave reform at its 82nd meeting in August 2008. The final report of the National Commission on Social Security (November 2008) stated that the childcare leave system should emphasize supporting flexible work styles, including shorter working hours. At the same time, it was necessary that the general workplace reduce long working hours for men (fathers) and encourage them to take childcare leave (www.mhlw.go.jp/english/policy/affiars/dl/05.pdf). At its 91st meeting in December 2008, the MHLW proposed mandating the short-hour option and implementing the "no overtime" policy for private employees who had children under the age of three (discussions and papers can be accessed at the MHLW website).

from January to March 2009, shortly after the MHLW's December 2008 announcement of its policy proposal for the private sector. The law was on the table of the Diet beginning in April 2009, discussed at the House of Representatives on June 12, and passed into law by the House of Councilors on June 24, 2009. But by then, because the law was expected to pass, attention had already halved. In June 2010, when the law was to be implemented, attention again increased. It can therefore be assumed that the public became aware of the short-time option during late 2008 to early 2009 (see the Google search trend in the Appendix). Since workers were required to have a one-year tenure before they were eligible for parental leave, they could not have self-selected the mandated firms quickly enough to account for any positive relationship between childbearing and firm size by 2009 (short-hour option).

It is more difficult to define the policy timing for the mandated firms with 301 or more employees to make action plans to accommodate work-life balance. Based on the *Act on Advancement of Measures to Support Raising Next-Generation Children of 2003,* firms were required to make plans that suited the needs of their employees and to register them with the local MHLW office by 2005. But because these action plans could vary from two to five years, and there were no specific requirements for their content, the time periods and content varied by firm.[6] However, in interviews I conducted in 2008 with personnel officers at 11 large enterprises, many officers said that the mandate resulted in personnel departments strongly recognizing the

Beginning in April 2005, firms with more than 300 employees were mandated to register an action plan to improve their work environments with the local office of the MHLW. For firms with 101 to 300 employees, the plans were not mandatory, but recommended. The MHLW also started acknowledging *nintei kigyou* (approved firms) in 2007, and allowing them to use "*kurumin*" or family-friendly seals on their goods and advertisements. To get approval for a *kurumin* seal, a firm should: have action plans for more than two and less than five years; realize the stated action plan goals; have some measures for workers having children between three years and school-going age; have at least one male parental leave-taker; and have female take-up of childcare leave exceeding 70 percent.

need for the higher utilization of female employees and thinking about the future labor force structure. On December 3, 2008, an amendment to the law ordered firms with more than 300 employees to announce their action plan to the public beginning in April 2009; firms with more than 100 employees were required to publicly announce the plan in April 2011. This rollout partly coincided with the short-hour option period. Therefore, I will estimate the policy period for action plans to be from 2005 to 2008. From 2009 onward, the policy effect of the action plan mandate will be measured together with that of the short-hour option.

B. Estimation Model

We can measure the causal effects of the regulations on the childbirth hazard for working mothers, especially for the 2009 reform, since they need to be employed for at least one year before being eligible for parental leave and the regulation was enacted only six months after the announcement. Consequently, if the childbirth hazard rose right after the reform in 2009, it would not be the selection effect, but rather the effect from the change in the regulation of 2009. Since marriage go together with childbirth in Japan, we will also estimate the policy effect on marriage.

The marriage, and the first-, second-, and third-childbirth hazard for women in the labor force will be estimated for one period. $Y1_{it}$ takes 1 among those who got married, or had their first child among those with no children, or second child among those with one child, or third child among those with two children. H_{it} is the vector of covariates, such as educational attainment and age category dummies, the hourly wage rate is at t-1, and birth intentions are at t-1. For the second- and third-childbirth hazard, the log income and domestic work hours of the husband were included as explanatory variables.

We estimate not only the first childbirth but also marriage, as both sometimes occur simultaneously. In Japan, premarital sexual intercourse has become more socially accepted, but out-of-wedlock birth still is not. Today, around one-fourth of marriages in Japan occur after the conception of a child, either planned or unplanned. Out-of-wedlock childbirths are still rare (1.63 percent in 2000, 2.15 percent in 2010, and 2.29 percent in 2015) according to the MHLW's Vital Statistics. Cohabitation of unmarried females in the age group 18 to 34 is still low (2.8 percent in 1987, rising to 7.6 percent in 2002, but declining to 5.8 percent in 2010, and returning to 7.0 percent in 2015) according to the National Fertility Survey. On the other hand, premarital conception resulting in marriage (identified by a marital period that is less than the pregnancy period) was 12.6 percent in 1980, 21.0 percent in 1990, 26.3 percent in 2000, and leveled off at 25.3 percent in 2009. For women in the age group 20 to 24, the figure was over 60 percent in 2009; in the age group 25 to 29, around 25 percent; and the age group 30–34, a little over 10 percent, according to the MHLW's *Vital Statistics Special Report on Childbirth*.

$firmsize100_{i\,t-1}$ in equation (1) is a dummy variable that applies if one is employed at a firm with 100 and more employees. The short-hour option mandate was applied to those who were employed at those firms who gave birth in 2009–10 and returned to work after 2010-12. For births after 2011, the short-hour option was mandated for all employees with children less than three years old, regardless of firm size. Thus, we will estimate, using the fixed linear probability model, that:

$$Y1_{it} = a_1 + b_1 H_{it} + c_1 firmsize100_{it-1} + d_1 firmsize100_{it-1} * (years\ for\ short\ hour\ option\ \ mandate\ \ policies) + e_1 year\ dummy + u_{it} \quad (1)$$

The action plan mandate for firms with 301 and more employees was announced in 2003, while the registration mandate took effect in 2005. Since the timing ambiguities may make assessing the action plan mandate more difficult, the effect of the 2009–10 policy will be estimated first, and then in another regression, we will add cross-terms of firm size of more than 300, $firmsize300_{i\,t-1}$ crossed with years 2005 to 2008 as in equation (2). Due to the firm-size categories asked in the questionnaire, we will use 100 instead of 101 and 300 instead of 301 for the firm size.

$$Y1_{it} = a_2 + b_2 H_{it} + c_2 firmsize100_{it-1} + d_2 firmsize100_{it-1} * (years\ after\ short\ hour\ option\ \ mandate\ \ policies) + e_2 firmsize300_{it-1} + f_2 firmsize300_{it-1} * (years\ after\ action\ plan\ \ \ mandate\ \ policies) + g_2 year\ dummy + u_{it} \quad (2)$$

If d_1 in equation (1) and d_2 in equation (2) is significantly positive statistically, we will know that the short-hour option increased the number of childbirths and marriages. If f_2 in equation (2) if significantly positive statistically, we will know that the action plan mandate increased the number of childbirths.

As a next step, difference-in-difference-in-difference will be estimated to see the varying effects of the short hour option mandate policy. The policy should affect those who had their first child at the treated firms after the policy enactment. $Y2_{it+1}$ is work continuation as a full-time permanent employee and the weekly hours worked in the following year. If the policy

is effective, the work hours *t+1* of women who had a newborn at *t* should become shorter at the treated firms with the short-hour option mandate, and also work continuation as a full-time permanent employee at *t+1* of these same women should be higher at the treated firms. d_3 in equation (3) should be statistically significant if the policy especially affected those females who were planning for their first child.

$$Y2_{it+1} = a_3 + b_3 H_{it} + c_3 firmsizei_{t-1} + c_4\ first\ childbirthi_t$$

$$+ c_5 firmsizei_{t-1} * first\ childbirth\ i_t\ +$$

$$c_6 first\ childbirthi_t\ * (years\ after\ enactment\ of\ policies)$$

$$+ c_7 firmsize_{it-1} * (years\ after\ enactment\ of\ policies)$$

$$+ d_3 firmsize_{it-1} * first\ childbirthi_t\ *\ (years\ after\ enactment\ of\ policies) +$$

$$e_3\ (year\ dummy\ including\ years\ after\ enactment\ of\ policies) + u_{it}\ (3)$$

C. Parity-Specific Effects, Childlessness, and Birth Intention

Policies to change work culture should have had the strongest impact on women who wished to have a child *and* continue to work, but hesitated because workplace norms did not support women with children taking on responsible work, or because work hours were long. In Japan in the past, around 40 percent of women left the workforce upon marriage and another 40 percent after the birth of their first child. But the large adjustment ends mostly at the first childbirth, as evidenced in the Japanese National Fertility Survey (Nagase 1999). Figure 3, which uses the Japanese Longitudinal Survey of Adults in the 21st Century (2002 Cohort) (the data this paper uses for its analysis), shows a similar picture for the period 2002–10: leaving the workforce at

marriage and at the first childbirth is much more prevalent than leaving the workforce at the birth of the second child.

