there is such a concentration, the distinction of firm size used in this study would be unreliable. However, we assume that such a distributional concentration is highly unlikely.

Second, firm size as defined in the ESS survey can include temporary and daily employees in addition to ordinary employees. ESS asks respondents about the number of employees in their firms, "including part-time and other types of workers"; therefore, the number of employees reported by ESS includes irregular employees.[3] According to the ESS survey, about 40% of irregular employees were temporary or daily employees in 2007. As a result, the ESS survey's percentage of ordinary employees working for large firms might exceed the actual percentage. However, we were able to dismiss worries about potential analytical problems by comparing ESS data with data from EEC, which has more accurate data about firm size, for 2006. We found that their percentages for ordinary employees were 38.9% and 44.0%, respectively. The rate reported by the ESS survey does not exceed that in EEC; indeed, their two values are similar. One possible reason for this result is that employees tend to regard the number of ordinary employees as the total number of their firms' employees. Therefore, the firm size obtained from the ESS survey captures actual conditions with sufficient accuracy.

Although the two possible problems regarding firm size might interrupt the estimation results, neither appears to be overtly serious. Therefore, we use ESS data for firm size as a factor to capture the Act's effects.

5. Empirical analysis

5.1 Empirical strategy

The ESS survey has the largest scale and is most trustworthy of all labor-related surveys in Japan. It is conducted in October every five years; the latest was in 2007. Because the Act was implemented in 2005, the pre-act 2002 survey and the post-act 2007 survey are used to investigate its effects. Per the discussion in Section 2, we use women's sample working in January 2006 for the 2007 survey. Correspondingly, we used women's sample working in January 2001 for the 2002 survey to determine the Act's effects.

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[3] Non-executive employees are classified into two categories: regular and irregular.

The sample used in this study consists of married women, aged 39 or younger and who were regular employees in industries other than agriculture, forestry, fisheries, and government.[4] As a result, 23,322 samples are used in this analysis.

Yoshida and Mizuochi (2005) suggest that the number of children already in the household is normally a strong constraint on additional childbirths and women's decisions to remain in the workforce. We therefore estimate three subsamples on the basis of the number of children aged from one to 14: zero, one, and over one. The number of children between one and 14 years old indicates how many children the woman had before the Act.

Turning to definitions of dependent variables, January 2006 is considered as the starting point—i.e., when the Act began to affect all employees of large firms. If women working for large firms had decided to have a child in January 2006, as the earliest case, the child would be zero years old in October 2007, when the 2007 survey was conducted. Consequently, whether women have a child aged zero is regarded as the indicator of childbirth encouraged by the Act's benefits.

Some large firms had submitted compliance plans before January 2006; thus, employees at those firms already had been affected by the Act, and at the time of the survey women employees may have had a one-year-old child for reasons attributable to the Act. However, which firms submitted plans their before January 2006 is not known to us. Further, one-year-old children might have been in their mother before April 2005, that is, before the Act's implementation. Therefore, had we included one-year-old children as the subject of the dependent variable, we would have obtained a biased estimate of the Act's effect. Moreover, because we cannot determine the birth month of children from the ESS suvey, we regard only children aged zero as falling within the Act's potential effects. The dependent variable for women's job retention is whether the women continued to work in the same firm until the time of the survey.

We use difference-in-differences (DID) analysis to determine the Act's effect on childbirth and job retention. The estimation equations are as follows:

$$\begin{cases} Birth = \beta_0 + \beta_1 After + \beta_2 Treat + \delta_1 After \cdot Treat + \boldsymbol{\eta}_1 \mathbf{X} + \varepsilon_1, & (1) \\ Job = \gamma_0 + \gamma_1 After + \gamma_2 Treat + \delta_2 After \cdot Treat + \boldsymbol{\eta}_2 \mathbf{X} + \varepsilon_2, & (2) \end{cases}$$

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[4] Although the law can be applied to the irregular employees, we excluded them from the sample for two reasons. First, firms' welfare programs do not usually apply to irregular employees. Second, many married women re-enter the labor market as irregular employees after childbirth, which means that irregular female employees have no immediate plans for an additional child and would be unaffected by the Act.

where *Birth* is a dependent variable that takes 1 if respondents have a child age zero, and 0 otherwise. *Job* is a dependent variable that takes 1 if respondents continued to work at the same firm, and 0 otherwise. *After* is a dummy variable that takes 1 for the sample of the 2007 survey and 0 otherwise, and it captures the time trend. *Treat* is a dummy variable that takes 1 for the treatment group (employees working for large firms) to obtain the effect of differences in ease of balancing child-bearing and work by firm size.

The variable to test the Act's effect on childbirth and job retention is an interaction term *After*Treat*. If the Act encourages employees to have children and continue working, its coefficients δ_1 and δ_2, DID parameters, will show significant and positive sign. Note that *After*Treat* might pick up effects of related policies implemented between 2002 and 2007. There were changes to the Child Care and Family Care Leave Law in 2004 and the Equal Employment Opportunity Law in 2006. However, these changes did not distinguish affected firms by size; thus, we can obtain the Act's effect by this specification.

