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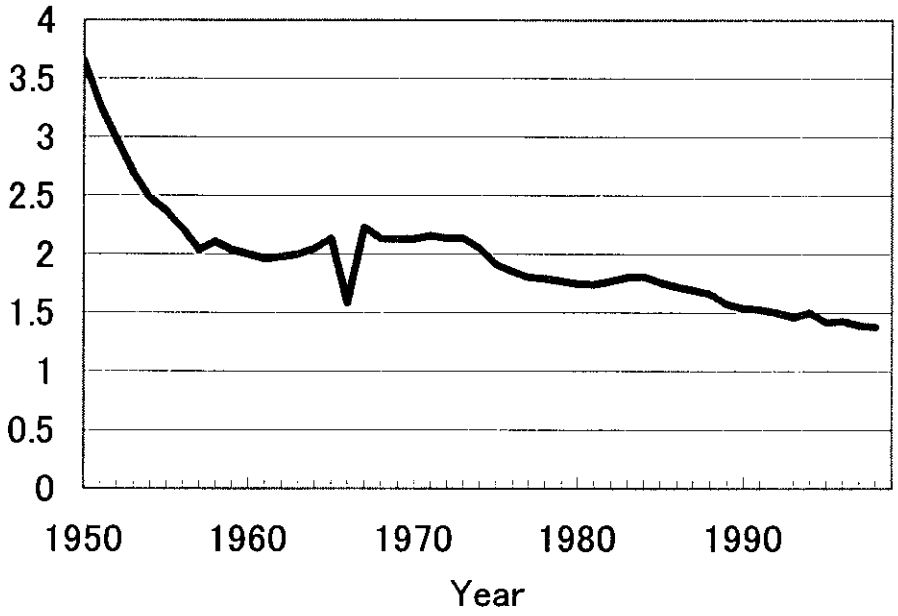
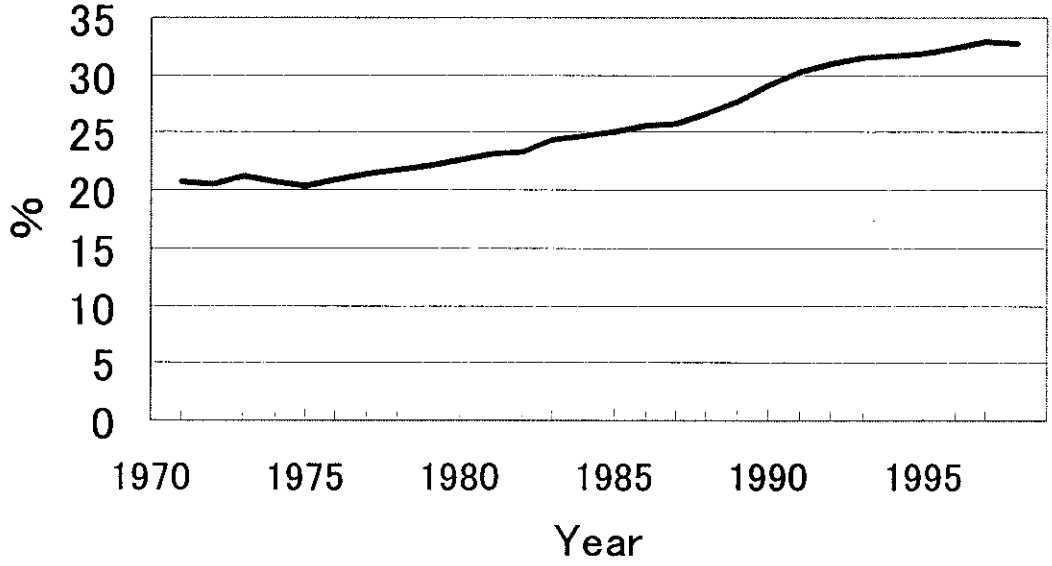
Fig.1 Total fertility rate (TFR)



Source: Vital statistics, Ministry of Health, Labour and Welfare

Fig2. Women's employment labor force participation rate (non-agriculture/forestry)

