Do Work-Life Balance Measures and Workplace Flexibility Matter?
An Empirical Analysis for Female Reinstatement Choice after the First Childbirth

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Abstract
The main purpose of this study is to evaluate the effects of work-life balance measures and workplace flexibility on a female worker's choice and timing of being reinstated into the labor market after the first childbirth. The results show that: (1) female workers who have not come back to work within one year after the first childbirth face a high risk of never being reinstated into the labor market; (2) a decrease in child care costs due to the presence of informal care and an increase in opportunity costs such as profession/skilled or clerical work with high annual income would motivate a female worker to be reinstated into the labor market within a short time period after the first childbirth; and (3) adjusting for the opportunity costs, the accessibility of work-life balance measures still remains a significant positive impact on the probability of a stable female employee to come back to work and thus shortens the length of being on leave.
Keywords: female reinstatement after first childbirth, accessibility of work-life balance systems, flexibility of working environment, duration analysis

1. Introduction

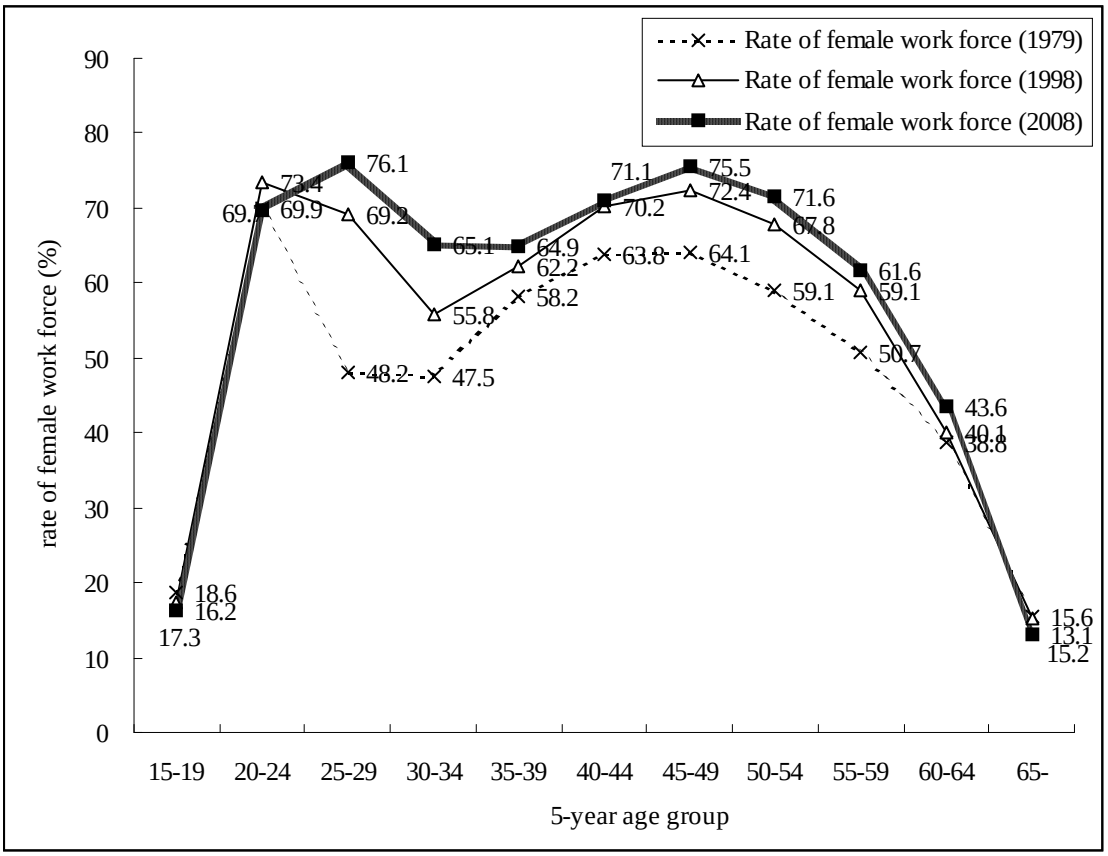
The female workforce in Japan has been gradually increasing in the background of an underlying change in industrial and family structures in society since the 1970s. The 2008 "Labour Force Survey" (Statistics Bureau, 2008) shows that the number of the female labor force became approximately 27.6 million, which is 48.4% out of the female population 15 years and older. Most significantly, the M-shaped distribution of female workers according to the 5-year age group, which has characterized the female workforce in Japanese society with the 20s and late 40s age groups forming the two peaks of the letter "M," has been getting much smoother in 2008 compared to the distributions in 1979 and 1998 (Figure 1). In 2008, the bottom of this M-shaped curve has shifted to the right from age groups 30-34 and 35-39, probably because of late marriages following late child bearing, incidentally while the labor participation rate at the bottom increased significantly from 47.5% in 1979 to 64.9% in 2008, by 17.4 percentage points. "The Actual Status of Working Women" concludes that a continuous increase in the percentage of female workers who choose to continue working even after having children, associated with the growing rates of the highly educated and late- or never married female population, would accelerate to smooth out the bottom of the M-shaped curve (Ministry of Health, Labour and Welfare (called "MHLW"), 2008).

However, the Japanese labor market has not yet completely dissolved the M-shaped curve like Sweden and France. A number of female workers still exit from the labor market due to either marriage or child bearing (Osawa, 1994). The distribution of the female workforce reflects that women remain confronting the difficulty to balance working and family lives especially when they have children in preschool age. Besides, the ratio of non-regular employees such as part-time and/or temporary dispatched workers to regular or full-time employees has been increasing for female workers especially in younger age groups (Note 1), which would raise the discrepancy of life-time income across different cohorts (MHLW, 2008). Suppose that full-time or regular status and high life-time income imply high opportunity costs for female workers, which may motivate them to continue to work after marriage and/or childbirth. The growth of the ratio of non-regular to regular workers causing low life-time income in the younger generation would be reducing the bottom of the M-shaped distribution of female workforce all over again in the next decade.

On the other hand, since a low fertility ratio apparently became one of the most serious socio-economic and political issues in late 1980s, the Japanese government has been adopting various work-life balance measures (Note 2) and taking legal actions to support female workers with children, countermeasures against a rapid change in the structure of population due to aging and an extreme low birthrate. For example, the Family Care Leave Act was activated in 1991 (Note 3). Because the law strongly suggests that all employers should make efforts to establish concrete systems for supporting employees for balancing work and family lives, the accessibility of

child care and sick/injured child care leave improving through the 1990s (Ministry of Labour, 1971-1985; and MHLW, 1986-2005). Also, the government had been targeting to reduce the numbers of waiting-list children for day care centers, which is called "zero-waiting list for nursery schools (that is day care centers) strategy", but the excess demand for child care in urban areas has not been dissolved yet.

Figure 1: Change in rate of female work force by five-year age group(1979, 1998, and 2008)



Source: Ministry of Internal Affairs and Communications, Statistics Bureau, Director-General for Policy Planning (Statistical Standards) & Statistical Research and Training Institute, "Labour Force Survey (1979, 1998, and 2008)"

Although the government has been promoting municipal governments and firms to adopt various measures for balancing working and family lives, the accessibility of child care resources and workplace flexibility are still different across local areas and employers. Therefore, applying the discrepancy in macro- and micro-based characteristics of different local governments and employers, this study will evaluate the effects of public child care resources, work-life balance measures, and workplace flexibility on a female worker's choice and timing of being reinstated into the labor market after the first childbirth. In order to test the validity of work-life balance measures and child care resources comparatively, I adjust for opportunity costs for being on child care leave which individual female workers face in the labor market. Even after controlling for a female worker's opportunity costs, if we observe robust and significant impacts of these policy variables on a female worker's choice, the government policies in the last couple of decades could be justified to increase female labor supply after childbirth as countermeasures against the shortage of the labor force in the future, which will be contributing to overcome the M-shaped curve of female workforce in Japan.

The paper proceeds as follows. Section 2 provides a brief overview of previous studies in Japan. Section 3 explains an empirical strategy. Section 4 describes the data set used in this study. Section 5 presents empirical results. The final section concludes.