<Figure 3 >

Therefore, the change in work culture may have the largest impact on women who hope to work as full-time regular employees after marriage and after having their first child. The work culture should also be important for the second and the third birth, but other factors, such as the husband helping with the child rearing, characteristics of the marital relationship, and the availability of daycare centers may be of equal importance to working mothers. Since we have questionnaires on husbands' domestic work hours on weekdays and on weekends in minutes, we made husbands' weekly and weekend domestic hours as explanatory variables by dividing them by 60 to estimate the second- and third-childbirth hazard. We also included the log of the husband's income in 10,000 yen at *t-1* as an explanatory variable for the second and third childbirth to account for the nonlabor income of the wives.

As for explanatory variables other than firm size and policy years, we have educational attainment to account for differences in human capital, and year dummies to account for periodical influences such as economic fluctuations. Age dummies were also included as controls, since childbirth is related to age by biological limitations at the higher end and schooling and social norms at the lower end. Logs of hourly wages of females are also included to account for both the opportunity cost of time and also the available income.

We will also focus on women's intention to have a child to see if fertility declined because more women did not want a child or because they were constrained in their wish. The

following question was asked of all respondents every year, “Do you want to have any or another child?” The response options were “definitely yes,” “yes,” “cannot say,” “no,” and “definitely no.” We made a dummy variable of 1 for strong intention of child when the respondent answered “definitely yes.”

IV. Data

The paper will use the Japanese Longitudinal Survey of Adults in the 21st Century (2002 Cohort), here called the JLSA, a nationally representative panel survey that follows cohorts of Japanese youth and was collected by the MHLW. Beginning in the first week of November 2002, the JLSA has collected yearly information on labor market experiences, housework hours, birth and marriage intent and outcome, and the background characteristics of people between the ages of 20 and 34 and their spouses. They are interviewed annually, and this paper uses up to the eleventh wave surveyed in 2012. These are data on cohorts born from 1967 to 1982, who were 20 to 34 years of age in 2002, and 30 to 44 years of age in 2012. We can thus follow their family formation. The original sample contained 14,150 females. The effective response rate for the first year was 82.8 percent, and the follow-up rates were 82.2, 85.1, 87.9, 89.0, 90.0, 91.3, 92.4, 85.5, 82.4, and 82.0 percent respectively for the following years. These data allow us to examine women of child-rearing age and how they responded to the change in the parental leave law.

The panel structure allows us to control for individual differences in unobserved preferences and individual abilities. Birth timing may differ by unobservables, such as the desire for children and fecundity. The advantages of these data are the large sample size and high

response rate. Other existing panel data in Japan, such as Panel Data on Consumers, the Keio Household Panel Survey (KHPS), or the Japan Household Panel Survey (JHPS) are smaller, with a lower response rate in the initial year as compared to the JLSA. These data have not been explored until very recently owing to restrictions on the use of microdata imposed by the governmental statistics law.[7]

The shortcoming of these data is that they start in 2002. Even though we have retrospective data on past childbirths and marriages, we have no information on past parental leave use, birth intent, and other variables, so we can only estimate the impact on behavior of law changes after 2002. For the purpose of this analysis, we selected a sample of people who were working.

V. The Results

A. Effect of Action Plan Mandate and the Short-Hour Option on Marriage and Childbirth

Figure 4 shows the first-childbirth hazard before and after the law mandate. The red line shows the result for firms with less than 100 employees, and the blue line for firms with 100 and more employees. In 2009–10, employees at firms with 100 and more employees were given the option to work short hours till a child reached the age of three. The fertility hazard seems to have risen for women working at such firms (the blue line) as compared to those without the option (the red line). Interestingly, in 2011–12, when employees of all the firms were given the option to work short hours, the first-childbirth hazard increased further for employees of both firms (as shown by the red line and blue lines). We need to take into effect other factors to verify the effect of the policy. Since in 2003, we had a group of women aged 21 to 35, while in 2012, they were 30 to

[7] Even today, one needs to go through a long application process and it takes time to get the permission and the proper documents. The term of use is also restricted.

44, I controlled the age of the females to be 30 to 35 so that I could have the same age group for every year. This control was made since childbirth is strongly connected to age, and the age group 30 to 35 was the only age group that was available as common. However, I added results for a wider age group of 25 to 37 in the appendix, which were likely ages for having a first child in the surveyed sample, and the general difference in trends between the treatment and control group is also evident in this age group as well.

＜Figure 4>

Table 1 shows the effect of the 2005 and 2009 policies on marriage and on the first childbirth, while controlling for the woman's age, year, educational attainment, log hourly wage of the previous period, and strong intentions to have a child.

The first and the second column show that the short-hour option policy had a significantly positive effect on marriage. It raised marriage hazard by around 2 percent, while the effect of the action plan mandate was nonsignificant, as estimated by the linear probability model. The yearly marriage rate during the survey years averaged around 5.8 percent for those who were working at *t-1*. Therefore, the 2 percent rise can be considered substantial.

The remaining columns show the effect on the first-childbirth hazard. The short-hour option policy had a significant effect also on the first childbirth, while the action plan mandate again had no significant effect. Women working at firms with 300 and more employees were less likely to have any children. However, after controlling for the woman's age, year, educational attainment, birth intent at *t-1,* log hourly wage rate at *t-1,* and marital status, the first childbirth of childless women at firms with the short-hour option mandate increased from 1.0 to 1.2 percent in

2009 to 2010, as estimated by a fixed-effect linear probability model. When the marriage dummy was included, the magnitude of the effect became smaller. A strong intention to have a child in the previous period exerted a significant influence on marriage and also on the first birth. We found that the short-hour option increased the first childbirth, both directly and also indirectly by increasing marriage. The average first-birth hazard during this period was 2.9 percent for those who were working at *t-1*. Therefore, the policy effect of the short-hour option mandate on first childbirths can be seen as significant and large—a 33 percent increase in first childbirths.

The base year for year dummies is 2003. Since we used 2002 data to obtain information on the previous year, the year dummy starts from 2003. It was the year when a bad economy raised the unemployment rate to 5.24 percent. The rate went down to 3.98 percent in 2008, but jumped to 5.06 percent in 2009 after the economic stagnation that followed the world financial crisis. Despite the upturn and then the downturn of the economy, the birth hazard for working women continued to rise as years went by, as shown in the positive significant signs of the year dummy for marriage and the first-childbirth hazard. The effect of the short-hour option will be included in the 2011 and 2012 dummies after 2011, as the short-hour option will be available to smaller firms as well, and the coefficients on dummies were significantly positive.

While higher hourly wages do not exert any influence on marriage, we found the same variable significantly discourages the first-childbirth hazard.

< Table 1>

Table 2 shows the effect of the action plan registration mandate and the short-hour option mandate on the second- and third-childbirth hazard. We see that neither of the cross-terms

of firm size and the 2005–08 dummy nor the 2009–10 dummy were significant in all of the estimates. While the short-hour option policy significantly increased the probability that working women with no children would have their first child, the policy was not significant for a second or a third childbirth. On the other hand, the effect of husbands' weekend domestic work hours on the second childbirth was significant and large. It was found that the increase in husbands' weekend domestic work contribution at *t-1* goes far toward predicting whether a working woman will have a second child the following year or not. Husbands' higher incomes at *t-1* also significantly increased the second-childbirth hazard.

On the other hand, none of the stated variables had any significant effect on the third-childbirth hazard.