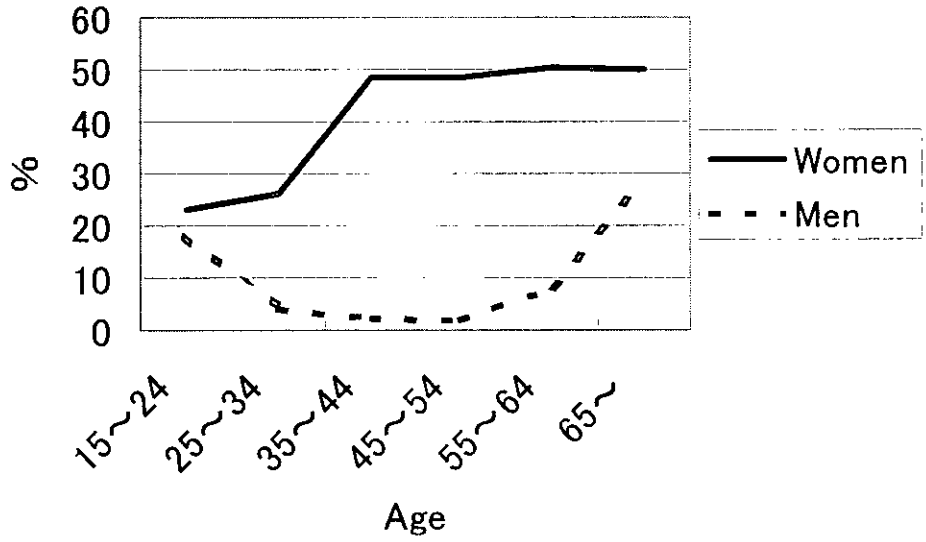


Source: Labour force survey,
Ministry of Public Management, Home Affairs, Posts and Telecommunications

Fig.3 Women's labor force participation rate by age group

Source: Labour force survey,
Ministry of Public Management, Home Affairs, Posts and Telecommunications

Fig.4 Part-time employment rate of non-agricultural/forestry employees (excluding directors)



Source: Labour force survey,
Ministry of Public Management, Home Affairs, Posts and Telecommunications

Table 1 Descriptive Statistics

First childbirth								
	(1)				(2)			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Parental leave dummy	0.338	0.473	0	1	0.238	0.426	0	1
Working hours	6.220	2.943	0	8.355	4.771	3.562	0	8.039
Day nursery dummy	0.149	0.357	0	1	0.088	0.284	0	1
Labor income	4.856	1.943	−0.281	6.721	4.255	2.271	−0.281	6.619
Self-employment dummy	0.036	0.186	0	1	0.043	0.202	0	1
Academic background								
University dummy	0.210	0.408	0	1	0.229	0.421	0	1
Junior college dummy	0.239	0.427	0	1	0.238	0.426	0	1
Vocational school dummy	0.219	0.414	0	1	0.201	0.402	0	1
Husband's income	1.178	2.425	−0.181	7.231	5.601	1.780	−0.181	7.231
Husband ubiversity dummy					0.530	0.500	0	1
Sample	1559				328			
Second childbirth								
	(1)				(2)			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Parental leave dummy	0.258	0.438	0	1	0.094	0.292	0	1
Working hours	5.035	3.571	0	8.355	2.057	3.267	0	8.039
Day nursery dummy	0.157	0.364	0	1	0.186	0.389	0	1
Labor income	3.964	2.518	−0.281	6.721	1.814	2.493	−0.201	6.557
Self-employment dummy	0.040	0.196	0	1	0.048	0.215	0	1
Academic background								
University dummy	0.176	0.381	0	1	0.113	0.317	0	1
Junior college dummy	0.236	0.425	0	1	0.236	0.425	0	1
Vocational school dummy	0.209	0.407	0	1	0.191	0.393	0	1
Husband's income	2.447	3.020	−0.261	7.538	5.760	1.553	−0.261	7.538
Husband ubiversity dummy					0.389	0.488	0	1
Sample	2307				661			

Table2 Estimation results of first childbirth

	(1)		(2)	
Variable	Haz. Ratio	z-value	Haz. Ratio	z-value
Parental leave dummy	1.668 *	1.92	2.280 **	2.52
Working hours	0.828 ***	-5.51	0.838 ***	-4.41
Day nursery dummy	1.804 **	2.10	2.082 **	2.07
Labor income	1.174 ***	3.16	1.119 **	2.04
Self-employment dummy	0.407 *	-1.69	0.586	-0.99
Academic background				
University dummy	0.979	-0.08	0.805	-0.66
Junior college dummy	0.772	-0.97	0.663	-1.18
Vocational school dummy	1.030	0.11	1.199	0.55
Husband's income	1.360 ***	8.50	1.026	0.45
Husband ubiversity dummy			1.613 *	1.81
P	10.298		10.030	
Log-Likelihood	-117.330		-41.740	
Sample	1559		328	
No. of failures	112		91	

Note: *** Significance at the 1% level ** Significance at the 5% level * Significance at the 10% level

(1) is including unmarried and married women who had no child at the previous survey time.

(2) is including only married women who had no child at the previous survey time.