2. Previous studies

A number of studies evaluate the effects of the

accessibility of day care centers and work-life balance measures on the female labor supply after childbirth. In regards to child care provided by nursery schools, almost all studies concluded that an increase in the rate of children entering day care centers in a municipal area would raise the probability of females to work in the labor market, regardless of the type of data to be analyzed (for either prefecture-level or municipal-level aggregated data, Yamada, Yamada, and Chaloupka, 1987; Komamura, 1996; Institute for Health Economics and Policy, 1996; Nagase, 1999 and 2003; and Maeda, 2002; for micro-based data, Nakamura and Ueda, 1999; Shigeno and Okusa, 1999 and 2001; Morita, 2002; Shigeno, 2003; Oishi, 2003 and 2005; Shimizutani and Noguchi, 2004).

Out of studies using aggregated data, Nagase (1999, 2003) and Maeda (2002) find that the rate of entering nursery school for children who are less than 3 years old has a positive impact on the labor supply of mothers, but the effects are statistically insignificant for children in the 3-5 age group. Probably due to multicollenearity, the multiplicity of child care provided by day care centers does not seem to be significant to the female labor supply (Shigeno and Okusa, 1999 and 2001; Shimizutani and Noguchi, 2004). The simulation analysis conducted by Shigeno and Okusa (1999 and 2001) shows that an increase by twice in the quota of children in day care centers would raise the female labor supply by 10 percentage points. On the other hand, Oishi (2003 and 2005) finds that an increase by 10 percentage points in quota or no charge in child care by nursery schools would increase the female labor supply by 2.7% and 14% respectively, while a uniform charge of 60,000 yen for child-care regardless of parents' income level might decrease the female labor supply by 14 percentage points.

For work-life balance measures, most studies focus solely on how the system of child care leave influences female workers to continue to work after childbirth (Higuchi and Abe, 1992; Higuchi, 1994 and 1996; Morita and Kaneko, 1998; Shigeno and Okusa, 1998; Waldfogel, J., Y. Higuchi and M. Abe, 1999; Suruga and Cho, 2003), while some examine the effects of multiple measures simultaneously within a single regression analysis (Tomita, 1994; Shigeno and Okusa, 2001; Shimizutani and Noguchi, 2004; and Kawaguchi, 2008). These studies find a consistent result such that the presence of a child care leave system has a significant positive impact on the continuous labor supply of female workers even after the childbirth, except for Kawaguchi (2008). Interestingly, Kawaguchi concludes that the presence of the system is not correlated with the length of female workers' service to the same employer, but a significant effect of child care leave could be observed either when some surrounding employees have the experience of utilizing the system or when employees are well informed about the policy. Also, Shigeno and Okusa (2001) find that the effect of child care leave policy becomes statistically insignificant when they focus on married couples, probably because of a strong commitment to be required by the employer. Tomita (1994) points out that the length of a female worker's service tends to be longer with employers adopting child care leave policy earlier than other firms.

In regards to other work-life balance measures than the child care system, the results seem to be inconsistent. Tomita (1994), Shigeno and Okusa (2001), and Shimizutani and Noguchi (2004) observe a significant positive effect of the shortening of working hours on continuous female labor supply. Also, annual paid leave by half a day, day care centers in the workplace, and flexible times of starting and ending work would motivate female workers to continue to work in the labor market (Tomita, 1994 and Shimizutani and Noguchi, 2004). In addition to work-life balance measures, Tomita (1994) and Kawaguchi (2008) find that equal opportunity between males and females in the workplace would have a significant positive effect on the length of service among female workers in the same employer, in particular for those in their 40s-50s who might have already finished child rearing.

3. Econometric specifications

Most parents might be inexperienced in child care until they have their first babies. Thus, for inexperienced parents, and in particular mothers, the first childbirth must have more significant impact on their working and family lives than the second or following ones. Focusing on these inexperienced mothers, this study applies a duration analysis scheme for evaluating empirically the effects of various characteristics of households, regions, and employers on the timing of mothers to be reinstated into the labor market.

Duration models have frequently been used in the context of medical science, e.g., the multiple-causes of death in patients who had heart surgery (prosthetic replacement of the mitral valve) (Litwak et al., 1969); the influence of smoking on the timing of death from vascular disease, cancer, and other causes (Holt, 1978); the timing of death of breast cancer (Chiang, 1968)

and lung cancer patients (Lubin, 1985); and the mortality risks of the elderly (Yashin, Manton, and Stallard, 1986). After Lancaster (1979, 1990) used duration analysis in the study of unemployment, it became common in economics, especially, labor economics, e.g., Heckman and Singer (1984, 1986); and Kiefer (1988). In Japan, some studies applied the duration analysis to estimate the timing of female workers to exit from the labor market (e.g., Yamaguchi, 1998; and Higuchi and Abe, 1999), however, as far as I know, no empirical studies have used this model to evaluate the timing of re-entry into the labor market after the first childbirth. In this study, I take three analytical strategies: (1) plots of the Kaplan-Meier survival estimates and the Nelson-Aalen cumulative hazard estimates; (2) the semi-parametric (the Cox proportional hazards) model; and (3) parametric approaches with weibull, exponential, and weibull-gamma distributions.

First, I introduce simple plots of the Kaplan-Meier survival estimates (Kaplan and Meier, 1958) and the Nelson-Aalen cumulative hazard estimates (Nelson, 1972; Aalen, 1978), which measure the length of months mothers remain on child care leave after the first childbirth. Suppose $S(t)$ to be the probability of a mother remaining on child care leave at or exceeding the time t. Let t_i ($i = 1,...,T$ and $t_1 \le t_2 \le ... \le t_T$, where T denotes the time when all respondents are failed) be the times at which failure occurs. Here, "failure" means that a mother is reinstated into the labor market or she comes back to work after the first childbirth. Assuming that n_i is the number of respondents at risk of failure just before time t_i and d_i is the number of failures at time t_i , the Kaplan-Meier survival estimates ($\hat{S}(t)$) and the Nelson-Aalen cumulative hazard estimates ($\hat{\Lambda}(t)$) are respectively shown as (StataCorp LP, 2007):

$$\hat{S}(t) = \prod_{t_i \le t} \left(\frac{n_i - d_i}{n_i} \right), \quad \hat{\Lambda}(t) = \sum_{t_i \le t} \frac{d_i}{n_i} \qquad \text{(Eq. 1)}$$

In particular, I will focus on the behavior of mothers for six years (72 months) after the first childbirth, while the child is preschool in age.

Next, I estimate the Cox-proportional hazards model. In this model, the j th individual hazard ($\lambda_j(t)$) is specified as:

$$\lambda_j(t) = \overline{\lambda}(t) \exp[\overline{X}_j' \beta]$$
$$\text{for} \quad j = 1,..., N \qquad \text{(Eq. 2)}$$

where $\overline{\lambda}(t) \ge 0$ is the baseline hazard at time t, which is arbitrary and a nuisance function. Here, $\overline{X}_j$ is assumed to be a row vector of explanatory variables for the j th couple which would affect the timing of mothers to come back to work. $\overline{X}_j$ includes household characteristics, the status of mothers in the labor market, macro-based characteristics of local areas, the accessibility of work-life balance measures and workplace flexibility, and timing of childbirth. I will describe the explanatory variables further in the next data section. β is a vector of unknown parameters to be estimated. In order to obtain parameter estimates ($\hat{\beta}$), the partial log-likelihood function to be maximized is shown as:

$$\ln L = \sum_{i=1}^{T} \left[\sum_{k \in D_i} \overline{X}_k' \beta - d_i \ln \left\{ \sum_{j \in R(t_i)} \exp(X_j' \beta) \right\} \right] \qquad \text{(Eq. 3)}$$

where i indicates the ordered failure times t_i ($i = 1,...,T$ and $t_1 \le t_2 \le ... \le t_T$); D_i is the set of d_i which is the number of failures at time t_i ; and $R(t_i)$ is the risk set of k observations that are at risk of failure just before or at time t_i (Kalbfleisch and Prentice, 2002; StataCorp LP, 2007). The arbitrary assumption of the baseline hazard in the Cox-proportional hazards model permits us to analyze transition data without specifying an exact distribution of people's taste (Lancaster 1990). Thus, this model will lead to measure (but not correct) the misspecification caused by heterogeneity among respondents.

