IS CHILDCARE LEAVE EFFECTIVE IN RAISING FERTILITY IN JAPAN?

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This paper estimates the effect of childcare leave on married women's fertility in Japan, based on data from the 2007 National Survey on Work and Family. The analysis takes into account how childcare leave influences fertility through its intermediate effects on women's selection into the labor market, job tenure, wages and the opportunity cost of children. Results indicate a strong effect of childcare leave on years of continuous job tenure with the same employer, and on predicted wages for full-time working women. Taking childcare leave for the first child increases the percentage progressing from first to second birth by six percentage points. There is also clear evidence that lowering the opportunity cost of children increases fertility, net of the effect of childcare leave, which affects fertility via the opportunity cost of children.

KEYWORDS: fertility; childcare leave; job tenure; opportunity cost of children

Introduction

An analysis of the effect of childcare leave on fertility in Japan properly begins with some recent history pertaining to trends in both fertility and childcare leave policy. Since 1973, the year of the global 'oil shock', which led to major changes in women's employment patterns, Japan's total fertility rate (TFR) declined fairly steadily, from 2.14 births per woman in 1973 to a record low of 1.26 in 2005. This decline was followed by a modest rebound to 1.37 in 2008. The Japanese government became actively concerned about low fertility when the TFR reached 1.57 in 1989, which was a record low. The media picked up the story and the '1.57 shock' appeared in headlines across the country. Since then, the government has incrementally adopted a number of pro-natalist policies and programs (Ogawa 2003; Retherford & Ogawa 2006).

The first of these was the 1991 Childcare Leave Act, which provided, for regular employees in companies with more than 30 employees, up to one year of unpaid childcare leave until the child reaches his/her first birthday. This law was superseded by the 1995 Childcare and Family Leave Act, which extended coverage to employees of firms with fewer than 30 employees. An additional provision granted employees 25 percent of their salary while on leave, during which the employer continued to pay the employer's share of social security contributions. In 2000, the government additionally took over the employer's share.

In 2001, the scheme was amended to provide 40 percent of one's salary while on childcare leave, and a new option provided unpaid leave for up to three months to care for a sick or incapacitated family member. In 2005, a further revision of the Childcare and Family Care Leave Act extended coverage to part-time limited-term contract workers, though with

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major limitations. The government's childcare leave policy continues to evolve. For example, in June 2009, the Diet passed a bill which allows employees raising young children to work six hours a day with the choice of not working overtime. The new bill also allows both parents to take a leave of absence until their child reaches age 14 months, up from the 12 months previously allowed. It also allows the father to take a second childcare leave if it is taken within eight weeks of the birth of his most recently-born child.

Despite the increasing generosity of childcare leave policy, the TFR continued to fall until 2005. It is likely, however, that it would have fallen even more without the childcare leave policy. The modest rebound in the TFR since 2005 may have as much or more to do with the economic recovery from 'Japan's lost decade' of the 1990s and early 2000s than with policy changes since 2005, which have occurred mainly as a result of the 2003 'Next Generation' law, which became effective in April 2005, and the effects of which are currently being evaluated by the government. The 'Next Generation' law required firms with more than 300 workers to prepare a plan to raise fertility among their employees.

The present paper analyzes the effect of childcare leave on women's fertility, based on data from the 2007 National Survey on Work and Family, conducted by the Nihon University Population Research Institute in collaboration with the World Health Organization. The analysis takes into account how childcare leave influences the fertility of married women, through its intermediate effects on women's selection into the labor market, job tenure, wages and the opportunity cost of children.

Theory

There is a growing body of literature, based mainly on the experience of Western countries, which examines the effect of childcare leave on women's labor force participation and fertility. Although methodology varies across studies, the studies generally indicate that childcare leave is an effective tool for raising fertility (Averrett & Whittington 2001; Büttner & Lutz 1990; Hoem *et al*. 2001; Lalive & Zweimüller 2005; Ridao-Cano & McNown 2005; Winegarden & Bracy 1995). Analyses of the effect of childcare leave on women's labor force participation, however, are somewhat mixed (Baum 2003; Berger & Milligan 2005; Berger *et al*. 2005; Klerman & Leibowitz 1999; Lalive & Zweimüller 2005; Schönberg & Ludsteck 2007).

There are only a few relevant studies of this kind in Japan (Kawaguchi 2007; Shigeno & Matsuura 2003; Suruga & Zhang 2003; Suruga & Nishimoto 2002; Suzuki 2006; Yamaguchi 2005; Yoshida 2006). Current debate about the effectiveness of the government's childcare leave policies is based mainly on these few studies. A lack of adequate data, and the complexity of causal relationships between childcare leave, women's labor force participation, job tenure, women's wages, the opportunity cost of children and fertility, make it difficult to draw firm conclusions about the effect of childcare leave on fertility. Schönberg and Ludsteck (2007) have concluded that the economic and fertility effects of childcare leave are not well understood, and that more research is needed to better understand them.

The opportunity cost of children is conventionally defined as earnings forgone as a result of not working, permanently or temporarily, in order to have children. Childcare leave can increase fertility by lowering this opportunity cost, through allowing working women to take temporary leave with return rights. The opportunity cost is lowered even more if working women continue to be paid and continue to accrue seniority while on

childcare leave. By making work more attractive to women who want children, however, childcare leave can also draw more housewives into the labor market, which tends to reduce fertility. Both of these effects are taken into account in our analysis, as will be explained shortly.

The opportunity cost of children is not directly observed, but it is closely related to working women's earnings capacity in the labor market. The earnings of a working woman can be used as a proxy for the opportunity cost of children for a non-working woman with otherwise similar characteristics. As earnings are not directly observed for housewives, unpaid family workers and (often) self-employed women, their earnings are typically predicted from a wage model. In addition, since earnings vary considerably over type of worker, they are typically based on only one type of worker, usually full-time workers. Another complication in estimating the opportunity cost of children is that to some extent, women choose, or self-select, to participate in the labor market, which pre-conditions their opportunity cost of having children. This self-selection affects the estimate of predicted wage. None of the previous studies of the effect of childcare leave on fertility measure indirect effects through self-selection into the labor market, job tenure, wages and the opportunity cost of children. Our study attempts to remedy these omissions.