Finally, **X** is a vector of other factors influencing the probability of childbirth and job retention. Control variables, the vector **X**, are wife's age, wife's education, husband's annual income, wife's industry, wife's occupation, and residency prefecture. Tables 1 to 3 show descriptive statistics.

Wife's education has four categories: junior high school, high school, junior/technical college, and college/graduate. Higher education could negatively influence childbirth and positively influence job retention because of the higher opportunity cost for working women. Husband's income is also an important determinant of child-bearing decisions and the wife's decision to remain employed.

We also consider that conditions for women vary among industries and occupations and control for its effect. Relevant information for January 2006 is taken from the 2007 survey and for January 2001 from the 2002 survey. Residence area (prefecture) also should be controlled because labor market conditions or availability of childcare facilities could vary widely by area. Making Tokyo the reference category, we employed 46 area dummy variables; however, results are excluded in this paper for brevity.

Table 1 Descriptive statistics (Number of children aged one to14 = 0)

	Mean	SD	Min	Max
Birth	0.2209	0.4149	0	1
Job	0.6915	0.4619	0	1
After	0.4292	0.4950	0	1
Treat	0.3672	0.4821	0	1
After*Treat	0.1587	0.3654	0	1
Wife's age	30.452	4.368	17	39
Wife's education				

Junior high	0.0198	0.1393	0	1
High	0.4027	0.4905	0	1
Junior/Technical college	0.4310	0.4952	0	1
College/Graduate	0.1465	0.3536	0	1
Wife's occupation				
Professional and technical workers	0.2377	0.4257	0	1
Managers and officials	0.0003	0.0175	0	1
Clerical and related	0.4470	0.4972	0	1
Sales	0.0870	0.2819	0	1
Service	0.1053	0.3069	0	1
Protective service	0.0006	0.0247	0	1
Transport and communication	0.0037	0.0603	0	1
Manufacturing and construction	0.1185	0.3232	0	1
Wife's industry				
Mining	0.0005	0.0225	0	1
Construction	0.0408	0.1979	0	1
Manufacturing	0.2147	0.4106	0	1
Electricity, gas, heat supply, and water	0.0041	0.0636	0	1
Information and communication	0.0337	0.1805	0	1
Transport	0.0215	0.1451	0	1
Wholesale and retail trade	0.1751	0.3801	0	1
Finance and insurance	0.0583	0.2343	0	1
Real estate	0.0082	0.0903	0	1
Eating and drinking places and accommodations	0.0247	0.1551	0	1
Medical, health care, and welfare	0.2613	0.4394	0	1
Education and learning support	0.0263	0.1600	0	1
Compound services	0.0153	0.1229	0	1
Services, n.e.c.	0.1154	0.3196	0	1
Husband's income (in ten thousand yen)				
Less than 250	0.2279	0.4195	0	1
250-299	0.2395	0.4268	0	1
300-399	0.1749	0.3799	0	1
400-599	0.2326	0.4225	0	1
600 or over	0.1251	0.3308	0	1

N=9850

Prefecture is not shown here.

Table 2 Descriptive statistics (Number of children aged one to 14 = 1)

	Mean	SD	Min	Max
Birth	0.1434	0.3505	0	1
Job	0.8269	0.3783	0	1
After	0.4789	0.4996	0	1
Treat	0.3639	0.4812	0	1
After*Treat	0.1745	0.3795	0	1

Wife's age	32.281	4.300	19	39
Wife's education				
Junior high	0.0202	0.1408	0	1
High	0.4571	0.4982	0	1
Junior/Tech. college	0.4047	0.4909	0	1
College/Graduate	0.1180	0.3226	0	1
Wife's occupation				
Professional and technical workers	0.2569	0.4370	0	1
Managers and officials	0.0002	0.0132	0	1
Clerical and related	0.4197	0.4935	0	1
Sales	0.0819	0.2743	0	1
Service	0.0969	0.2958	0	1
Protective service	0.0002	0.0132	0	1
Transport and communication	0.0045	0.0672	0	1
Manufacturing and construction	0.1398	0.3468	0	1
Wife's industry				
Mining	0.0002	0.0132	0	1
Construction	0.0444	0.2061	0	1
Manufacturing	0.2314	0.4218	0	1
Electricity, gas, heat supply, and water	0.0037	0.0604	0	1
Information and communication	0.0261	0.1596	0	1
Transport	0.0192	0.1371	0	1
Wholesale and retail trade	0.1521	0.3592	0	1
Finance and insurance	0.0551	0.2281	0	1
Real estate	0.0061	0.0779	0	1
Eating and drinking places and accommodations	0.0209	0.1431	0	1
Medical, health care, and welfare	0.3006	0.4586	0	1
Education and learning support	0.0265	0.1606	0	1
Compound services	0.0180	0.1328	0	1
Services, n.e.c.	0.0957	0.2942	0	1
Husband's income (in ten thousand yen)				
less than 250	0.2363	0.4249	0	1
250-299	0.2116	0.4085	0	1
300-399	0.1830	0.3867	0	1
400-599	0.2361	0.4247	0	1
600 or over	0.1330	0.3396	0	1

N=5738

Prefecture is not shown here.