Finally, for verifying the robustness of results from the Cox-proportional hazards model, I estimate the duration model for three possible underlying distributions, weibull, exponential, and weibull-gamma distributions. Unlike a semi-parametric approach, a parametric approach assumes an investigator to have full information on the distribution of tastes over the population of interest and thus, it requires us to specify the distribution of baseline hazard ($\overline{\lambda}(t)$), given the explanatory vector, $\overline{X}_j$. The baseline hazards, $\overline{\lambda}(t) = \alpha t^{\alpha - 1}$ (some describe $\sigma = 1/\alpha$ instead of α) and $\overline{\lambda}(t) = 1$ (meaning $\alpha = 1$ in the setting of weibull distribution), are assumed for weibull and exponential distributions, respectively. However, the assumption of the homogeneous baseline hazard across individuals has two possible effects: (1) parameter estimates will be inconsistent and/or (2) disturbances will be based on inappropriate standard errors (Greene, 1990). In order to modify an unobservable heterogeneity effect, Greene (1990) suggested using a parametric model which assumes that the baseline hazard is distributed as weibull-gamma. Let ϑ be an

unobservable multiplicative effect on the hazard function as:

$$\lambda_j(t \mid \vartheta) = \vartheta \lambda_j(t)$$

$$\text{where} \quad \vartheta \sim \Gamma(k, \theta), \quad k, \theta > 0 \qquad \text{(Eq. 4)}$$

Here, ϑ is assumed to be a random positive and to have mean k and finite variance θ with the gamma distribution. The probability density function is specified as:

$$g(\vartheta \mid k, \theta) = \frac{\vartheta^{k-1} \exp(-\vartheta / \theta)}{\theta^k \Gamma(k)} \qquad \text{(Eq. 5)}$$

In this study, $\theta = 1/k$ is defined and $\theta = 0$ correspondents to the weibull distribution. Therefore, the further θ deviates from 0, the greater the effect of heterogeneity is. I will test whether a zero hypothesis test such that $H_0 : \theta = 0$ is statistically rejected.

In order to re-examine the results from the previous studies shown in the last section, this study assesses the effects of work-life balance measures, and the flexibility of the working environment on a female worker's choice and timing of being reinstated into the labor market after the first childbirth, adjusting for a female worker's opportunity costs. Since the child care costs are not identified for the first child in individual household, I rather control for the rate of waiting-lists to the quota of children for day care centers in a female worker's residential municipal area. In regards to work-life balance measures and workplace flexibility, I use principal component scores calculated by principal component analysis in order to avoid multicollenearity. Here, I have to note a critical limitation of this study such that I cannot specify these variables (the rate of waiting-lists, work-life balance measures, and workplace flexibility) exactly at the timing of the first childbirth. Rather, I use the status at the survey period in 2007. Due to the restrictions, I should interpret the results very carefully.

4. Data and basic statistics

4.1 Data

The data used in this study is the micro-level data from the "Survey for Working Environment and Fertility" conducted by Central Research Service Inc ("Chuo Chosa Sha" in Japanese) in November, 2007 (National Institute of Population and Social Security Research, 2009). The survey was carried out on married members of two labor unions and their spouses, the Japan Federation of Service and Distributive Workers Unions (JSD) and the Japanese Federation of Textile, Chemical, Food, Commercial, Service and General Workers' Unions (UIZ) (Note 4). Out of 2,810 married couples (Note 5), the number of respondents was 1,441 (a response rate of 51.3%) for the questionnaire on union members and 1,312 (a response rate of 46.7%) for their spouses (Note 6).

Out of 1,312 couples of which data are available for both subjects and spouses, first, I extract 548 couples who have at least one child and female respondents who were working one-year before the first childbirth (Note 7). Out of the 548, I exclude couples whose data necessary for the analyses are missing, such as the timing of a mother's reinstatement into the labor market after the first childbirth, household characteristics, a mother's status in the labor market before the first childbirth, timing of childbirth, and macro-based characteristics of local areas. Most importantly, this study focuses on the effects of various measures for balancing work and family lives on the mothers' timing of coming back to work. Since the survey asked these questions related to only respondents' current employers at the survey period, I have to clarify those who worked in the same firm as now when they first had a baby. Therefore, the data has to be limited to stable employees who continue to be hired by the same employers after school graduation. Consequently, the sample size becomes downsized to 140.

I have to note that the policy implications in this study would be quite restricted due to the three major data limitations as follows. First, since the sampling of the subjects is left in charge of each local labor union, the results would statistically suffer from a severe sampling-bias due to the non-random scheme of the data collection. Second, the survey was conducted on labor union members and their spouses so that, by definition, at least one person of each couple belongs to the labor union. Thus, they might be working in a better environment than non-labor union couples, e.g., being easier to use child care leave (Suruga (1999); and Nishimoto and Suruga (2002)). The exclusion of non-labor union couples will lead to a "selection-bias problem." Third, this study includes very limited labor union couples, such as female respondents who were employed one-year before the first childbirth, and even further, stable female employees who continue to be hired by the same employers after school graduation, for examination of the effects of work-life balance measures on the labor supply. Therefore, the restrictions of samples to be analyzed must cause another "selection-bias problem." I will come

back to discuss the limitations of this study in the last section.

4.2 Basic statistics

Table 1 shows basic statistics. The first column of Table 1 shows the censoring and duration variables, and explanatory variables used for the duration analyses. The second column shows the means and standard deviations of these variables for 140 couples and the third and fourth columns indicate the basic statistics by female respondents' reinstatement status, "Not being reinstated after 1st childbirth (right-censored samples)" and "Being reinstated after 1st childbirth (failure)." Out of 140 couples, 45 female workers (32.1%) did not come back to work (right-censored) and 95 (67.9%) were reinstated into the labor market (failure). Thus, in this model, the number of failures is 95. The mean lengths of female respondents' reinstatements after the first childbirth are 35 months for total samples, 84.5 months for right-censored samples, and 11.5 months for failed samples, respectively. The mean difference between right-censored and failed samples is statistically significant at a 1% level.

In regards to explanatory variables indicating household characteristics, I adjust for age at the first childbirth and educational attainment of parents, a dummy for having informal child care, a dummy for the first child's birth weight being less than 2,500g, and a dummy variable of having the second child before a mother comes back to work after the first childbirth. The basic statistics show that the presence of informal support for child care (48.9% versus 67.4%), the first child birth weight (22.2% versus 7.4%), and the timing of the second childbirth (62.2% versus 3.2%) differ significantly between the right-censored and failure groups. So, compared to right-censored mothers, those who were reinstated into the labor market after the first childbirth are more likely to have informal support for child care, less likely to have a low-weight baby, and also less likely to have the second child before they come back to work.

The status of mothers in the labor market one-year before the first childbirth seems to influence significantly the female labor supply after the first childbirth (Note 8). Compared to right-censored respondents, failed samples are more likely to be full-time workers (8.9% versus 46.3%) and to be profession or skilled (nobody versus 18.9%); or clerical workers (8.9% versus 23.2%). The mean annual income is approximately 3.01 million yen for the censored group compared to 3.65 million yen for those who were reinstated into the labor market after the first childbirth. Mothers' employment status, type of job, and annual income in the labor market imply opportunity costs for being on child care leave. The above results show that high opportunity costs will motivate mothers to exit the labor market than those who face low opportunity costs.

Some studies show that the demand and supply for child care provided by day care centers are significantly mismatched, in particular for infants who are less than 3 years old in urban areas of Japan (e.g., Zhou and Oishi, 2003 and Shimizutani and Noguchi, 2003). So, I assume that the rate of waiting-list children for day care centers in local areas affects the labor supply of mothers (Note 9). The mean rates of waiting-list children between right-censored and failed female respondents are different as 1.4% versus 0.7%. The result implies that the excess demand for facility-based child care would give a negative impact on the probability of a mother's reinstatement. However, as stated at the end of Section 3, I use the rate at the survey period as a proxy variable, and so the results cannot clearly indicate the effects of excess demand. Further, in the regression analyses, I put year dummies indicating the timing of first childbirth to control for fixed effects of macro status of the labor market.