< Table 2>

B. Effect of the Action Plan Mandate and Short-Hour Option on Work Hours and Full-time Permanent Work Status Following the First Childbirth

In order to look at the effect of the policy on labor supply, we will make a *difference-in-difference-in-difference* estimate of the policy, to see whether the policy affected the take-up of full-time permanent work following the first child for workers at the treated firms than those at the control firms. To avoid collinearity, we will only look at the effect of the short-hour option. The analysis was conducted for those who had no children at *t-1* by the linear probability fixed-effect model. Full-time permanent work status at *t+1* was compared with those who had the first childbirth at *t* at the treated firms and those firms without the policy effect. We found that women who had a firstborn were significantly less likely to continue to work as full-time permanent employees in the next period, but working at larger firms encouraged their job

continuation. Gender values, such as wanting to share the income burden with their husbands equally, significantly increased such employment. After controlling for such factors, the greyed row in Table 3 shows whether the policy had a significant effect on the full-time permanent employment of the women at *t+1* when they had a firstborn at *t* at firms that were affected by the policy. The sign of the cross-term of firm size, year, and the first childbirth was significantly positive, an increase of 13.3 percent, while the average was 43 percent, indicating that the short-hour mandate increased full-time permanent work following the first childbirth by around 30 percent.

<Table 3>

Table 4 estimates the weekly work hours at *t+1* of women who had no children at *t-1*. We will see whether the weekly work hours of those who had their first child at *t* became shorter after the short-hour option mandate. The result shows that women employed at firms with more than 100 employees work significantly longer hours than those working at smaller firms, and the work hours are reduced after the first childbirth. After controlling for such effects, the sign of the cross-terms of the firm size, year, and the first childbirth were significantly negative, indicating that work hours decreased at firms that had the short-hour option mandate following the first childbirth, and became around 3.4 hours shorter per week according to the estimate.

<Table 4>

We found that the short-hour option increased full-time permanent employment following the first childbirth, while reducing the weekly work hours. However, we have to add that the explanatory power of the equation is low.

C. Birth Intent among Childless Women and Unmet Demand for Children

Strong intentions to have a child need to be further explored. Female fecundity declines with age, especially in the late thirties. Therefore, for those who definitely want but have been postponing a child, the mid-thirties may be a good time to consider their schedule.

Figure 5 shows the percentage of women who have a child or children at ages 35 to 36. Fixed-term workers, who have only limited access to parental leave entitlement, compose the smallest percentage of those with children: 37 percent as of 2009–10. Full-time regular workers, permanent full-time workers, or *seishain*, follow at 45 percent, and part-time workers (mainly workers hired and paid by the hour) come next with 60 percent. Those out of the labor force have the highest percentage of motherhood at ages 35 to 36: 81 percent.

<Figure 6>

A strong intent to have a child was expressed by 35 percent of childless, permanent full-time regular workers (*seishain*), and by 24 percent of childless females who were out of the labor force on average. When we see this stronger desire for children, even though there is higher childlessness among full-time, regularly employed 35–36 year old females (such as *seishain* and fixed-termed workers), it indicates that they have a preference for children, but their demand is unmet.

Reasons for the unmet demand for children can be various, for example, not meeting the right partner, or waiting for the right time to have a child. It could also be difficulty in balancing work and family responsibilities.

We will examine the unmet child demand by looking into the change in the strong intention to have a child, $Y3_{it}$, for the working population without any child. The group that replied that they definitely wanted a child is a dependent dummy variable. This paper will see whether the policy change not only influenced the birth timing but also whether it increased the birth intent itself. If d_4 in equation (3) is positive for childless females, it shows that the reform increased their desire for children by reducing the child cost. X_{it} is the vector of covariates, such as educational attainment, log of hourly wage at t-1, and age category dummies. The intent will be regressed by the fixed-effect linear probability model, with the difference-in-difference setting, to see whose birth intention is most affected by the policy change.

$$Y3_{it} = a_2 + b_2 X_{it} + c_2 firmsizei_{t-1} + d_4 firmsizei_{t-1} * (year\ after\ the\ mandate\ of\ policies) e_3 * year\ dummy + u_{it} \quad (4)$$

Table 5 is the result of the linear probability fixed-effect model of strong desire to have a child among childless working women. We would like to see if the natural experiment of 2005–08 and 2009–10 increased the strong desire among those without children.

We find the action plan mandate increased women's strong desire to have a child by 2.1 percent and the short-hour option by 2.0 percent. The percentage of those surveyed who definitely wanted a child was on average 32 percent. This means the two policies increased birth intent by around 12 percent. Another factor affecting the strong demand for children is a woman's age. The strong desire decreases with age. The wage rate did not exert any influence on the birth intent.

The significant effect of policy implies that for many working women, having a child is less attractive when the work environment lacks family-friendly practices. When the work environment changed so women could better handle work and family responsibilities, a larger fraction of childless working women expressed their strong desire for a child, which is a good predictor of childbirth in the next year (see Table 1). Therefore, increasing the attractiveness of having a child should help to increase the number of first childbirths in the long run.

VI. Concluding Remarks

Despite a series of enhancements in parental leave law, childbirth has continued to be delayed in Japan for the past 20 years, and the number of births within the same age group has continued to decline for younger cohorts. Additionally, the proportion of females who returned to a prebirth employer did not show any significant increase in the same period, despite favorable law changes. Because of long-term employment practices that predict a large drop in wages after a worker quits long-term employment, along with long and inflexible work hours, more women prefer to delay childbirth. The favorable law change after 2009 was not enough to prompt women to have a child while continuing to work until new laws (that increased work flexibility among long-term, regular workers with a newborn) were implemented.

This paper shows the importance of organizational and cultural changes that increase work flexibility by using the natural experiment of the two laws that increased work hour flexibility (passed in 2003) to mandate the action plan register (by 2005) and the short-hour option (proposed in late 2008 and legislated in June 2009). We used the largest and best-suited panel data in Japan for this purpose.

Using these natural experiments that vary by firm size, we estimated the effect on fertility and job continuation using a linear probability fixed-effect model. The results showed that the first-childbirth hazard effectively went up in the 2009–10 period for those working at firms with more than 100 employees who can use the short-hour option after their return from parental leave. The effect of the registration mandate of 2005, however, was not significant. The short-hour option also significantly increased marriage in the 2009–10 period at the treated firms.

We also found that during the policy period, a strong intention to have a child significantly increased among childless working women in the treated firms. The result can be interpreted as a new "flexibility" in work hours that made balancing work and family a more possible and more attractive option. The increase in the child intention occurred not only alongside the short-hour option but also with the action plan mandate.

While the policy significantly increased women's first childbirth and marriage, as well their intention to give birth, it did not show any significant impact on the second or third childbirth. The husband's contribution to domestic work and income level were important factors in deciding which working women opted for a second child.

This delay in the first childbirth may partly explain why the gap in the proportion of working mothers stayed about the same from the 1980s to the early 2000s—in contradiction to the findings of previous research, that parental leave entitlement increased mothers' return to prebirth employers. Since a substantial fraction of women were delaying the birth of their first child, and, up to the early 2000s, many first childbirths occurred after women quit their job, the time series data showed little change until very recently in the fraction of women with and

without work after the first childbirth, while fertility declined. When the prospect of balancing both work and family improved, delayed birth among the working population made an upturn.

The change in climate occurred slowly, along with a series of efforts such as the adoption of the work and life balance charter by businesses, unions, and government, as well as with changes in the parental leave law, the short-hour option, and publicity around firms' mandated action plans.

Yet, we have to add that while the proportion of women who choose to continue work while raising children is increasing, it remains still a small fraction of females in Japan. On the one hand, the portion of women who have a full-time permanent employment contract without contract termination upon graduation is decreasing, and on the other, the portion of women with a fixed-term contract has been rising from the late 1990s and 2000s. The latter have much weaker leave entitlement and no job protection. After considering that most of the regulation and protection extends only to long-term, regularly employed workers, companies may well increase this type of employment.

The evidence from Japan shows that parental leave, if not easy to take advantage of, may not in fact increase fertility. On the contrary, it may even cause a delay in fertility. Only after a series of mandates exerted strong pressure on firms, combined with companies' own internal efforts to change the work climate and increase work flexibility (as evidenced in qualitative researches), did the laws finally show an impact on women's job continuation and fertility. However, there is still much unmet desire for children. Further steps to increase work flexibility, so that Japanese women can combine work and family, and so that men can be more involved in domestic work, should be one of the measures undertaken to help fill the unmet

demand in Japan's fertility rate. The effect of the constraint caused by the inadequate number of subsidized daycare facilities should be pursued in future research.