Table 3 Descriptive statistics (Number of children aged one to14 >1)

	Mean	SD	Min	Max
Birth	0.0367	0.1881	0	1
Job	0.9401	0.2373	0	1
After	0.4728	0.4993	0	1

Treat	0.3013	0.4588	0	1
After*Treat	0.1475	0.3547	0	1
Wife's age	34.700	3.320	21	39
# of children aged 1-14	2.2723	0.4960	2	5
Wife's education				
Junior high	0.0221	0.1471	0	1
High	0.5233	0.4995	0	1
Junior/Tech. college	0.3841	0.4864	0	1
College/Graduate	0.0705	0.2560	0	1
Wife's occupation				
Professional and technical workers	0.2539	0.4353	0	1
Managers and officials	0.0003	0.0161	0	1
Clerical and related	0.3989	0.4897	0	1
Sales	0.0831	0.2761	0	1
Service	0.0928	0.2902	0	1
Protective service	0.0001	0.0114	0	1
Transport and communication	0.0032	0.0568	0	1
Manufacturing and construction	0.1676	0.3735	0	1
Wife's industry				
Mining	0.0010	0.0321	0	1
Construction	0.0657	0.2477	0	1
Manufacturing	0.2499	0.4330	0	1
Electricity, gas, heat supply, and water	0.0043	0.0652	0	1
Information and communication	0.0132	0.1141	0	1
Transport	0.0203	0.1410	0	1
Wholesale and retail trade	0.1280	0.3341	0	1
Finance and insurance	0.0581	0.2339	0	1
Real estate	0.0053	0.0726	0	1
Eating and drinking places and accommodations	0.0239	0.1528	0	1
Medical, health care, and welfare	0.3101	0.4625	0	1
Education and learning support	0.0129	0.1130	0	1
Compound services	0.0224	0.1479	0	1
Services, n.e.c.	0.0849	0.2788	0	1
Husband's income (in ten thousand yen)				
less than 250	0.2539	0.4353	0	1
250-299	0.1755	0.3804	0	1
300-399	0.1606	0.3672	0	1
400-599	0.2533	0.4349	0	1
600 or over	0.1567	0.3636	0	1

N=7734

Prefecture is not shown here.

5.2 Estimation results

Table 4 reports the results of bivariate probit estimation. We first refer to the effect on childbirth. In subsample (1), the coefficient of *After*Treat* shows a positive and significant effect, although at the 10% significance level. In subsamples (2) and (3), no effect for the Act is found.

We find that the Act has a positive effect on first births, but the significance level is low. There may be three reasons for this result. First, sufficient time had not passed since the Act's implementation. Large firms began to support employees' child-bearing and rearing when the Act was implemented, but it is reasonable to assume that its influence on behavior was not immediate. In addition, the Act provides only an intangible incentive—a certification of good practice for compliant firms—but no punishment for non-compliant firms. This weak enforcement might undermine the effect of the Act. Finally, Japan already had enacted legislation related to children and work retention, such as a child allowances and paid maternity leave. The Act did not introduce new provisions in this area, and thus its impact on the estimation equation for births might be weak. Nevertheless, our results demonstrate that the Act has had a positive effect on decisions to have children, which indicates the policy is effective in reversing declining birthrates.

We also find no effect of the Act on second and subsequent births. One possible reason for this result is that working women rearing children, in subsamples (2) and (3), have already balanced work and family; Therefore, the Act may not have influenced their decisions.

Concerning results for other variables, Wife's age shows a diminishing positive effect. The number of children aged from one to 14, only in subsample (3), has a statistically significant, negative effect on childbirth. Wife's education, the effect of college/university, has positive significance only in subsample (3) and is thus totally ambiguous. Certain industries show a negative effect on childbirth compared to the medical, healthcare, and welfare industries. With respect to the influence of occupation, the variable managers and officials has a negative effect on childbirth compared to clerical and related workers. Husband's high annual income may decrease the probability of childbirth because of the interaction between parents' demand for quality and quantity of children, as suggested by Becker (1960, 1981).

Next, we note the effect on job retention, shown in the lower part of Table 4. In all subsamples, the coefficients of *After*Treat* show no significant effect. *After* has a significantly positive effect on job retention, reflecting that women being part of the workforce is a sustained trend. *Treat* shows an unclear effect. In consequence, we find no evidence that the Act influenced women's decisions to remain employed. For second and subsequent births, as previously explained, women perhaps have already resolved the conflict between work and family. The reason for effects on first births is discussed later.

Turning to results of other variables related to job retention, wife's age, the number of children aged from one to 14, and wife's education all show ambiguous effects. For the effect of occupation, female managers and officials are more likely to continue to work; this probably explains the negative effect on childbirth. Moreover, most industries show a negative effect on job continuance compared to the medical, healthcare, and welfare industries. The effect of the husband's annual income on wives' job retention is slightly unclear.