4.3 Measurements for the working environment

In this section, I will discuss how to measure the accessibility of various work-life balance measures and workplace flexibility in the mother's current employer. The survey asked about the presence and accessibility of 12 types of systems (annual paid leave by half a day; shortening of working hours; limitation on late-night work; limitation on overtime work; child care leave system and nursing care leave system more generous than the legal definition; flexible time of starting and ending work; financial support for day care center; telecommuting; area-specific working system; reemployment; and sick/injured child care leave); and the flexibility of 7 factors related to the working environment (workloads; tasks; deadline or time of delivery; schedule for meeting and conference; time of starting work on weekdays; time of ending work on weekdays; annual paid leave). With regard to the presence, the survey asked whether each of 12 systems is available for employees. For the accessibility, the respondents are questioned about how easy it is to use it when a system is available, according to five-grade system such as "very easy," "easy," "cannot be said either," "not very easy," and "very

difficult." The flexibility of 7 factors related to the working environment is also asked by a four-grade system such as "very flexible," "flexible," "not very flexible," and "not flexible at all."

Using these variables, I create a "principal components score" across firms, which is extracted from "principal components" for measuring the accessibility of measures and the flexibility of the workplace environment based on a principal component analysis. The principal component analysis would be valuable to expose the fundamental structure of the data in a way that best explains the variance in the data. The benefit of this method is to assign a continuous "principal component score" to each respondent by summing up numerous correlated variables into a smaller number of uncorrelated variables. Therefore, use of "principal component scores" which summarize the accessibility to various work-life balance measures and the flexibility of working environments may avoid a statistical bias caused by "multicollinearity" when we put these possibly correlated explanatory variables separately into a single regression. Here, the larger scores mean the better accessibility to various measures and a more flexible working environment as a whole.

Table 1: Basic Statistics

	Continue to be hired by the same employer (N=140)			
	Total (N=140)	Not being reinstated after 1st childbirth (N=45) Censored	Being reinstated after 1st childbirth (N=95) Failed	
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	
1. Censoring and duration variables				
Censoring dummy for reinstatement after 1st childbirth (=1)	0.679	0.000	1.000	
	(0.469)	(0.000)	(0.000)	
Months after 1st childbirth (months)	34.957	84.533	11.474	a/
	(48.113)	(58.562)	(9.152)	
2. Household characteristics				
Mother's age at 1st childbirth	28.964	28.244	29.305	
	(3.599)	(3.076)	(3.790)	
Father's age at 1st childbirth	30.757	30.578	30.842	
	(4.692)	(3.368)	(5.217)	
Mother's educational attainment (college graduate=1)	0.564	0.489	0.600	
	(0.498)	(0.506)	(0.492)	
Father's educational atteinment (college graduate=1)	0.571	0.667	0.526	
	(0.497)	(0.477)	(0.502)	
Informal support for child care (=1)	0.614	0.489	0.674	b/
	(0.489)	(0.506)	(0.471)	
1st child's health status at birth (birthweight<2500g=1)	0.121	0.222	0.074	b/
	(0.328)	(0.420)	(0.263)	
2nd childbirth before reinstatement after 1st childbirth (=1)	0.221	0.622	0.032	a/
	(0.417)	(0.490)	(0.176)	
3. Mothers' status in the labor market at the time of one-year before 1st childbirth				
Full-time worker (=1)	0.343	0.089	0.463	a/
	(0.476)	(0.288)	(0.501)	
Profession or skilled worker (=1)	0.129	0.000	0.189	a/
	(0.336)	(0.000)	(0.394)	
Clerical worker (=1)	0.186	0.089	0.232	b/
	(0.390)	(0.288)	(0.424)	
Other (=1)	0.686	0.911	0.579	a/
	(0.466)	(0.288)	(0.496)	
Annual income (yen)	3,443,214	3,014,667	3,646,211	b/
	(1,369,208)	(1,449,661)	(1,288,004)	
Logarithum value of annual income	14.949	14.748	15.044	a/
	(0.512)	(0.678)	(0.380)	
4. Macro-based characteristics of local areas at the survey				
Rate of waiting-list child for day-care center in the local area (%)	0.910	1.444	0.657	a/
	(1.349)	(1.845)	(0.947)	

Source: Calculated by the author, based on the "Survey for Working Environment and Fertility" conducted by Central Research Service Inc (Chuo Chosa Sha) in 2007.
Note: a/, b/, and c/ refer to a significance level of 1, 5, and 10 percent, respectively, for differences between means of two categories within (1) reinstatement after 1st childbirth ("Not being reinstated after 1st childbirth" and "Being reinstated after 1st childbirth"); and (2) Continuity of 1st job after school graduation ("Change jobs" and "Continue to be hired by the same employer ").
Note: Unfortunately, the survey did not ask father's status in labor market at the time of one-year before the first childbirth.

Table 2: Work-life balance measures and workplace flexibility on mother's job

Variables	Continue to be hired by the same employer (N=140)	Not being reinstated after 1st childbirth (N=45)	Being reinstated after 1st childbirth (N=95)	
		Censored	Failed	
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	
1. Comprehensive measurements				
Principal components score for accessibilty	0.605	0.084	0.852	**a/**
	(1.043)	(1.093)	(0.926)	
Principal components score for flexibility at mother's working place	0.516	0.244	0.645	**a/**
	(0.859)	(0.808)	(0.857)	
2. Presence (=1)				
Annual paid leave by half a day	0.743	0.511	0.853	**a/**
	(0.439)	(0.506)	(0.356)	
Shortening of working hours	0.736	0.489	0.853	**a/**
	(0.443)	(0.506)	(0.356)	
Limitation on late-night work	0.679	0.511	0.758	**a/**
	(0.469)	(0.506)	(0.431)	
Limitation on overtime work	0.379	0.111	0.505	**a/**
	(0.487)	(0.318)	(0.503)	
Child care leave system more generous than the legal definition	0.557	0.356	0.653	**a/**
	(0.499)	(0.484)	(0.479)	
Nursing care leave system more generous than the legal definition	0.279	0.022	0.400	**a/**
	(0.450)	(0.149)	(0.492)	
Flexible time of starting and ending work	0.429	0.200	0.537	**a/**
	(0.497)	(0.405)	(0.501)	
Financial support for day-care center	0.114	0.067	0.137	
	(0.319)	(0.252)	(0.346)	
Telecommuting	0.300	0.244	0.326	
	(0.460)	(0.435)	(0.471)	
Area-specific working system	0.129	0.089	0.147	
	(0.336)	(0.288)	(0.356)	
Reemployment	0.193	0.067	0.253	**a/**
	(0.396)	(0.252)	(0.437)	
Sick/injured child care leave	0.257	0.022	0.368	**a/**
	(0.439)	(0.149)	(0.485)	
3. Accessibility (very easy to use or easy to use=1)				
Annual paid leave by half a day	0.850	0.667	0.937	**a/**
	(0.358)	(0.477)	(0.245)	
Shortening of working hours	0.321	0.200	0.379	**b/**
	(0.469)	(0.405)	(0.488)	
Limitation on late-night work	0.229	0.200	0.242	
	(0.421)	(0.405)	(0.431)	
Limitation on overtime work	0.093	0.067	0.105	
	(0.291)	(0.252)	(0.309)	
Child care leave system more generous than the legal definition	0.714	0.711	0.716	
	(0.453)	(0.458)	(0.453)	
Nursing care leave system more generous than the legal definition	0.207	0.133	0.242	
	(0.407)	(0.344)	(0.431)	
Flexible time of staring and ending work on weekdays	0.236	0.133	0.284	**b/**
	(0.426)	(0.344)	(0.453)	
Financial support for day-care center	0.064	0.067	0.063	
	(0.246)	(0.252)	(0.245)	
Telecommuting	0.600	0.667	0.568	
	(0.492)	(0.477)	(0.498)	
Area-specific working system	0.257	0.111	0.326	**a/**
	(0.439)	(0.318)	(0.471)	
Reemployment	0.257	0.111	0.326	**a/**
	(0.439)	(0.318)	(0.471)	
Sick/injured child care leave	0.157	0.022	0.221	**a/**
	(0.365)	(0.149)	(0.417)	
4. Flexibility (very flexible or flexible=1)				
Workloads	0.500	0.511	0.495	
	(0.502)	(0.506)	(0.503)	
Tasks	0.371	0.400	0.358	
	(0.485)	(0.495)	(0.482)	
Deadline or time of delivery	0.307	0.222	0.347	
	(0.463)	(0.420)	(0.479)	
Schedule for meeting and conference	0.150	0.067	0.189	**c/**
	(0.358)	(0.252)	(0.394)	
Time of staring work on weekdays	0.314	0.178	0.379	**b/**
	(0.466)	(0.387)	(0.488)	
Time of ending work on weekdays	0.507	0.400	0.558	**c/**
	(0.502)	(0.495)	(0.499)	
Annual paid leave	0.829	0.756	0.863	
	(0.378)	(0.435)	(0.346)	