Japan is an interesting case. The opportunity cost of children in Japan is much higher for women than for men, because childbearing and childrearing are still largely considered to be the responsibility of women. The opportunity cost of children is especially high for educated women because of the high economic returns to education, i.e. wage gain per additional year of education, for Japanese women. Education levels of women have vastly increased in Japan over the past few decades, and the associated wage gains have been an important factor drawing educated women into paid employment. The economic return to education has been greater for women than for men. For example, between 1976–1988, the average wage differential between junior high school and university graduates was 60 percent for women compared with 43 percent for men (Ogawa & Clark 1995).

The opportunity cost of children is especially high for regular full-time working women, because of Japan's highly segmented labor market and the huge wage gap between regular full-time workers and part-time workers. Japan's labor market is highly segmented between full-time workers, who enjoy considerable job security and generous fringe benefits, and non-regular (mostly part-time) workers, who have little job security and few benefits. By 'highly segmented', what is meant is that once a worker enters the non-regular part of the labor market, there is little opportunity to achieve, or re-achieve, regular full-time status, especially since firms usually hire regular full-time workers at the time they graduate. So when a full-time working woman quits her job to have children, she experiences a major loss of earnings, especially if she has to return to the labor market as a part-time worker, as is usually the case. Currently, about half of married women of reproductive age work, and among those who work, about half work full-time and half work part-time.

Retherford and Ogawa (2006) argue that the average opportunity cost of children will keep rising in Japan, because married women's propensity to work full-time will increase due to the persisting large wage gap between part-time and full-time workers, and continuing increases in women's educational attainment. In support of their argument, they cite a government White Paper (Cabinet Office 2003) that simulated the average opportunity cost of children for women university graduates with regular full-time

jobs who temporarily drop out of the labor market for six years to have children. As mentioned, most regular full-time women workers who temporarily drop out for several years have little choice but to re-enter the labor force as part-time workers. In this case, the White Paper estimated lost lifetime income at 237,930,000 yen (US$2,379,300 at 100 yen per dollar). The main reason why this opportunity cost is so large is that part-timers, who may actually be working full-time though they are classified as part-time, are so poorly paid in Japan, with average annual earnings of about 1,000,000 yen (US$10,000), compared with about 4,000,000 yen (US$40,000) for regular full-time workers.

One expects that strengthening and expanding the childcare leave system are good ways to raise fertility in Japan (Matsukura *et al*. 2007). Evidence in support of this is provided by responses to a direct question intended to shed light on the fertility-enhancing effect of childcare leave, asked in the 2007 National Survey on Work and Family. The survey asked how important childcare leave was for having a child. Forty percent of female respondents said 'very important', and another 35 percent said 'relatively important'.

In practice, however, not every woman who is eligible takes the childcare leave to which she is entitled. In the 2007 survey, the proportion of married women workers aged 20–49 with at least one child who took childcare leave for their first birth was only 19 percent. For those who continued working after the first birth and had the option of taking childcare leave, however, this proportion was much higher, at 62 percent. The difference between 19 percent and 62 percent is accounted for mainly by women who quit working either during pregnancy or at childbirth.

The 2007 survey also reveals that many women experienced problems when they took childcare leave, due mostly to silent pressure from peers and employers. In response to a survey question about such problems, respondents who took childcare leave were allowed to choose as many as three pre-coded responses as follows: 'there were no particular problems' (18 percent); 'during the childcare leave I had no income or my income was reduced to a considerable extent' (35 percent); 'while on the childcare leave, I felt uneasy because information on my company and work was not available to me' (11 percent); 'after returning from the leave, I could not keep up with my colleagues in the work' (8 percent). Due to these problems, it is perhaps not surprising that many women who are eligible to take childcare leave either quit working or continue working without taking childcare leave for their first child.

Data and Methods

As mentioned, our study is based on data from the 2007 National Survey on Work and Family. The survey covers a wide range of topics related to work and family life, including information about the demographic and socio-economic characteristics of respondents and their spouses, marriage decisions, childbearing and childrearing, care of the elderly, birth history, working conditions, contraceptive use, experience of infertility, and sexual activity. The target population was both men and women aged 20–59. A two-stage cluster sample design was used to select 9000 potential respondents. The questionnaire was left for potential respondents to complete on their own, and to be picked up later by a member of the survey team. Due to low response, the first round of data collection was followed up with a second round using direct-mail methods. Characteristics of respondents in the first and second rounds were found to be similar. The final response rate, however, was only 51.4 percent of the original 9000. To minimize non-response bias, the sample has been

weighted to match the officially published age-sex profile of the Japanese population in 2007.

Our statistical analysis is restricted to married women aged 20–49 who have had at least one child. The reason for this restriction is that we measure fertility as parity progression between first and second births, i.e. the fraction of women who had a first birth and who went on to have a second, and between second and third births, i.e. the fraction of women who had a second birth and who went on to have a third, where parity is defined in the usual way as the number of children that a woman has ever borne. Higher-order progressions are not considered because very few Japanese women have more than three births. These parity progression percentages are referred to in the demographic literature as parity progression ratios (PPRs). Progression from marriage to first birth is not considered, as the analysis requires a variable indicating whether childcare leave was taken for the starting birth in the progression, and there is no starting birth in the case of progression from marriage to first birth.

Variables included in the models are shown in Table 1. The selection of predictor variables is based not only on data availability, but also on our knowledge of previous theoretical and empirical studies of factors affecting woman's work, parity progression and desire for children. Table 1 classifies predictor variables in each model into six categories pertaining to (A) childcare leave variables, (B) woman's education, (C) woman's age and job market experience, (D) job/employer characteristics, (E) woman's time constraint and other household characteristics, and (F) variables constructed from one of the other models.

As will be discussed, the predictor variables and sub-sample sizes vary from model to model, which means that the means and standard deviations shown in Table 1 are based on specific sub-samples. For example, the labor market experience and job characteristics variables are based on the sub-sample used for Model 3, and woman's age at recent birth and residence when young are based on the sub-sample used for Model 4. The other variables are based on Model 5, for which the sub-sample is married women aged 20–49 who had at least one child. There are two childcare-leave variables, one of which is used in Model 4, and the second of which is used in Models 2 and 5.