Table 4 Estimation results

	Number of children aged 1–14					
	0		1		>1	
Subsample	(1)		(2)		(3)	
Birth equation						
After	−0.0522		0.0504		0.0382	
	(0.0377)		(0.0536)		(0.0663)	
Treat	0.0327		0.0207		0.1103	
	(0.0415)		(0.0644)		(0.0844)	
After*Treat	0.1127	*	0.0717		−0.0982	
	(0.0608)		(0.0867)		(0.1164)	
Wife's age	0.1235	***	0.4712	***	0.5118	***
	(0.0449)		(0.0734)		(0.1395)	
Wife's age squared	−0.0029	***	−0.0079	***	−0.0084	***
	(0.0007)		(0.0012)		(0.0021)	
No. of children aged 1–14					−0.3024	***
					(0.0710)	
Wife's education (Ref: High)						
Junior high	−0.1532		−0.0122		0.0972	
	(0.1156)		(0.1657)		(0.1836)	
Junior/Technical college	0.0368		−0.0189		0.0238	
	(0.0345)		(0.0510)		(0.0655)	
College/University	−0.0022		0.0221		0.282	***
	(0.0492)		(0.0744)		(0.1027)	
Wife's occupation (Ref: Clerical and related)						
Professional and technical workers	0.0787		0.0431		−0.0489	
	(0.0500)		(0.0723)		(0.1021)	
Managers and officials	−4.4799	***	−4.1	***	−4.2068	***
	(0.1693)		(0.2527)		(0.2768)	
Sales	0.0611		0.0083		-0.0015	
	(0.0578)		(0.0916)		(0.1134)	
Service	0.09		0.025		−0.0604	
	(0.0570)		(0.0860)		(0.1149)	
Protective service	0.8065		6.0117	***	−3.8785	***
	(0.5006)		(0.3271)		(0.2714)	
Transport and communication	−0.3601		0.468		−4.0347	***
	(0.2751)		(0.2997)		(0.1443)	
Manufacturing and construction	−0.0091		0.0628		0.0554	
	(0.0571)		(0.0802)		(0.1032)	
Wife's industry (Ref: Medical, healthcare, and welfare)						
Mining	−4.9267	***	−3.3875	***	0.3867	

	(0.1294)		(0.2664)		(0.5554)	
Construction	−0.1445	*	−0.1767		−0.3356	**
	(0.0869)		(0.1223)		(0.1528)	
Manufacturing	−0.1521	**	−0.1777	**	−0.3112	**
	(0.0602)		(0.0888)		(0.1251)	
Electricity, gas, heat supply, and water	−0.0573		−0.7852		−4.5206	***
	(0.2248)		(0.4799)		(0.1400)	
Information and communication	−0.3304	***	−0.1309		−0.3526	
	(0.0938)		(0.1376)		(0.2749)	
Transport	−0.1196		−0.2076		−0.8248	**
	(0.1133)		(0.1789)		(0.3751)	
Wholesale and retail trade	−0.0783		−0.2098	**	−0.1577	
	(0.0594)		(0.0891)		(0.1208)	
Finance and insurance	−0.1091		−0.191		−0.118	
	(0.0790)		(0.1169)		(0.1553)	
Real estate	0.2162		−0.6659	*	−0.3399	
	(0.1542)		(0.3424)		(0.4283)	
Eating and drinking places and accommodations	−0.0248		−0.1838		−0.1905	
	(0.0990)		(0.1686)		(0.1915)	
Education and learning support	0.0248		0.1617		0.0251	
	(0.0936)		(0.1262)		(0.2107)	
Compound services	−0.0799		−0.0639		−0.0611	
	(0.1265)		(0.1688)		(0.1916)	
Service, n.e.c.	−0.1541	***	−0.1931	**	−0.0152	
	(0.0578)		(0.0894)		(0.1149)	
Husband's income (Ref: less than 250)						
250–299	0.0569		0.0195		0.0403	
	(0.0415)		(0.0618)		(0.0801)	
300–399	0.06		0.0405		−0.0449	
	(0.0462)		(0.0652)		(0.0855)	
400–599	−0.0188		−0.0258		0.0201	
	(0.0454)		(0.0655)		(0.0807)	
600 or more	−0.367	***	−0.2014	***	−0.2826	***
	(0.0560)		(0.0765)		(0.1018)	
Constant	−1.7824	***	−7.8489	***	−8.5142	***
	(0.6791)		(1.1556)		(2.3200)	
Job equation						
After	0.3126	***	0.1814	***	0.2441	***
	(0.0360)		(0.0532)		(0.0589)	
Treat	0.0714	*	−0.0757		−0.1368	**
	(0.0392)		(0.0593)		(0.0688)	
After*Treat	−0.0848		0.1357		0.096	
	(0.0587)		(0.0863)		(0.1017)	
Wife's age	0.0321		0.0445		0.2576	**
	(0.0420)		(0.0648)		(0.1056)	
Wife's age squared	0.0007		0.0006		−0.003	*
	(0.0007)		(0.0010)		(0.0016)	
No. of children aged 1–14					0.0234	
					(0.0517)	
Wife's education (Ref: High)						
Junior high	−0.0690		−0.0332		−0.3284	**
	(0.1035)		(0.1535)		(0.1274)	
Junior/Tech. college	0.0337		−0.0416		0.0248	
	(0.0330)		(0.0497)		(0.0559)	