The analyses offered in this paper are limited by the small number of years that have passed since the reforms. We need to see if fertility went up permanently, or if it only changed the timing of childbirth. Whether the reforms truly eased constraints on having both work and family, or whether they only released some of the long-awaited demand for children is yet to be determined through further developments and the release of panel data gathered after 2012. We do, however, see in the Japanese Labor Force Survey a further increase in maternal labor supply in 2013 to 2015 related to the "womanomics" policy as analyzed by Nagase (2017).

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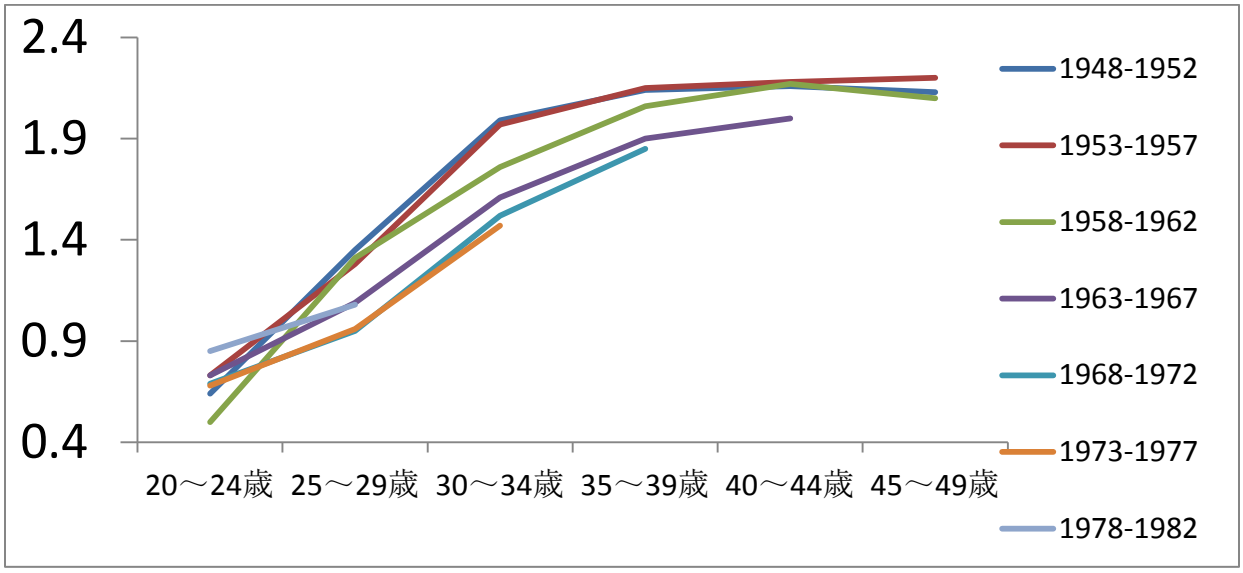


Figure 1
Decline in the Average Number of Children of Married Women by Cohort

Source: IISPR Statistics on Population.

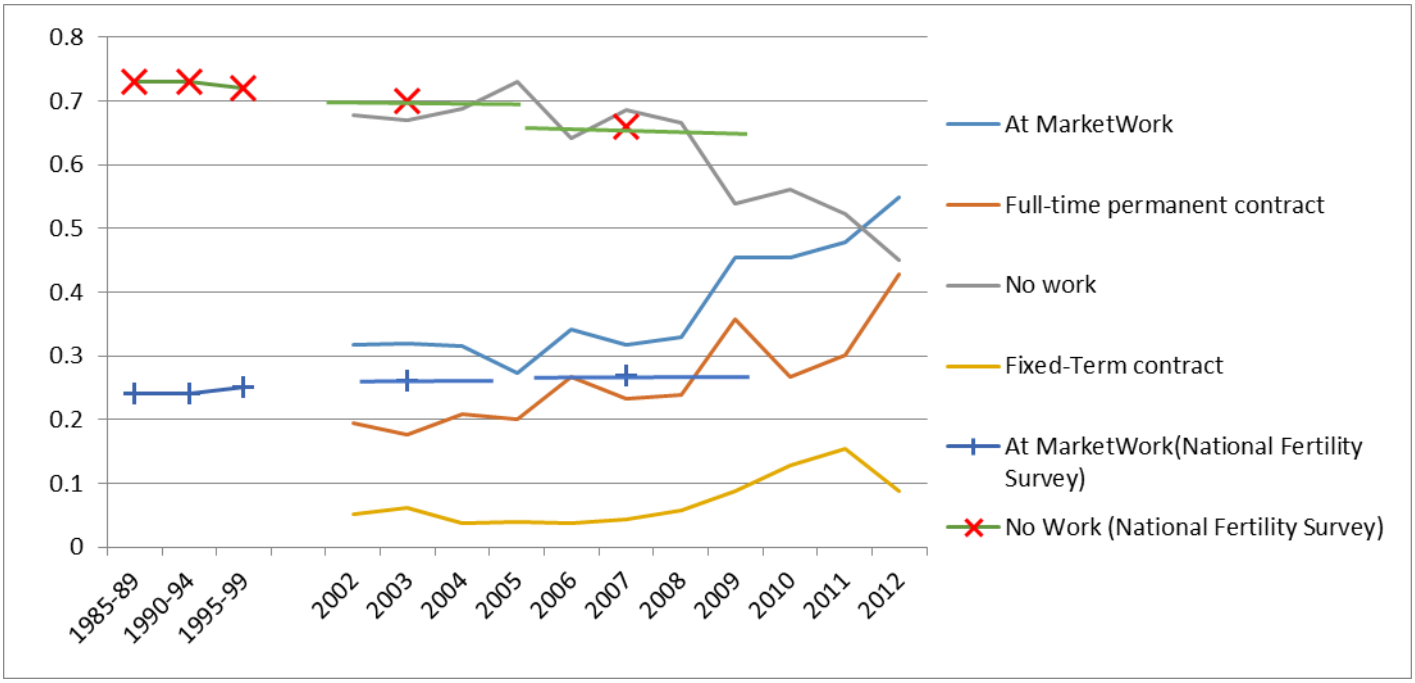


Figure 2
Percentage of Women in the Labor Force Whose First Child is Age Zero to One

Source: IISPR Japanese National Fertility Surveys of 1992, 1997, 2002, 2005, and 2010, surveyed a cross-section of women under age 49, which is shown as a five-year average for 1985–89, 1990–94, 1995–99, 2000–04, 2005–09, and 2009 until early June, as the survey was conducted in June 2009. The yearly data from 2002 are calculated by the author using the panel data of the MHLW's *JLSA in the 21st Century (2002 Cohort)* of females born in the period 1967 to 1982.