Source: Calculated by the author, based on the "Survey for Working Environment and Fertility" conducted by Central Research Service Inc (Chuo Chosa Sha) in 2007.
Note: The data are limited to those who have at least one child and continue to be hired by the same employer after school graduation. Since the survey asked questions related only to respondents' current working place, the author has to clarify those who worked in the same firm as now when they had a first baby, in order to examine effects of various systems on the timing of being reinstated after 1st child birth.
Note: The survey asked the presence and accessibility of 12 types of systems for balancing work and family lives; and the flexibility of 7 factors related to working environment at current respondent's workplace, shown in Table 2. As regards the presence, the survey asked whether each of 12 systems is available for employees. For the accessibility, the respondents are questioned how easy to use it (such as "very easy", "easy", "cannot be said either", "not very easy", and "very difficult") when a system is available. The flexibility of 7 factors related to working environment is asked ("very flexible", "flexible", "not very flexible", and "not flexible at all"). Using these variables, the author creates a couple of "principal components score" across firms, which is extracted "principal components" for measuring the accessibility of systems and the flexibility of workplace environment based on principal component analysis.
Note: In this study, the presence of accessibility of these systems and the flexibility of working environment at current father's working place are ignored, because they are not statistically significant for further duration analyses.
Note: a/, b/, and c/ refer to a significance level of 1, 5, and 10 percent, respectively, for differences between means of two categoris; "Not being reinstated after 1st childbirth" and "Being reinstated after 1st childbirth".

Table 2 shows the basic statistics. For the comprehensive measurements, both principal components scores are significantly less in the right-censored group than the failure group for the accessibility (0.08 versus 0.85) and the flexibility (0.24 versus 0.65). Indeed, female workers who are reinstated in the labor market after the first childbirth are likely to benefit from the presence and accessibility of each system and the flexibility of the working environment. In sum, as far as the basic statistics show, various support from employers would have positive impact on female reinstatement after the first childbirth.

5. Results

5.1 Kaplan-Meier survival and Nelson-Aalen cumulative hazard estimates

While the basic statistics give us a clue to the effects of various characteristics on the probability of females to come back to work, the Kaplan-Meier survival and the Nelson-Aalen cumulative hazard estimates focus on the timing when female workers exit to the labor market after the first childbirth. Figure 2-Figure 4 show plots of the Kaplan-Meier survival and the Nelson-Aalen cumulative hazard estimates for 72 months after the first childbirth, by major respondents' characteristics of which means differ significantly between right-censored and failed samples in Table 1. In all figures, survival ratios tend to decrease and thus hazard estimates are inclined to increase largely at the time of two months (eight weeks) and one year after the first childbirth for certain types of female respondents. This shows that female respondents are most likely to be reinstated into the labor market just after eight-week maternity-leaves or one-year child care leaves, which are the time periods provided by the law. After 12 months, both survival and hazard curves are inclined to stay steady, which implies that female workers who have not been reinstated into the labor market within one year after the first childbirth are less likely to come back to work eventually.

The first group of figures (Figure 2-1-a-Figure 2-2-b) regards the relation of survival ratios and cumulative hazard estimates with major household characteristics, such as the presence of informal support for child care and birthweight. In regards to household characteristics, the timing of coming back to work would be much earlier for females with informal support for child care (Figure 2-1-a and Figure 2-1-b); and whose first baby's birthweight is 2500g or heavier (Figure 2-2-a and Figure 2-2-b), correspondingly compared to those without informal support, and who have a low-weight baby.

The second group of figures (Figure 3-1-a-Figure 3-3-b) shows the relation of survival ratios and cumulative hazard estimates with the mother's status in the labor market one-year before the first childbirth, such as employment status (full-time versus part-time workers), type of job (profession or skilled worker, clerical worker, and other), and quartile income level. As the basic statistics show, these figures imply that females who face high opportunity costs, such as full-time work (Figure 3-1-a and Figure 3-1-b), profession or skilled work (Figure 3-2-a and Figure 3-2-b), and high-income employees (Figure 3-3-a and Figure 3-3-b), are likely to exit to the labor market earlier than those with low opportunity costs. Remarkably, survival ratios are decreasing and so hazards estimates are increasing almost proportionally to quartile income levels.

Finally, the fifth group of figures (Figure 4-1-a-Figure 4-2-b) indicates how the accessibility of work-life balance measures provided by employers and the flexibility of the working environment on a mother's job affects survival ratios and hazard estimates. Figure 4-1-a and Figure 4-1-b show survival ratios and hazard estimates by principal component scores for the accessibility less than the median (-0.602), -0.602, and larger. Also, Figure 4-2-a and Figure 4-2-b show the principal component scores for flexibility less than the median (0.521), 0.521, and larger. Female employees who have better access to measures and who work in relatively flexible working environments are likely to exit to the labor market early after the first childbirth. The following sections adjust for all these characteristics at the same time within a single regression.

5.2 Effects of the accessibility to work-life balance measures and workplace flexibility

In this section, I introduce the accessibility to work-life balance measures and the flexibility of the working environment into the duration analyses. Table 3 shows the results based on semi- parametric and parametric regression analyses for 140 extracted samples. Due to the restricted number of samples, I apply a bootstrapping estimation to calculate standard errors in the following regressions with 50 replication times. The first column of Table 3

indicates explanatory variables ($\overline{X}_j$) to expose the timing of female workers to come back to work after the first childbirth. Observing hazard ratios as results of the semi-parametric Cox-proportional hazards estimates, parametric hazard estimates with weibull, exponential and weibull-gamma distributions are shown from the second through the fifth columns. A hazard estimate of more than one is interpreted as a higher probability of female workers to come back to work and thus a shorter duration of being on child care leave after the first childbirth. On the other hand, a hazard estimate of less than one shows a less likelihood to exit to the labor market and longer duration of being on leave after the first childbirth.

Figure 2: Kaplan-Meier survival estimates and Nelson-Aalen cumulative hazard estimates by household characteristics (N=140; Failure=95)

Nelson-Aalen cumulative hazard estimates

Figure2-1-b: by informal support for child care

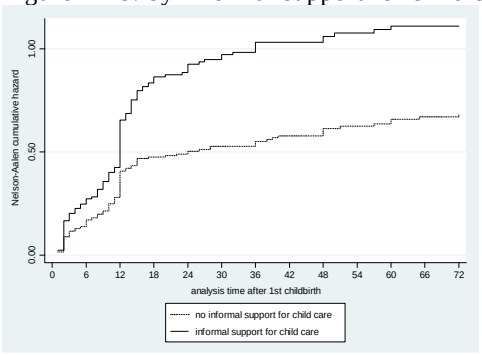
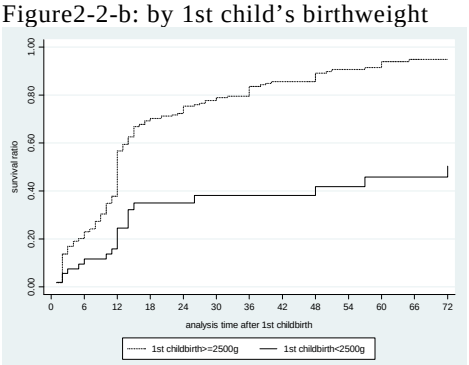