College/University	0.1710	***	0.0769		0.1323	
	(0.0475)		(0.0752)		(0.1016)	
Wife's occupation (Ref: Clerical and related)						
Professional and technical workers	0.0753		0.0052		−0.086	
	(0.0480)		(0.0714)		(0.0915)	
Managers and officials	−0.2834		3.9022	***	4.1867	***
	(0.7363)		(0.2503)		(0.2498)	
Sales	−0.0455		−0.1357	*	−0.1271	
	(0.0538)		(0.0802)		(0.0905)	
Service	−0.0139		0.0255		−0.0771	
	(0.0545)		(0.0872)		(0.1053)	
Protective service	0.2198		−5.556	***	4.0188	***
	(0.5289)		(0.3225)		(0.2542)	
Transport and communication	−0.1947		−0.5357	*	−0.5348	
	(0.2425)		(0.2799)		(0.3565)	
Manufacturing and construction	0.0368		0.0852		−0.0673	
	(0.0544)		(0.0778)		(0.0816)	
Wife's industry (Ref: Medical, healthcare, and welfare)						
Mining	−0.3698		2.9983	***	4.0915	***
	(0.5249)		(0.2696)		(0.1966)	
Construction	−0.0103		−0.1942		−0.0251	
	(0.0825)		(0.1196)		(0.1313)	
Manufacturing	0.1496	**	−0.1711	**	−0.1604	
	(0.0587)		(0.0870)		(0.1058)	
Electricity, gas, heat supply, and water	0.3515		−0.0785		0.1812	
	(0.2243)		(0.3226)		(0.4497)	
Information and communication	−0.0183		−0.1607		−0.0434	
	(0.0847)		(0.1380)		(0.2171)	
Transport	0.0792		−0.2712	*	0.2022	
	(0.1069)		(0.1574)		(0.2066)	
Wholesale and retail trade	−0.1269	**	−0.3052	***	−0.181	*
	(0.0563)		(0.0844)		(0.1076)	
Finance and insurance	−0.124	*	−0.2952	***	−0.4051	***
	(0.0734)		(0.1106)		(0.1294)	
Real estate	−0.5228	***	−0.2797		−0.1934	
	(0.1507)		(0.2586)		(0.3011)	
Eating and drinking places and accommodations	−0.3768	***	−0.3431	**	−0.226	
	(0.0932)		(0.1490)		(0.1587)	
Education and learning support	−0.3415	***	−0.5802	***	−0.7885	***
	(0.0877)		(0.1215)		(0.1619)	
Compound services	0.6506	***	0.5575	**	−0.0716	
	(0.1451)		(0.2181)		(0.1937)	
Service, n.e.c.	−0.0711		−0.1287		−0.1339	
	(0.0552)		(0.0888)		(0.1100)	
Husband's income (Ref: less than 250)						
250–299	−0.0867	**	−0.03		−0.0925	
	(0.0410)		(0.0621)		(0.0750)	
300–399	−0.2366	***	−0.0971		−0.185	**
	(0.0450)		(0.0658)		(0.0761)	
400–599	−0.3161	***	−0.1401	**	−0.1589	**
	(0.0440)		(0.0647)		(0.0715)	
600 or more	0.1359	***	0.0509		−0.1206	
	(0.0518)		(0.0758)		(0.0770)	
Constant	−0.8737		−1.1419		−3.6535	**

	(0.6374)		(1.0078)		(1.7336)	
ρ	−0.4712	***	−0.0534	*	−0.2731	***
Log likelihood	−10100		−4630		−2750	
N	9850		5738		7734	

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors are in parenthesis.

Prefecture is not shown here.

5.3 Marginal effect of the Act

Here, we discuss the Act's marginal effect on childbirth and women's job retention using subsample (1)—that is, the sample involving first births.

Table 5 shows the marginal effects of the Act in four cases. Case A, the probability of continuing to work after giving birth, shows about a 1% increase. Case B, the probability of giving birth and quitting work, shows about a 2.2% increase. The probability of Case B is about double that of Case A. Case C, the probability of women continuing to work without having children, shows a 3.7% decrease.

The Act certainly increased the number of women who continued to work after having children (Case A). However, it also increases the number of women who quit their jobs when they gave birth (Case B). These results imply two possibilities. First, women working for large firms may have been able to resolve conflicts between child-bearing and work more easily than before the Act. However, because "the problem of children on a waiting list for a daycare center" persists, especially in urban areas, women still face difficulty balancing child-bearing and work. Second, as a recent Japanese Time-Use Survey shows, husbands have not increased their contributions toward childcare and housework. In consequence, women have to choose either giving birth or working continuously. The Act boosts child-bearing by reducing the number of women in Case C. However, it increases numbers in Cases A and B, offsetting the Act's effect on women's job retention.