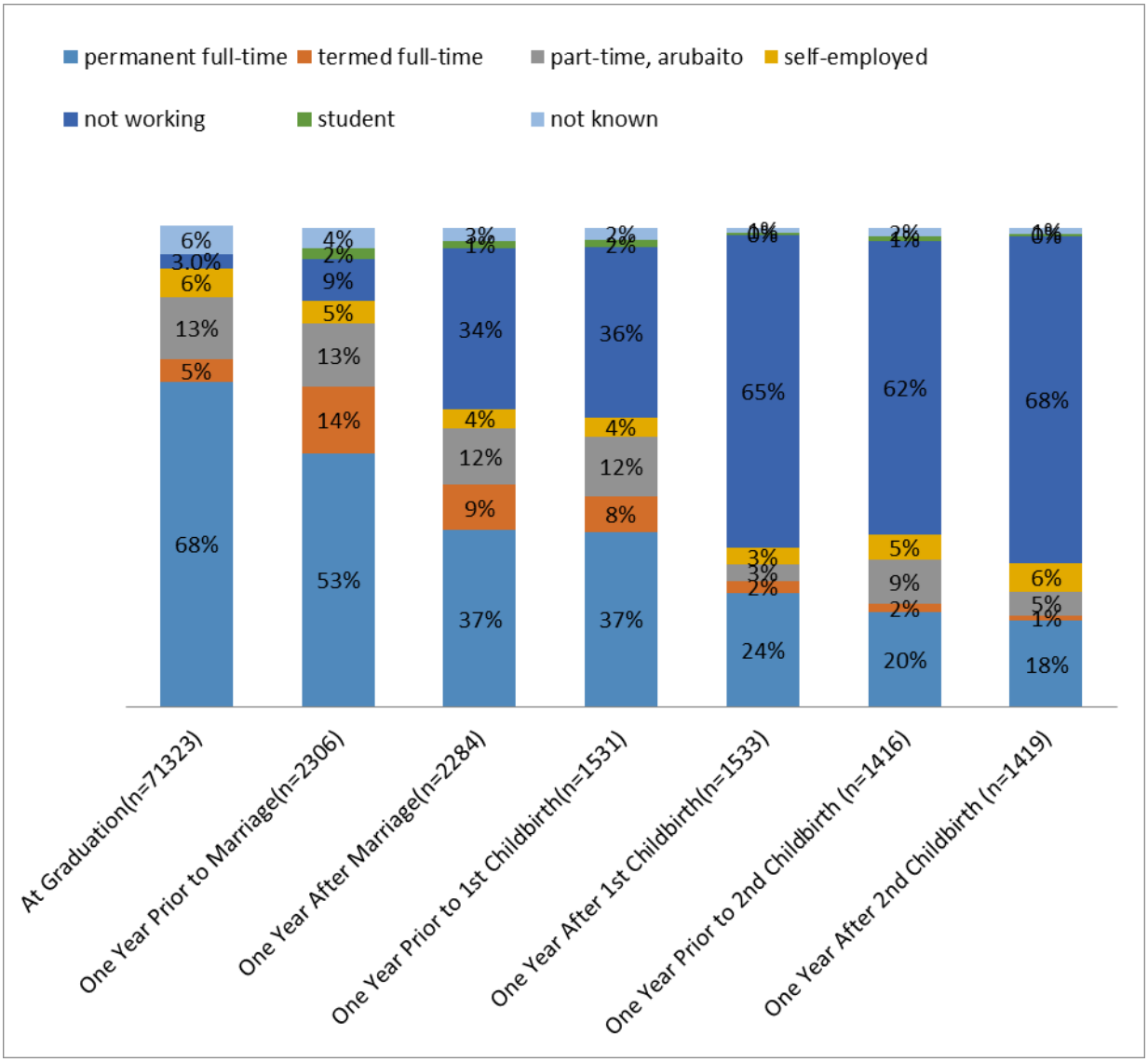


Figure 3 *Change in Female Labor Status at Major Life Events*

Source: Calculated by the author using the data of the MHLW's *JLSA in the 21st Century (2002 Cohort)* for marriages and births that occurred during 2002–10.

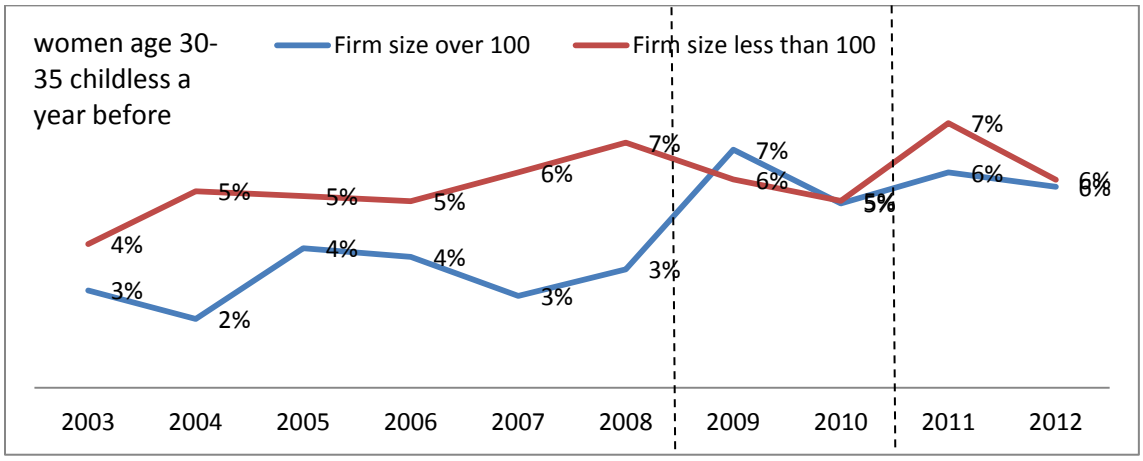


Figure 4

The Ratio of Women Who Had Their First Childbirth in the Surveyed Year; Shown by Firm Size and Surveyed Years

Source: Calculated by the author using the data of the MHLW's *JLSA in the 21st Century (2002 Cohort)*. In 2009–10, firms with more than 100 employees were mandated to offer the short-hours option to their employees till their children reached the age of three. In 2011–12, all firms were mandated to implement the short-hours option.

Table 1

The Effect of the Short-Hours Option (2009) and Action Plan Mandate (2005) on Marriage and the First-Childbirth Hazard Using the Linear Probability Model

		Marriage Hazard of Working Females		First Childbirth Hazard of Working Females with Short Hour Option		First Childbirth Hazard of Working Females with Action Plan Mandate and Short Hour Option	
		coefficier	t value	coefficier	t value	coefficient	t value
20-22	base age over 39	0.031	0.80	-0.024	-0.99	-0.026	-1.05
23-24		0.047	1.35	-0.028	-1.28	-0.029	-1.32
25-26		0.063	2.01 **	-0.023	-1.19	-0.024	-1.24
27-28		0.077	2.81 ***	-0.017	-1.00	-0.018	-1.04
29-30		0.081	3.50 ***	0.000	-0.03	-0.001	-0.06
31-32		0.072	3.79 ***	0.012	1.01	0.012	0.98
33-34		0.056	3.67 ***	0.018	1.88 *	0.018	1.86 *
35-36		0.039	3.42 ***	0.022	2.95 ***	0.022	2.92 ***
37-38		0.025	2.94 ***	0.013	2.39 **	0.013	2.29 **
2004	base year 2003	0.012	2.52 **	0.017	6.37 ***	0.018	6.39 ***
2005		0.030	4.70 ***	0.029	7.51 ***	0.031	7.58 ***
2006		0.048	6.04 ***	0.038	7.64 ***	0.040	7.75 ***
2007		0.058	5.84 ***	0.046	7.35 ***	0.047	7.44 ***
2008		0.080	6.67 ***	0.049	6.45 ***	0.050	6.57 ***
2009		0.072	5.06 ***	0.055	6.20 ***	0.055	6.18 ***
2010		0.087	5.32 ***	0.057	5.52 ***	0.057	5.51 ***
2011		0.085	4.99 ***	0.074	6.69 ***	0.074	6.65 ***
2012		0.102	5.46 ***	0.073	6.12 ***	0.072	6.07 ***
high child intention		0.017	3.10 ***	0.012	3.01 ***	0.012	2.92 ***
Log wage (t-1)		0.002	0.76	-0.011	-4.68 ***	-0.010	-4.44 ***
firm size 300 & over (t-1)						-0.027	-7.38 ***
firm size 300 & over(t-1)*(2005 to 2008)						-0.004	-1.10
firm size 100 & over (t-1)		0.002	0.42	-0.004	-1.30	0.002	0.72
firm size 100 & over(t-1)*(2009 to 2010)		0.019	2.44 ***	0.012	2.14 **	0.012	1.98 **
high school	base middle school and other school	0.046	1.11	-0.002	-0.09	-0.004	-0.13
junior college or vocational school		-0.028	-0.77	-0.014	-0.67	-0.013	-0.60
university		-0.009	-0.30	0.020	0.87	0.020	0.87
graduate school		-0.002	-0.05	0.004	0.12	0.006	0.18
constant		-0.066	-1.48	0.068	2.42 **	0.070	2.49 **
number of obs		32449		32449		32449	
number of groups		6966		6966		6966	
R2	within	0.0205		0.0387		0.0412	
	between	0.0016		0.0111		0.008	
	overall	0.0036		0.0037		0.0045	

Notes: * <0.1 ; ** <0.5; ***<0.01. Standard errors were corrected for clustering.