Table3 Estimation results of second childbirth

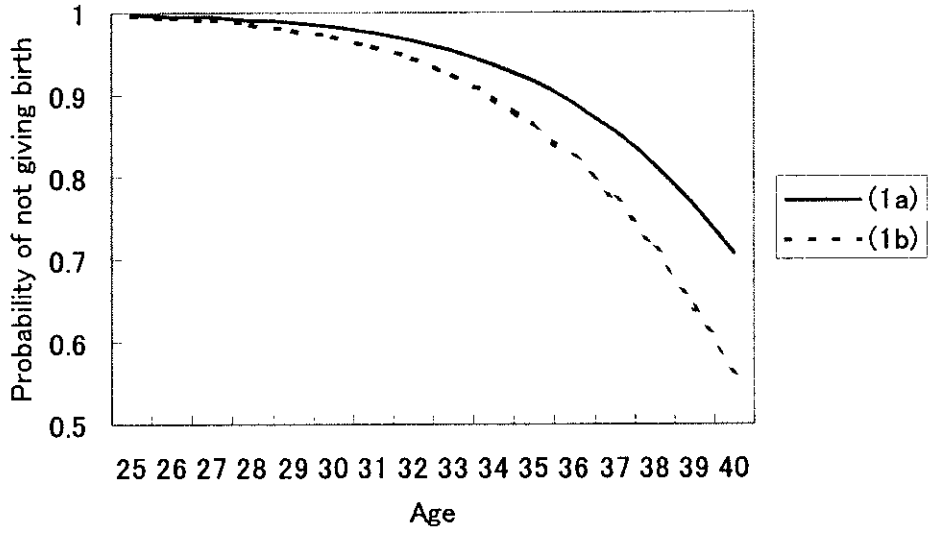
	(1)		(2)	
Variable	Haz. Ratio	z-value	Haz. Ratio	z-value
Parental leave dummy	1.242	0.45	0.874	-0.28
Working hours	0.798 ***	-5.34	0.867 ***	-3.48
Day nursery dummy	0.666	-1.59	0.620 *	-1.87
Labor income	0.936	-1.48	0.999	-0.01
Self-employment dummy	0.475	-1.61	0.495	-1.51
Academic background				
University dummy	0.569 *	-1.89	0.730	-0.99
Junior college dummy	0.681 *	-1.77	0.804	-0.93
Vocational school dummy	0.708	-1.50	0.802	-0.96
Husband's income	1.240 ***	4.41	0.967	-0.71
Husband ubiversity dummy			0.820	-1.00
P	9.798		9.472	
Log-Likelihood	-174.387		-123.23037	
Sample	2307		661	
No. of failures	137		137	

Note: *** Significance at the 1% level ** Significance at the 5% level * Significance at the 10% level

(1) is including unmarried and married women who had no child or one child at the previous survey time.

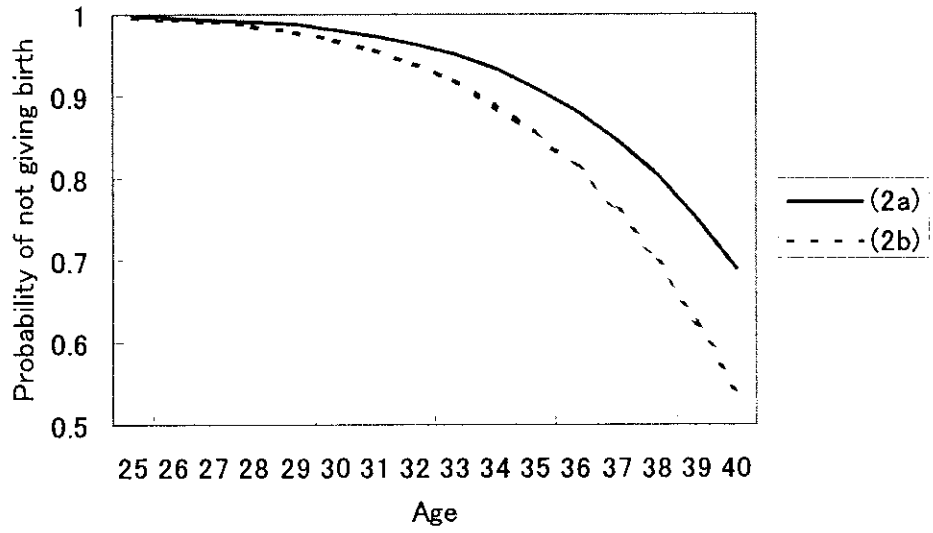
(2) is including only married women who had one child at the previous survey time.