Table 5 Marginal effects of the Act for subsample (1)

Case	A	B	C	D
Birth	1	1	0	0
Job	1	0	1	0
After	0.019	−0.034	0.081	−0.066
Treat	0.011	−0.002	0.011	−0.021
After*Treat	0.010	0.022	−0.037	0.005

6 Conclusion

The Japanese government has recently changed its policy direction for measures intended to reverse the nation's declining birthrate and now focuses on the role of firms. As part of this new policy direction, the *Act on Advancement of Measures to Support Raising Next-Generation Children* took effect in 2005. The Act requires large firms to support their employees in bearing and rearing children.

Thus, this study has investigated the act's effect on childbirth and on women's job retention. Our DID estimation, using the quasi-experimental condition, demonstrates that the policy has a positive effect of about 1% on the joint probability of first births and women's job retention. This indicates that the Act can reduce the opportunity cost of having children for working women and that firms play important roles in improving Japan's birthrate. However, the Act also increases the probability that women will quit their jobs after giving birth. That outcome may be tied to the shortage of childcare facilities and to husbands' static contributions to household chores. Although the Act shows unexpected effects, the change in policy direction is partially successful in encouraging employees to have children.

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The effect of work-family policy on fertility in Japan

Masaaki Mizuochi

1 Introduction

Japan's birth rate has been declining for four decades and is now far below the replacement level, the latest Total Fertility Rate, in 2010, being 1.39. A low birth rate causes serious problems for social security systems such as public pensions and medical insurance.

Accordingly, in the past two decades, the Japanese government has implemented policies intended to improve the declining birth rate. The first policy, what we call the *Angel Plan*, was enacted in 1994, and the next plan, the *New Angel Plan,* followed in 1999[1]. However, these policies primarily intended to increase child-care facilities and did not focus on firms' role, proving ineffective in improving the birth rate. These inadequate results thus forced the Japanese government to develop a more effective policy to promote childbirth, the *Act on Advancement of Measures to Support Raising Next-Generation Children,* enacted in April 2005. This Act compels large firms to support their employees in bearing and raising children by reducing the overall cost of having children. It particularly helps working women to pursue their careers, which in turn could increase childbirth. Introduction of this Act, which has such a compulsory requirement, as a measure to reverse the declining birth rate is considered a major policy change in Japan. Thus, determining the Act's effect on fertility is politically important.

One of the Act's features, from the perspective of scientific analysis, is that firms having over 300 ordinary employees (large firms) are compelled to follow the Act, whereas those with 300 or less (medium and small firms) are not[2]. Therefore, the degree of firms' support for employees differs by firm size and probably has different effects on employees' childbirth. This quasi-experimental condition enables us to determine the Act's effect on childbirth.

The Act does not compel medium and small firms to submit their plan to the government, although some exceptional firms do so. According to the Ministry of Health, Labor,

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[1] For more detail, see the website of the Ministry of Health, Labor, and Welfare, http://www.mhlw.go.jp/english/wp/wp-hw4/07.html.

[2] Employees are classified into four categories as per government definition: executive, ordinary, temporary, and daily. Temporary employees are employed on a term of a month or more, but less than a year; daily employees are employed on a daily basis or a term of less than a month. Thus, employees other than executive, temporary, and daily are ordinary employees.

and Welfare, 1,422 medium and small firms submitted their plan in December 2006, the percentage of which however is not reported. Thus, the submission rate of medium and small firms is calculated using the official survey, the 2006 Establishment and Enterprise Census (EEC) conducted by the Ministry of Internal Affairs and Communications (MIC); the rate found was only 0.03%. Thus, we may affirm that there is a clear difference in the Act's effects between large and smaller firms.

One limitation of this analysis is that the Act does not specify the measures that firms should undertake. Thus, large firms can choose among many possible measures to support their employees, such as extending the duration of parental leave more than the standard quota or decreasing the amount of overtime work. Although this flexibility in choosing measures prevents us from identifying the effects of specific measures on fertility, we can observe the Act's overall effect.

The remainder of this paper is organized as follows. Section 2 reviews theory and related papers. In Section 3, the data and sample used in this study is introduced. Section 4 describes the issues of using firm size as the key factor in this analysis. Section 5 explains the empirical model and reports the estimation results. Section 6 summarizes the results obtained and suggests a policy implication.

2 Theory and related literature

Economists such as Becker (1960, 1981), Willis (1973), and others have viewed children as a durable goods and analyzed its production mechanism. These studies suggest that the cost of having children is one of the major determinants of childbirth, i.e., a decrease in the price of children increases the demand for children. Considering the recent increase of women's labor force participating in developed countries, the opportunity cost caused by women's job interuption becomes a crucial factor in the declining birth rate.