The first childcare-leave variable is constructed from the woman's birth history, which contains information on childcare-leave status at the time of childbirth. The reference category is 'no leave taken because not working'. Leave status is of three types: 'took childcare leave at birth', 'no leave taken because it was not available', and 'no utilization of childcare leave although it was available'. The mean values in Table 1 are for first births. Mean values of the three types of leave status indicate that 52.2 percent of the women were not working at the time of the first birth, 29.0 percent were working in jobs where childcare leave was available, and 18.8 percent were working in jobs where childcare leave was not available. Among those who were working in jobs where childcare leave was available, 61.7 percent (17.9/29.0) took childcare leave for the first birth. The utilization percentage for second births is 58.8 percent, which is slightly lower than the utilization percentage for first births. This is surprising, inasmuch as second births occurred more recently as childcare leave benefits were becoming more generous.

The second childcare-leave variable is an indicator of childcare-leave experience, taking on the value of one if the woman has ever taken childcare leave, and zero otherwise. About 19 percent of married women aged 20–49 who have had births utilized childcare leave at least once.

TABLE 1
Definitions and mean values of variables.

Variable	Definition (dummy variables take on the value of one if the specified condition is met, zero otherwise)	All models[a]					Mean[b] (standard deviation)
		1	2	3	4	5	
A. Childcare leave							
Leave status at childbirth	(Reference) No leave taken because not working						
Childcare leave	Took childcare leave at childbirth				X		0.179
Not available	Did not take childcare leave because not available				X		0.188
Not taken	Did not take the leave although it was available				X		0.111
Childcare leave experience	(Reference) Never took childcare leave						
Ever took childcare leave	Took childcare leave at least once		X			X	0.188
B. Woman's education							
Woman's education[c]	(Reference) High school or below						
Junior college	Junior college	X	X	X	X	X	0.381
University	University	X	X	X	X	X	0.160
C. Woman's age/job market experience							
Year of starting (first) birth	A set of dummy variables indicating the year of first birth (Models 2 & 5) or starting birth (Model 4)		X		X	X	—
Woman's age at starting birth	(Reference) 20–24						
25–27	25–27				X		0.336
28–30	28–30				X		0.243
31–33	30–33				X		0.095
≥34	At or above 34				X		0.059
Woman's current age	(Reference) 20–29						
30–34	30–34	X	X			X	0.271
35–39	35–39	X	X			X	0.273
40–44	40–44	X	X			X	0.184
≥45	45 or above	X	X			X	0.101

TABLE 1 (*Continued*)

Variable	Definition (dummy variables take on the value of one if the specified condition is met, zero otherwise)	All models[a]					Mean[b] (standard deviation)
		1	2	3	4	5	
Years of labor market experience	Years of potential labor market experience (calculated as age minus years of schooling minus six)			X			20.45 (6.33)
Years of tenure	Years of job tenure (seniority) with current employer			X			12.29 (8.22)
D. Woman's job characteristics							
Firm size (number of employees)	(Reference) Firm with fewer than 100 employees						
100–499	100–499 employees		X	X			0.157
500–999	500–999 employees		X	X			0.040
1000 or more	1000 or more employees		X	X			0.101
Public sector	Woman is a public sector worker		X	X			0.245
E. Woman's time constraint/household characteristics							
Young children	Has at least one child age 0–6	X					0.517
Co-residence	Couple currently co-resides with parents/parents-in-law	X				X	0.220
Husband's income (thousands of yen)	(Reference) Husband does not work/no income						
1–3999	Below 4 million yen	X			X	X	0.316
4000–7999	Between 4 and 8 million yen	X			X	X	0.396
8000 or higher	8 million yen or more	X			X	X	0.106
Arranged marriage	The marriage was an arranged marriage				X	X	0.099
Daycare center utilization	Woman used daycare center for the starting (first) birth				X	X	0.410
Current residence	Woman lives in urban area	X	X	X		X	0.884
Childhood residence	Woman lived in an urban area as a child				X		0.751
F. Variables constructed from other model							
Inverse Mills ratio	Selection variable (constructed from Model 1)		X	X			—

TABLE 1 (*Continued*)

Variable	Definition (dummy variables take on the value of one if the specified condition is met, zero otherwise)	All models[a]					Mean[b] (standard deviation)
		1	2	3	4	5	
Woman's predicted wage	Predicted wage (actually predicted log wage), based on current wages of full-time women workers and used as a proxy for opportunity cost of children (constructed from Model 3)				X	X	—

[a]Dependent variables are the following: Model 1: years of tenure, Model 2: job status (five indicators), Model 3: natural log of wage, Model 4: a binary indicator of parity progression, and Model 5: a binary indicator of desire for additional children. Model 3 also includes a set of dummy variables indicating year of childbirth as controls.
[b]Means and standard deviations are based on different sub-samples. The labor market experience and job characteristics variables are based on the sample used for Model 3; women's age and childcare leave status and residence when young are based on the sample used for Model 4; all the other variables are based on the sample used for Model 5. The sub-samples for each mean value are full-time working women (Model 3), first birth (Model 4), and wife and husbands who have only one child (Model 5). All samples are first restricted to the sample of married women aged 20–49 who have had at least one child. These sub-samples are then further restricted to smaller samples for some models; full-time working women for Models 2 and 3, first birth for Model 4, and those who have only one child for Model 5.
[c]It indicates that the woman graduated at the specified level of education.

We consider five models to account for the effect of childcare leave on labor market outcome and fertility. The models pertain to (1) job selection, (2) job continuity, with separate models for full-time and part-time jobs, (3) wages, with separate models for full-time and part-time wages, (4) parity progression, with separate models for the 1–2 and 2–3 transitions, and (5) desire for another child, with separate models for women with one child and women with two children. 'Part-time' in these models pertains to both part-time and limited-term contract workers, but does not include the self-employed or family workers.

A brief overview of the five models is as follows. Model 1 is used to estimate a selection variable (the inverse Mills ratio), which is used to correct for self-selection of women into any of four major work categories of women. A value of the selection variable is computed for every woman in the sample, regardless of her employment status. The selection variable is then included in the set of predictor variables in Model 2 (job continuity) and Model 3 (wage model) in order to correct for selection bias. Model 2 estimates the effect of childcare leave on job continuity, with years of tenure (seniority) with most recent employer used as a proxy for job continuity. The wage model in Model 3 assesses the effects of predictor variables on woman's current wage. The fitted Model 3 for full-time working women, which is estimated separately for parity-1 women and parity-2 women, is then used to calculate a predicted wage for each woman, regardless of whether or not they were working. Predicted wage, rather than observed wage, is used even for regular full-time working women because predicted wage corrects for selection bias. Predicted wage is then used as a proxy for the opportunity cost of children, and is included in the set of predictor variables in Model 4 (parity progression) and Model 5 (desire for another child).