Fig. 5 Simulation results by age at 2,500 working hours



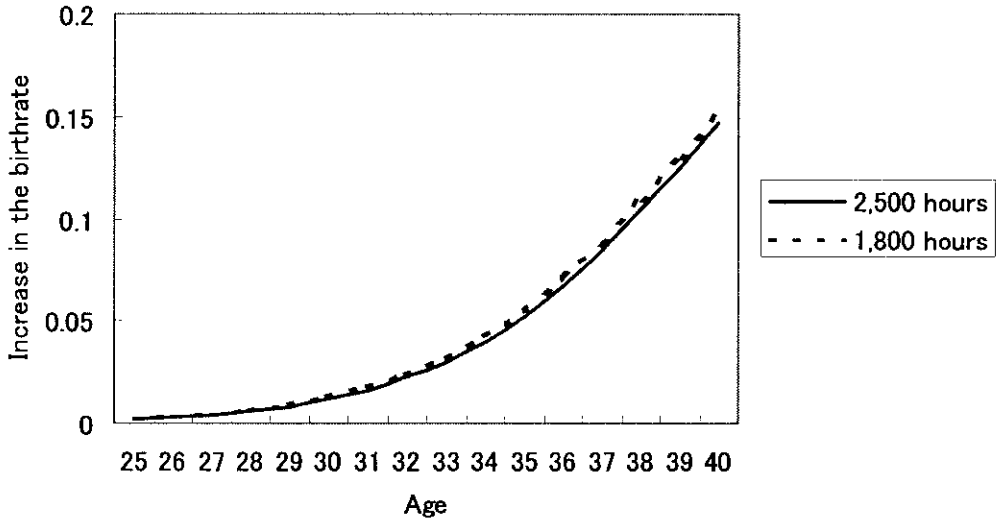
Note: (1a) is indicated that the parental leave schemes are provided.
(1b) is indicated that the parental leave schemes are not provided.

Fig. 6 Simulation results by age at 1,800 working hours



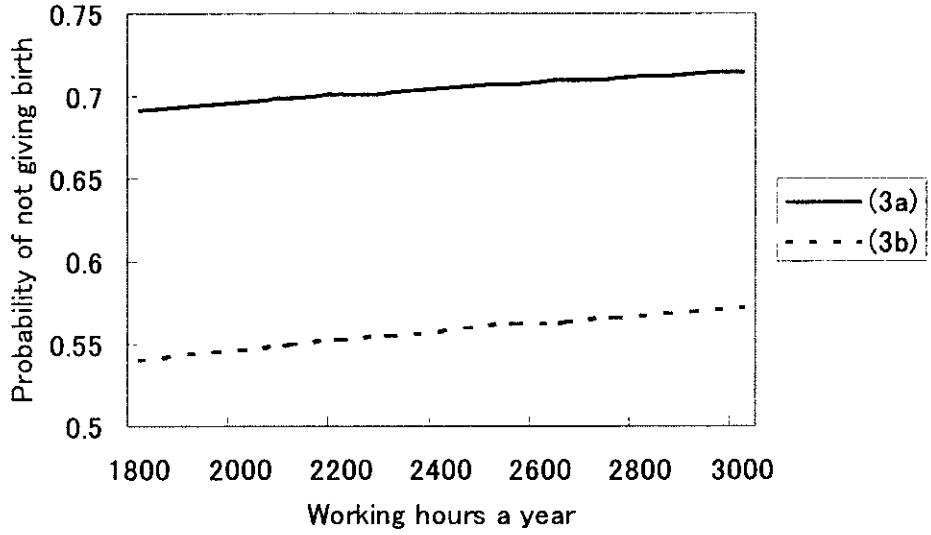
Note: (2a) is indicated that the parental leave schemes are provided.
(2b) is indicated that the parental leave schemes are not provided.

Fig. 7 The effect of the parental leave schemes on first childbirth by age



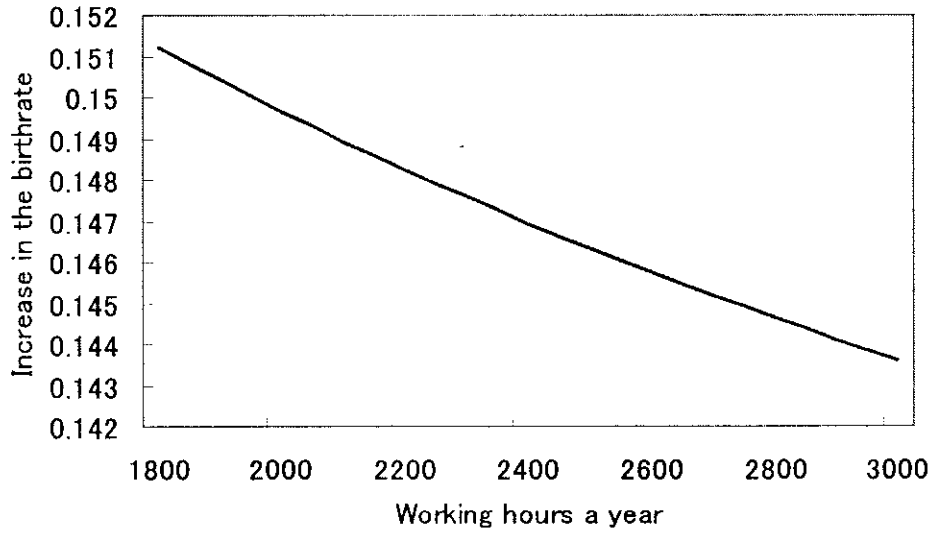
Note: 2,500 hours: (1a)-(1b) in Fig.5
1,800 hours: (2a)-(2b) in Fig.6