In Japan, a strong trade-off between women's work retention and childbirth continues to exist. As a concrete value, the Japanese Cabinet Office notes that roughly 60% of women working prior to giving birth quit their job after childbirth. This suggests the difficulty working women experience in continuing work while rearing children. Therefore, firms' support required by the Act could ease the trade-off and enable women who have given birth to continue their job. Thus, the Act can reduce the price of children, which in turn would increase childbirth.

To the best of our knowledge, no studies have analyzed the effect of the Act on childbirth in Japan, despite the policy's importance. Therefore, no directly related papers are referred to here. However, the effect of the Act appears to be similar to that of

parental/maternity leave in reducing the cost of having children, as mentioned above. Thus, here, previous studies investigating the effect of parental/maternity leave on fertility are discussed[3].

Averett and Whittington (2001) find that maternity leave has a positive effect on childbirth in the US. Adserà (2004) also reveals that maternity benefits have a positive effect on fertility using panel data of 23 OECD nations. Kalwij (2010) indicates that maternity/parental leave has a positive effect on childbirth using individuals' data from 16 European countries. Gupta, Smith, and Verner (2008) investigate the relationship between fertility and family-friendly policies, including maternity/paternal leave using aggregated country level data, and note a positive relationship. However, Zhang, Quan, and Van Meerbergen (1994) find no such effect of maternity leave on fertility using time series data from Canada. Among studies on Japan, Higuchi (1994) and Morita and Kaneko (1998) remark that child-care leave positively affects childbirth.

The above-mentioned studies suggest that policies supporting women to continue their job while raising children have a positive effect on childbirth. Moreover, if the Act reduces the cost of having children, as the effect of maternity/parental leave demonstrates, it should promote childbirth in Japan.

3 Data and sample

This study uses an official survey, the Employment Status Survey (ESS), conducted by MIC, which has the largest scale of all labor-related surveys in Japan. The number of those included in the sample, i.e., from children aged 15 to the retired elderly, is about a million. The ESS is conducted in October every five years, and the latest one was conducted in 2007. Because the Act was implemented in 2005, the pre-act 2002 survey and the post-act 2007 survey are used to investigate the Act's effect.

The sample used in this study comprises married women, who were 35 years old or younger, working at the time of the survey as regular employees in industries other than

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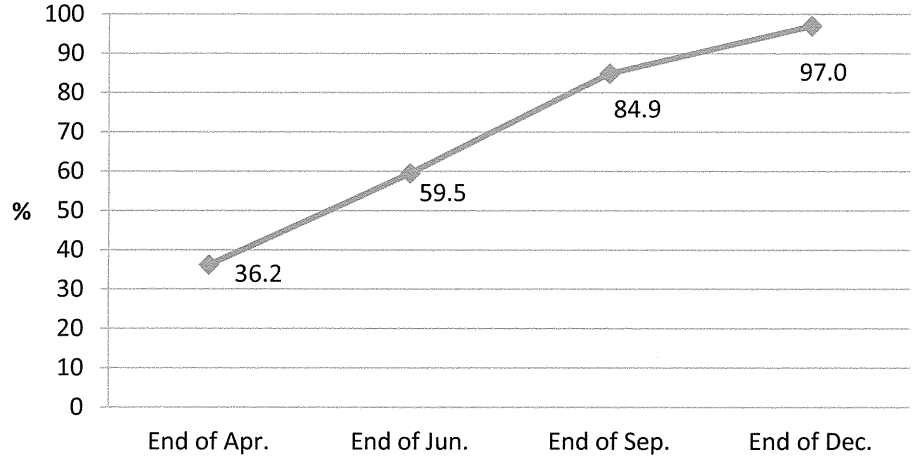
[3] In reducing the cost of having children, there are two other major factors: childcare facility and financial benefit. In the former, Del Boca (2002), Yoshida and Mizuochi (2005), and Haah and Wrohlich (2011) reveal that an increase in the supply of facilities has a positive effect on childbirth. Concerning financial benefit, Zhang, Quan, and Van Meerbergen (1994), Whittington, Alm, and Peters (1990), Schellekens (2009), McNown and Ridao-cano (2004), Azmat and González (2010), and Tanaka and Kouno (2009) suggest that family allowance, child tax deduction, and similar benefits promote childbirth.

agriculture, forestry, fisheries, and governments[4]. As a result, 12,753 samples were used in this analysis.

As mentioned above, the Act compels large firms to submit their plan for supporting their employees in bearing and raising children to the government. According to the Act's regulations, plan submission began in April 2005. Although no statistics verify when these firms actually initiated their plans, by evaluating several firms' plans, we can assume that such firms implemented and submitted their plans simultaneously. Therefore, we regard the time of submission as the initiation of the plan.

Fig. 1 shows that the submission rate of large firms in April 2005 was only 36.2%, and by December 2005, the rate reached 97.0%. Thus, we may consider that the Act affected most employees in large firms by this time. Considering the submission rate, women with continous employment since January 2006 were used for the 2007 survey. Correspondingly, women who had worked since January 2001 were selected for the 2002 survey. In other words, this study examines the difference in the probability of childbirth of women who worked continuously for at least 21 months prior to each ESS survey. If the Act had a positive effect on job retention after giving birth, the probablity of having children for women who continued their job would increase in the 2007 survey compared to that in the 2002 survey.