As mentioned, predicted wage is estimated separately for parity-1 women and parity-2 women, before its inclusion in the sets of predictor variables for the models for the 1–2 transition and the 2–3 transition that together constitute Model 4, and for the models for parity-1 women and parity-2 women that together constitute Model 5. The fitted wage model shown in Table 2, which does not distinguish between parities, is not used for this purpose. It has a different purpose as discussed later.

Although Model 3 is necessary for the estimation of Models 4 and 5, Model 2 (the job tenure equation) is not necessary. Tenure appears as a predictor of wages in Model 3, but it appears in Model 3 as actual tenure, and not predicted tenure from Model 2. Model 2 is nevertheless included in the paper because in conjunction with Model 3, as fitted in Table 2 without distinguishing between parity transitions, it shows that childcare leave has a positive effect on job tenure, which in turn has a positive effect on predicted wage. Due to the importance of seniority in job promotion in Japan, tenure is a key variable for predicting wage. In the following paragraphs, each of these five models and its rationale are discussed in more detail.

Our theory predicts that the opportunity cost of children plays a key role in understanding how childcare leave affects parity progression. The opportunity cost of children is defined here as the loss of earnings for a woman who is not working because of childbearing and childrearing. The opportunity cost is conceptualized as the market wage—measured as predicted wage in Model 3—that she would have had as a regular full-time worker if she had either not stayed out of or left the labor force in order to have children.

A difficult issue is how to handle the selection problem. We want to estimate the determinants of wages, but we have information about wages only for working women.

We need to estimate wages also for women who are not working, however, in order to estimate an opportunity cost for them. In the case of these women, the estimated wages are potential wages. The problem is that a woman who chooses to work is selected non-randomly from the population, which pre-conditions her opportunity cost of children. Ignoring this selection can lead to substantial bias in estimating not only her opportunity cost, but also the opportunity cost of a woman who is not working, which in turn biases the estimated effect of childcare leave on fertility as, according to our theory, the effect of childcare leave is indirect through its effect on the opportunity cost of children as measured by predicted wage.

There is a standard way of addressing this selection problem that reduces bias. The general approach was proposed originally by Heckman (1979), and the multivariate version was formulated by Lee (1981). The method has been used frequently in the economics literature, for example, in Clark and Ogawa (1992), and Ogawa and Ermisch (1996). In the application of the method in the present study, women are first categorized into four types of employment status: housewives, the self-employed and family workers, part-time wage-earners, and full-time wage-earners. As mentioned, 'full-time' and 'part-time' are job classifications; many persons classified as part-time actually work full-time or close to full-time. Model 1 employs this categorization in a multinomial logistic regression of employment status (three dummy variables to represent the four types) on the predictor variables shown in Table 1, fitted to all women in our sub-sample of married women aged 20–49 who have had at least one child. A value of the selection variable (the inverse Mills ratio) is calculated for each woman from the multinomial logistic regression results using a methodology too complex to explain here (see the references cited earlier for details). Then, as mentioned, the selection variable is included in the sets of predictor variables for Models 2 and 3 in order to reduce selection bias in the estimates of coefficients and predicted values of the dependent variable. Model 1 is included because it allows construction of the selection variable. As coefficient estimates from Model 1 are not otherwise germane to the estimation of the effect of childcare leave on fertility, results from Model 1 are not shown in this paper.

The effect of childcare leave on women's job continuity is examined in Model 2, using years of woman's job tenure with current employer as a proxy variable for job continuity. This indirect measurement is necessary because our data set does not contain labor market histories for women. Model 2 is estimated by the method of ordinary least squares (OLS), separately for full-time women workers and part-time women workers aged 20–49 who are married with at least one child.

In the wage model (Model 3), the dependent variable is actually the natural logarithm of earnings, adjusted for weekly working hours by dividing woman's annual income by number of working hours per week. There are two reasons for using log wage instead of wage itself. First, the wage distribution is skewed to the right, so that the distribution of error terms is far from normal. By taking the log of wage, the distribution becomes closer to normal, i.e. log-normal, thereby conforming more closely to the assumptions underlying OLS regression. Second, the estimated coefficients of predictor variables no longer depend on wage level. When the dependent variable is log wage, the coefficient of a predictor variable is interpreted as the proportional or percentage change in wages associated with a one-unit increase in the predictor variable.

Predicted log wage is calculated for each woman in the sample, regardless of whether or not she is working, by substituting in her values of the predictor variables into the Model 3

equation (separate equations for parity-1 women and parity-2 women). This is straightforward except for tenure and firm size (number of employees), for which housewives, the self-employed and family workers have no values in our data set. We have used zero tenure and 'fewer than 100 employees' (the reference category for the firm-size variable) for these women. These women would have had higher tenure, and many would have worked in a bigger firm if they had been working all along, but there is no way to measure this. The use of arbitrary values of tenure and firm size for these women is a limitation of the analysis.[1] Predicted log wage, estimated separately for women of parity 1 (starting parity for the 1–2 transition) and parity 2 (starting parity for the 2–3 transition), is then included in the set of predictor variables when estimating the effect of childcare leave on parity progressions from first to second birth and from second to third birth in Model 4, and on desire for an additional child among women of parity 1 and parity 2 in Model 5. Models 4 and 5 are probit regression models. In the case of the 1–2 parity transition in Model 4, the model is fitted to married women aged 20–49 who ever had a first birth. In the case of the 2–3 transition, the model is fitted to married women aged 20-49 who ever had a second birth.

According to our theory, childcare leave affects parity progression by reducing the opportunity cost of children, which functions as an intermediate variable. Thus, if we include childcare leave as a predictor of log wage in Model 3, controlling for the opportunity cost of children (predicted log wage) in Model 4 would wipe out the effect of childcare leave on parity progression in Model 4. This means that we have to predict log wage in Model 3 without including childcare leave in the set of predictor variables. Then, in Model 4, we can include both the opportunity cost of children (predicted log wage) and childcare leave in the set of predictor variables when estimating effects of predictor variables on parity progression. In this case, the estimated effect of childcare leave in the fertility model is the effect of the childcare leave on having an additional child, net of the effect of woman's opportunity cost of having an additional child without taking childcare leave into account. Not controlling for opportunity cost (predicted log wage) in Model 4 would result in substantial underestimation of the effect of childcare leave on parity progression, because childcare leave would then not capture the positive correlation between childcare leave and predicted log wage.[2] It would capture instead the negative correlation between opportunity cost (predicted log wage) and parity progression.