Figure2-2-b: by 1st child's birthweight



Kaplan-Meier survival estimates

Figure2-1-a: by Informal support for child care

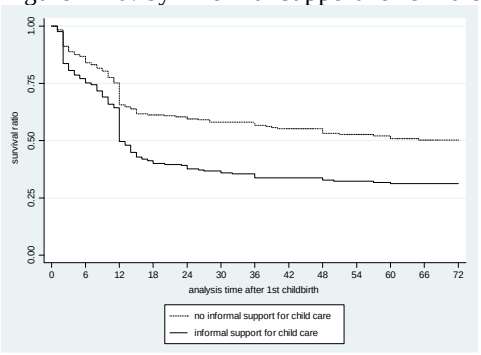
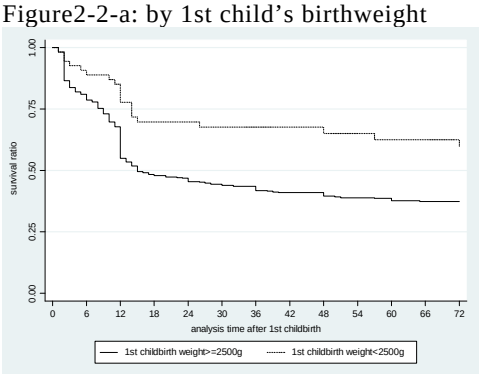


Figure2-2-a: by 1st child's birthweight



In regards to household characteristics, the mother's age at the time of the first childbirth would increase the probability of a mother to come back to work and thus remain on leave in long time periods. On the other hand, a low-weight baby would decrease the probability of mothers to exit to the labor market and so he or she is likely to prolong the duration to be on child care leave. They are robust variables, regardless of type of regression. The parametric models show that a father's educational attainment and the presence of informal child care have reversed impacts on the reinstatement of mothers. Higher educated fathers are likely to remain mothers out of the labor market for long time periods, while the presence of informal child care is likely to raise the probability of mothers to exit to the labor market within short time periods. Approaches other than weibull implies that a father's age at the time of the first childbirth and the second childbirth continuously to the first baby before reinstatement would decrease the probability of mothers to exit to the labor market and so these characteristics are likely to prolong the duration of mothers to be on child care leave. The educational attainments of mothers do not seem to have significant impacts on their own reinstatement into the labor market after the first childbirth. The father's educational attainment and age might also be interpreted as proxy variables for their income status. Also, the presence of informal care would decrease the costs of child care.

Figure 3: Kaplan-Meier survival estimates and Nelson-Aalen cumulative hazard estimates by mothers' status in the labor market at the time of one-year before the first childbirth (N=140; Failure=95)

Kaplan-Meier survival estimates

Figure3-1-a: by employment status

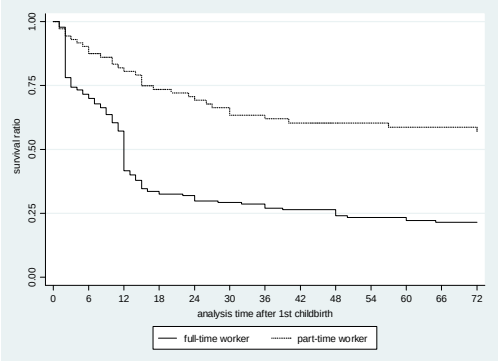


Figure3-2-a: by type of job

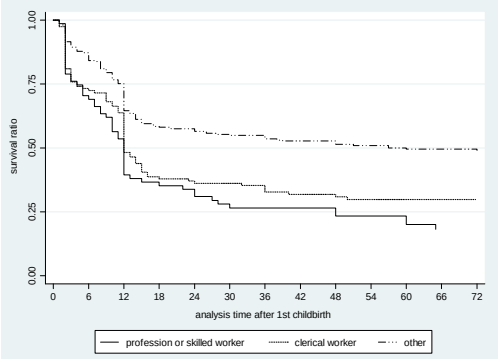
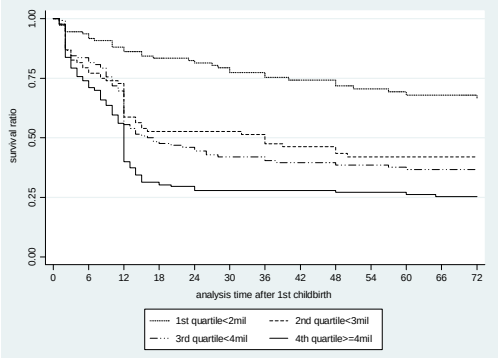


Figure3-3-a: by quartile income level one year



Nelson-Aalen cumulative hazard estimates

Figure3-1-b: by employment status

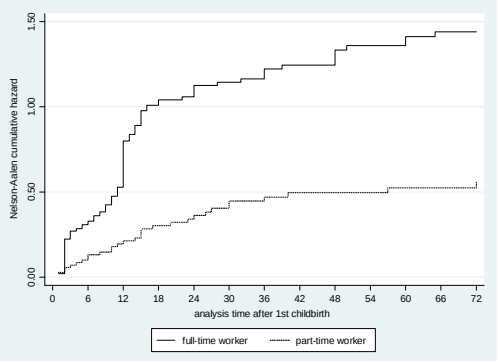


Figure3-2-b: by type of job

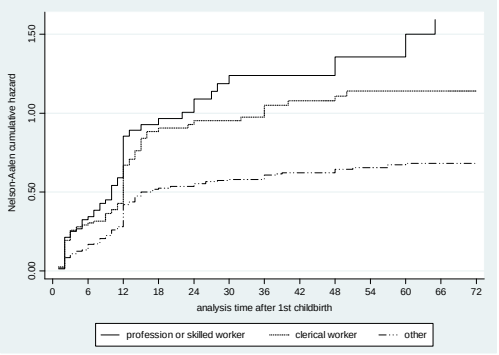
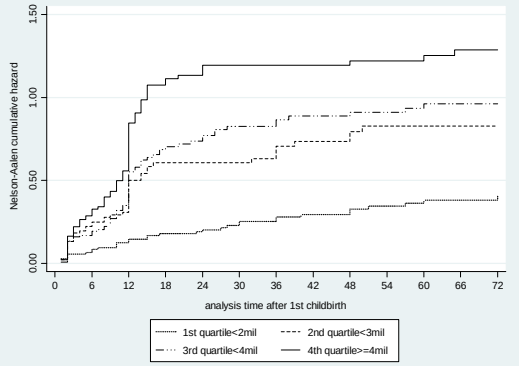


Figure3-3-b: by quartile income level one year



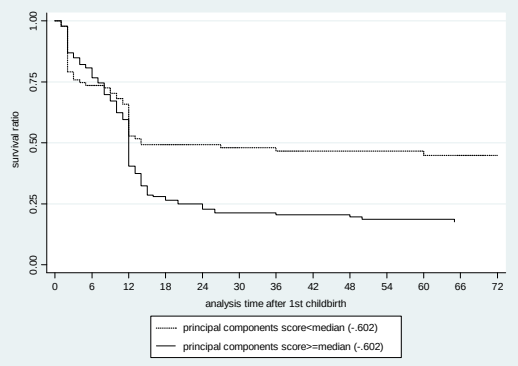
Related to the status of mothers in the labor market one-year before the first childbirth, profession/skilled workers or clerical workers with higher income would motivate mothers to be reinstated into the labor market and thus shorten the time period of being on leave after the first childbirth in some parametric approaches. Especially in the weibull-gamma model, these variables have the strongest positive impacts on the probability of reinstatement. However, the results are inconsistent across the type of regression.

For the accessibility of work-life balance measures and workplace flexibility, principal component scores for accessibility has a significant positive impact on female reinstatement in parametric approaches, while the effects of principal components score for flexibility are consistently negative but statistically insignificant. Therefore, a female employee who accesses work-life balance measures easily is likely to come back to work within short periods of time after the first childbirth, after adjusting for the effects of opportunity costs.