Fig. 8 Simulation results by working hours at 40 years old



Note: (3a) is indicated that the parental leave schemes are provided.
(3b) is indicated that the parental leave schemes are not provided.

Fig. 9 The effect of the parental leave schemes on first childbirth by working hours



Note: (3a)-(3b) in Fig.8

The Effect of Childcare Costs on Mothers' Labor Force Participation*

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November 18, 2002

Abstract

Using micro data from the Basic Survey on People's Life for 1998, this paper investigates (1) the childcare situation of preschoolers and (2) the economic situation of the households using licensed day-care centers. Then it analyzes (3) the impact of day-care fees on the labor force participation of mothers with preschool children.

Our main findings are as follows. First, households using licensed day-care centers are not always low-income households. Considering the fact that a large amount of subsidies is granted to licensed day-care centers, the question of fairness arises, because there are households that take care of children at home. Second, in most cases, mothers who use licensed day-care centers earn less than 1.3 million yen a year, so that they pay neither taxes nor social security premiums. Third, day-care fees have significantly negative effects on the labor force participation of mothers, and its elasticity is about -0.63. We also find that raising subsidies on day-care fees increases the employment of mothers, especially that of low-income groups.

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1. Introduction

With more women entering the labor market and the birthrate continuing its decades-long decline, the issue of childcare has been receiving increasing attention by policymakers. Economic theory predicts that mothers' decisions regarding labor supply and childcare demand are likely to be affected by childcare costs. In the United States, a number of studies have estimated the effect of the price of purchased childcare on the labor force participation of mothers[1]. Though estimated price elasticities reported by the authors vary from 0.06 to −1.26, most studies show negative effect of the price of childcare on mothers' employment. On the other hand, there have been few empirical studies on the women's labor supply in Japan which explicitly included childcare costs as explanatory variables. Moreover, past studies in Japan sometimes show positive or insignificant effect of childcare costs on mothers' labor supply and even if the price elasticities are negative, they are often extraordinary large (-2.6 to −4.3). This may be because most of the past studies used prefecture-average day-care fees as a variable that indicates childcare costs due to limited availability of the data.

In this paper we employ micro data from the 1998 Basic Survey on People's Life (BPSL) conducted by the Ministry of Health, Labour and Welfare to examine the impact of childcare costs on the labor force participation of mothers with preschool children. Childcare costs are estimated using a generalized tobit specification corrected for sample selection. The results of our analyses provide evidence to support the prediction that higher childcare costs lower the mothers' probability of participation. We also find that raising subsidies on day-care fees increases the employment of mothers, especially that of low-income groups.

In the next section, we outline the Japanese childcare system and present the situation of households utilizing licensed day-care centers. We then analyze the effect of childcare costs on mothers' labor force participation. Simulation results show how changes in day-care fees influence mothers' participation by each income group and wage level. Finally, we discuss the policy implications of day-care fees.

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[1] Blau (2000, 2001).

2. Present Situation of Childcare in Japan

2.1 Overview of the Japanese Childcare System

One of the characteristics of Japanese childcare system is the major role played by the government. The government sets standards for licensed day-care centers, including the staff-child ratio and space of the facilities per child. If the centers are approved by governors of prefectures as satisfying the government standards, they can receive subsidies from the national and local governments. The government also sets standards for day-care fees for licensed day-care centers, though the actual fees are set by each municipality. The fee structure is dependent on parental income level, age of the child, and the number of siblings. Day-care fees tend to be lower for elder children, and if parents leave two or more children to licensed day-care centers, they are given discounts of up to 50 percent for older or younger children according to their income level. Besides such public services, there are non-licensed day-care centers run by private companies. But due to the absence of government subsidies, fees of such centers tend to be higher[2].