A potential point of confusion is that predicted log wage is viewed sometimes as a benefit and sometimes as a cost. For example, we saw earlier that the effect of childcare leave on predicted wage, via the effect of childcare leave on tenure, was positive, as expected. In this case, a higher predicted wage is viewed as a benefit of childcare leave. By contrast, in Model 4 for parity progression, a higher predicted wage is viewed as indicating a higher opportunity cost of children.

As will be seen, job tenure has a strong positive effect on predicted wage, which is the measure of opportunity cost through which childcare leave increases fertility (by reducing the opportunity cost). Thus, job tenure, which is increased by childcare leave, plays an important role in explaining why we expect childcare leave to increase fertility. It is noteworthy that the increase in job tenure, as a consequence of childcare leave, captures the tendency of childcare leave to increase women's labor force participation, inasmuch as women take childcare leave instead of quitting their jobs.

In Model 5, the dependent variable is whether the woman wants to have another child. Model 5 is actually two models, one for married women aged 20–49 who currently, i.e. at the time of the survey, have one child, and one for married women aged 20–49 who

currently have two children. Measurement of desire for another child is based on the question, 'how many more children would you like to have? Please indicate the number of children you *really want*'. In this model, we do not distinguish between the wife's and husband's response on this question. Again, probit regression was used to estimate the model.

Estimation of each model requires statistical controls for other factors. Woman's education is included as a control in all the models, since it has major effects on all the dependent variables in those models. Husband's education is not included because of multicollinearity problems. Woman's age at starting birth is included in Model 4 (parity progression) but not in the other models. Woman's current age needs to be controlled for in all models except Model 4 (parity progression), where age at starting birth is used instead, and Model 3 (wages), where years of labor market experience (which, in the absence of a measure of actual labor market experience in our data set, is measured by potential market experience, calculated as current age minus years of schooling minus six years of pre-school age) and years of job tenure are used instead. Squares of both of the latter two variables are also included, because human capital theory suggests that the effect of training on earnings declines with age and experience. Firm size is a relevant determinant in Models 2 and 3 (job tenure and wages) but not in the other models. The presence of children aged 0–6 in the household is clearly relevant to Model 1 (employment status) and to Model 5 (desire for another child), but not to the other models. In Model 5, however, this variable is not included because it is effectively controlled by the set of dummy variables indicating year of childbirth. Husband's income is clearly relevant to Model 1 (employment status), Model 4 (parity progression) and Model 5 (desire for another child), but not to the other models. Arranged marriage is relevant to Model 4 (parity progression) and Model 5 (desire for another child), but not to the other models. Current residence is relevant to all models except Model 4, where childhood residence is used instead.

Models 2, 4 and 5 also include a set of dummy variables indicating year of childbirth; Models 2 and 5 include year of first birth, and Model 4 includes year of starting birth in a parity progression. Year of childbirth is not shown in any table because the number of dummy variables is large. Year of childbirth is controlled for three reasons. First, it controls for the downward trend in fertility. Second, it controls for the effects of the recession, i.e. 'Japan's lost decade', which followed the collapse of the bubble economy at the end of the 1980s, and for the effects of changes in childcare leave and other pro-natalist policies. Third, combined with woman's age at childbirth, it controls for the effect of birth interval on fertility. Dummy variables are used in order to control more precisely for these effects.

Findings

The Effect of Childcare Leave on Women's Labor Market Outcomes

Married women's careers are often interrupted by childbearing and childrearing. The 2007 survey collected information about woman's job status one year prior to each childbirth and at the time of childbirth. Twenty-three percent of full-time employees, and 41 percent of part-time employees or self-employed women who were working one year before they gave birth, were no longer working at any childbirth. Although this does not

indicate whether a woman returned to work soon after childbirth, it does suggest that childbearing has had a negative impact on women's job careers in Japan.

Column one of Table 2 shows results for Model 2 (the job continuity model), where job continuity is measured by job tenure (seniority) in the woman's current job. The results indicate that a full-time working woman who ever took childcare leave had 5.8 years more tenure on average than a woman who never took childcare leave. The effects of childcare leave on job continuity for part-time working woman are not statistically significant and are not shown. This is not surprising because childcare leave was available only for regular full-time workers until 2004. In addition, although the revision of the Childcare and Family Care Leave Act, effective from 2005, guaranteed part-time employees' right to childcare leave, the act contains limitations and loopholes that make it fairly easy for employers to avoid granting childcare leave to part-time and other non-regular workers.

Column two of Table 2 present results for Model 3 (the wage model). The tenure variable and its square are both statistically significant. Model 3 indicates that five more

TABLE 2
Effects of childcare leave on job tenure and wages of full-time working women (Models 2 and 3).

	Model 2 Years of tenure	Model 3 Log wage
Childcare leave history		
Ever took childcare leave	5.794***	
Woman's education		
Junior college	−0.324	0.178*
University	−0.964	0.561***
Tenure		0.085***
Tenure-squared		−0.002*
Experience		0.022
Experience-squared		−0.0005
Woman's current age		
30–34	2.689**	
35–39	6.248***	
40–44	9.088***	
≥ 45	13.384***	
Firm size (number of employees)		
100–499	1.830*	0.339***
500–999	4.662***	0.505**
1000 or more	3.687***	0.303**
Public sector	5.426***	0.454***
Urban residence	−1.995	−0.160
Selection variable	0.793	0.415
R-squared	0.479	0.394
Number of observations	360	289

Note: The ordinary least squares method was used for estimation. Variables included in Model 2 but not shown are a set of dummy variables indicating the year in which the first birth occurred. They were jointly significant in all specifications. The number of observations underlying the wage equations are reduced because of non-reporting on some variables, especially wages.
***Statistical significance at the one-percent level.
**Statistical significance at the five-percent level.
*Statistical significance at the 10-percent level.

years of tenure increase a full-time working woman's wage by about 18 percent.[3] Model 2 indicates that childcare leave increases tenure by more than five years, namely, by 5.794 years. Thus, Models 2 and 3 together imply that full-time women workers who took childcare leave received 21 percent higher wages than those who did not take childcare leave, many of whom quit their jobs. These results indicate that childcare leave has a substantial beneficial effect on a full-time working woman's wage as a consequence of her career not being interrupted.