Source: Ministry of Health, Labor, and Welfare

[4] Employees other than executives are classified into two categories: regular and irregular. Although the law can be applied to the irregular employees, we excluded them from the sample for the following two reasons. First, the firms' welfare programs usually do not apply to irregular employees. Second, many married women re-enter the labor market as irregular employees after childbirth, which means that the irregular female employees have no immediate plan for an additional child and would be unaffected by the Act.

Fig. 1 Plan submission rate (2005)

4 Firm size in the Act and the ESS

Firm size is the most important factor in this study. However, there are two possible problems regarding firm size because of the difference in the definition of "size" between the Act and the ESS. The problems are as follows.

First, the Act distinguishes between firms with more than 300 employees and those with 300 or less, whereas the ESS in its questionnaire distinguishes between firms with 300 employees or more and those with fewer, resulting in a difference of one person between the Act and the ESS. Unfortunately, whether the distribution of firm size concentrates at 300 or 301 is unclear. If there was such a concentration of distribution, the distinction of firm size used in the study would be unreliable. However, it is reasonable to assume that such a distributional concentration does not exist.

Second, the firm size of the ESS can include temporary and daily employees as well as ordinary employees. The ESS asks the respondents about the number of employees in their firm "including part-time and other types of workers"; the number of employees reported by the ESS includes irregular employees. According to the ESS in 2007, about 40% of irregular employees are temporary or daily employees. As a result, the rate of ordinary employees working in large firms in the ESS might exceed the actual rate. Thus, we compare the rate of the ESS with that of the EEC in 2006. We find that the rate for the ESS and EEC is 38.9% and 44.0%, respectively. Contrary to the problem-causing prediction, the rate of the ESS does not exceed that of the EEC; in fact, these two values are similar. One reason for this result is probably that employees tend to recognize the number of ordinary employees as the total number of employees working in their firms. Therefore, the firm size obtained from the ESS captures the actual condition with sufficient accuracy.

Although the two possible problems regarding firm size might interrupt the estimation results, neither problem is considered to be serious. Therefore, the ESS firm size is used as a factor that can capture the effect of the Act.

5. Empirical analysis

5.1 Empirical model

First, let us define the dependent variable. As mentioned above, January 2006 is considered as the starting point, i.e., when the Act began to affect all employees in large firms. Thus, if women working in large firms had decided to have a child in January 2006, at the earliest, the child would be zero-year-old in October 2007, when the ESS was conducted. Consequently,

whether women have a child aged zero is regarded as the indicator of childbirth encouraged by the Act's benefits.

Indeed, some large firms submitted their plan before January 2006; thus, employees in such large firms had already been affected by the Act, and those women may have a child aged one as a result of the Act. However, we cannot know which firms had already submitted the plans before January 2006. Further, children aged one could have been in their mother before April 2005, i.e., before the Act's implementation. Therefore, if we include the children aged one as the subject of the dependent variable, we would obtain a biased effect of the Act. Moreover, because we cannot know the birth month of children from the ESS, only children aged zero as attributable to the Act's effects are used. About 12.6% of women had a zero-year-old child at the time of the survey in this sample.

The difference-in-differences (DID) analysis is used to determine the effect of the Act on childbirth. The estimation equation is as follows:

$$Birth = \beta_0 + \delta_0 After + \beta_1 Treat + \delta_1 After \cdot Treat + \gamma \mathbf{X} + \varepsilon, \qquad (1)$$

where *Birth* is the dependent variable and takes 1 if the respondents have a child aged zero, and 0 otherwise. *After* is a dummy variable that takes 1 for the sample of the 2007 survey and 0 otherwise, and captures the time trend of childbirth behavior. *Treat* is a dummy variable that takes 1 for the treatment group (employees working in large firms) to obtain the effect of the difference in the easiness of balancing childbirth and work retention by firm size.

The variable to test the Act's effect on fertility is an interaction term *After*Treat*. If the Act encourages employees to have children, its coefficient δ_1, the DID parameter will show a significant and positive sign. Note here that the *After*Treat* might pick up another related policy's effect implemented between 2002 and 2007. There certainly were changes of the Child Care and Family Care Leave Law in 2004 and the Equal Employment Opportunity Law in 2006. However, these changes do not distinguish the targeted firms by size. Thus, we can obtain the Act's effect by this specification.

Finally, **X** is a vector of other factors influencing the probability of childbirth, and ε is an i.i.d. error term. Control variables, the vector **X**, are the number of children aged between 1 and 14, wife's age, wife's education, wife's experience in the firm, husband's annual income, wife's industry, wife's occupation, and residency prefecture. The number of children aged between 1 and 14 indicates the number of children the woman already has before being affected by the Act. The number of existing children is normally a strong constraint on additional childbirth. Wife's education has four categories: junior high school, high school, junior/tech. college, and college/graduate. Higher education could have a negative impact on childbirth because of the higher opportunity cost for working women. However, the Act would have a