Before 1997 when the Child Welfare Law was amended, parents couldn't choose the particular licensed day-care center in which their child is cared for. It was the local welfare office that examined each applicant's need for childcare and decided who should be approved of with a consideration of the applicant's working status and economic situation of the family. The revision to the law has introduced a scheme to let parents select day-care centers, but in areas where shortage of day-care services is significant, the local welfare office still plays decisive role.

As of April 2001, there are 22,272 licensed day-care centers in Japan and they care for 1.83 million children, or 26 percent of preschool children[3]. However, the potential

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[2] In the 19 wards of central Tokyo, the licensed day-care centers charge ¥57,500 per month at most, while some private-run centers charge around ¥100,000.

[3] For children below 3 years of age, the enrollment rate is 16 percent. Kindergartens, that are available for children aged 3 years and older, care for 25 percent of the preschool children. The exact number of children cared for in non-licensed day-care centers is not known, but according to the estimates of the Imperial Gift Foundation Boshi Aiiku Kai, the number was 143 thousand children,

needs for licensed day-care services are considered to be large. For example, the number of children who cannot get into licensed day-care centers rose by 991 from a year ago to 35,144 in 2001 despite the fact that the full quota of licensed day-care centers throughout the country increased by 13,975 during the year. This is probably because the increased capacity of day-care centers caused "potential waiting children" to become "tangible waiting children."

In May 2001, Prime Minister Junichiro Koizumi promised to eliminate the waiting lists for licensed day-care centers, and the government allocated ¥31.6 billion in the fiscal 2002 budget proposal. Specifically, the government decided to create places for 50,000 more children to be taken care of at the licensed day-care centers in the year. To increase the supply of childcare services, existing regulations on the establishment of day-care centers have been relaxed and new entries to the childcare service business have been encouraged. The immediate purpose of this strategy is to support mothers with small children, but from a longer-term perspective, the government hopes that the policy will encourage women to have more children and that continued work of women will lead to higher tax and social insurance premium revenues.

The long waiting list suggests that demand for childcare services at day-care centers exceeds their supply. Two alternatives can be considered as methods for settling the question of these children: to increase the supply or to raise day-care fees. The present policy puts emphasis solely on quantitative adjustments and gives no consideration to the manipulation of day-care fees. However, the fees of licensed day-care centers are now set at a far lower level than actual childcare costs, and users enjoy great benefits, as has been pointed out by Takayama (1982), Katsumata (1994), Suzuki (1993), and Zhou and Oishi (2002). In addition, there are probably some grounds to argue that the fees of day-care centers, which are set at a lower level than the supply-demand equilibrium, stimulate demand and result in the long waiting list. Thus, a fair evaluation of childcare policies requires empirical studies on the effects of accessibility to day-care centers and day-care fees on the labor supply of women.

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or 1.8 percent of preschool children in 1998.

2.2 Childcare Arrangements of Preschoolers: Descriptive Statistics

We use data from the *1998 Basic Survey on People's Life* on households with preschool children. The Survey is conducted by the Ministry of Health, Labour and Welfare as a household survey for each household member. The Survey includes information on family status, current job status, and situation of care of preschool children in the daytime. The analysis of this paper used 3,781 households comprising both parents with preschool children, i.e. children 6 years or younger excluding those in primary school. First, let us look at the childcare situations of preschoolers.

Who are taking care of the preschool children?

Table 1 outlines the primary childcare arrangements in the daytime by the mother's working status. In the total of 3,781 households, 1,270 (34%) mothers are working and 900 (24%) mothers are working as employees. According to the results, 45% of the working mothers are using licensed day-care centers for childcare in the daytime, and only 5% of them choose to use non-licensed day-care centers. For households with working mothers, grandparents also play an important role as a primary caregiver, especially when the child is under 1 year old. Since 45 percent of licensed day-care centers do not accept children under 1 year old, and since alternatives to licensed day-care centers are quite limited in Japan, living with her (or her husband's) parents and getting help from them can sometimes be critical for a working mother.

On the other hand, although most (68%) non-working mothers are taking care of the children by themselves, there also exist a significant proportion (7%) of non-working mothers who are using licensed daycare centers regularly. The probable reasons could be as follows: (1) Admission to licensed daycare centers could be forwarded for reasons other than the working status of mothers such as sicknesses of parents, nursing care needs of other household members and so on; (2) Some mothers are taking a childcare leave; (3) Some non-working mothers pretended that they were working somewhere; (4) Some areas, especially rural areas, have enough capacity to

admitting use of licensed daycare centers with no strict work requirement.

Kindergartens, which provide care and education for preschool children aged 3 years and older, account for 16 percent of all care for preschool children. However, working mothers are less likely to use the kindergartens partly because their open time is too short (generally 4 hours a day).