To investigate whether childcare leave has an independent additional effect on the wage, net of its effect through job continuity, we re-ran the wage regression including both tenure and childcare leave in the set of predictor variables. The results (not shown) indicate that childcare leave does not have a significant additional impact on a full-time working woman's wage, net of its effect on tenure.

The effect of labor market experience on a full-time working woman's wage is not significant. This lack of effect is at least partly due to poor measurement of labor market experience as potential labor market experience, calculated as described earlier. Years of tenure, which has a positive effect that is significant for full-time workers but not part-time workers (results not shown for part-time workers), is less subject to measurement error because it is measured directly from survey questions, except for housewives, family workers and the self-employed. As expected, woman's education and firm size also have significant positive effects on wages. However, urban residence has an unexpected negative effect, which, however, is small and not significant.

The Effect of Childcare Leave on Fertility

As explained earlier, predicted wage, which is estimated separately for parity 1 women at the start of the 1–2 transition and parity 2 women at the start of the 2–3 transition, is used as a proxy for the opportunity cost of children. Columns one and two of Table 3 present probit regression results for progression from first to second birth, with and without predicted wage in the model. For each of the two transitions, the dependent variable observed for an individual woman is a dummy variable indicating whether the woman progressed to the next parity, i.e. had a next birth, by the time of the survey (one if yes, zero if no). Predicted values of the dependent variable are thus PPRs indicating the fraction of women who progress from the starting parity to the next parity, i.e. to the next birth. In Table 3, these fractions are expressed as percentages. In each panel of Table 3, PPRs are calculated by varying the indicated predictor variable while holding all the other predictor variables in the model constant at their mean values in the sub-sample on which the probit regression is run. It should be noted that PPRs are more appropriately calculated by life-table methods, which means that the estimates of PPRs in Table 3 are not very accurate because they are affected by censoring by the survey date, which also means that some women may progress to the next survey after the survey date.

All of the predictor variables in Model 4 (Table 3) are categorical, except opportunity cost of children, as measured by predicted wage, which is a continuous variable that actually appears in the model as predicted log wage. As predicted log wage is a continuous variable, predicted PPRs are calculated for selected values of predicted log wage. These selected values play the role of categories. The selected values of predicted log wage are not actually shown in Table 3 because they differ between the models for the 1–2 transition and the models for the 2–3 transition. The selected values are chosen so that

TABLE 3
Predicted percentages of women progressing from first to second birth and from second to third birth (Model 4).

	First to second birth	First to second birth	Second to third birth	Second to third birth
Controlling opportunity cost	Yes	No	Yes	No
Childcare leave for starting birth				
No leave because not working‡	73.1	76.4	32.0	32.7
Took childcare leave	78.6**	74.1	38.3	34.0
No leave because not available	73.8	74.1	32.0	32.7
No leave even though available	78.0*	78.2	33.7	33.9
Woman's education				
High school‡	73.2	74.1	30.5	31.3
Junior college	75.3	75.3	34.6*	34.2
University	78.3	76.2	41.0**	36.3
Woman's age at starting birth				
20–24‡	81.2	81.6	42.6	42.7
25–27	80.1	80.4	41.3	41.7
28–30	73.6***	73.7***	33.5*	33.4*
31–33	61.5***	61.2***	25.8***	25.3***
34 or older	48.5***	47.6***	13.8***	13.2***
Daycare center utilization				
No‡	77.4	78.3	30.4	31.2
Yes	74.6	74.0	33.6	32.3
Arranged marriage				
No‡	76.1	76.3	31.4	31.2
Yes	76.5	76.8	34.3	34.5
Husband's income (thousands of yen)				
Income not reported‡	73.3	73.7	34.9	35.0
1–3999	75.8	75.8	33.3	32.7
4000–7999	76.8	77.1	31.8	31.5
8000 or more	77.2	77.8	27.6	28.2
Childhood residence				
Rural‡	78.6	78.5	32.1	31.2
Urban	75.4	75.8	31.7	31.9
Opportunity cost of children				
Low (25th percentile)	78.6**		36.0***	
Medium (50th percentile)	76.9**		33.1***	
High (75th percentile)	74.0**		28.7***	
Pseudo *R*-squared	0.318	0.314	0.104	0.100
Number of observations	1513	1513	1121	1121

Note: The probit method was used for estimation. The sign ‡ indicates the reference category. See Table 1 for the reference category. Variables included in the models but not shown are a set of dummy variables indicating year in which the starting birth occurred. They were jointly significant in all specifications. Husband's income is current income, not income in the year of starting birth. When husband's income is excluded from the models, predicted parity progression ratios change only slightly (results not shown).
***Statistical significance at the one-percent level.
**Statistical significance at the five-percent level.
*Statistical significance at the 10-percent level.

they correspond to the 25th, 50th and 75th percentiles in the distribution of predicted log wage over women in each of the four models shown in Table 3.

The results in column one indicate, as expected, that childcare leave has a positive effect on progression from first to second birth. The predicted percentage of women progressing to second birth is 78.6 percent for women who took childcare leave, compared with 73.1 percent for non-working women, indicating that childcare leave increases the probability of having a second child by 5.5 percentage points. Unexpectedly, the predicted percentage progressing to second birth for women who were eligible for childcare leave but who did not take it is almost as large, at 78.0 percent, suggesting that just making childcare leave available has an effect on fertility, even if the leave is not taken. The reason may be that women are more willing to have another birth when they know that childcare leave is available if they need it. However, many women may not need it in the end.

Column one also shows that the effect of the opportunity cost of children on progression from first to second birth, net of the effect of childcare leave, which operates through the opportunity cost of children by reducing it, is negative and highly significant; this is also in line with expectations. The predicted probability of progressing to second birth is 78.6 percent for women with low opportunity cost of children (25th percentile) and 74 percent for women with high opportunity cost of children (75th percentile). Each of the three predicted percentages for low, medium and high opportunity cost has the same level of statistical significance because there is only one underlying coefficient of predicted log wage, and that coefficient differs significantly from zero at the five-percent level.