Figure 4: Kaplan-Meier survival estimates and Nelson-Aalen cumulative hazard estimates by the accessibility of work-and-balance systems and the flexibility of working environment (N=140; Failure=95)

Kaplan-Meier survival estimates

Figure4-1-a: by the accessibility



Nelson-Aalen cumulative hazard estimates

Figure4-1-b: by the accessibility

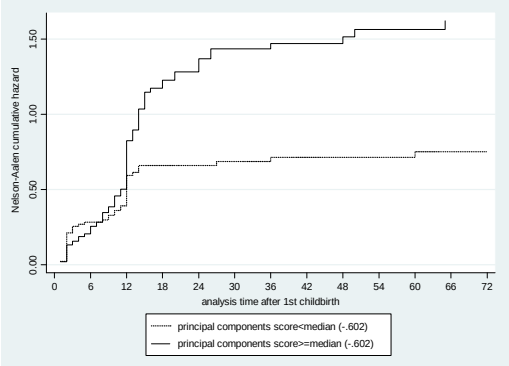


Figure4-2-a: by the flexibility

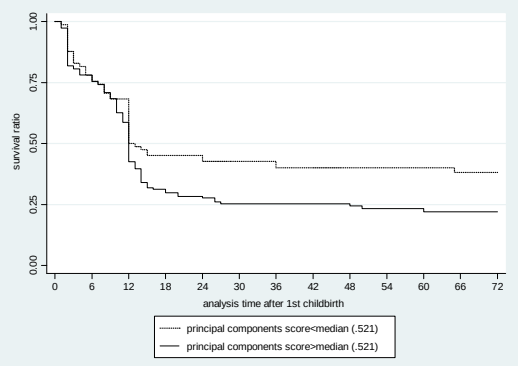
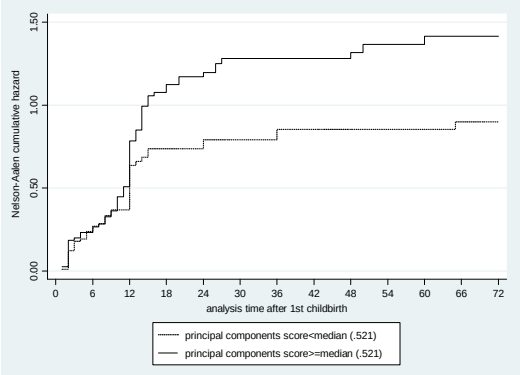


Figure4-2-b: by the flexibility



The results are also controlled by 17 year dummy variables from 1991 through 2007, implying the timing of the first childbirth, which I did not show in the Table. Overall, regardless of the type of regression, those who had their first babies after the Family Care Leave Act was enacted in 1991 are significantly less likely to exit to the labor market and so prolong the duration to be on child care leave. This era after 1991 has overlapped with the so-called "lost decade" after the burst of the economic bubble in Japan. The economic recession might have both negative and positive effects on the timing of females to be reinstated into the labor market after a certain time period of child care leave and the direction of effects depend on the stability of the female's career. In a economic recession, a female worker who quit a job before childbirth would remain unemployed for long time periods since she simply could not find a job or she was less likely to find a job with favorable working conditions. On the other hand, a stable female worker who has been hired by the same employer before and after the childbirth is likely to come back to work immediately after the childbirth because the long duration of being on child care leave would be a risk to their job in the tight labor market. However, focusing on stable female workers in this study, I obtained completely opposite results to what I expected. Because the Japanese government has been revising family-related systems and adopting work-life balance measures from the 1990s through to the early 2000s (e.g., the extension and amendment of the Family Care Leave Act in 1995 and 2005, reduction of firms' responsibility of employees' pension insurance fee and health insurance in 2000 and 2001, respectively), the negative impacts of year dummies after 1991 could imply that the improvement of the accessibility to child care and sick/injured child care leave have a much stronger impact on a stable female worker's reinstatement than the pressure by the tight labor market. In that sense, the hazard estimates of year dummy variables after 1991 could be even underestimated.

Table 3: Effects of various determinants including work-life balance measures and workplace flexibility on timing of mothers to be reinstated into the labor market after the 1st childbirth (Number of subjects=140; Number of failures=95)

Independent variable	Cox-proportional	Parametric hazard estimates with weibull distribution	exponential distribution	weibull-gamma distribution
	Observed Hazard Ratio (Boot strap S.E)			
1. Household characteristics				
Mother's age at 1st childbirth	1.072	1.107	1.087 c/	1.112 c/
	(0.060)	(0.081)	(0.050)	(0.063)
Father's age at 1st childbirth	0.910 c/	0.900 b/	0.917 b/	0.881 a/
	(0.047)	(0.047)	(0.033)	(0.039)
Mother's educational attainment (college graduate=1)	1.687	1.963 c/	1.673	1.806
	(0.622)	(0.791)	(0.587)	(0.675)
Father's educational atteinment (college graduate=1)	0.486 b/	0.487	0.559 c/	0.457 b/
	(0.162)	(0.223)	(0.167)	(0.171)
Informal support for child care (=1)	1.314	1.639	1.471 c/	1.456
	(0.410)	(0.568)	(0.341)	(0.478)
1st child's health status at birth (birthweight<2500g=1)	0.333	0.203	0.289	0.274 b/
	(2.298)	(0.251)	(0.235)	(0.159)
2nd childbirth before reinstatement after 1st childbirth (=1)	0.044	0.017	0.028	0.006 a/
	(0.595)	(0.076)	(0.083)	(0.006)
2. Mothers' status in the labor market at the time of one-year before 1st childbirth				
Full-time worker (=1)	0.665	0.707	0.743	0.599
	(0.303)	(0.397)	(0.284)	(0.345)
Profession or skilled worker (=1)	3.707 b/	4.054 b/	3.235 b/	4.665 b/
	(1.986)	(2.552)	(1.615)	(2.942)
Clerical worker (=1)	2.811 c/	3.050 c/	2.504 b/	3.647 b/
	(1.574)	(1.824)	(1.164)	(2.321)
Logarithum value of annual income	2.539 a/	3.023 b/	2.509 a/	3.607 a/
	(0.757)	(1.354)	(0.859)	(1.453)
3. Stability of carrier				
Father: Continue to be hired by the same employer after graduation (=1)	0.858	1.040	1.039	1.053
	(0.277)	(0.375)	(0.283)	(0.399)
4. Timing of childbirth and macro-based characteristics of local areas				
Timing of 1st childbirth after the Family Care Leave Act activated in 1991	0.281 b/	0.487	0.536	0.246 b/
	(0.173)	(0.356)	(0.308)	(0.158)
Rate of waiting-list child for day-care center in the local area (%)	0.885	0.882	0.871	0.800
	(0.118)	(0.117)	(0.080)	(0.116)
Urban dummy (population of municipal area>=0.3million=1)	0.901	0.932	0.928	0.835
	(0.322)	(0.350)	(0.209)	(0.288)
5. The accessibility and the flexibility				
Principal components score for accessibilty	1.267	1.411	1.344 b/	1.382 b/
	(0.220)	(0.312)	(0.167)	(0.225)
Principal components score for flexibility at mother's working place	0.794	0.802	0.865	0.978
	(0.175)	(0.164)	(0.157)	(0.219)
$\ln \sigma$	-	0.237 b/	-	0.503 a/
	(-)	(0.114)	(-)	(0.157)
$\sigma (=1/\alpha)$	-	1.268	-	1.654
	(-)	(0.144)	(-)	(0.259)
$1/\sigma (=\alpha)$	-	0.789	-	0.605
	(-)	(0.090)	(-)	(0.095)
θ				0.624
				(0.372)
Wald chi-square	66.060	47.240	55.490	132.480
Log likelihood	-359.142	-150.498	-154.191	-149.823

Source: Calculated by the author, based on the "Survey for Working Environment and Fertility" conducted by Central Research Service Inc (Chuo Chosa Sha) in 2007.
Note: The data are limited to those who have at least one child and continue to be hired by the same employer after school graduation. Since the survey asked questions related only to respondents' current working place, I have to clarify those who worked in the same firm as now when they had a first baby, in order to examine effects of various systems on the timing of being reinstated into labor market after the first childbirth.
Note: In this study, the presence of accessibility of these systems and the flexibility of working environment at current father's working place are ignored, because they are not statistically significant for further duration analyses.
Note: a/, b/, and c/ refer to a significance level of 1, 5, and 10 percent, respectively.
Note: Likelihood-ratio test of theta=0: chibar2(01) = 1.35 Prob>=chibar2 = 0.123

Finally, in regards to the effect of heterogeneity in the model, the weibull -gamma estimation shows that the p-value for the likelihood-ratio test becomes 0.255. Therefore, we cannot reject the zero hypothesis of $H_0 : \theta = 0$ so that the assumption of the homogeneous baseline hazard across individuals may be justified. After correcting standard errors, effects of opportunity costs remain strongly positive on the probability of reinstatement for female stable workers who have been hired by the same employers after school graduation. Further, the effects of accessibility to work-life balance measures become positive.