<Table 1 around here>

Table 2 demonstrates the primary care arrangement by age of the youngest child. In a word, the younger the child, the less likely households to use day-care centers, the more likely mothers care the child by themselves. For instance, only 4% of child under 1 year old are cared by licensed day-care centers, while more than 30% of children older than 3 years old are cared by centers in the daytime.

<Table 2 around here>

Who are richer? Users or non-users of day-care centers

Table 3 summarizes average income of the households by the category of childcare arrangement. Households using non-licensed centers and households utilizing kindergartens are relatively richer not only in the absolute value but also in the relative value of income adjusted by equivalence scale. On the other hand, incomes of other three kinds of household do not differ with each other significantly.

Turning to the contribution of mother and father to the household income, we find that fathers using licensed day-care centers averagely earn less than fathers in other categories by 0.9 million yen. However, differences in overall income are smaller due to mothers' contribution. For example, mothers using licensed daycare centers contribute to 21% of overall household income, while mothers whose children are cared by themselves or grandparents contribute to only 10% of overall household income, and mothers using kindergarten earn only 8% of overall household income.

<Table 3 around here>

Average incomes of mothers, users or non-users of day-care centers, are quite low in Japan partly because of the tax and social security system. Specifically, under the current tax system, most married women have strong incentives to work less than 1.03 million yen per year otherwise the income deduction for dependent spouse (0.38 million yen) will no longer be applicable to their husbands and they have to pay income tax as well[4]. Moreover, if she makes more than 1.3 million yen a year, or if she works more than 75% of regular workers' working hours, she could no longer enjoy exempt from social insurance premiums. Instead, if she works part-time and makes more than 1.3 million yen a year, a fixed amount (13,300 yen per month in 2002) is levied on her as a premium for the *National Pension*[5]. If she works more than 75% of regular workers' working hours, she has to participate in the *Employees' Pension Insurance* in which both employers and employees contributes 8.675% of employee's monthly salary as premiums[6]. For fear of losing these tax and social security benefits, many housewives stay at home or work part-time in Japan, although hourly wage of part-time worker is quite low compared to regular worker[7].

Table 4 verifies the above hypothesis. In fact, not only mothers whose children are cared by themselves or grandparents but also mothers using licensed day-care centers rarely contribute tax and social security premiums even though 76% of them are working[8].

<Table 5 around here>

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[4] The inhabitant tax will be levied if the annual salary exceeds one million yen.

[5] All residents in Japan between ages of 20 to 60 are eligible and required to become a subscriber of the *Basic Pension*. Whereas regular employees automatically enroll in the Basic Pension when they subscribe to the *Employees' Pension Insurance*, the Basic Pension for non-regular employees and non-employed persons is called the *National Pension*. For further details on the Japanese public pensions, see http://www.ipss.go.jp/English/Jasos2001/Jasos2001.html.

[6] Including a premium for the *National Pension*.

[7] Hourly wage of part-time workers is 67% of female regular workers, and in comparison to male regular workers, the ratio is 44%.

[8] This is partly because some of them work unpaid as family workers, but mainly because their earnings are below the taxable threshold.

To summarize, if it were not for licensed day-care services, a significant number of mothers would have been unable to work and the income disparities among the childrearing households would have been wider. In that sense one can say that licensed day-care centers have some kind of inequality reducing effect; but the issue is whether such effect could be justified from the viewpoint of equity and efficiency. According to the estimates of the Foundation for Children's Future (2000), the in-kind benefits arising from childcare services at licensed day-care centers are worth 0.9 million yen per year for a child under 1 year old and 0.2-0.3 million yen per year for a child 3 years of age or older. Households that do not use (or are unable to use) licensed day-care centers are not eligible for such benefits even if their mothers are working. If we took account of the in-kind benefits as a part of household income, the actual living standard of households using licensed day-care centers would improve substantially. Despite that, one cannot expect these households to provide higher tax revenues or make higher social security contributions because mothers of these households often work part-time and earn income below the level of the dependent spouse's exemption.

3. Analyses of Childcare Cost on Mother's Labor Participation

3.1 Past Studies

Many empirical studies on the effects of childcare expenses on childcare demand and on the labor supply of mothers have been undertaken in the United States. The author leaves a detailed survey of such research to Blau (2000, 2001) and examines past studies in Japan. Komamura (1996) used data by prefecture and estimated a reduced form model of childcare demand with the admission rate of day-care centers as a dependent variable. The independent variables of the model include childcare costs, but the costs used here are prefecture-specific representative day-care fees for households with yearly income of 7-8 million yen. Komamura uses the estimated childcare demand

as an independent variable for a model determining women's labor force participation rates. The elasticity of childcare demand (admission rate of day-care centers) due to a change in the childcare cost is high at -2.639. In addition, childcare costs have no significant direct impact on the labor supply.