Column two of Table 3 provides insight into the extent of bias that enters when the model is estimated without including opportunity cost of children in the set of predictors. The predicted percentage progressing to second birth is now smaller for women who took childcare leave than for non-working women, although the difference is far from significant. This finding indicates the importance of controlling for opportunity cost, estimated, as mentioned earlier, without taking childcare leave into account.

Columns three and four show results for progression from second to third birth. The patterns are similar to those for progression from first to second birth in terms of direction and magnitude of effects, but the effect of childcare leave is no longer significant. The effect of opportunity cost of children is, however, highly significant.

Table 4 (Model 5) shows the effects of childcare leave on desire to have another child. The desire to have another child obviously differs from actually having another child, but the desire to have another child may still be somewhat predictive of whether the woman will have another birth in the future. Model 5 was run separately for parity-1 women and parity-2 women.

Columns one and two of Table 4 present the results. Childcare leave has a substantial positive effect on desire for another child for persons who currently have one child, but no effect at all for persons who currently have two children. Opportunity cost (predicted wage) has a strong negative effect on desire for another child for persons who currently have one child, but no effect for persons who currently have two children.

Daycare utilization has a modest positive effect on desire for another child, but the effect is significant only for persons who currently have two children. The estimated effects of daycare utilization may be biased downward, however, because there is excess demand for daycare centers in some areas, as indicated by the waiting lists for acceptance into daycare centers in large metropolitan areas (Ogawa 2005). The other predictor variables function mainly as controls. It is noteworthy, however, that income and

TABLE 4
Predicted percentage of wives and husbands who want another child (Model 5).

	Currently has one child	Currently has two children
Woman's childcare leave history		
Never took childcare leave‡	61.4	18.8
Ever took childcare leave	73.3*	16.7
Woman's education		
High school‡	61.6	9.1
Junior college	61.2**	17.8
University	69.2*	19.6*
Woman's current age		
20–29‡	90.1	34.0
30–34	83.8	21.5*
35–39	56.1***	18.2**
40–44	38.8***	9.0***
≥ 45	14.9***	19.2
Co-residence with parents/parents-in-law		
No‡	64.4	17.4
Yes	65.2	13.8
Daycare center utilization		
No‡	61.3	12.4
Yes	68.5	16.1**
Arranged marriage		
No‡	63.9	15.8
Yes	69.0	15.0
Husband's income (1,000 Yen)		
Income not reported‡	59.9	10.1
Income 1–4000	62.2	17.6*
Income 4000–7999	64.7	16.1
Income over 8000	76.3*	20.1*
Current residence		
Rural‡	63.2	22.7
Urban	64.6	14.9*
Opportunity cost of children		
Low (25th percentile)	71.3**	14.8
Medium (50th percentile)	68.0**	15.7
High (75th percentile)	59.3**	17.3
Pseudo *R*-squared	0.257	0.185
Number of observations	379	686

Note: The probit method was used for estimation. The sign ‡ indicates a reference category. See Table 1 for the reference category. Husband's response and wife's response are both included. Husband's response and wife's response differ in that husbands are more likely to desire another child. Factors affecting the desire for children might be also different. However, it was not feasible to estimate them separately due to the small number of observations. Variables included in the models but not shown are a set of dummy variables indicating year in which the first birth occurred. They were jointly significant in all specifications.
***Statistical significance at the one-percent level.
**Statistical significance at the five-percent level.
*Statistical significance at the 10-percent level.

education have positive effects on desire for another child after the other predictor variables are controlled for.

Conclusion

Family policies intended to raise fertility have expanded rapidly in Japan since 1990. However, only a few studies have attempted to evaluate the effectiveness of these policies. The lack of policy evaluation makes it difficult to see what steps should be taken next. The current debate on policy effectiveness is based on a handful of studies, which provide insufficient evidence for firm conclusions.

This study has focused on only one of the policies intended to raise fertility, namely, childcare leave. The analysis has shown that this policy has a positive effect on both labor supply and marital fertility through its effect on the opportunity cost of children. The analysis of the effect of childcare leave on fertility takes into account the effects of women's selection into the labor market and job tenure on the opportunity cost of children. Marital fertility is measured by parity progressions from first to second birth and from second to third birth, and by desire for another child.

The findings indicate a strong effect of childcare leave on years of tenure, which is a major determinant of a woman's wage for full-time working women, implying that childcare leave has implications for human capital accumulation. The results also indicate that taking childcare leave for the first child increases the predicted percentage of having a second child by six percentage points. There is also clear evidence that lowering the opportunity cost of children increases fertility, net of the effect of childcare leave on fertility, which operates indirectly by reducing the opportunity cost of children.

The results presented here should be interpreted with caution, however, due to a number of limitations of the data. The survey data do not contain labor market histories. Thus, there is no information on earlier spells of job tenure in previous jobs, or on opportunity cost of children at the time of childbirth. With our data, this opportunity cost can be estimated only at the time of the survey. Our method of estimating parity progression is also not optimal. A final limitation is that the findings do not necessarily indicate causality between childcare leave and tenure, and between childcare leave and fertility, because the decision to stay with the current employer, the decision to take childcare leave, and the decision to have another child, may, to some extent, be simultaneously determined. Despite these limitations, the findings are informative, and they strongly suggest that childcare leave has a strong positive effect on woman's job tenure, and a modest positive effect on parity progression via reduction of the opportunity cost of children. One reason why the effect of childcare leave on parity progression is not larger may be that one year of childcare leave—the maximum allowed by the policy—is not long enough, given that many women do not feel comfortable entrusting the first child to a daycare service until the child is age two or three years, at which point the second child may be on the way.

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NOTES

1. The use of somewhat arbitrary values of tenure and firm size for non-working women is a fairly minor problem, compared with the time inconsistency problem, namely, that predicted wage is estimated using current wage of full-time working women rather than their historical wages, for which information is lacking in our data set.

2. If childcare leave and wages are negatively related, then childcare leaves does not reduce the opportunity cost of children. It increases it.

3. This is calculated as follows. Take the derivative with respect to T (tenure) of both sides of the wage equation and multiply through by the differential dT. The result is d$W/W = (b + 2cT)$dT, where W denotes wage, b is the coefficient of T, c is the coefficient of T-squared, and dT is a small increment in T. Set T equal to its mean value in the sample on which the probit regression is run, and set d$T = 5$. Substituting in these numbers and the numbers for the coefficients b and c for full-time workers in column two of Table 2, this becomes d$W/W = [(0.085) + (2)(-0.002)(12.3)](5) = 0.18$ or 18 percent.