Table 2

The Effect of the Action Plan Mandate and Short-Hours Option on the Second- and Third-Childbirth Hazard Using the Linear Probability Model

		Second Childbirth Hazard of Working Females				Third Childbirth Hazard of Working Females			
		coefficier	t value	coefficier	t value	coefficien	t value	coefficier	t value
20-22	base age over 39	-0.801	-5.16 ***	-0.799	-5.15 ***	-0.424	-4.71 ***	-0.421	-4.69 ***
23-24		-0.451	-3.04 ***	-0.451	-3.04 ***	-0.346	-2.42 **	-0.348	-2.43 ***
25-26		-0.522	-4.49 ***	-0.521	-4.47 ***	-0.199	-2.49 **	-0.199	-2.51 ***
27-28		-0.344	-3.79 ***	-0.342	-3.77 ***	-0.107	-3.07 ***	-0.106	-3.05 ***
29-30		-0.190	-2.74 ***	-0.190	-2.73 ***	-0.052	-2.56 **	-0.051	-2.49 ***
31-32		-0.077	-1.44	-0.077	-1.43	-0.025	-1.60	-0.024	-1.54
33-34		-0.030	-0.72	-0.030	-0.71	-0.011	-1.03	-0.011	-0.99
35-36		0.033	1.08	0.033	1.10	0.002	0.25	0.002	0.27
37-38		0.025	1.17	0.026	1.19	0.003	0.49	0.002	0.47
2004	base year 2003	0.138	5.04 ***	0.136	5.01 ***	0.017	1.67 *	0.018	1.74 *
2005		0.125	4.36 ***	0.131	4.38 ***	0.027	2.44 **	0.030	2.67 ***
2006		0.122	3.9 ***	0.128	3.92 ***	0.025	2.36 **	0.028	2.58 ***
2007		0.117	3.26 ***	0.124	3.33 ***	0.024	2.20 **	0.027	2.43 **
2008		0.137	3.44 ***	0.143	3.50 ***	0.028	2.29 **	0.031	2.48 ***
2009		0.140	3.23 ***	0.142	3.22 ***	0.029	2.27 **	0.031	2.40 **
2010		0.163	3.47 ***	0.166	3.49 ***	0.022	1.62	0.023	1.76 *
2011		0.181	3.75 ***	0.180	3.72 ***	0.034	2.56 **	0.035	2.64 ***
2012		0.208	4.28 ***	0.207	4.26 ***	0.031	2.30 **	0.032	2.38 **
high child intention(t-1)		0.005	0.16	0.006	0.20	-0.009	-0.41	-0.009	-0.41
weekday husband's domestic work hour(t-1)		0.002	0.26	0.002	0.27	0.000	1.10	0.002	1.04
weekend husband's domestic work hour(t-1)		0.006	2.58 ***	0.006	2.56 ***	0.000	-0.50	0.000	-0.46
log husband's income(t-1)		0.044	2.23 **	0.045	2.26 **	-0.004	-0.87	-0.004	-0.90
firm size 300 & over(t-1)*(2005 to 2008)				-0.027	-1.15			-0.027	-1.15
firm size 100 & over (t-1)				-0.023	-1.05			-0.016	-2.03
firm size 100& over (t-1)		-0.002	-0.1	-0.037	-1.45	-0.003	-0.58	-0.006	-0.76
firm size100 & over(t-1)*(2009 to 2010)		-0.031	-1.25	0.009	0.41	-0.003	-0.49	0.003	0.42
log of wife's wage (t-1)		-0.005	-0.43	-0.005	-0.40	0.001	0.25	-0.005	-0.66
high school	base middle school and othe school	0.075	3.73 ***	0.057	2.38 **	0.083	4.71 ***	0.083	4.74 ***
junior college or vocational school		0.113	2.37 **	0.104	2.18 **	0.030	2.47 **	0.029	2.45 ***
university						0.029	2.25 **	0.029	2.26 **
graduate school									
constant		-0.298	-1.85 *	-0.290	-1.82 *	-0.026	-0.63	-0.025	-0.63
number of obs		3420		3420		7357		7357	
number of groups		1239		1239		1885		1885	
R2	within	0.0962		0.0971		0.0230		0.0045	
	between	0.0535		0.0531		0.0300		0.0535	
	overall	0.0102		0.0095		0.0055		0.0102	

Notes: * <0.1 ; ** <0.5; ***<0.01. Standard errors were corrected for clustering.

Table 3

The Effect of Short-Hour Option Mandate on the Permanent Full-Time Employment of Women at the Treated Firms One Year after They Had Their First Child

		coefficient	t value
20-22	base age over 39	0.049	1.15
23-24		0.090	2.50 *
25-26		0.068	2.15 **
27-28		0.051	1.84 *
29-30		0.035	1.45
31-32		0.017	0.82
33-34		0.015	0.81
35-36		0.000	-0.02
37-38		-0.001	-0.11
2004	base year 2003	0.036	4.42 ***
2005		0.033	3.20 ***
2006		0.019	1.61
2007		0.023	1.70 *
2008		0.020	1.29
Policy(2009-2011)		0.007	0.39
1st childbirth(t)		-0.057	-4.61 ***
firmsize 100 & over (t-1)		0.112	10.91 ***
1st childbirth(t) * firmsize100 & over (t-1)		0.011	0.40
1st childbirth(t) * Policy		-0.080	-3.43 ***
firm size 100 & over (t-1) * Policy		0.016	1.55
firm size 100 & over (t-1) * 1st childbirth(t)*Policy		0.133	3.26 ***
want to equally burden household income with husband		0.018	1.94 *
want to equally burden child care with husband		0.002	0.22
other school	base middle school	0.036	0.29
high school		-0.216	-1.72 *
junior college or vocational school		0.090	0.80
university		0.131	1.14
graduate school		0.418	2.78 ***
constant		0.262	2.47 **
number of obs		22458	
number of groups		5697	
R2	within	0.0412	
	between	0.0862	
	overall	0.0703	

Notes : * Notes: <0.1 ; ** <0.5; ***<0.01. Standard errors were corrected for clustering.

Table 4

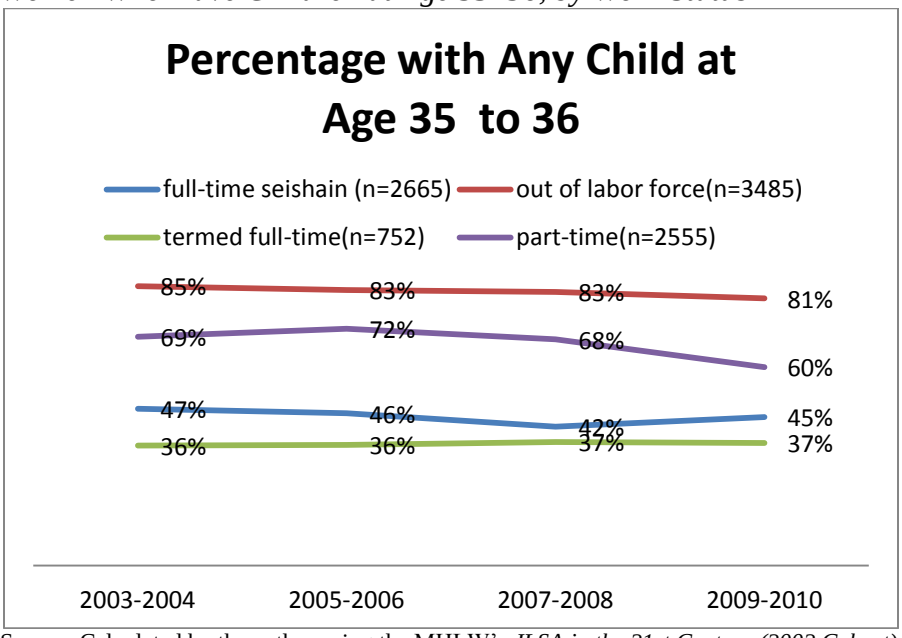
The Effect of the Short-Hour Option on the Work Hours of Women at the Treated Firms One Year after They Had Their First Child