Niimi (2002) followed Komamura and estimated childcare demand and women's labor supply functions using prefecture data. Like Komamura (1996), Niimi used prefecture-specific representative day-care fees for households with yearly income of 7-8 million yen, and the price elasticity of childcare demand was greater than that of Komamura (1996) at -3.5 to -4.3. Increases in childcare costs indirectly restrict the labor supply of women by reducing childcare demand. However, when day-care fees for households with yearly income of 3-4 million yen were used as explanatory variables, the effect of childcare costs on childcare demand was not significant and no impact of these costs on women's employment was observed. From these results, Niimi concluded that while higher day-care fees have no effect on the employment of women in low-income households, they do obstruct that of women in high-income brackets.

Shigeno (2001) used data from the *Survey on Population and Socioeconomic Situations* (1996) of the Ministry of Health, Labour and Welfare, and analyzed the impact of childcare costs on women's employment and the use of childcare leave. The survey covered mothers with babies aged six to eight months and investigated the yearly income of their households, whether or not they were employed, employment patterns, whether or not they were taking childcare leave, childcare patterns, and childcare costs. Shigeno inserted the estimation result of the childcare cost function into the employment probability and childcare leave-taking probability functions, and estimated the impact of childcare costs on mothers' employment and childcare leave use. As a result, she found that childcare costs had a negative effect on employment and a positive effect on childcare leave. On the other hand, the data she used have some problems: they do not show mothers' income and the household income of the data included mothers' income. Apparently, the household income is not exogenous to mother's employment and estimation results might be biased.

Morita (2002) analyzed the effects of childcare services and childcare costs on the women's choice of working status, using data of the *Survey on Women's Employment and Childcare.* Because the survey data includes academic background and working hours of samples, it is possible to estimate a wage function. Morita first estimated a selectivity-adjusted wage function and then inserted the result into a multinomial logit model. The model includes such independent variables as information about childcare costs and childcare policies. Here she substitutes the collection rates of day-care fees by local governments as compared to government-level day-care fees for childcare costs. The outcome of her estimation is opposite to that predicted by theory; for example, the higher childcare costs are, the higher the probability of employment becomes.

3.2 Analytical Framework

For our econometric analysis, we employ the model by Connelly (1992) in which the decision of a mother with young children to participate in the labor market is modeled as the outcome of maximizing her utility over goods, child quality, and leisure, subject to a production function for child quality, a money budget constraint, the mother's time constraint and the child's time constraint. Specifically, we estimate a probit model relating maternal employment to wages and childcare costs such that

$$L^* = a_w \ln W + a_p P + a'X + \varepsilon, \qquad L=1 \text{ (participates) if } L^*>0,$$
$$L=0 \text{ (does not participate) otherwise}$$

where L^* is the labor supply of a mother having small children, W is her market wage, P is the hourly cost of childcare, X is a vector of other observed determinants, and ε represents unobserved determinants.

For other observable determinants X, we use city size, housing status, a dummy variable indicating grandparents live together, variables affecting budget line (the household's net financial assets, incomes of other household members), and variables showing childcare burdens (age of the youngest child, number of preschool children).

Furthermore, we include admission rate for licensed day-care centers to capture the effect of childcare policy. Admission rate here is defined as the ratio of number of children approved to licensed day-care centers to number of preschool children.

The problem is that W is observed only if the mother is working. Similarly, P is observed only if the mother is working and using licensed day-care centers although there are a number of working mothers with no expenditure on childcare. Therefore, we will account for the sample selection bias following the method described in Connelly (1992) and Maddala (1983).

First, we define wage function such that:

$$Ln\, W = \Gamma' M + \gamma$$

where M is factors affecting the level of market wage. Because wages are observed only for those who work, Heckman's two-stage estimation procedure is employed to correct the sample selection bias. Note that the natural logarithm of the salaried income of mothers in the past year is used here instead of their hourly wage rates due to data limitations. The independent variables used were age, its square term, city size, type of public pension programs in which the mother takes part, and the active opening ratio of residing area. Type of public pension plan is included in order to account for the effects of working hours on yearly earnings, because *BPSL* data do not contain information on hours worked. As we have noted in section 2.2, married women are likely to limit their working hours so that they earn less and exempt from paying tax and social security premiums. Thus, mothers' pension status has a close relation to their working hours. For comparison, we will estimate alternative models excluding pension status.

Second, assume that the childcare cost per child can be defined as follows:

$$P^* = Z\theta + \varepsilon_{i2} \quad if\ \varepsilon_{i2} > -Z\theta,\ \varepsilon_{i2} \sim N\ (0, \sigma_2^2)$$

$$P^* = 0\ otherwise$$