REFERENCES

AVERRETT, S. L. & WHITTINGTON, L. A. (2001) 'Does maternity leave induce births?', *Southern Economic Journal*, vol. 68, no. 2, pp. 402–417.

BAUM, C. L. (2003) 'The effects of maternity leave legislation on mother's labor supply after child birth', *Southern Economic Journal*, vol. 69, no. 4, pp. 772–799.

BERGER, M. & MILLIGAN, K. (2005) *How Does Job-protected Maternity Leave Affect Mothers' Employment and Infant Health?*, NBER Working Paper No. 11135, National Bureau of Economic Research, Cambridge, MA.

BERGER, L., HILL, J. & WALDFOGEL, J. (2005) 'Maternity leave, early maternal employment and child health and development in the U.S.', *Economic Journal*, vol. 115, no. 501, pp. F29–F47.

BÜTTNER, T. & LUTZ, W. (1990) 'Estimating fertility responses to policy measures in the German Democratic Republic', *Population and Development Review*, vol. 16, no. 3, pp. 539–555.

CABINET OFFICE (2003) *Annual Report on Japanese Economy and Public Finance/Economic Survey of Japan*, Government of Japan, Tokyo.

CLARK, R. L. & OGAWA, N. (1992) 'Employment tenure and earnings profiles in Japan and the United States: comments', *American Economic Review*, vol. 82, no. 1, pp. 336–345.

HECKMAN, J. J. (1979) 'Sample selection bias as a specification error', *Econometrica*, vol. 47, no. 1, pp. 153–161.

HOEM, J. M., PRSKAWETZ, A. & NEYER, G. (2001) *Autonomy or Conservative Adjustment? The Effect of Public Policies and Educational Attainment on Third Births in Austria*, MPIDR Working Paper WP-2001-016, Max Planck Institute for Demographic Research, Rostock.

KAWAGUCHI, A. (2007) 'Work-life balance measures and gender division of labor', in *Population Change, Labor Markets, and Sustainable Growth: Towards a New Economic Paradigm*, eds A. Mason & M. Yamaguchi, Elsevier, Amsterdam, pp. 189–209.

KLERMAN, J. A. & LEIBOWITZ, A. (1999) 'Job continuity among new mothers', *Demography*, vol. 36, no. 2, pp. 2145–2155.

LALIVE, R. & ZWEIMÜLLER, J. (2005) *Does Parental Leave Affect Fertility and Return-to-work? Evidence from a "True Natural Experiment"*, IZA Discussion Paper No. 1613, Institute for the Study of Labor, Bonn.

LEE, L.-F. (1981) 'Simultaneous equations models with discrete and censored variables', in *Structural Analysis of Discrete Data with Econometric Applications*, eds C. F. Manski & D. McFadden, MIT Press, Cambridge, MA, pp. 345–364.

MATSUKURA, R., OGAWA, N. & CLARK, R. L. (2007) 'Analysis of employment patterns and the changing demographic structure of Japan', *The Japanese Economy*, vol. 34, no. 1, pp. 82–153.

OGAWA, N. (2003) 'Japan's changing fertility mechanisms and its policy responses', *Journal of Population Research*, vol. 20, no. 1, pp. 89–106.

OGAWA, N. (2005) 'Analysis of policies for the promotion of women's employment and childrearing', in *Perceptions of Family in the Age of Very Low Fertility*, ed. Population Problems Research Council, The Mainichi Newspapers, Tokyo, pp. 107–147 (in Japanese).

OGAWA, N. & CLARK, R. L. (1995) 'Earnings patterns of Japanese Women: 1976–1988', *Economic Development and Cultural Change*, vol. 43, no. 2, pp. 293–313.

OGAWA, N. & ERMISCH, J. F. (1996) 'Family structure, home time demands, and the employment patterns of Japanese married women', *Journal of Labor Economics*, vol. 14, no. 4, pp. 677–702.

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

RIDAO-CANO, C. & MCNOWN, R. (2005) 'The effect of tax-benefit policies on fertility and female labor force participation in the United States', *Journal of Policy Modeling*, vol. 27, no. 9, pp. 1083–1096.

SCHÖNBERG, U. & LUDSTECK, J. (2007) *Maternity Leave Legislation, Female Labor Supply, and the Family Wage Gap*, IZA Discussion Paper No. 2699, Institute for the Study of Labor, Bonn.

SHIGENO, Y. & MATSUURA, K. (2003) 'Aspiring both for work and childbirth and rearing: with a focus on marriage and employment selection, and the effects of childcare-leave system on married and employed women', *The Quarterly of Social Security Research*, vol. 39, no. 1, pp. 43–54 (in Japanese).

SURUGA, T. & NISHIMOTO, M. (2002) 'The influence of policies for promoting childcare on child birth-related behavior', *The Quarterly of Social Security Research*, vol. 37, no. 4, pp. 371–379 (in Japanese).

SURUGA, T. & ZHANG, J. (2003) 'About the influence of childcare leave system on births and continuation of employment in women: econometric analysis using panel data', *Japanese Journal of Research on Household Economics*, vol. 59, pp. 56–63.

SUZUKI, T. (2006) 'Lowest-low fertility and governmental actions in Japan', paper presented to the International Conference on Declining Fertility in East and Southeast Asian Countries, Hitotsubashi Collaboration Center, Tokyo, 14–15 December.

WINEGARDEN, C. R. & BRACY, P. M. (1995) 'Demographic consequences of maternal leave programs in industrial countries: evidence from fixed effects models', *Southern Economic Journal*, vol. 61, no. 4, pp. 1020–1035.

YAMAGUCHI, K. (2005) 'About the determinants and measures concerning low fertility: the role of the husband, workplace, government and society', *Japanese Journal of Research on Household Economics*, vol. 66, pp. 57–67 (in Japanese).

YOSHIDA, H. (2006) 'Lowest-low fertility and governmental actions in Japan: a comment', commentary to Toru Susuki's paper presented at the international conference on

Declining Fertility in East and Southeast Asian Countries, Hitotsubashi Collaboration Center, Tokyo, 14–15 December.

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