6. Conclusions and discussions

Using the micro-based data on married union members and their spouses, this study evaluates the effects of work-life balance measures and workplace flexibility on a female worker's choice and timing of being reinstated into the labor market after the first childbirth. In this section, I would like to review major results in this study with the discussion about the limitations and some policy implications.

The plots of Kaplan-Meier survival and the Nelson-Aalen cumulative hazard estimates show a basic characteristic in the female labor market after the first childbirth, such that those who have not come back to work within one year have been facing a high risk of never being reinstated into the labor market, regardless of various factors.

In the weibull-gamma model setting for correcting standard errors, the results show that opportunity costs such as profession/skilled or clerical work with high annual income would motivate a female worker to be reinstated into the labor market within short time periods after the first childbirth. If the significant effects of opportunity costs are reliable results, the growth in the rates of female workers with low opportunity costs (such as non-regular status with low life-time income) in younger age groups will have a reversed negative impact on the bottom of the M-shaped distribution of the female workforce in the next decades.

However, as I previously mentioned, due to the limitations of the data, this study includes married couples of which at least one person belongs to the labor union and thus, are probably working in a better environment than non-labor union couples. Further, for investigating policy effects, out of these labor-union couples, I extract couples with female spouses having a stable career and who may enjoy even better working conditions than unstable employees. This implies that including only female employees who could take advantage of better working conditions will lead to a "selection bias problem" to overestimate the effects of opportunity costs. Aside from the size of effects, however, the lower opportunity costs for younger female workers still could be a serious issue in order to be complemented with the lack of workforce caused by a drastic change in the population structure by an increase in female labor supply.

For a stable female employee who has continued to be hired by the same employer after school graduation, adjusting for the opportunity costs, and the accessibility of work-life balance measures as a whole remains a significant positive impact on the probability to come back to work and thus would shorten the length of being on leave after the first childbirth in parametric model settings. However, including only stable female employees working in better environments would probably underestimate the effects of the measures because I choose only female workers who have strong wills to continue to work even after the first childbirth, regardless of the accessibility of various measures. Also, I have to note another crucial limitation of this study, such that work-life balance measures can be identified at the survey period rather than at the timing of first childbirth. Due to the public pressure on firms to extend family-care and work-life balance measures in the last decade, the systems were most likely to be changed between the early 1990s and the time of survey. So, I just can interpret the work-life balance measures in the year of 2007 as a proxy of the tolerance and liberal attitudes of firms to family care.

Since the direct child care costs are not identified for the first child in individual households, I rather control for the presence of informal child care and rate of waiting-lists to the quota of children for day care centers in a female worker's residential municipal area. In the results, the presence of informal care would decrease the costs of child care and increase the probability of mothers to exit to the labor market within short periods. While an increase in the rate of waiting-list children for day care centers in a local area robustly has a significant negative effect on female reinstatement for entire labor-union couples, the direction and size of the effects are almost the same for female stable employees, and becomes statistically insignificant. Suppose that female employees with stable careers can take advantage of child care measures. They may stay at home with infant babies who are less than 3 years old, of which demand and supply for child care provided by day care centers are most likely to be mismatched. Therefore, a choice of reinstatement by a stable female worker would not be affected by the rate of waiting-list children in local areas. In that sense, this result may also be affected by the "selection bias," which underestimates the effect of public child care resources provided by day care centers. Besides, I use the waiting-list children for day care centers in 2007 because I cannot specify the data at the timing of the first childbirth which I should have used. Thus, the results should also be very carefully interpreted.

Since the data used in this study suffer from serious selection bias, the results should never be generalized and the policy implications are quite restricted. Further research should be to re-examine the hypothesis using the nation-wide random sampling data source. Under such conditions, the results show that:

(1) female workers, who have not come back to work within one year after the first childbirth, would face a high risk of never being reinstated into the labor market; (2) a decrease in child care costs due to the presence of informal care and an increase in opportunity costs such as profession/skilled or clerical work with high annual income would motivate a female worker to be reinstated into the labor market within short time periods after the first childbirth; and (3) adjusting for the opportunity costs, the accessibility of work-life balance measures still remains a significant positive impact on the probability of a stable female employee to come back to work, thus shortening the length of being on leave.

Notes

(Note 1) "The Special Survey of the Labour Force Survey" and "Labour Force Survey" show that the percentages of female regular and non-regular employees in age groups of 15-24 and 25-34 are approximately 62% versus 37%, and 70% versus 29% in 1998, which has become about 50% versus 50%, and 59% versus 41% respectively, in 2008 (Statistics Bureau, 2008).

(Note 2) In this study, I use "Survey for Working Environment and Fertility" which is described in the latter section. For example, as work-life balance policies, the survey asked the presence and accessibility of 12 types of policies such as annual paid leave by half a day, shortening of working hours, limitation on late-night work, limitation on overtime work, child care leave systems and nursing care leave systems more generous than the legal definition, flexible times of starting and ending work, day care center financial support, telecommuting, area-specific working systems, reemployment, and sick/injured child care leave.

(Note 3) The law is officially called "Act on the Welfare of Workers Who Take Care of Children or Other Family Members Including Child Care and Family Care Leave.".Article 1 shows that the purposes of this Act are to promote the welfare of workers, etc. who take care of children or other family members and to contribute to the development of the economy and society.These purposes will be accomplished by helping balance such persons' work life and family life by means of continuing employment and promoting re-employment of said workers, etc. through such steps as establishing a system for Child Care Leave, Family Care Leave, and Sick/Injured Child Care Leave, prescribing measures to be taken by employers concerning working hours, etc. with the view to facilitating the care of children and other family members, and taking measures to support said workers, etc ("Japanese Law Transition" webpage: http://www.japaneselawtranslation.go.jp/law/detail/?ft=2&re=01&dn=1&yo=&kn[]=%E3%81%84&x=10&y=16&ky=&page=3).

(Note 4) JSD was established on July 2001, which consists of 194,000 workers (Women-59%, Men-41%, and Part-time workers-35%) in 137 enterprise-wide unions in distributive, service, and allied industries, as of April 2007 (JSD webpage, http://www.jsd-union.org/). UIZ was founded in September 2002 and the number of members is approximately one million (Women-53%, Men-47%, and Part-time workers-44%) in about 2,500 affiliated unions as of September 2008 (UZI webpage, http://www.uizensen.or.jp/).

(Note 5) It includes "de facto marriage" which is a married, but not registered couple.

(Note 6) The survey was also conducted on 1,514 unmarried union members (a response rate of 53.9% out of 2,810).However, this study excludes them because there are too few single-parent households and the information on either parent who does not currently live with children is missing, such as age, educational attainment, and status in the labor market, which is necessary for regression analyses in this study. Further, the survey was carried out on 52 current employers (a response rate of 65% out of 80) of the union members, asking questions regarding working environments in detail, e.g., the number of employees by sex, age and full-time or part-time status, the presence and accessibility of various systems for balancing work and family lives, wage structure by sex and educational attainment, and personnel affairs and welfare systems. The regression results adjusting for these characteristics of each firm are not shown in this paper, because none of these are statistically significant. Yet, the results can be requested to the author.

(Note 7) The survey asked only female respondents employment status, type of job, and income one-year before the first childbirth.

(Note 8) Unfortunately, the survey did not ask fathers' statuses in labor market one-year before the first childbirth.

(Note 9) Accurately, the rate of waiting-list children for day care centers should be treated

as an endogeneous variable in functions of the female labor supply due to the interactive causality. However, in this study, this variable is considered to be exogenous under a strong assumption such that people do not migrate before and after the first childbirth.

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