		coefficient	t value	
20-22	base age over 39	-2.48	-1.24	
23-24		-0.87	-0.54	
25-26		-0.88	-0.63	
27-28		-1.26	-1.04	
29-30		-1.72	-1.65	*
31-32		-1.62	-1.81	*
33-34		-1.36	-1.86	*
35-36		-0.94	-1.63	
37-38		-0.26	-0.61	
2004	base year 2003	-0.22	-0.56	
2005		1.37	3.40	***
2006		-0.21	-0.44	
2007		0.31	0.56	
2008		0.01	0.02	
Policy(2009-2011)		0.32	0.31	
1st childbirth(t)		-18.52	-3.66	***
firm size 100 & over (t-1)		2.54	4.08	***
1st childbirth(t) * firm size 100 & over (t-1)		15.84	3.08	***
1st childbirth(t) * Policy		11.74	1.67	*
firm size 100 & over (t-1) * Policy		-0.57	-0.75	
firm size 100 & over (t-1) * 1st childbirth(t)*Policy		-14.43	-2.02	**
Log of wage (t-1)		1.55	6.28	***
other school	base middle school	-5.22	-1.78	*
high school		-5.91	-1.76	*
junior college or vocational school		-1.72	-0.80	
university		-3.23	-4.25	***
graduate school		-4.33	-0.54	
constant		31.57	12.48	***
number of obs		13772		
number of groups		3899		
R2	within	0.0270		
	between	0.0195		
	overall	0.0164		

Notes: * <0.1 ; ** <0.5; ***<0.01. Standard errors were corrected for clustering.

Figure 5

Women Who Have Children at Age 35–36, by Work Status



Source: Calculated by the author using the MHLW's *JLSA in the 21st Century (2002 Cohort)*.

Table 5

The Effect of Two Policies on Women's Strong Intention to Have a Child

		coefficient	t value
20-22	base age over 39	-0.036	-0.77
23-24		0.015	0.37
25-26		0.047	1.30
27-28		0.050	1.58
29-30		0.053	1.93 *
31-32		0.056	2.39 **
33-34		0.048	2.40 **
35-36		0.028	1.82 *
37-38		0.017	1.53
2004	base year 2003	-0.005	-1.29
2005		-0.017	-1.66 *
2006		-0.022	-1.88 *
2007		-0.020	-1.44
2008		-0.019	-1.18
2009		-0.012	-0.63
2010		-0.037	-1.82 *
2011		-0.031	-1.48
2012		-0.022	-0.96
firm size 300 & over (t-1)		-0.001	-0.18
firm size 300 & over (t-1)*(2005 to 2008)		0.021	2.31 **
firm size 100 & over (t-1)		0.000	-0.01
firm size 100 & over (t-1)*(2009 to 2010)		0.020	1.82 *
Log wage (t-1)		-0.004	-0.87
high school	base middle school	-0.171	-2.13 *
junior college or vocational school		-0.053	-0.91
university		-0.025	-0.38
graduate school		-0.118	-1.07
constant		0.393	5.85 ***
number of obs		32661	
number of groups		7019	
R2	within	0.0048	
	between	0.0003	
	overall	0.0015	

Notes: * <0.1 ; ** <0.5; ***<0.01. Standard errors were corrected for clustering.

Appendix

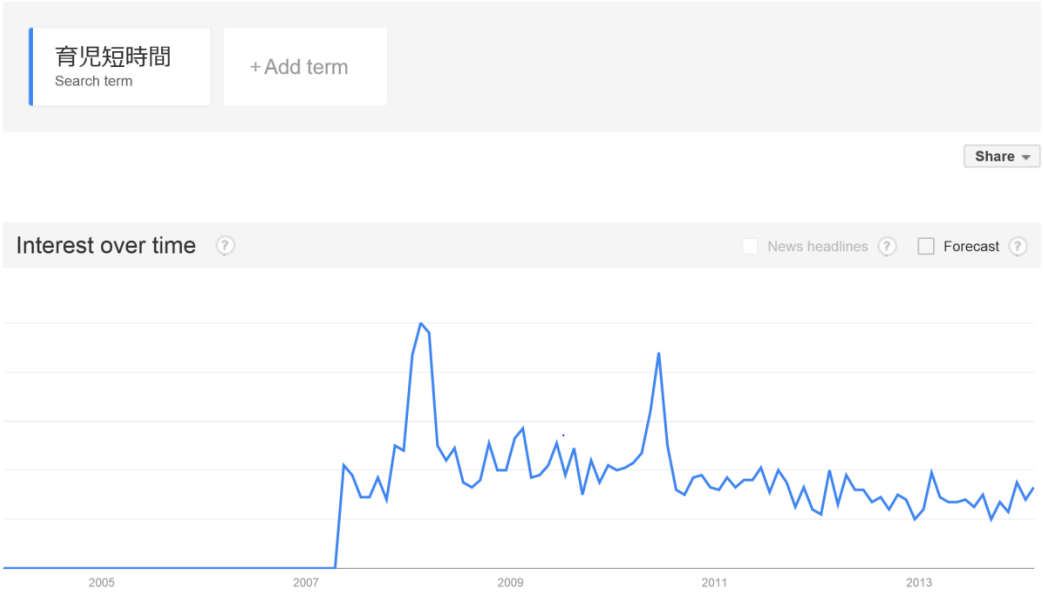


Figure A1

Google Search for "ikuji tanjikan," Short-Hours Option

Table A1

Means of the Data Used for Tables 1 and 2

	Childless Working Females				Working Females with One Child				Working Females with Two Child			
	Mean	Std.Dev	Min	Max	Mean	Std.Dev	Min	Max	Mean	Std.Dev	Min	Max
First Childbirth	0.029	0.168	0	1								
Second Childbirth					0.118	0.323	0	1				
Third Childbirth									0.025	0.155	0	1
Marrying	0.058	0.234	0	1	0.000	0.000	0	0	0.000	0.016	0	1
marital status dummy	0.217	0.412	0	1	1.000	0.000	1	1	1.000	0.000	1	1
age 20-22	0.031	0.174	0	1	0.000	0.017	0	1	0.000	0.012	0	1
23-24	0.082	0.274	0	1	0.005	0.068	0	1	0.001	0.023	0	1
25-26	0.125	0.331	0	1	0.018	0.133	0	1	0.005	0.070	0	1
27-28	0.147	0.354	0	1	0.049	0.217	0	1	0.017	0.128	0	1
29-30	0.153	0.360	0	1	0.100	0.300	0	1	0.042	0.202	0	1
31-32	0.134	0.341	0	1	0.136	0.343	0	1	0.089	0.284	0	1
33-34	0.113	0.317	0	1	0.164	0.370	0	1	0.142	0.350	0	1
35-36	0.090	0.286	0	1	0.175	0.380	0	1	0.197	0.398	0	1
37-38	0.060	0.238	0	1	0.140	0.347	0	1	0.188	0.391	0	1
39-40	0.038	0.191	0	1	0.107	0.309	0	1	0.156	0.363	0	1
40-41	0.027	0.161	0	1	0.107	0.309	0	1	0.164	0.370	0	1
2003	0.159	0.366	0	1	0.107	0.309	0	1	0.063	0.244	0	1
2004	0.137	0.344	0	1	0.089	0.285	0	1	0.071	0.257	0	1
2005	0.125	0.331	0	1	0.089	0.285	0	1	0.080	0.271	0	1
2006	0.116	0.320	0	1	0.096	0.295	0	1	0.098	0.298	0	1
2007	0.104	0.305	0	1	0.099	0.299	0	1	0.106	0.308	0	1
2008	0.092	0.290	0	1	0.102	0.303	0	1	0.114	0.318	0	1
2009	0.083	0.276	0	1	0.103	0.304	0	1	0.115	0.319	0	1
2010	0.070	0.256	0	1	0.106	0.308	0	1	0.116	0.320	0	1
2011	0.060	0.238	0	1	0.106	0.308	0	1	0.118	0.323	0	1
2012	0.052	0.223	0	1	0.101	0.302	0	1	0.118	0.322	0	1
high child intention(t-1)	0.322	0.467	0	1	0.237	0.425	0	1	0.034	0.182	0	1
log hourly wage (t-1)	7.057	0.643	1.291	12.134	6.874	0.803	2.813	11.472	6.825	0.773	1.897	12.008
log f husband's yearly income in 10000 yen (t-1)					5.947	0.488	1.099	8.006	6.021	0.483	0.000	9.105
weekday husband's domestic work hour in hour (t-1)					1.360	1.419	0	24	1.225	1.297	0	14
weekend husband's domestic work hour in hour(t-1)					4.966	4.413	0	24	4.854	4.366	0	24
firm size 300 & over (t-1)	0.337	0.473	0	1	0.306	0.461	0	1	0.250	0.433	0	1
firm size 300 & over(t-1)*(2005 to 2008)	0.161	0.367	0	1	0.127	0.334	0	1	0.104	0.306	0	1
firm size 100 & over (t-1)	0.528	0.499	0	1	0.461	0.499	0	1	0.384	0.486	0	1
firm size 100 & over(t-1)*(2009 to 2010)	0.080	0.272	0	1	0.094	0.292	0	1	0.089	0.285	0	1
middle school	0.026	0.158	0	1	0.027	0.162	0	1	0.019	0.136	0	1
high school	0.239	0.427	0	1	0.356	0.479	0	1	0.461	0.499	0	1
junior college or vocational school	0.466	0.499	0	1	0.441	0.497	0	1	0.408	0.492	0	1
university	0.252	0.434	0	1	0.168	0.374	0	1	0.108	0.311	0	1
graduate school	0.017	0.127	0	1	0.010	0.101	0	1	0.004	0.059	0	1
sample size	32449				3240				7357			

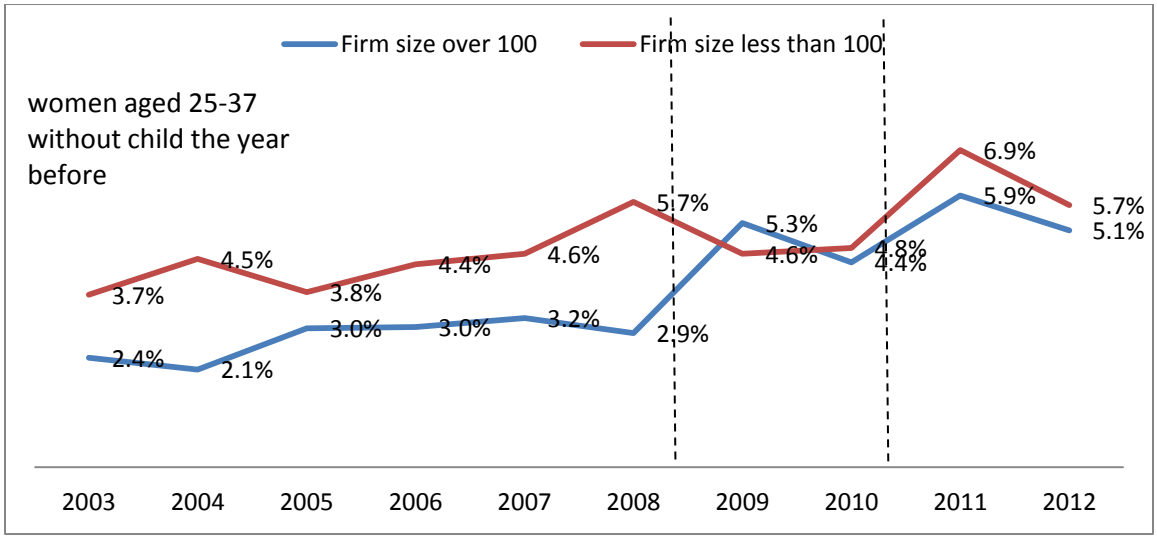


Figure A2
The Ratio of Women Who Had Their First Childbirth in the Surveyed Year

Table A2

Means of Variables Used in Table 3

	Mean	Std.Dev	Min	Max
full-time Permanent work t+1	0.426	0.494	0	1
20-22	0.033	0.180	0	1
23-24	0.083	0.276	0	1
25-26	0.123	0.329	0	1
27-28	0.146	0.353	0	1
29-30	0.155	0.362		
31-32	0.136	0.343	0	1
33-34	0.115	0.319	0	1
35-36	0.094	0.291	0	1
37-38	0.060	0.237	0	1
2004	0.141	0.348	0	1
2005	0.131	0.337		
2006	0.121	0.326	0	1
2007	0.111	0.314	0	1
2008	0.101	0.301	0	1
Policy(2009-2011)	0.231	0.421	0	1
1st childbirth(t)	0.057	0.231	0	1
firm size 100 & over (t-1)	0.684	0.465	0	1
1st childbirth(t) * firm size 100 & over (t-1)	0.013	0.115	0	1
1st childbirth(t) * Policy	0.015	0.122	0	1
firm size 100 & over (t-1) * Policy	0.143	0.351	0	1
firm size 100 & over (t-1) * 1st childbirth(t)*Policy	0.005	0.072	0	1
want to equally burden household income with husband	0.365	0.481	0	1
want to equally burden child care with husband	0.861	0.346	0	1
other school	0.012	0.109	0	1
high school	0.251	0.433	0	1
junior college or vocational school	0.430	0.495	0	1
university	0.271	0.444	0	1
graduate school	0.017	0.131	0	1
sample size	22458			

Table A3

Means of Variables Used in Table 4

	Mean	Std.Dev	Min	Max
Weekly Whour Hour(t+1)	40.593	10.981	1	120
first child birth	0.0205	0.1416	0	1
20-22	0.0249	0.156	0	1
23-24	0.0847	0.278	0	1
25-26	0.1311	0.337	0	1
27-28	0.1508	0.358	0	1
29-30	0.1550	0.362	0	1
31-32	0.1324	0.339	0	1
33-34	0.1139	0.318	0	1
35-36	0.0901	0.286	0	1
37-38	0.0611	0.239	0	1
2004	0.1393	0.346	0	1
2005	0.1352	0.342	0	1
2006	0.1200	0.325	0	1
2007	0.1144	0.318	0	1
2008	0.1052	0.307	0	1
Policy(2009-2011)	0.2371	0.425	0	1
1st childbirth(t)	0.0205	0.142	0	1
firmsize 100 & over (t-1)	0.8946	0.307	0	1
1st childbirth(t) * firmsize100 & ov(t-1)	0.0169	0.129	0	1
1st childbirth(t) * Policy	0.0075	0.086	0	1
firmsize100 & ov(t-1) * Policy	0.1978	0.398	0	1
firmsize100&ov(t-1) * 1st childbirth(t)*Policy	0.0067	0.081	0	1
Log of wage (t-1)	7.1548	0.606	2.996	10.021
middle school	0.0113	0.105	0	1
high school	0.2252	0.418	0	1
junior college or vocational school	0.4393	0.496	0	1
university	0.2926	0.455	0	1
graduate school	0.0190	0.136	0	1
sample size	13772			

Table A4

Means of Variables Used in Table 5

	Mean	Std.Dev	Min	Max
High intention for Child	0.319	0.466	0	1
20-22	0.031	0.173	0	1
23-24	0.082	0.275	0	1
25-26	0.125	0.331	0	1
27-28	0.147	0.355	0	1
29-30	0.152	0.359	0	1
31-32	0.134	0.341	0	1
33-34	0.113	0.317	0	1
35-36	0.090	0.286	0	1
37-38	0.060	0.237	0	1
2004	0.136	0.343	0	1
2005	0.131	0.337	0	1
2006	0.115	0.319	0	1
2007	0.103	0.305	0	1
2008	0.092	0.289	0	1
2009	0.083	0.276	0	1
2010	0.070	0.255	0	1
2011	0.060	0.238	0	1
2012	0.052	0.222	0	1
firmsize 300 & over (t-1)	0.337	0.473	0	1
firmsize 300 & over(t-1)*(2005 to 2008)	0.162	0.368	0	1
firmsize 100 & over (t-1)	0.527	0.499	0	1
firmsize 100 & over(t-1)*(2009 to 2010)	0.080	0.271	0	1
Log wage (t-1)	7.057	0.644	1.291	12.134
high school	0.239	0.427	0	1
junior college or vocational school	0.466	0.499	0	1
university	0.252	0.434	0	1
graduate school	0.017	0.128	0	1
	32661			